COUNTY OF UNION

DEPARTMENT OF ENGINEERING, PUBLIC WORKS & FACILITIES MANAGEMENT
Joseph A. Graziano Sr., Director

MEMO TO: To All Potential Bidders

FROM: Thomas O. Mineo, P.E.
County Engineer

DATE: April 7, 2017

RE: **CLARIFICATION NUMBER 2**
Ash Brook Golf Course Clubhouse
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project 2015-035

Please note the following:

The Title of the Bid Proposal Form Page B-4 should read **BA#9-2017** instead of BA#39-2016.

Bidder's Name: _____

ACKNOWLEDGMENT OF ADDENDUM

COUNTY OF UNION

ADDENDUM NUMBER 3 – ISSUED: March 30, 2017

ASH BROOK GOLF COURFSE CLUBHOUSE TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY	**BA#9-2017 UC ENGINEERING PROJECT #2015-035**
(Name of Construction /Public Works Project)	**(Project or Bid Number)**

Pursuant to N.J.S.A. 40A:11-23.1a., the undersigned bidder, hereby acknowledges receipt of the following notices, revisions, or addenda to the bid advertisement, specifications or bid documents. By indicating date of receipt, bidder acknowledges the submitted bid takes into account the provisions of the notice, revision or addendum. Note that the County of Union's record of notice to bidders shall take precedence and that failure to include provisions of changes in a bid proposal may be subject for rejection of the bid.

Local Unit Reference Number or Title of Addendum/Revision	How Received (mail, fax, pick-up, etc.)	Date Received
Addendum Number 3: • Cover Memo with Responses to Questions • Referenced Bidding Documents • Referenced Division 1 Specifications • Referenced Project Specifications • Referenced Drawings		

ACKNOWLEDGMENT BY BIDDER:

NAME OF BIDDER: _____

ORIGINAL SIGNATURE: _____

PRINTED NAME AND TITLE: _____

DATE: _____

COUNTY OF UNION

DEPARTMENT OF ENGINEERING, PUBLIC WORKS & FACILITIES MANAGEMENT
Joseph A. Graziano Sr., Director

MEMO TO: To All Potential Bidders

FROM: Thomas O. Mineo, P.E., County Engineer

DATE: March 30, 2017

RE: **ADDENDUM NUMBER 3**
Ash Brook Golf Course Clubhouse
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project #2015-035

The following are responses received for the above referenced project. *Please sign the attached "Acknowledgement of Receipt of Addendum" and include in your original bid packet submission.*

Q.1 Access Control: The bid document lists Vanderbilt Industries equipment. Is this a hard specification or can an equivalent system be incorporated as long as it fulfills all access specs?

R.1 Yes, an equivalent system can be substitute. Complete shop-drawings are required for review.

Q.2 There are CCTV and data/phone drops indicated on both floors but I don't see these in the bid docs. Has it already been awarded? If not, we would like to bid on this too.

R.2 Refer to E-202/Key Notes and Spec. 281300-Section 2.7.

Q.3 Please confirm that hydraulic cement underlayment (Specification 035416) is only needed if the new concrete floors were not finished in a manner that would accept finished flooring and remedial work is required, per the specification, to address imperfections that will not allow for an appropriate finish floor application.

R.3 Confirmed.

Q.4 The specs contain Section 221429 – Sump Pumps. Please advise where the Sump Pump is to be located on the plans.

R.4 Spec Section 221429 shall be deleted for Add#3 Issue.

Q.5 Please confirm the finishes for both Overhead Door (083323) and grilles (083326). Stainless steel or Powder coated?

R.5 Spec. 083323-Overhead Door and 083326 Grilles shall be revised with Powder coated for Add #3 Issue

Q.6 In the new set of plans the landscaping in the Basin Area is called the "Base Bid" but the plant list is labeled "Alternative Bid". Please clarify.

R.6 Refer to C-08.00 in Add #3 Issue. Additionally, the Bid Form and Alternates Spec Section have been revised to include the Basin Area planting as an "ADD" Alternate.

Q.7 Addendum # 2 stated that there is no CMU required on this project. However, Dwg A-224 calls out CMU in Detail 6 & Detail Q. Please clarify.

R.7 Refer to revised A-224 in Add #3 issue.

Q.8 Please confirm or deny that Owner will be responsible to provide both Owners Protective Liability Insurance and Builder's Risk Insurance.

R.8 Contractor to provide Owner's Protective Liability Insurance and Builder's Risk Insurance.

Q.9 The new fire alarms drawings show a note stating that the new fire alarm system shall be a Siemens XLS series with no substitutes. Please confirm that no substitutions for the alarm system are permitted as this is contrary to state bidding law on a publicly funded project. This also reduces competition which leads to higher bid prices.

R.9 The fire alarm system shall be a Siemens XLS or approved equal.

Q.10 There is some confusion as to the Food Service scope of work with the Food Service Vendors. Please further clarify if the GC installation of the Food Service Equipment is just to provide MEP infrastructure or actually direct the placement of the equipment in addition to the MEP infrastructure. Clarification will ensure that the right amount is carried in the bid for this item by all bidders to make sure the bidding is on a level playing field.

R.10 Please reference the bid documents for the correct scope of work. GC to install all Food Service equipment.

Q.11 In conversations with the Food Service Vendor hired by the Owner it was disclosed that they would by furnishing and installing the Hoods. Please confirm or deny that this is the case.

R.11 Please reference the response to Question 10. GC to install all Food Service Equipment.

REFERENCED BIDDING DOCUMENTS

TABLE OF CONTENTS	REVISED
BID SHEET B-6	REVISED
ACKNOWLEDGEMENT OF ADDEUNDUM	REVISED

REFERENCED DIVISION 1 SPECIFICATIONS:

012300 ALTERNATES	REVISED

REFERENCED PROJECT SPECIFICATIONS:

TOC	TABLE OF CONTENTS	REVISED

DIVISION 08 – OPENINGS

083323	OVERHEAD COILING DOORS	REVISED
083326	OVERHEAD COILING GRILLES	REVISED

DIVISION 22 – PLUMBING

221429	SUMP PUMPS	DELETED

REFERENCED DRAWINGS:

CIVIL		
C-08.00	LANDSCAPING PLAN OVERALL	REVISED
ARCHITECTURAL		
T-000	COVER SHEET	REVISED
A-224	WALL SECTION	REVISED

ASHBROOK GOLF COURSE CLUBHOUSE
TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
BA#9-2017; UNION COUNTY ENGINEERING PROJECT #2015-035

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BIDDING DOCUMENTS

BID DOCUMENTS CONTINUED:

Statement of Bidder's Qualifications
Contractor Performance Record
Affidavit Regarding List of Disbarred, Suspended or Disqualified Bidders
Prior Negative Experience Questionnaire-Certification
Contractor's Certification of Compliance - New Jersey Prevailing Wage Act
Uncompleted Contracts Affidavit
Certificate of Insurance Statement
Collection of Use Tax on Sales to Local Governments Statement
Acknowledgement of Project Labor Agreement Requirements
Time of Completion
Disclosure of Investment Activities in Iran

NEW JERSEY PREVAILING WAGE DETERMINATION DOCUMENTS

SS - STANDARD SPECIFICATIONS SS-1

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR AIA DOCUMENT A-101/2007
(Draft form until contract is awarded**)**

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A-201/2007
(Draft form until contract is awarded**)**

PROJECT DIVISION 1 SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

011000	SUMMARY
012100	ALLOWANCES
012300	ALTERNATES
012500	SUBSTITUTION PROCEDURES
012600	CONTRACT MODIFICATION PROCEDURES
012900	PAYMENT PROCEDURES
013100	PROJECT MANAGEMENT AND COORDINATION
013200	CONSTRUCTION PROGRESS DOCUMENTATION
013233	PHOTOGRAPHIC DOCUMENTATION
013300	SUBMITTAL PROCEDURES
014000	QUALITY REQUIREMENTS
014200	REFERENCES
015000	TEMPORARY FACILITIES AND CONTROLS
015396	TREE AND VEGETATION PROTECTION
015640	TREE ROOT PRUNING
015953	SAFETY & HEALTH
016000	PRODUCT REQUIREMENTS
017123.13	CONSTRUCTION LAYOUT
017300	EXECUTION
017329	SAWCUTTING
017426	FINAL CLEANUP/SITE RESTORATION
017700	CLOSEOUT PROCEDURES
017823	OPERATION AND MAINTENANCE DATA
017839	PROJECT RECORD DOCUMENTS
017900	DEMONSTRATION AND TRAINING

PROJECT TECHNICAL SPECIFICATIONS

Bidder's Name_____

BID ALTERNATES

Alternates may be deducted to the Total Base Bid Amount. The Bid will be awarded and / or alternates will be selected as follows:

1. Award Base Bid Only
2. Award Base Bid + Alternate Number 1
3. Award Base Bid + Alternate Number 2
4. Award Base Bid + Alternate Number 3
5. Award Base Bid + Alternate Number 4
6. Award Base Bid + Alternate Number 1 and 2
7. Award Base Bid + Alternate Number 1 and 3
8. Award Base Bid + Alternate Number 1 and 4
9. Award Base Bid + Alternate Number 2 and 3
10. Award Base Bid + Alternate Number 2 and 4
11. Award Base Bid + Alternate Number 3 and 4
12. Award Base Bid + Alternate Number 1, 2 and 3
13. Award Base Bid + Alternate Number 1, 3 and 4
14. Award Base Bid + Alternate Number 1, 2, 3 and 4

Contractor must propose on the alternates listed below and as further described in Division 1 (Section 012300) of these Specifications.

ALTERNATE NUMBER 1: PROVIDE A "DEDUCT" LUMP SUM FOR ROOFING

DEDUCT: $_____ Written $_____ Figures

ALTERNATE NUMBER 2: PROVIDE A "DEDUCT" LUMP SUM FOR EXTERIOR SIDING

DEDUCT: $_____ Written $_____ Figures

ALTERNATE NUMBER 3: PROVIDE A "DEDUCT" LUMP SUM FOR LIGHTNING PROTECTION

DEDUCT: $_____ Written $_____ Figures

ALTERNATE NUMBER 4: PROVIDE AN "ADD" LUMP SUM FOR LANDSCAPING AT RETENTION BASIN

ADD: $_____ Written $_____ Figures

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Roofing.

1. Base Bid: Provide standing-seam metal roofing as specified in Division 07 Section "Standing-Seam Metal Roof Panels."

2. Alternate: In lieu of standing-seam metal roofing, provide asphalt shingle roofing as specified in Division 07 Section "Asphalt Shingles."

B. Alternate No. 2: Exterior Siding.

1. Base Bid: Provide cement board siding as specified in Division 07 Section "Composite Siding."
2. Alternate: In lieu of cement board siding, provide wood siding as specified in Division 07 Section "Exterior Finish Carpentry."

C. Alternate No. 3: Lightning Protection.

1. Base Bid: Provide lightning protection as specified in Division 26 Section.
2. Alternate: Eliminate lightning protection from the Project Scope

D. Alternate No. 4: Pond Area of Landscape

1. Base Bid: Plantings within the Retention Basin should not be included in the Base Bid.
2. Alternate: Provide Retention Basin Landscape per C.08.01 and C10.08; and Division 31 and 32.

END OF SECTION 012300

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SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Insulated service doors.
2. Counter doors.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Curtain Slats: 12 inches long.
2. Hood: 6 inches square.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Door Curtain Material: Galvanized steel sheet thickness of 0.025 inch and as required to meet requirements.
2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Endlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel, ~~***stainless steel, or aluminum extrusions [ADDENDUM NO.3]***~~ to match curtain slats and finish.

D. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, ~~***stainless steel, or aluminum extrusions***~~ ***[ADDENDUM NO.3]*** to match curtain slats and finish.

E. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

F. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that project beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Hood: Match curtain material and finish
2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.3 COUNTER DOORS

A. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:

1. ~~Stainless Steel: 0.062-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.~~ Galvanized steel [ADDENDUM NO.3]

B. Integral Metal Sill for Counter Door: Fabricate sills as integral part of frame assembly of ~~Type 304 stainless steel in manufacturer's standard thickness with No. 4 finish~~. Galvanized steel finished to match slats [ADDENDUM NO.3]

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Provide Three for each cylinder.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

1. At door head, use 1/8-inch- thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.

2.6 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics: Manufacturer’s standard assembly; ¾ horse power.
2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

H. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.8 DOOR ASSEMBLY

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide “Wind-Tite” Weather Sealed Rolling Service Door by Alpine Overhead Doors, Inc. or approved equal.

B. Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

C. Operation Cycles: Not less than 10,000.

1. Include tamperproof cycle counter.

D. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu.

E. Door Curtain Material: ~~Stainless steel.~~ Galvanized steel [ADDENDUM NO.3]

F. Door Curtain Slats: Flat profile slats of 1-1/4-inch (counter doors) 2-3/4-inch (service doors) center-to-center height.

G. Curtain Jamb Guides: with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

H. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

I. ***Integral Frame, Hood, and Fascia for Counter Door: ~~Stainless steel~~ Galvanized steel [ADDENDUM NO.3]***.

1. Mounting: As shown on Drawings.

J. Sill Configuration for Counter Door: No sill.

K. Locking Devices: Equip door with locking device assembly and chain lock keeper.

1. Locking Device Assembly: Single-jamb side locking bars, operable from inside and outside with cylinders.

L. Electric Door Operator:

1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Location: Top of hood or front of hood as shown on Drawings.
3. Motor Exposure: Interior.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic photoelectric sensor.

    a. Sensor Edge Bulb Color: Black.

6. Remote-Control Station: As directed or where shown on Drawings.

M. Door Finish:
1. Powder-Coated Finish: Color as selected by Architect from manufacturer's full range
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

~~*2.10 STAINLESS-STEEL FINISHES*~~ *[ADDENDUM NO.3]*

~~***A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.***~~

~~***B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.***~~

2.8 STEEL AND GALVANIZED-STEEL FINISHES [ADDENDUM NO.3]

A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

B. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Fire-Rated Doors: Install according to NFPA 80.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 083326 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Open-curtain overhead coiling grilles.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Open-Curtain Grille: 18-inch- square assembly with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
2. Hood: 6 inches square.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

1. ~~***Stainless-Steel Grille Curtain: ASTM A 666, Type 300 series.***~~ ***Galvanized steel [ADDENDUM NO.3]***

B. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

C. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.

1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
2. Provide motor-operated grilles with combination bottom astragal and sensor edge.

D. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.2 HOODS AND ACCESSORIES

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. ~~***Stainless Steel: 0.025-inch-thick stainless-steel sheet, Type 304, complying with ASTM A 666.***~~ ***Galvanized steel [ADDENDUM NO.3]***

B. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

2.3 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 ELECTRIC GRILLE OPERATORS

A. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.

C. Grille Operator Location(s): Operator location indicated for each grille.

1. Top-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on top of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
2. Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics: Manufacturer's standard.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized grille with indicated external automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

G. Emergency Manual Operation: Equip each electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed 25 lbf.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for ADA-ABA-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive upon return of handle to original position.

J. Self-Opening Mechanism: Automatic release mechanism triggered by smoke detector, fire alarm or power failure. When activated, the grille self opens by means of a fail-safe operator to the fully open position without the need of power operation or battery backup systems. When the alarm is cleared and power is restored, the grille will operate normally.

2.6 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.

B. Operation Cycles: Not less than 10,000.

1. Include tamperproof cycle counter.

C. ~~Grille Curtain Material: Stainless steel.~~ Galvanized steel [ADDENDUM NO.3]

1. Space rods at approximately 1-1/2 inches o.c.
2. Space links approximately 3 inches apart in a straight in-line pattern.
3. Spacers: Metal tubes matching curtain material.

D. Curtain Jamb Guides: ~~***Stainless steel***~~ ***Galvanized steel [ADDENDUM NO.3]*** with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

E. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

F. Locking Devices: Equip grille with locking device assembly and chain lock keeper.

G. Electric Grille Operator:

1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Location: Top of hood or front of hood as shown on Drawings.
3. Motor Exposure: Interior.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic photoelectric sensor or manufacturer's standard**.**

    a. Sensor Edge Bulb Color: Black.

6. Remote-Control Station: Where shown on Drawings.
7. Other Equipment: Emergency-egress release.

H. Grille Finish:

1. ~~Stainless-Steel Finish: No. 2B (bright, cold-rolled).~~ Powder-Coat Finish: Color as selected by Architect from manufacturer's full range. [ADDENDUM NO.3]

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

~~***2.8 STAINLESS-STEEL FINISHES***~~ ***[ADDENDUM NO.3]***

~~***A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.***~~

~~***B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.***~~

~~***1. Run grain of directional finishes with long dimension of each piece.***~~
~~***2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.***~~
~~***3. Directional Satin Finish: No. 4.***~~

~~***C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.***~~

2.8 STEEL AND GALVANIZED-STEEL FINISHES [ADDENDUM NO.3]

A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

B. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.

C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 083326

COUNTY OF UNION
BOARD OF CHOSEN FREEHOLDERS
PLANS FOR

NEW CLUB HOUSE AT ASH BROOK GOLF COURSE

LOCATED AT
1210 RARITAN ROAD
(TAX BLOCK 14201, LOT 1)
TOWNSHIP OF SCOTCH PLAINS
UNION COUNTY, NEW JERSEY
FEBRUARY 22, 2017

UNION COUNTY FREEHOLDERS

Bruce H. Bergen
CHAIRMAN

Sergio Granados
VICE CHAIRMAN

Mohamed S. Jalloh
FREEHOLDER

Linda Carter
FREEHOLDER

Bette Jane Kowalski
FREEHOLDER

Angel G. Estrada
FREEHOLDER

Alexander Mirabella
FREEHOLDER

Christopher Hudak
FREEHOLDER

Vernell Wright
FREEHOLDER

PUBLIC UTILITY CONTACTS

SERVICE	COMPANY	ADDRESS
GAS	ELIZABETH TOWN GAS	520 GREEN LANE UNION, N.J. TEL: (908) 662-8321
ELECTRIC	PUBLIC SERVICE ELECTRIC AND GAS (PSE&G)-ELECTRIC	80 PARK PLAZA, T-12 NEWARK, N.J. TEL: (973) 297-2128
WATER	NEW JERSEY AMERICAN WATER	1341 NORTH AVE. PLAINFIELD, N.J. TEL: (973) 564-5701
SEWER	TOWNSHIP OF SCOTCH PLAINS ENGINEERING DEPARTMENT	430 PARK AVENUE SCOTCH PLAINS, N.J. 07076 TEL: (908) 322-6700x306
TELECOM	VERIZON	175 WEST MAIN STREET FREEHOLD, N.J. TEL: (732) 357-2313

CONSULTING ENGINEERS

Site Engineers:
NEGLIA ENGINEERING ASSOCIATES — Tel: 201.939.8805
34 Park Avenue — Fax: 201.939.0846
Lyndhurst, NJ 07071

Structural Engineers:
REUTHER + BOWEN — Tel: 570.496.7020
326 Ward Street — Fax: 570.496.7021
Scranton, PA 18512

Mechanical-Electrical-Plumbing Engineers:
DLB ASSOCIATES — Tel: 646.381.6721
One Penn Plaza — Fax:
New York, NY 10119

ADDENDUM #3 ISSUE - 3.30.17

EXTERIOR RENDERING

NETTAARCHITECTS
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

CUMMING
Building Value Through Expertise

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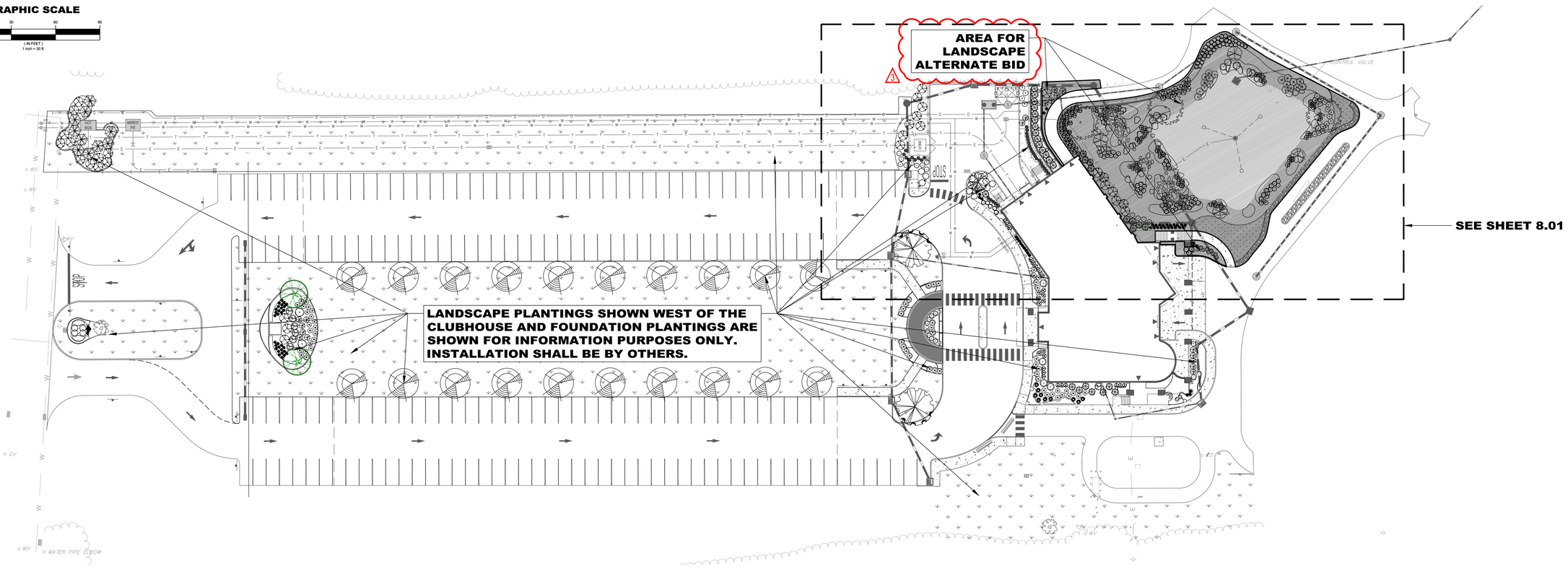
NORTH

N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.



ALTERNATE BID

LANDSCAPE NOTES:

1. THE LANDSCAPING WITHIN THE RETENTION BASIN SHALL BE AN ALTERNATE BID.
2. THE LANDSCAPING OUTSIDE OF THE BASIN SHALL BE DONE BY OTHERS. THE CONTRACTOR SHALL ENSURE THOSE AREAS ARE LEFT FREE FROM CONSTRUCTION DEBRIS AND HAVE A MINIMUM OF 6" OF TOPSOIL INSTALLED. THE CONTRACTOR IS RESPONSIBLE TO BRING THE AREA TO FINISHED GRADE.

LANDSCAPE PLANTING SCHEDULE - RETENTION BASIN

Key	Quan.	Unit	Botanical Name	Common Name	Size	Spacing	Root	Remarks
Deciduous Trees								
AMCA	2	Unit	Amelanchier canadensis	Shadblow Servicebery	7'-8' ht.	as shown	B&B	
BEND	1	Unit	Betual nigra "Dura Heat'	Dura Heat River Birch	6'-8" ht.	as shown	B&B	
CECA	2	Unit	Cercis canadensis	Eastern Redbud	1.75"-2" cal.	as shown	B&B	Single stem
QUPA	2	Unit	Quercus palustrus	Pin Oak	2"-2.5" cal.	as shown	B&B	
Shrubs								
COSB	7	Unit	Cornus amomum	Silky Dogwwd	18"-24" ht.	2' o.c.	3 gal.	
SPTO	48	Unit	Spirea tomentosa	Steeplebush	18"-24" ht.	2.5' o.c.	3 gal.	
LIBE	24	Unit	Lindera benzoin	Spicebush	18"-24" ht.	2' o.c.	3 gal.	
COSK	63	Unit	Cornus sericea 'Kelsy's Dwarf'	Kelsey's Dwarf Redtwig Dogwood	15"-18"	2' o.c.	2 gal.	
FOSU	20	Unit	Forsythia suspensa	Weeping Forsythia	4'-5' ht.	as shown	5 gal.	
ILGS	27	Unit	Ilex glabra 'Shamrock'	Shamrock Inkberry Holly	18"-24" spr.	3' o.c.	B&B	Dense full to ground
ILVJ	3	Unit	Ilex virticillata 'Jim Dandy'	Jim Danady Winterberry	3-4' ht.	4.5' o.c.	B&B or cont.	
ILVR	8	Unit	Ilex virticillata 'Red Sprite'	Red Sprite Winterberry	24"-36" ht.	3' o.c.	B&B or cont.	
SPJL	40	Unit	Spriaea japoinica 'Little Princess'	Little Princess Spirea	15"-18" ht.	3' o.c.	2 gal.	
FOGM	14	Unit	Fothergilla gargenii 'Mount Airy'	Mount Airy Dwarf Fothergilla	18"-24" ht.	4' o.c.	3 gal.	
Grasses / Herbaceous Material								
ASCL	46	Unit	Asclepias incarnata	Swamp Milkweed	5' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
CACA	65	Unit	Calamagrostis canadensis	Bluejoint Grass	2' ht.	2' o.c.	1 gal.	
ELRI	71	Unit	Elmus riparius	Riverank Wild-rye	2' ht.	2' o.c.	1 gal.	
ERSP	221	Unit	Ergrostis spectabolis	Purple Love Grass	1' ht.	2' o.c.	1 gal.	Above elevation 106
EUCO	182	Unit	Eupatorium coelestinum	Blue Mistflower	1' ht.	2' o.c.	1 gal.	
EUMA	76	Unit	Eupatorium maculatum	Joe-Pye Weed	2' ht.	2' o.c.	1 gal.	
JUCA	41	Unit	Juncus canaadensis	Canada Rush	3' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
JUEF	11	Unit	Juncus effusus	Soft rush	3' ht.	2' o.c.	1 gal.	
LOCA	33	Unit	Lobelia cardinalis	Cardinal flower	1' ht.	2' o.c.	1 gal.	
POCO	30	Unit	Pontederia cordata	Pickerelweed	3' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
RUFL	87	Unit	Rudbeckia fulgida	Orange Coneflower	2' ht.	2' o.c.	1 gal.	Above elevation 105
RULA	87	Unit	Rudbeckia lacinata	Cutleaf coneflower	4' ht.	2' o.c.	1 gal.	
SOCA	11	Unit	Solidago canadensis	Canada Goldenrod	3' ht.	2' o.c.	1 gal.	Above elevation 105
VEHA	53	Unit	Verbena Hastata	Blue Vervain	5' ht.	2' o.c.	1 gal.	Above elevation 104

NOTE:
SEE SHEET 10.08 FOR LANDSCAPE DETAILS AND LANDSCAPE NOTES.

RETENTION BASIN SEED MIXES

BASIN SLOPE MIX

Species	WIC	Percent of Mix
Andropogon virginicus	FACU	5.00%
Andropogon gerardii	FAC	8.00%
Asclepias syriaca	UPL	1.00%
Coreopsis lanceolata	FACU	1.00%
Echinacea purpurea	FACU	9.00%
Elymus virginicus	FACW	10.00%
Eupatorium purpureum	FAC	2.00%
Eupatorium coelestinum	FAC	1.00%
Euthamia graminifolia	FAC	1.00%
Heliopsis helianthoides	NI	8.00%
Monarda punctata	UPL	8.00%
Panicum virgatum	FAC	10.00%
Penstemon digitalis	FAC	2.00%
Rudbeckia hirta	FACU	15.00%
Schizachyrium scoparium	FACU	13.00%
Sorghastrum nutans	UPL	6.00%
		100%

WET SITE POLLINATOR MIX (BASIN FOREBAY FLOOR)

Species	WIC	Percent of Mix
Asclepias syriaca	UPL	2.00%
Carex crinita	OBL	2.00%
Carex lurida	OBL	6.00%
Carex stricta	OBL	3.00%
Carex vulpinoidea	OBL	4.00%
Echinacea purpurea	FACU	8.00%
Elymus virginicus	FACW	5.00%
Eupatorium purpureum	FAC	3.00%
Eupatorium coelestinum	FAC	3.00%
Heliopsis helianthoides	NI	9.00%
Iris veriscolor	OBL	1.00%
Juncus effusus	FACW	4.00%
Lobelia siphilitica	FACW	8.00%
Panicum virgatum	FAC	5.00%
Penstemon digitalis	FAC	4.00%
Rudbeckia hirta	FACU	9.00%
Schizachyrium scoparium	FACU	2.00%
Schoenoplectus atrovirens	OBL	1.00%
Schoenoplectus cyperinus	FACW	1.00%
Symphyotrichum novae-angliae	FACW	4.00%
Verbena hastata	FACW	8.00%
Vernonia noveboracensis	FACW	8.00%
		100%

RETENTION BASIN SEED MIXES SHALL BE AS SUPPLIED BY PINELANDS NURSERY & SUPPLY, 323 ISLAND ROAD, COLUMBUS, NJ 08022, (800) 667-2729, OR APPROVED EQUAL

NOT FOR CONSTRUCTION
ADDENDUM #3 SET
3-30-2017

NEGLIA ENGINEERING ASSOCIATES
54 PARK AVENUE
LYNDHURST, NEW JERSEY 07071
TEL: (201) 939-8805
FAX: (201) 939-0846
N.J. CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) GA 276890

HEIDI K. COHEN L.L.A., P.P.
LICENSED LANDSCAPE ARCHITECT
N.J. LICENSE NO. 21AS00076500

NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

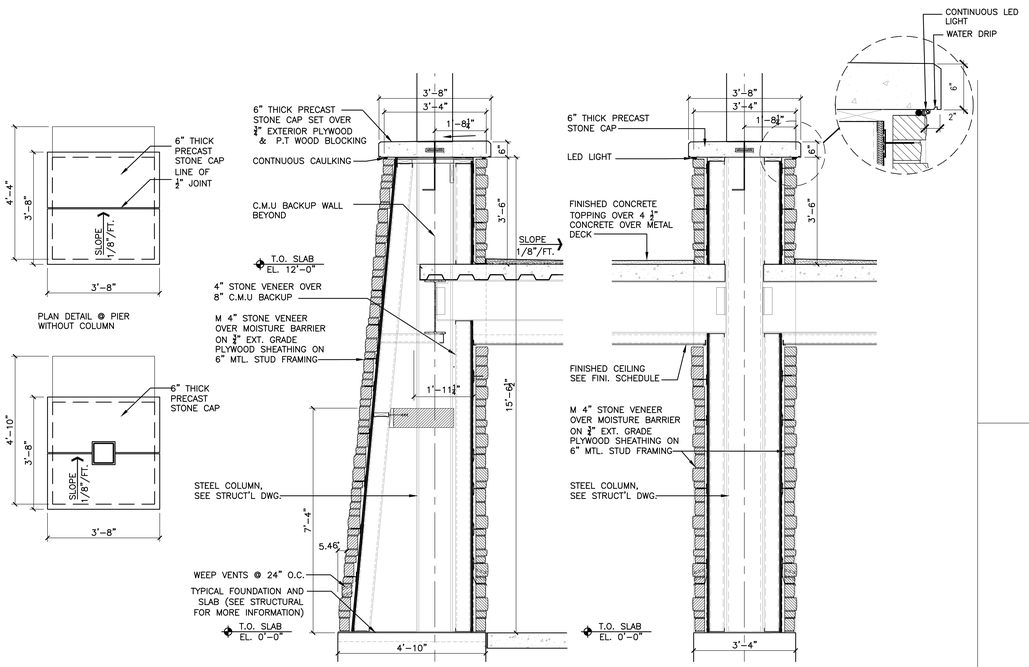
SHEET CONTENTS:

LANDSCAPE PLAN - OVERALL

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		
03.24.17	ADD #2 ISSUE		
03.30.17	ADD #3 ISSUE		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	10 OF 22
DRWG NO	**C-08.00**

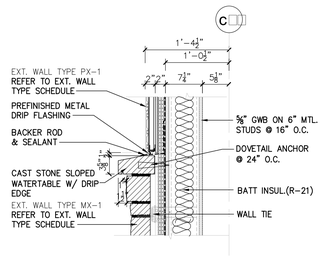
M:\SCOTCH PLAINS\SCOTPRV16.010 \NEW ASH BROOK CLUB HOUSE\CADD_FINAL SHEETS\08.00 - LANDSCAPE PLAN - OVERALL.DWG Plotted: Wednesday, March 29, 2017 1:43:18 PM



5 A-222 PLAN DETAIL
SCALE: 1/2"=1'-0"

6 A-222 COLUMN SECTION
SCALE: 1/2"=1'-0"

7 A-222 COLUMN SECTION
SCALE: 1/2"=1'-0"



A A-224 TYP. SILL DETAIL
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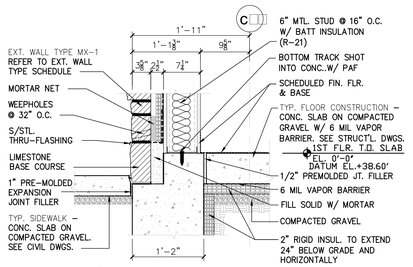

B A-224 TYP. EDGE OF SLAB
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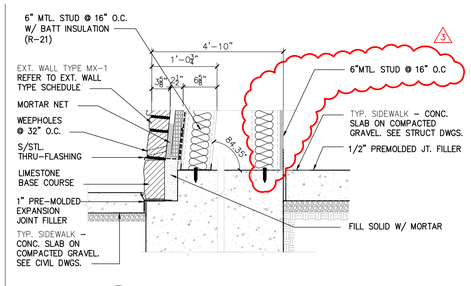

C A-224 TYP. EDGE OF SLAB
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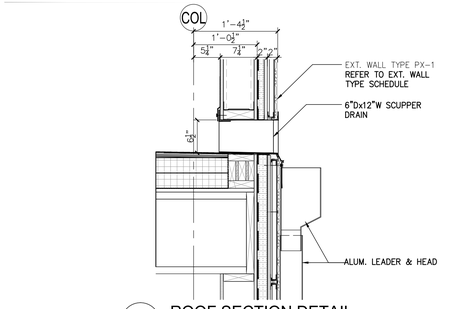
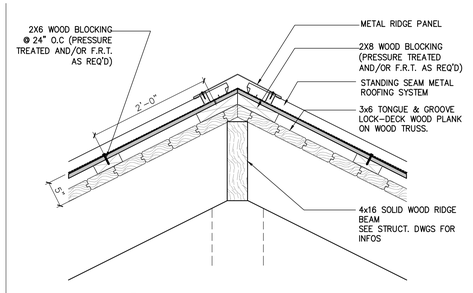


F A-224 ROOF SECTION DETAIL
SCALE: 1" = 1'-0"



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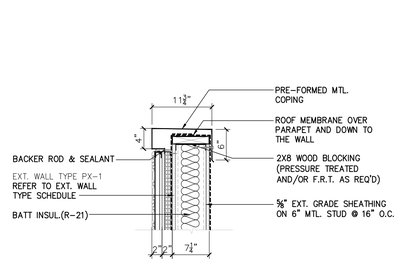

H A-224 TYP. COPING DETAIL
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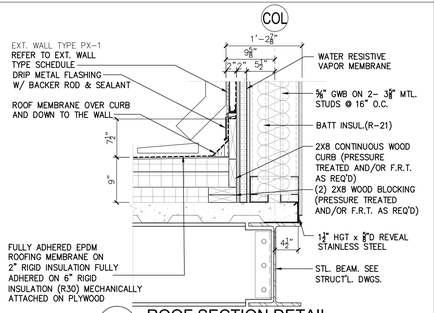
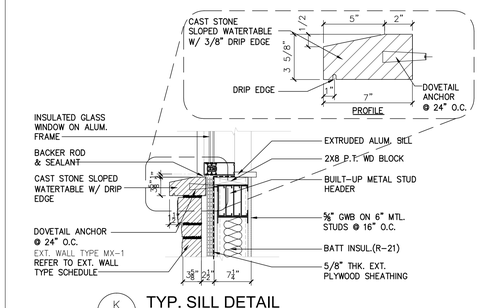


J A-224 ROOF SECTION DETAIL
SCALE: 1" = 1'-0"



K A-224 TYP. SILL DETAIL
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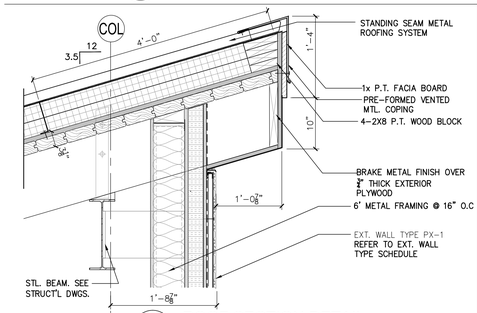

L A-224 ROOF SECTION DETAIL
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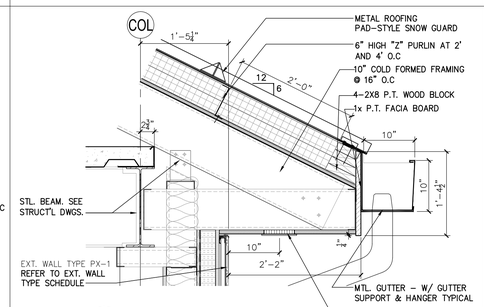

M A-224 ROOF SECTION DETAIL
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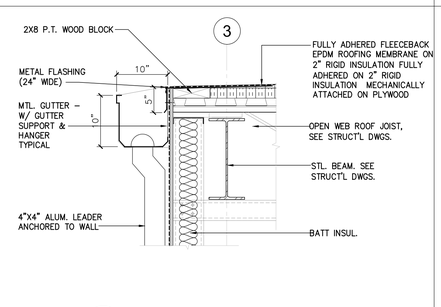

N A-224 ROOF SECTION DETAIL
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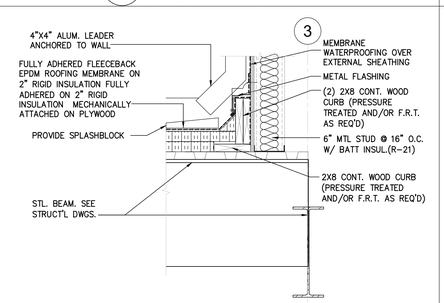

P A-224 ROOF SECTION DETAIL
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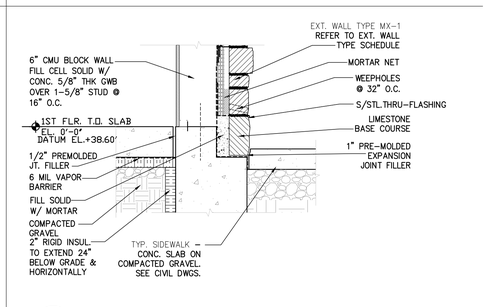

Q A-224 TYP. EDGE OF SLAB
SCALE: 1" = 1'-0"

NOT FOR CONSTRUCTION
ADDENDUM #3 SET
3-30-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
NJ License No. AI 12118

MARK E. BESS, AIA, NCARB
NJ License No. AI 16160

LAURENCE K. UHER, AIA, LEED, AP
NJ License No. AI 14394

NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

WALL SECTIONS & DETAILS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	DV
02.22.17	REBID SET			CHKD BY	NJN
03.27.17	ADD #2 ISSUE			JOB NO	2161228
03.30.17	ADD #3 ISSUE			SHEET:	OF:
				DRWG NO	A-224

COUNTY OF UNION

DEPARTMENT OF ENGINEERING, PUBLIC WORKS & FACILITIES MANAGEMENT
Joseph A. Graziano Sr., Director

MEMO TO: To All Potential Bidders

FROM: Thomas O. Mineo, P.E.
County Engineer

DATE: March 27, 2017

RE: **CLARIFICATION NUMBER 1**
Ash Brook Golf Course Clubhouse
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project #2015-035

Attached are the PreBid Meeting Minutes and Sign-In Sheet for the above referenced project.

Thank you

DIVISION OF ENGINEERING
2325 South Avenue *Scotch Plains, NJ 07076* *(908)789-3690* *fax(908)789-3674* www.ucnj.org
We're Connected to You!

CUMMING
Building Value Through Expertise

Meeting #1

Cumming Corporation
200 South Avenue East Suite 302
Cranford, New Jersey 07016
Phone: (908) 516-7016

Project: - Ash Brook Golf Course Clubhouse
1210 Raritan Road
Scotch Plains, New Jersey 07076

Ash Brook Golf Course Clubhouse: PreBid Meeting Minutes

MEETING DATE: 03/21/2017 **MEETING TIME:** 10:30 am - 11:00 am

MEETING LOCATION: 1210 Raritan Road, Scotch Plains, NJ

OVERVIEW:

1. Introductions
2. Bid Requirements
3. Project Overview
4. Design Overview
5. Site Walk/Questions

NOTES:
Sign-in sheet attached

ATTACHMENTS:

ATTENDEES:

Name	Company	Phone Number	Email	Attendance

Introductions

No	Title	Assignment	Due Date	Priority	Status
1.1	Introductions	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed

Official Documented Meeting Minutes:

1. Owner - County of Union
2. Architect - Netta Architects
3. Civil Engineer – Neglia Engineering Associates
4. Structural Engineer – Reuther + Bowen
5. MEP Engineer – DLB Associates
6. Construction Manager - Cumming Construction Management

Bid Requirements

No	Title	Assignment	Due Date	Priority	Status
1.2	Bid Schedule	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed

Official Documented Meeting Minutes:

1. Deadline for Questions - March 28, 2017
    - All questions must be submitted in writing to Stephen Walter, swalter@ccorpusa.com
    - Questions recieved after that date cannot be answered.
2. Bids Due - April 11, 2017 - 10:30 am, Union County Administration Building

These meeting minutes are believed to be an accurate reflection of those items discussed and the conclusions that were reached during the referenced meeting.

Please contact Cumming Corporation if there are any discrepancies or questions with the content of these minutes.

	◦ Bidders are made aware that they should provide ample time to deal with with parking & security on the day of the bid opening. ◦ The bid deadline will not be extended.				
1.3	General Specifications	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Bidders are asked to carefully review the General Specifications, which includes important information relating to this bid.				
1.4	Project Labor Agreement	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: The Project Labor Agreement is included as Section 55 of the General Specifications.				
1.5	Bidding Documents	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Bidders are asked to carefully review all bidding documents, and to ensure that all requirements for submission are met in full to avoid disqualification of bids. **Bid Form (B-4)** This is a lump sum project. Bidders are asked to compete the bid form as shown. Lump sum prices per division are requested for informational purposes. Divisions and Allowances will total to one Lump Sum Bid Price. *Allowances* 1. Testing & Inspection Allowance - $30,000 2. Permit Fees Allowance - $40,000 3. Bid Contingency Allowance - $350,000 (to be used if and when directed by the County) **Subcontractor Identification Statement (B-10)** Bidders are asked to pay careful attention to provide subs and their DPMC classifications as required.				
1.6	Time Of Completion	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Time of Completion - 365 calendar days from Notice to Proceed to Substantial Completion.				

Project Overview

No	Title	Assignment	Due Date	Priority	Status
1.7	Building Permits	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Building Permits & Inspections to take place through local building department. Permit fees will not be waived.				
1.8	Project Collaboration	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Project collaboration (RFI's/Submittals) will take place through the Construction Manager's web-based platform, Procore. Use of the software will be through the CM's license, no additional license is required for purchase.				
1.9	Logistics	Richard Brown **(Cumming Corporation - New Jersey)**			Closed

These meeting minutes are believed to be an accurate reflection of those items discussed and the conclusions that were reached during the referenced meeting.

Please contact Cumming Corporation if there are any discrepancies or questions with the content of these minutes.

	Official Documented Meeting Minutes: **Golf Course Access** Ash Brook Golf Course will remain open during the course of construction. It is absolutely imperative that access to the Golf Course be kept unrestricted at all times. In the case where access must be restricted for a period of time, approval from the County is required. The County and Construction Manager will maintain a presence on site, and will be able to have open discussions and make quick decisions. The County will also be setting up a trailer to act as the temporary clubhouse. **Logistics** Contractors are asked to reference drawing C-03.00 included in the Bid Set, which is a construction staging plan. A clear path to the course must be kept at all times during golf season.				
1.10	Working Hours	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: Standard working hours will be in effect for this project.				

Design Overview

No	Title	Assignment	Due Date	Priority	Status
1.11	Design Overview	Duc Vuong **(Netta Architects)**, Tom Murphy **(Reuther+Bowen)**, Rob Jankowski **(DLB Associates)**, David Atkinson **(Neglia Engineering Associates)**			Closed
	Official Documented Meeting Minutes: The design team provides an overview of the design.				
1.12	Food Services Equipment	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: All food services equipment will be installed by the contractor. The food services equipment schedule indicates which items the contractor is required to furnish, and which items will be furnished by others.				

Questions

No	Title	Assignment	Due Date	Priority	Status
1.13	Questions	Stephen Walter **(Cumming Corporation - New Jersey)**			Closed
	Official Documented Meeting Minutes: All questions should be submitted in writing to the County Engineer or the construction manager.				

PRE BID MEETING SIGN-IN SHEET

ASH BROOK GOLF COURSE CLUBHOUSE

CUMMING
Building Value Through Expertise

DATE: 3/14/207
LOCATION: 1210 Raritan Road, Scotch Plains, NJ

NAME	FIRM	PHONE	EMAIL	FAX
RICK EUSTAQUIO	IRIS ENV. LABS	9082060073	RICK@IRISLaboratories.com	9082060093
CHRIS SIMPSON	CARSON CORPORATION	973-579-4100	CSIMPSON@CARSON CORPORATION.NET	973-579-4105
Nick Porchetta	Porchetta Etc	(908) 9661640	NCPorchetta@Aol	
Eddie Santana	Veterans Contracting	9083801220	Santana@comcast.net	
JON TOMB	WIREFRAME SOLUTIONS	(516) 236-1190	JON@WIREFRAME SOLUTIONS.COM	
Frank Melhus	Brockwell + Carrington	973-237-1222	fmelhus@brockwellcarrington.com	(973)-257-1223
PHIL AMICO	Singer Equipment	631-585-5717	PAMICO@singerequipment.com	
VIN MASTRIA	HUDSON VALLEY COM	732-9670060	HUDSON VALLEY@Ach.com	
TOM BAUER	Red Roc MATERIALS	201-529-4430	T BAUER@REDROCMATERIALS.COM	
PETE SAMBINO	3R CONTRACTING	732-775-4369	3rpete@gmail.com	732-775-3978
NICK FARERI	EPIC MANAGEMENT	732-752-6100	NFARERI@EPICBUILDS.COM	732-752-9106

PRE BID MEETING SIGN-IN SHEET

ASH BROOK GOLF COURSE CLUBHOUSE

CUMMING
Building Value Through Expertise

DATE: 3/14/207
LOCATION: 1210 Raritan Road, Scotch Plains, NJ

NAME	FIRM	PHONE	EMAIL	FAX
Dan James	RR Irrigation	732-271-7070	dan@rrirrigation.com	732-271-0721
Al Manti	D/T/A/ Corp.	908-351-1177	AMANTI@NJ-NWNC.com.	908-351-3871
Pralaum	Viking Demo.	609-443-3500	forourke@vikingdemolition.com.	
William D'Ambola	Simpson & Brown	732-266-5302	wdambola@simpsonandbrown.com	908-276-2776
Kevin Stack	Pow R Save	973 470 0200	KEVINSTACK@POWRSAVE.COM	973-470-8997
Bill Meinel	Warren Lightning Rod	856 854 7000	marketing@wlrc.net	856 854 1803
Jude Orsi	Pro Scaffold	(908)862-9488	V.Ruiz@ProScaffoldUSA.Com	

Bidder's Name: _____

ACKNOWLEDGMENT OF ADDENDUM

COUNTY OF UNION

ADDENDUM NUMBER 2 – ISSUED: March 27, 2017

ASH BROOK GOLF COURFSE CLUBHOUSE TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
(Name of Construction /Public Works Project)

BA#9-2017
UC ENGINEERING PROJECT #2015-035
(Project or Bid Number)

Pursuant to N.J.S.A. 40A:11-23.1a., the undersigned bidder, hereby acknowledges receipt of the following notices, revisions, or addenda to the bid advertisement, specifications or bid documents. By indicating date of receipt, bidder acknowledges the submitted bid takes into account the provisions of the notice, revision or addendum. Note that the County of Union's record of notice to bidders shall take precedence and that failure to include provisions of changes in a bid proposal may be subject for rejection of the bid.

Local Unit Reference Number or Title of Addendum/Revision	How Received (mail, fax, pick-up, etc.)	Date Received
Addendum Number 2: ● Cover Memo with Responses to Questions ● Referenced Bidding Documents ● Referenced Project Specifications ● Referenced Drawings		

ACKNOWLEDGMENT BY BIDDER:

NAME OF BIDDER: _____

ORIGINAL SIGNATURE: _____

PRINTED NAME AND TITLE:_____

DATE: _____

COUNTY OF UNION

DEPARTMENT OF ENGINEERING, PUBLIC WORKS & FACILITIES MANAGEMENT
Joseph A. Graziano Sr., Director

MEMO TO: To All Potential Bidders

FROM: Thomas O. Mineo, P.E.
County Engineer

DATE: March 27, 2017

RE: **ADDENDUM NUMBER 2**
Ash Brook Golf Course Clubhouse
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project #2015-035

Attached is Addendum Number 2 for the above referenced project. Please sign the attached "Acknowledgement of Receipt of Addendum" and include in your original bid packet submission.

In addition, the following questions were received for the above referenced project:

Q.1 **Please provide an outline of the changes to the original set of plans & specs.**

R.1 *This information will not be provided.*

Q.2 **Drawing A-223 Wall Sections is listed on the Drawing Index but was missing from the download file. Please clarify.**

R.2 *Drawing A-223 Wall Sections shall be re-issued per Drawing Index.*

Q.3 **There are 2 Tables of Contents in the Spec Book. The TOC in the front of the specs doesn't list 072119 Foamed-In-Place Insulation. The Technical Specs TOC lists 072119 Foamed-In-Place Insulation and it is included in the spec book. Please confirm that it is required for this project.**

R.3 *Spec. Div 072119-Foamed-In-Place Insulation is required on the project per the 2nd TOC.*

Q.4 **The spec book did not contain a specification for Concrete Masonry Units. Please clarify.**

R.4 *Spec 042200-Concrete Masonry Unit is NOT required on this project.*

Q.5 **Section 066400 Plastic Paneling makes reference to Wall & Door Protection specs in Div 10. There isn't any Wall & Door Protection specified in Div 10. Please clarify.**

R.5 *Refer to Addendum revision for revised Spec. 066400 – Deleted the referenced Spec to Wall & Door Protection.*

Q.6 **Section 044313 Anchored Stone Masonry Veneer makes reference to Section 076200 Sheet Metal Flashing & Trim. There isn't any Sheet Metal Flashing & Trim specs listed in Div 7 or provided. Please clarify.**

R.6 *Spec 076200-Sheet Metal Flashing & Trim has been added in this addendum to include the required items.*

Q.7 **Please provide the name and contact information of the Food Service Contractor that the County will be purchasing their items from so that we can obtain an installed price for the GC installed items. Other Food Service companies will not provide proposals for installation when they are not providing the equipment.**

R.7 Joseph Manente
201-953-6958
Josephmanente@don.com

Q.8 **This project is out for Re-Bid & it has some renovation work with new construction. So, is GC with DPMC Classification C-009 allowed to bid this job?**

R.9 *No.*

Q.10 **Specification Section 083326 for the Pro Shop coiling grille calls for "stainless-steel grille curtain", bottom bar, and hood. Also specified are "electric grille operators" with a "self-opening mechanism" for fail-safe opening upon receipt of a signal from a smoke detector, alarm system, or power failure.**

This is in conflict with the door schedule remarks on A-311 which indicate "Manual aluminum roll-up overhead grille w/locking function."

Since there is a very significant cost difference between the two, please confirm which rolling grille finish and type of operation applies to this project

R.10 *Spec. Section 083326 is correct with "Self-opening mechanism" for fail safe-Drawing A.311 Door Schedule shall be revised per Spec. 083326.*

Q.11 **Please provide details for storm structure shown on Drawing # C-06:**
- **Outlet Structure # -2 shown for 24" SQ Inlet grate w/ open bottom**
- **Manhole # 4 /24" SQ w/Solid cover**

R.11 *Drawing C-10.08 has been revised in this addendum to include a Detail for 24-inch Square Inlet.*

Q.12 **We respectfully request that the bid opening be changed to 2:00 PM in lieu of 10:30 AM. It is very difficult to obtain Bid proposals from the named trades in the early morning when preparing the final bid proposal.**

R.13 *Bid opening time will not be changed.*

Q.14 **Our subcontractors have requested that the bid submission date be extended for few days as various other Projects are bidding the previous day and the next day of this bid opening.**

R.14 *Bid opening date will not be changed.*

Q.15 **Please confirm or deny that any clarifications issued in Addenda in earlier Bid also applies to this Rebid.**

R.15 *Clarifications issued in Addenda in the first bid do not apply to this ReBid.*

Q.16 **Please clarify on the Plan review Status of the new plans by the local building department.**

R.16 *New Revised* documents shall be submitted to local Building Department for reviews/approval.

Q.17 **Please advise on expected date of NTP - Notice to proceed**

R.17 *This information will not be provided.*

Q.18 **Please provide the name and contact info for the Fire Alarm & Security Vendors for the existing building.**

R.18 *This information will not be provided.*

Q.19 **Specification Section 113100 indicates RESIDENTIAL APPLIANCES. However, there are drawing #FS-1.0 and FS-2.0 which indicate Food Service Equipment. Please review and advise.**

R.19 *Spec. 113100 Residential Appliances applies to the Employee Breakroom in the Lower Level.*

ASHBROOK GOLF COURSE CLUBHOUSE
TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
BA#9-2017; UNION COUNTY ENGINEERING PROJECT #2015-035

TABLE OF CONTENTS

GENERAL SPECIFICATION CONTINUED:

BIDDING DOCUMENTS

BID DOCUMENTS CONTINUED:

Statement of Bidder's Qualifications
Contractor Performance Record
Affidavit Regarding List of Disbarred, Suspended or Disqualified Bidders
Prior Negative Experience Questionnaire-Certification
Contractor's Certification of Compliance - New Jersey Prevailing Wage Act
Uncompleted Contracts Affidavit
Certificate of Insurance Statement
Collection of Use Tax on Sales to Local Governments Statement
Acknowledgement of Project Labor Agreement Requirements
Time of Completion
Disclosure of Investment Activities in Iran

NEW JERSEY PREVAILING WAGE DETERMINATION DOCUMENTS

SS - STANDARD SPECIFICATIONS SS-1

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR AIA DOCUMENT A-101/2007
(Draft form until contract is awarded**)**

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A-201/2007
(Draft form until contract is awarded**)**

PROJECT DIVISION 1 SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

PROJECT TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

B. Related Sections:

1. Division 06 Section "Rough Carpentry" for wood furring for installing plastic paneling.
2. ~~***Division 10 Section "Wall and Door Protection" for corner guards installed over plastic paneling.***~~ ***[ADDENDUM 2]***

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For plastic paneling.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.
3. Testing Agency: UL.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for plastic paneling is manufactured by Crane Composites; refer to Finish Schedule. Subject to compliance with requirements, provide flush wood doors manufactured by the Basis of Design manufacturer or approved equal.

2.2 PLASTIC SHEET PANELING (FP1)

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

1. Nominal Thickness: Not less than 0.075 inch.
2. Surface Finish and Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: Match panels.

B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

D. Adhesive: As recommended by plastic paneling manufacturer.

E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels, unless otherwise indicated.

3.3 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.

1. Drill oversized fastener holes in panels and center fasteners in holes.
2. Apply sealant to fastener holes before installing fasteners.

D. Install factory-laminated panels using concealed mounting splines in panel joints.

E. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

F. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

G. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

H. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

I. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing with snaplock receiver.
2. Manufactured reglets with counterflashing.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Roof Accessories" and "Roof Specialties" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 2B (bright, cold rolled).

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

C. Solder:
1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall, Ribbed, Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry, with ribs at 3-inchintervals along length of flashing to provide integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.

1. Stainless Steel: 0.016 inch thick.

B. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.

1. Material: Stainless steel, 0.019 inch thick.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

4. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inchoffset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

I. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

J. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Joint Style: Overlapped, 4 inches wide.
2. Fabricate from the Following Materials:

    a. Aluminum: 0.050 inch thick.

B. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering.
3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 07 Section “Anchored Stone Masonry Veneer “

C. Reglets: Installation of reglets is specified in Section 033000 "Cast-in-Place Concrete."

D. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inchoffset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

COUNTY OF UNION
BOARD OF CHOSEN FREEHOLDERS
PLANS FOR

NEW CLUB HOUSE AT ASH BROOK GOLF COURSE

LOCATED AT
1210 RARITAN ROAD
(TAX BLOCK 14201, LOT 1)
TOWNSHIP OF SCOTCH PLAINS
UNION COUNTY, NEW JERSEY
FEBRUARY 22, 2017

UNION COUNTY FREEHOLDERS

Br□c□ H. B□r□□n
CHAIRMAN

S□r□i□ Gr□n□d□□
VICE CHAIRMAN

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FREEHOLDER

V□rn□□□Wri□ht
FREEHOLDER

PUBLIC UTILITY CONTACTS

SERVICE	COMPANY	ADDRESS
GAS	ELI□ABETH TOWN GAS	520 GREEN LANE UNION, N.J. TEL: (908) 662-8321
ELECTRIC	PUBLIC SERVICE ELECTRIC AND GAS (PSE&G)-ELECTRIC	80 PAR□ PLA□A, T-12 NEWAR□, N.J. TEL: (973) 297-2128
WATER	NEW JERSEY AMERICAN WATER	13□1 NORTH AVE. PLAINFIELD, N.J. TEL: (973) 56□-5701
SEWER	TOWNSHIP OF SCOTCH PLAINS ENGINEERING DEPARTMENT	□30 PAR□ AVENUE SCOTCH PLAINS, N.J. 07076 TEL: (908) 322-6700□306
TELECOM	VERI□ON	175 WEST MAIN STREET FREEHOLD, N.J. TEL: (732) 357-2313

CONSULTING ENGINEERS

Site Engineers:
NEGLIA ENGINEERING ASSOCIATES — T□□:201.939.8805
3□ P□r□ A□□n□□ — F□□: 201.939.08□6
L□ndh□r□t, NJ 07071

Structural Engineers:
REUTHER □ BOWEN — T□□:570.□96.7020
326 W□rd Str□□t — F□□: 570.□96.7021
Scr□nt□n, PA 18512

Mechanical-Electrical-Plumbing Engineers:
DLB ASSOCIATES — T□□:6□6.381.6721
On□ P□nn P□□□ — F□□:
N□□ Y□r□, NY 10119

ADDENDUM #2 ISSUE - 3.27.17

EXTERIOR RENDERING

NETTAARCHITECTS
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

CUMMING
Building Value Through Expertise

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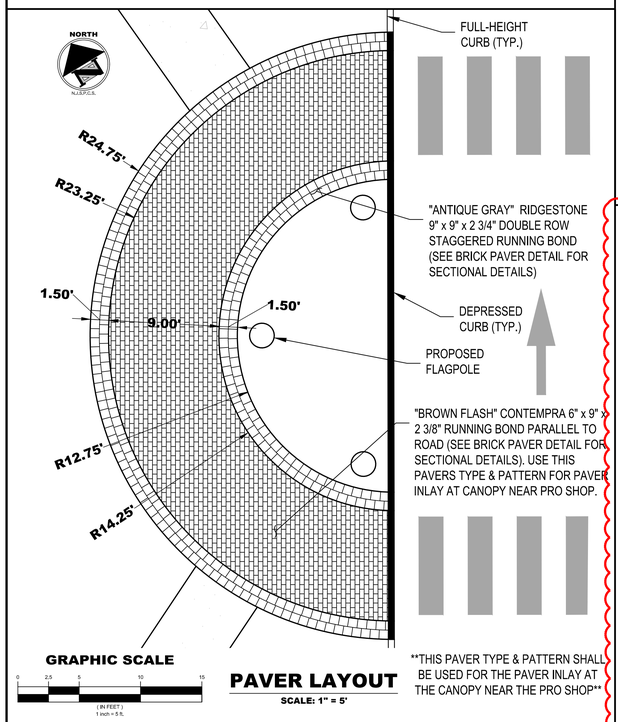
LANDSCAPE NOTES

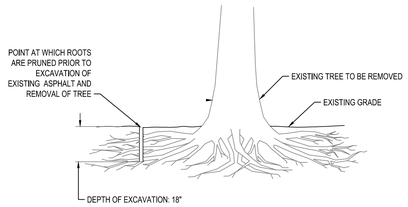
1. ALL PLANT MATERIAL SHALL CONFORM TO STANDARDS SET BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
2. ALL PLANT MATERIAL SHALL BE REVIEWED AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. THE LANDSCAPE ARCHITECT RETAINS THE RIGHT TO FURTHER INSPECT PLANT MATERIALS FOR CONDITION AND DAMAGE AT ANY TIME DURING THE PROGRESS OF WORK. ANY AND ALL UNSATISFACTORY PLANT MATERIALS SHALL BE REMOVED IMMEDIATELY FROM THE PROJECT SITE.
3. ALL B & B MATERIAL SHALL BE FRESHLY DUG THE CURRENT GROWING SEASON. MATERIALS SHALL NOT BE PRUNED PRIOR TO DELIVERY UNLESS OTHERWISE DIRECTED. DO NOT BEND OR BIND/TIE TREES OR SHRUBS IN SUCH A MANNER AS TO DAMAGE BARK, BREAK BRANCHES, OR DESTROY THE NATURAL SHAPE.
4. ANY DISCREPANCIES BETWEEN PLANS, NOTES, DETAILS AND EXISTING CONDITIONS SHALL BE IMMEDIATELY REPORTED TO THE LANDSCAPE ARCHITECT PRIOR TO RESUMING WORK. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL REVISIONS DUE TO FAILURE TO GIVE SUCH NOTICE.
5. ALL PLANTING, SODDING AND SEEDING SHALL BE PERFORMED IN A WORKMANLIKE MANNER USING ACCEPTED NURSERY PRACTICES AND STANDARDS. PAVED SURFACES TO BE KEPT BROOM-CLEAN AND ALL DEBRIS GENERATED BY THIS WORK IS TO BE PROMPTLY REMOVED BY THE CONTRACTOR.
6. PERSONNEL SHALL BE FAMILIAR WITH PLANTING PROCEDURES AND BE SUPERVISED BY A QUALIFIED FOREMAN. ALL EQUIPMENT NECESSARY TO COMPLETE THE LANDSCAPING WORK SHALL BE SUPPLIED BY THE CONTRACTOR.
7. CONTRACTOR SHALL FIELD LOCATE PLANT MATERIAL FOR LANDSCAPE ARCHITECT APPROVAL PRIOR TO INSTALLATION.
8. ALL PLANTS AND ENTIRE SHRUB BEDS SHALL RECEIVE MULCH AS INDICATED ON THE DRAWINGS.
9. SOIL SHALL BE PREPARED AS SPECIFIED IN THE SOIL PREPARATION TECHNICAL SPECIFICATION PRIOR TO PLANT MATERIAL INSTALLATION. SHOULD PLANT MATERIAL BE INSTALLED PRIOR TO ACCEPTANCE OF THE SOIL PREPARATION THE CONTRACTOR, AT HIS EXPENSE, SHALL REMOVE THE PLANT MATERIAL, CORRECT THE SOIL, AND REPLANT AT THE DIRECTION OF THE LANDSCAPE ARCHITECT. THE LANDSCAPE ARCHITECT MAY, AT HIS DISCRETION, AND AT THE CONTRACTOR'S COST, REQUIRE THE REMOVED PLANT MATERIAL BE REPLACED IN LIEU OF BEING REPLANTED.
10. TREES SHALL BE PLANTED SUCH THAT THE ROOT FLAIR IS FULLY EXPOSED AT GRADE. SHRUBS SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS THEY BORE TO EXISTING GRADE IN THE NURSERY.
11. CUT AND REMOVE BURLAP AND WIRE BASKET FROM THE TOP ⅓ OF THE ROOT BALL. NYLON ROPE AND/OR NYLON BALLING MATERIAL SHALL NOT BE USED.
12. UPON COMPLETION OF THE TWO YEAR PLANT GUARANTEE PERIOD, THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR REMOVING PLANTING SAUCERS AND ALL STAKES FROM TREES. THIS SHALL BE DONE IN CONSULTATION WITH THE LANDSCAPE ARCHITECT.
13. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT QUANTITIES. IF THERE IS A DISCREPANCY BETWEEN THE PLANT COUNT SHOWN IN THE PLANT LIST AND THE PLANTING GRAPHIC, THE GRAPHIC SHALL TAKE PRECEDENCE.
14. SOIL IN ALL AREAS UTILIZED FOR CONSTRUCTION STAGING OR GOLF COURSE OPERATIONS WEST OF THE CLUB HOUSE, SHALL BE THOROUGHLY UNCOMPACTED PRIOR TO INSTALLATION OF TOPSOIL AND PLANTING SOIL.
15. IF THE CONTRACTOR DETERMINES THE SUB-GRADE SOIL CONDITIONS ARE DELETERIOUS TO PLANT GROWTH OR WILL INHIBIT DRAINAGE, THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY AND PRIOR TO INSTALLATION OF ANY PLANT MATERIAL.
16. TOPSOIL AND SEED ALL AREAS DISTURBED AS A RESULT OF ANY AND ALL DISTURBANCES, CONSTRUCTION OR STORAGE EQUIPMENT, WHETHER SUCH AREAS ARE SHOWN ON THE PLANS OR NOT. CONTRACTOR TO FIELD VERIFY AREAS OF SEED PRIOR TO SUBMITTING A BID. SEE SPECIFICATIONS FOR SEED MIX.
17. CONTRACTOR SHALL NOT DEVIATE FROM THE APPROVED PLAN AND IT'S CONTENTS WITHOUT THE PRIOR WRITTEN CONSENT BY THE LANDSCAPE ARCHITECT.
18. CONTRACTOR IS RESPONSIBLE TO MAINTAIN EXISTING STRUCTURES, FACILITIES AND MATERIALS TO REMAIN. CONTRACTOR SHALL REPAIR AND OR REPLACE ANY DAMAGE CAUSED BY ANY EQUIPMENT, VEHICLE OR PERSON RELATED TO THE COMPLETION OF THIS WORK AT NO EXPENSE TO THE OWNER. THIS INCLUDES, BUT IS NOT LIMITED TO, ALL SURVEY BOUNDARY MARKERS AND BENCH MARKS. IF DISTURBED OR LOST, IT SHALL BE THE CONTRACTORS RESPONSIBILITY FOR CONTRACTING TO HAVE THE SAME RESET.
19. ALL TREES AND STUMPS TO BE REMOVED SHALL BE REMOVED TO A CLEAR DEPTH OF NOT LESS THAN TWO FEET BELOW SUBGRADE LEVEL. CONTRACTOR SHALL DISPOSE OF OFF SITE IN ACCORDANCE WITH ALL LAWS.
20. ACTUAL UTILITY LOCATIONS MAY VARY FROM PLANS. CONTRACTOR SHALL VERIFY FIELD LOCATIONS PRIOR TO PLANTING.
21. ALL PLANT MATERIAL SHALL BE GUARANTEED TO BE ALIVE AND IN VIGOROUS GROWING CONDITION FOR A PERIOD OF TWO YEARS AFTER ACCEPTANCE BY THE OWNER.
22. ALL PLANT MEAREIAL SHALL HAVE ROOT BALLS THAT ARE NOT CRACKED, LOOSE OR BROKEN. IF TEH ROOT BALL IS CRACKED, LOOSE OR BORKEN IT WILL BE REJECTED. PLANT MATERIALS THAT ARE STORED ON SITE FOR LONGER THAN THREE DAYS SHALL BE KEPT IN THE SHADE, PROTECTED FROM WEATHER AND MECHANICAL INJURY AND HAVE THE ROOT BALLS HEALED IN AND KEPT WELL WATERED.



PAVER LAYOUT

SCALE: 1" = 5'

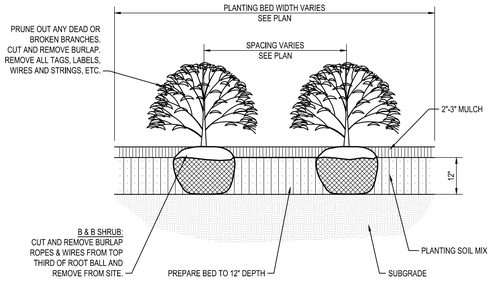
THIS PAVER TYPE & PATTERN SHALL BE USED FOR THE PAVER INLAY AT THE CANOPY NEAR THE PRO SHOP



NOTES:
1. CUTS ARE TO BE MADE CLEANLY WITH A SHARP ROOT PRUNING TOOL SUCH AS DOSCO OR VERMEER ROOT PRUNER.

ROOT PRUNING DETAIL

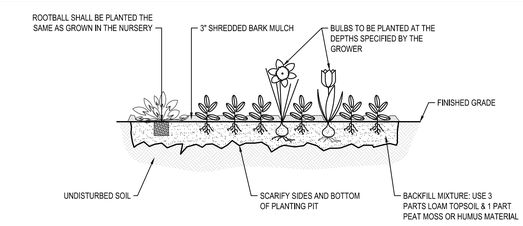
NOT TO SCALE



NOTES:
1. WHEN PLANTING CONTAINER, MAKE 4 TO 5 VERTICAL CUT TO THE ROOT BALL BEFORE SETTING IN PLACE

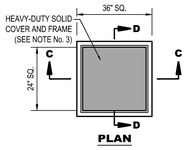
SHRUB PLANTING

NOT TO SCALE



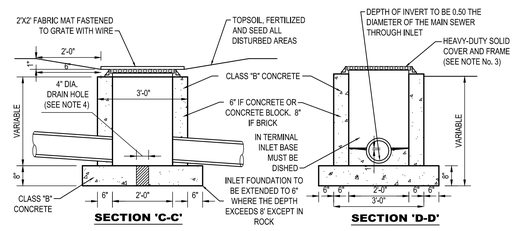
PERENIALS, BULBS & GROUND COVER PLANTING DETAIL

NOT TO SCALE



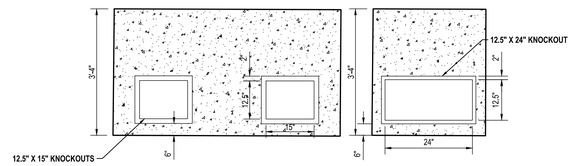
PLAN

NOTES:
1. INVERTS TO BE ELIMINATED IN BOTTOM OF TERMINAL INLETS, BOTTOMS SHALL BE DISHED AND SLOPED TOWARDS THE OUTLET PIPE AT A RATE OF GRADE OF 2 INCHES PER FOOT.
2. THIS INLET MAY BE CONSTRUCTED OF BRICK, CONCRETE OR CONCRETE BLOCK. IF BRICK OR CONCRETE BLOCK IS USED, THE BOTTOM SHALL BE AS SHOWN FOR CONCRETE & THE OUTSIDE OF THE WALLS SHALL BE PLASTERED WITH 1/2" COAT OF 1:2 CEMENT SAND MORTAR.
3. MANHOLE FRAME AND SOLID COVERS TO BE CAMPBELL FOUNDRY PATTERN NO. 2802, OR APPROVED EQUAL.
4. STRUCTURES INDICATED AS "OPEN BOTTOM" SHALL HAVE A 4" DIA. DRAIN HOLE/SUMP DRAIN LOCATED IN THE CENTER. OTHERWISE, NO HOLE SHALL BE PROVIDED.

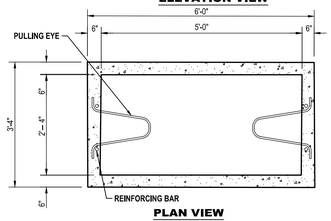


24"x24" SQUARE INLET

NOT TO SCALE



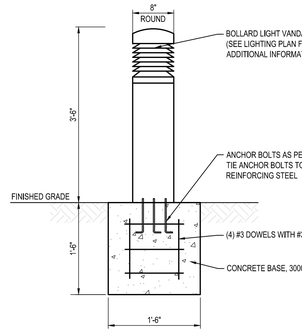
ELEVATION VIEW



PLAN VIEW

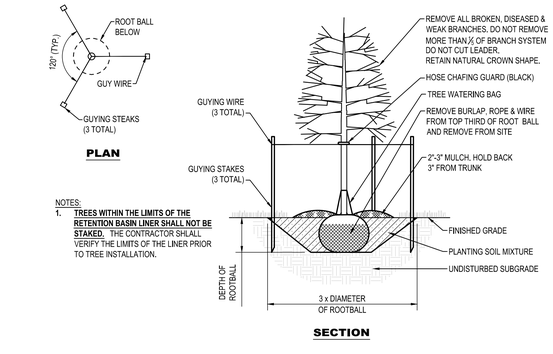
PULL BOX

NOT TO SCALE



BOLLARD LIGHT AND FOOTING

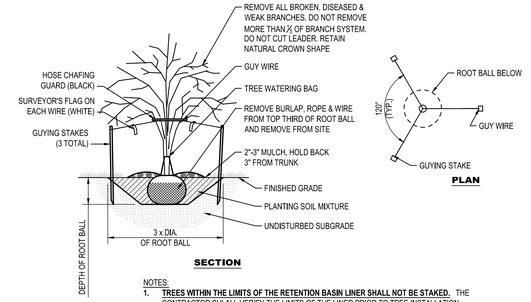
NOT TO SCALE



NOTES:
1. **TREES WITHIN THE LIMITS OF THE RETENTION BASIN LINER SHALL NOT BE STAKED.** THE CONTRACTOR SHALL VERIFY THE LIMITS OF THE LINER PRIOR TO TREE INSTALLATION.

DECIDUOUS TREE PLANTING

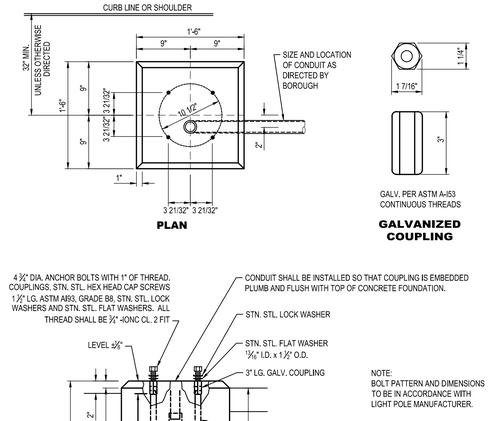
NOT TO SCALE

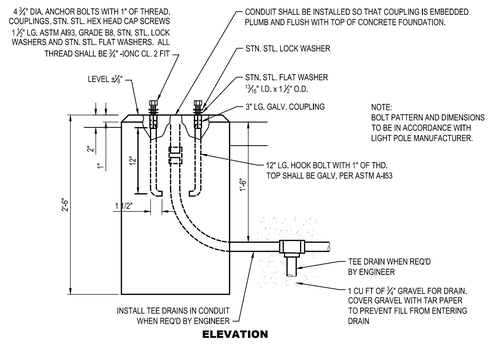


NOTES:
1. **TREES WITHIN THE LIMITS OF THE RETENTION BASIN LINER SHALL NOT BE STAKED.** THE CONTRACTOR SHALL VERIFY THE LIMITS OF THE LINER PRIOR TO TREE INSTALLATION.
2. GUY TRUNKS TOGETHER PRIOR TO GUYING TO STAKES. MAINTAIN TRUNK SEPARATION.
3. PLACE TWO GUY STAKES ON UPHILL SIDE OF TREES PLANTED ON SLOPES

MULTI-STEM TREE PLANTING

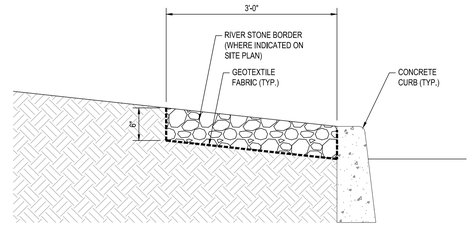
NOT TO SCALE





LIGHT POLE FOUNDATION

NOT TO SCALE



RIVER STONE BORDER

NOT TO SCALE

NOT FOR CONSTRUCTION
ADDENDUM #2 SET
3-27-2017

NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE
LYNDHURST, NEW JERSEY 07071
TEL: (201) 939-8805
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N.J. CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) GA 276890

THOMAS R. SOLFARO, P.E., C.M.E.
N.J. PROFESSIONAL ENGINEER
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NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

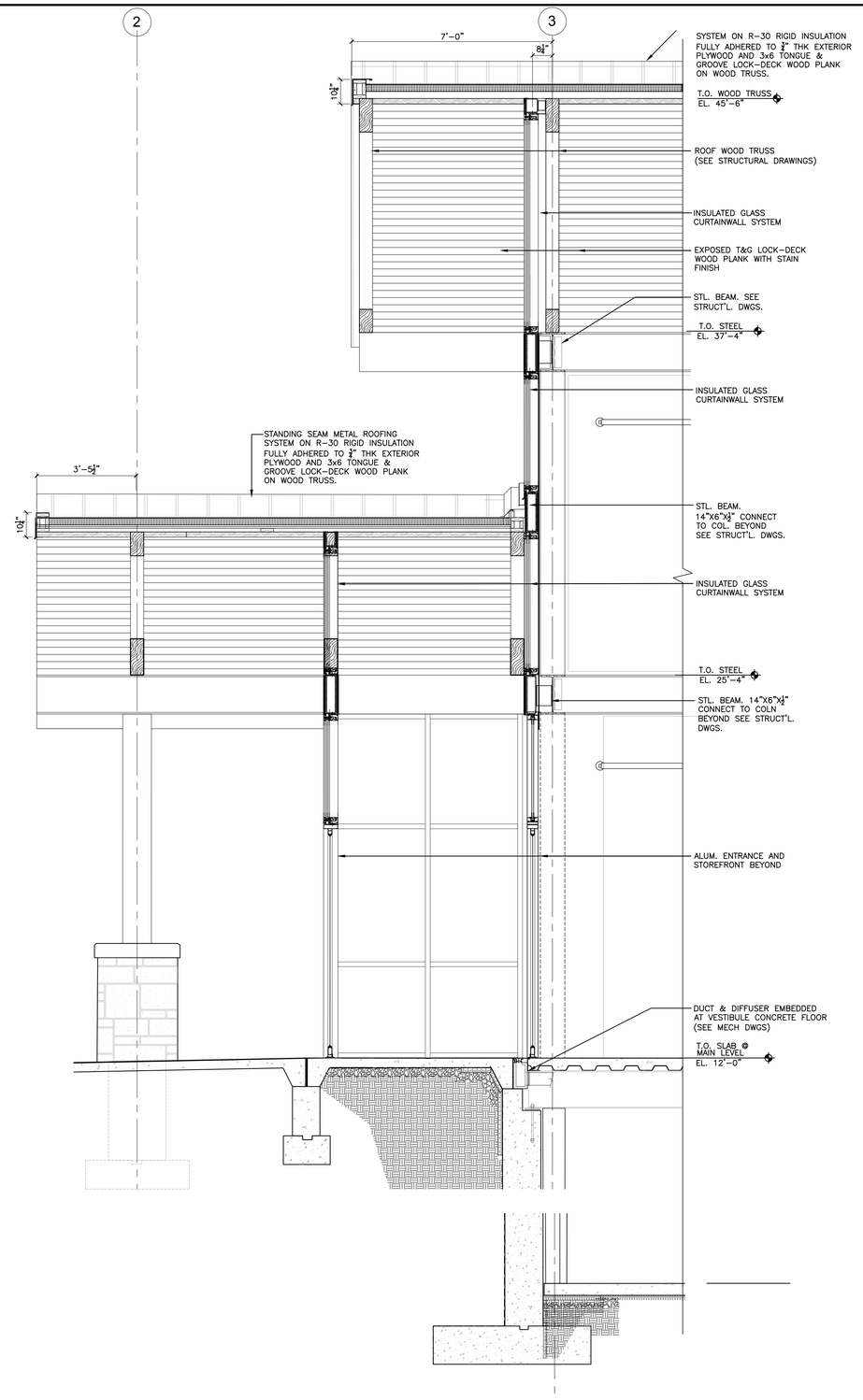
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS VIII

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	EMJ
02.22.17	REBID SET			CHKD BY	DRA/TRS
03.27.17	ADD #2 ISSUE			JOB NO	SCOTPRV16.010
				SHEET:	22 OF 22
				DRWG NO	10.08

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\10.00 - DETAILS.DWG Plotted: Friday, March 24, 2017 9:22:58 AM



1 A223 WALL SECTION
SCALE: 1/2" = 1'-0"

2 A223 WALL SECTION
SCALE: 1/2" = 1'-0"

3 A223 WALL SECTION
SCALE: 1/2" = 1'-0"

4 A223 WALL SECTION
SCALE: 1/2" = 1'-0"

NOT FOR CONSTRUCTION
ADDENDUM #2 SET
3-27-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
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MARK E. BESS, AIA, NCARB
NJ License No. AI 16160

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

WALL SECTIONS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		
03.27.17	ADD #2 ISSUE		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	DV
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-223 2

DOOR AND FRAME SCHEDULE-LOWER LEVEL

DOOR NO.	DOOR LOCATION FROM	DOOR LOCATION TO	DOOR WD	DOOR HGT	DOOR TH	FRAME MAT'L.	FRAME TYPE	FRAME MAT'L.	FRAME TYPE	FRAME JAMB	FRAME HEAD	SILL MAT'L.	SILL TYPE	FIRE-RATING LABEL	HARDWARE SET (SEE SPECS.)	REMARKS
L01	TURNSTAND	BREAK ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	JI	H1	RB.	S4	–		
L02	BREAK ROOM	CART STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	RB.	S3	–		CARD READER ACCESS
L03	NOT USED															
L04	CORRIDOR	STAFF MEN'S LOCKER ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S9	–		
L05	CORRIDOR	STAFF WOMEN'S LOCKER ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S9	–		
L06A	CORRIDOR	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J2	H2	–	–	–		
L06B	CART STORAGE	STORAGE ROOM	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		INSULATED ROLL-UP DOOR
L07A	CART STORAGE	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L07B	CART STORAGE	EXTERIOR	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		INSULATED ROLL-UP DOOR
L07C	CART STORAGE	EXTERIOR	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		ROLL-UP DOOR
L07D	CART STORAGE	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L08	CART STORAGE	BAR STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		
L09	CART STORAGE	MECHANICAL ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		
L10	SERVICE CORRIDOR	CART STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		CARD READER ACCESS
L11	STORAGE ROOM	SERVICE CORRIDOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	RB.	S3	–		
L12	ELECTRICAL ROOM	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	D	H.M.	F1	J1	H1	–	–	–		W/ TRANSFER GRILL
L13A	ELECTRICAL ROOM	FIRE SPRINKLER ROOM	3'-0"	7'-0"	1 3/4"	H.M.	D	H.M.	F1	J1	H1	–	–	–		W/ TRANSFER GRILL
L13B	FIRE SPRINKLER ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	E	H.M.	F1	J1	H1	RB.	S3	–		W/ TRANSFER GRILL
L14	HOT WATER HEATER ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	E	H.M.	F1	J1	H1	RB.	S3	–		W/ TRANSFER GRILL
L15A	SERVICE CORRIDOR	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J1	H1	RB.	S3	–		
L15B	STORAGE ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J1	H1	–	–	–		
L16	STORAGE ROOM	EXTERIOR	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L17	ELEVATOR MACHINE CL.	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J3	H3	RB.	S3	–		
L18	KITCHEN STORAGE	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	RB.	S3	–		
L19	KITCHEN STORAGE	CHEF'S OFFICE	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	RB.	S5	–		
L20	KITCHEN STORAGE	STAIR #1	3'-0"	7'-0"	1 3/4"	H.M.	C	H.M.	F1	J2	H2	RB.	S3	1 HR		W/ VISION PANEL
L21	KITCHEN STORAGE	TOILET ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	ST.	S10	–		
L22	KITCHEN STORAGE	JAN. CL.	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	ST.	S10	–		
L23	OPEN OFFICE	STAFF LOCKER ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	RB.	S3	–		

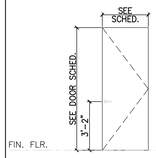
DOOR AND FRAME SCHEDULE-MAIN LEVEL

DOOR NO.	DOOR LOCATION FROM	DOOR LOCATION TO	DOOR WD	DOOR HGT	DOOR TH	FRAME MAT'L.	FRAME TYPE	FRAME MAT'L.	FRAME TYPE	FRAME JAMB	FRAME HEAD	SILL MAT'L.	SILL TYPE	FIRE-RATING LABEL	HARDWARE SET (SEE SPECS.)	REMARKS
100	VESTIBULE	EXTERIOR	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
101A	MAIN HALL	VESTIBULE	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	–	–	–		
101B	MAIN HALL	EXTERIOR	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
102	MAIN HALL	UNION COUNTY OPEN OFFICE	3'-0"	8'-0"	1 3/4"	ALUM.	F	ALUM.	F3	J8	H8	RB.	S8	–		
103	UNION COUNTY OPEN OFFICE	CONFERENCE ROOM	3'-0"	8'-0"	1 3/4"	WD	H	H.M.	F4	J7	H7	–	–	–		
104	UNION COUNTY OPEN OFFICE	OFFICE	3'-0"	8'-0"	1 3/4"	WD	H	H.M.	F4	J7	H7	–	–	–		
105	MAIN HALL	MEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S6	–		
106	MAIN HALL	WOMEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	H1	H1	ST.	S6	–		
107A	MAIN HALL	PRO SHOP	11'-0"	8'-0"	–	–	L	–	–	#	#	–	–	–		ELECTRIC GRILLE OPERATORS WITH SELF-OPENING MECHANISM FOR FAIL SAFE
107B	PRO SHOP	EXTERIOR	3'-0"	8'-0"	1 3/4"	ALUM.	F	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS 2
108	OPEN OFFICE	PRO SHOP	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	RB.	S8	–		
109	CORRIDOR	IT	3'-0"	7'-0"	1 3/4"	WD	K	H.M.	F1	J1	H1	RB.	S12	–		W/ TRANSFER GRILL
110	CORRIDOR	OFFICE	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	–	–	–		
111	NOT USED															
112A	BAR/LOUNGE	MAIN HALL	3'-0"	8'-0"	–	ALUM.	F	ALUM.	–	–	–	ALUM.	S7	–		
112B	BAR/LOUNGE	EXTERIOR	(2)3'-0"	8'-0"	–	ALUM.	G	ALUM.	–	–	–	ALUM.	S2	–		CARD READER ACCESS
112C	BAR/LOUNGE	EXTERIOR	–	8'-0"	–	–	N	–	F7	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
112D	BAR/LOUNGE	EXTERIOR	–	8'-0"	–	–	N	–	F7	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
113	RESTAURANT	WOMEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		CARD READER ACCESS
114	JAN. CL.	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		
115	RESTAURANT	MEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		
116A	RESTAURANT	MAIN HALL	(2)3'-0"	8'-0"	–	ALUM.	G	ALUM.	–	–	–	ALUM.	S7	–		
116B	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116C	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116D	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116E	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116F	RESTAURANT	EXTERIOR	(2)3'-0"	8'-0"	–	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
117A	KITCHEN	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	J	H.M.	F1	J2	H2	ALUM.	S7	–		W/ VISION PANEL
117B	KITCHEN	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	J	H.M.	F1	J2	H2	ALUM.	S7	–		W/ VISION PANEL
118	DELIVERY AREA	STAIR #1	3'-0"	8'-0"	1 3/4"	H.M.	C	H.M.	F1	J2	H2	RB.	S4	1 HR		W/ VISION PANEL
119A	DELIVERY AREA	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J9	H9	ALUM.	S1	–		CARD READER ACCESS
119B	DELIVERY AREA	EXTERIOR	6'-0"	8'-0"	–	MTL.	M	MTL.	F5	#	#	–	–	–		INSULATED ROLL-UP DOOR
119C	ELEVATOR	EXTERIOR	4'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6/10	H9	ALUM.	S1	–		

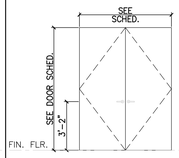
DOOR SCHEDULE LEGEND

ALUM.	ALUMINUM	I.T.	INSULATED TEMPERED GLASS
ANO.	ANODIZED ALUMINUM	ST.	STONE
CLR	CLEAR	RB.	RUBBER
GL	GLASS	WD	WOOD
INSUL. H.M.	INSULATED HOLLOW METAL	WT	WIRED TEMPERED GLASS
H.M.	HOLLOW METAL	FRP	FIBERGLASS REINFORCED POLYESTER
MIN.	MINUTE		
PNT.	PAINT – SEE FIN. SCHED.		

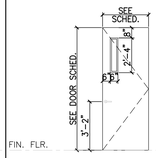
DOOR TYPE ELEVATIONS (SCALE: 1" = 1'-0")



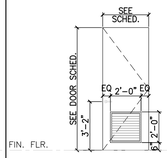
A H.M. FLUSH DOOR — FIELD PAINTED



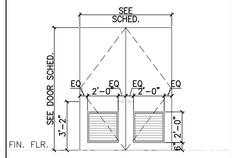
B H.M. FLUSH DOOR — FIELD PAINTED



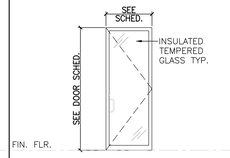
C H.M. FLUSH DOOR — FIELD PAINTED



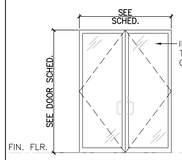
D H.M. FLUSH DOOR — FIELD PAINTED



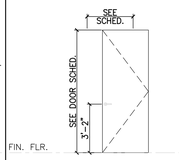
E H.M. FLUSH DOOR — FIELD PAINTED



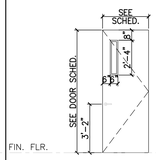
F GLASS DOOR ON ALUM. FRAME — INSULATED GLASS ON EXT. DOORS



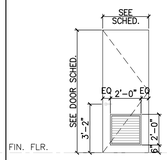
G GLASS DOOR ON ALUM. FRAME — INSULATED GLASS ON EXT. DOORS



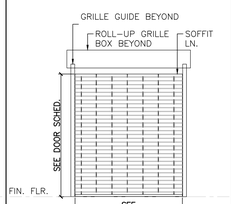
H SOLID CORE WOOD FLUSH DOOR



J SOLID CORE WOOD FLUSH DOOR

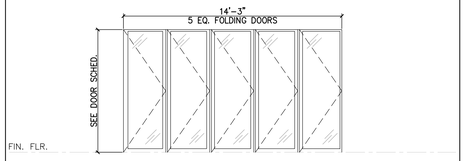


□ SOLID CORE WOOD FLUSH DOOR



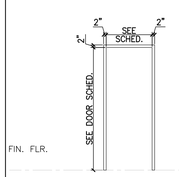
L ROLL-UP GRILLE — ALUMINUM ROLL-UP GRILL

M ROLL-UP DOOR

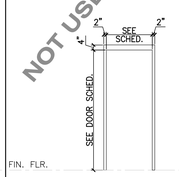


N FOLDING GLASS DOOR SYSTEM — INSULATED FOLDING GLASS DOOR SYSTEM

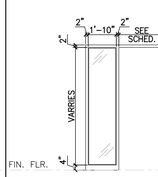
FRAME TYPE ELEVATIONS (SCALE: 1" = 1'-0")



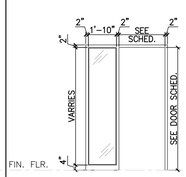
F1 H.M. FRAME — FIELD PAINTED



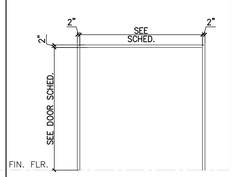
F2 H.M. FRAME — FIELD PAINTED



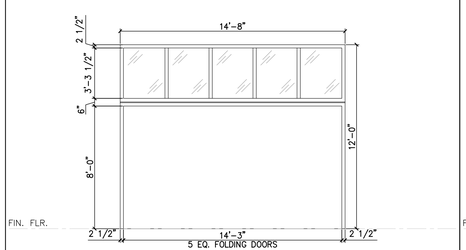
F3 ALUM. FRAME W/ SIDE LITE



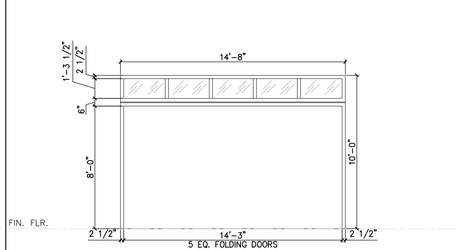
F□ H.M. FRAME W/ SIDE LITE



F5 MTL. FRAME — FIELD PAINTED



F6 ALUM. FRAME W/ TRANSOM



F7 ALUM. FRAME W/ TRANSOM

NOT FOR CONSTRUCTION
ADDENDUM #2 SET
3-27-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
NJ License No. AI 12118

MARK E. BESS, AIA, NCARB
NJ License No. AI 16160

LAURENCE K. UHER, AIA, LEED, AP
NJ License No. AI 14394

NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

DOOR SCHEDULE

SUBMISSIONS DATE	DESCRIPTION	REVISIONS DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		
03.27.17	ADD #2 ISSUE		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-311

COUNTY OF UNION

DEPARTMENT OF ENGINEERING, PUBLIC WORKS & FACILITIES MANAGEMENT
Joseph A. Graziano Sr., Director

MEMO TO: To All Potential Bidders

FROM: Thomas O. Mineo, P.E.
County Engineer

DATE: March 13, 2017

RE: **ADDENDUM NUMBER 1**
Ash Brook Golf Course Clubhouse
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project #2015-035

Please note:

Due to an expected snow storm moving into the area tonight into Tuesday, the Pre-bid meeting scheduled for March 14, 2017 at 10:30 a.m. at the Ash Brook Golf Course, 1210 Raritan Road, Scotch Plains, New Jersey ***has been changed*** to March 21, 2017 at 10:30 a.m. at the Ash Brook Golf Course, 1210 Raritan Road, Scotch Plains, New Jersey.

Please sign the attached Acknowledgement of Addendum Number 1 and include in your bid packet submission.

Thank you

Bidder's Name: _____

ACKNOWLEDGMENT OF ADDENDUM

COUNTY OF UNION

ADDENDUM NUMBER 1 – ISSUED: March 13, 2017

ASH BROOK GOLF COURFSE CLUBHOUSE TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY	**BA#9-2017 UC ENGINEERING PROJECT #2015-035**
(Name of Construction /Public Works Project)	**(Project or Bid Number)**

Pursuant to N.J.S.A. 40A:11-23.1a., the undersigned bidder, hereby acknowledges receipt of the following notices, revisions, or addenda to the bid advertisement, specifications or bid documents. By indicating date of receipt, bidder acknowledges the submitted bid takes into account the provisions of the notice, revision or addendum. Note that the County of Union's record of notice to bidders shall take precedence and that failure to include provisions of changes in a bid proposal may be subject for rejection of the bid.

Local Unit Reference Number or Title of Addendum/Revision	How Received (mail, fax, pick-up, etc.)	Date Received
Addendum Number 1: Due to an expected snow storm moving into the area tonight into Tuesday, the Pre-bid meeting scheduled for March 14, 2017 at 10:30 a.m. at the Ash Brook Golf Course, 1210 Raritan Road, Scotch Plains, New Jersey has been changed to March 21, 2017 at 10:30 a.m. at the Ash Brook Golf Course, 1210 Raritan Road, Scotch Plains, New Jersey		

ACKNOWLEDGMENT BY BIDDER:

NAME OF BIDDER: _____

ORIGINAL SIGNATURE: _____

PRINTED NAME AND TITLE: _____

DATE: _____

SPECIFICATIONS

FOR

ASHBROOK GOLF COURSE CLUBHOUSE

TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY

BA#9-2017; UNION COUNTY ENGINEERING PROJECT #2015-035

FEBRUARY 2017

UNION COUNTY OFFICIALS
BOARD OF CHOSEN FREEHOLDERS

Bruce H. Bergen, Chairman
Sergio Granados, Vice Chairman
Linda Carter, Freeholder
Angel G. Estrada, Freeholder
Christopher Hudak, Freeholder
Mohamed S. Jalloh, Freeholder
Bette Jane Kowalski, Freeholder
Alexander Mirabella, Freeholder
Vernell Wright, Freeholder

CLERK OF THE BOARD
James E. Pellettiere, RMC

COUNTY MANAGER
Alfred J. Faella

DEPARTMENT OF ENGINEERING, PUBLIC WORKS AND FACILITIES MANAGEMENT
Joseph A. Graziano, Sr., CPWM, Director

COUNTY ENGINEER
DIVISION OF ENGINEERING
Thomas O. Mineo, P.E.
2325 South Avenue
Scotch Plains, New Jersey 07076
Telephone: (908) 789-3675
Fax: (908) 789-3674

PREPARED BY:
Cumming Construction Management
200 South Avenue East
Suite 302
Cranford, New Jersey 07016
T: 908-516-7017
F: 908-276-4230

ASHBROOK GOLF COURSE CLUBHOUSE
TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
BA#9-2017; UNION COUNTY ENGINEERING PROJECT #2015-035

TABLE OF CONTENTS

GENERAL SPECIFICATION CONTINUED:

BIDDING DOCUMENTS

BID DOCUMENTS CONTINUED:

Statement of Bidder's Qualifications
Contractor Performance Record
Affidavit Regarding List of Disbarred, Suspended or Disqualified Bidders
Prior Negative Experience Questionnaire-Certification
Contractor's Certification of Compliance - New Jersey Prevailing Wage Act
Uncompleted Contracts Affidavit
Certificate of Insurance Statement
Collection of Use Tax on Sales to Local Governments Statement
Acknowledgement of Project Labor Agreement Requirements
Time of Completion
Disclosure of Investment Activities in Iran

NEW JERSEY PREVAILING WAGE DETERMINATION DOCUMENTS

SS - STANDARD SPECIFICATIONS SS-1

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR AIA DOCUMENT A-101/2007
(Draft form until contract is awarded**)**

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A-201/2007
(Draft form until contract is awarded**)**

PROJECT DIVISION 1 SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

PROJECT TECHNICAL SPECIFICATIONS

COUNTY OF UNION
NOTICE TO BIDDERS

Sealed bids will be received by the director of the Division of Purchasing, or her designee, at the County of Union, New Jersey on April 11, 2017 at 10:30 a.m., prevailing time, in the 3rd Floor Conference Room, U.C. Administration Building, 10 Elizabethtown Plaza, Elizabeth, New Jersey for:

ASHBROOK GOLF COURSE CLUBHOUSE
TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
BA#9-2017; UNION COUNTY ENGINEERING PROJECT #2015-035

Bid Packages may be obtained at no charge by registering and downloading at http://ucnj.org/bid-specs. Bid Packages may also be obtained in person from the Division of Engineering at 2325 South Avenue, Scotch Plains, New Jersey 07076 between 8:30 a.m. and 4:00 p.m. weekdays upon payment of a non-refundable money order or bank check in the amount of $875.00 made payable to the County of Union. No Personal / Company checks will be accepted. Requests for mailing of specifications will not be honored. For further information please call 908-789-3675.

A **pre-bid meeting** will be held on March 14, 2017 at 10:30 am. The meeting will be located at Ash Brook Golf Course, 1210 Raritan Road, Scotch Plains, New Jersey. Specific questions regarding the project will be addressed at the pre-bid meeting.

Bidders on this project are required to be classified by the State of NJ, Division of Property Management and Construction (DPMC) under classification(s) # C008 as well as other documentary requirements in the INSTRUCTION TO BIDDERS found in the bid specification. If the Bidder himself does not have the required classification(s) as stated above, the Bidder must include and identify a subcontractor(s), of any tier, who has the required classification(s) in the List of Subcontractors.

Please note the successful bidder will be required to sign a *PROJECT LABOR AGREEMENT (PLA)* for this project. A PLA form is included in the bid package for your review. Further, take note of all documents referring to the PLA and any action required on same.

The County reserves the right to reject any and all bids and to waive any and all informalities in the bid.

Bids shall be submitted in a sealed envelope and clearly marked with the subject of the bid, name and address of the bidder, phone & fax number, and date of the bid opening. Each bid must be delivered to reach the Division of Purchasing prior to the stated time of the opening of the bids. The County will not be responsible for late delivery by the U.S. Mail or any other carrier. If hand delivered, please note that parking and security access at the County Complex may cause delays and bidders should take them into consideration in order to submit a timely bid. **No** late bids will be accepted.

Bidders are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.S.A.C. 17:27.

LAURA M. SCUTARI, QPA, MPA, DIRECTOR OF PURCHASING

UNION COUNTY BOARD
OF CHOSEN FREEHOLDERS

We're Connected to You!

UNION COUNTY BOARD OF CHOSEN FREEHOLDERS
INSTRUCTIONS TO BIDDERS AND FORMS

DEFINITIONS

Wherever reference is made to the County, Title of Project, Bidder, or Vendor/Contractor they shall be as follows:

OWNER/COUNTY:

Union County Board of Chosen Freeholders
UC Administration Building, 6th Floor
10 Elizabethtown Plaza
Elizabeth, New Jersey 07207

ADDRESS BIDS AND SUBMIT TO:

Union County Division of Purchasing
UC Administration Building, 3rd Floor
10 Elizabethtown Plaza
Elizabeth, NJ 07207
Attn: Laura M. Scutari, QPA, MPA, Director, Division of Purchasing
Telephone: 908-527-4130
Facsimile: 908-558-2548

TITLE OF PROJECT: ASHBROOK GOLF COURSE CLUBHOUSE
Township of Scotch Plains, County of Union, New Jersey
BA#9-2017; Union County Engineering Project #2015-035

BIDDER: Bidder shall be a single overall contract bidder

ARCHITECT/ENGINEER: Netta Architects

COUNTY ENGINEER AND/OR CONSTRUCTION MANAGER (as applicable):

COUNTY ENGINEER:
Thomas O. Mineo, P.E.
Union County
Division of Engineering
2325 South Avenue
Scotch Plains, NJ 07076
Office: (908) 789-3675
Facsimile: (908) 789-3674
Email: tmineo@ucnj.org

CONSTRUCTION MANAGER: Cumming Construction Management

GENERAL SPECIFICATIONS

1. BID FORM

Bids for this Work will be enclosed in a sealed envelope addressed to the Purchasing Division, County of Union, New Jersey, Union County Administration Building, 10 Elizabethtown Plaza, Elizabeth, New Jersey 07207, with the full name of the Project clearly marked on the outside. Refer to the sheet marked "Notice of Bid (Advertisement)" for the correct name of the Project. Bidders must submit their bids on the attached pricing sheet (Bid Form), in a sealed envelope addressed to the County and bearing on the outside: the name of the Bidder, Bidder's business address, and the title of the Project.

The Division of Purchasing will receive the bids for this Work at the Union County Administration Building, 10 Elizabethtown Plaza, Elizabeth, New Jersey on the date and time noted on the sheet marked "**Notice of Bid (Advertisement)**".

The County will not assume responsibility for bids forwarded by mail. It is the individual's responsibility to see that the bids are presented to the Purchasing Division at the time and at the place designated.

Bids will be accepted only on the Bid Form supplied. Bids on forms other than the original supplied herein will be rejected. The "complete" Bid Documents includes the Bid Bond, Bid Form, Bidder's Checklist, Consent of Surety, Ownership Disclosure Certification, Non-Collusion Affidavit, and any other documents noted in these Instructions to Bidders or Contract Document to be submitted with this Bid. (See AIA Owner/Contractor Agreement & General Conditions attached.)

The bidder will state in the bidding sheet the price per unit of measure for each scheduled Item of Work for which he will agree to carry out the Work, and the Total Bid Price for the construction of the Project.

The prices in the Bid Form shall be typed or written in pen and ink. Erasures or alterations must be initialed by the bidder in ink.

The bidding sheet for this Project may include a fixed amount as a Bid Allowance. If applicable, all bidders are required to add this fixed amount to their base bid and to include this additional amount in their Bid Bond. This sum will be included in the Contract as well as the performance, labor and materials bond. Payment by the County will be made to the Contractor from these funds only upon the completion of extra Work pursuant to a written Change Order(s) signed by the County's Engineer or his designee and the Contractor, prior to the commencement of such Work. Work commenced prior to written approval by the County shall be done at Contactor's risk. Such payment will only be in the amount agreed to by the parties, in writing in the

Change Order(s). See Section 39, Change Orders, of these general specifications for further details.

Refer to Bid Document Submission Checklist for all required documents.

In the event there is a discrepancy between the unit price given and the extended total, the unit price will govern. Any discrepancies will be mathematically adjusted.

Insert applicable alternates, if any have been specified, applicable to the Bidder's Work. All alternates MUST be bid upon. Any Bidder's failure to do so will be deemed a material, non-waivable defect and shall render the bid nonresponsive. The Bidder shall clearly designate whether the change in price is an addition or subtraction, by using either a "+" sign or the word "addition", or in the alternative, a "-"sign or the word "minus". If there is no other change in price, the Bidder shall insert "NC" or "No Charge".

When two or more low bids are equal in all respects, awards will be made according to the provisions of N.J.S.A. 40A:11-6.1(d).

Where unit prices have already been established by the Contract Documents, the Bidder agrees that such unit prices shall prevail. All unit prices, whether filled in by the Bidder or established by the Contract Documents, shall become part of the Contract. No bid will be considered or award made, unless applicable unit prices, as required, are filled in.

The County reserves the right to reject any or all bids and also reserves the right to waive any informality in the bids received so long as said waiver is not of a response which is considered to be material and non-waivable pursuant to law.

The County of Union has the right to reject any and all bids from any bidder that is in, or contemplates bankruptcy of any chapter of nature. Said bidder shall notify the County, in writing, of any condition or knowledge of the same.

Conditional bids will not be accepted. Bids may be withdrawn prior to the advertised time for the opening of bids or authorized postponement thereof or in accordance with the provisions of N.J.S.A. 40A:11-23.3 discussed below. Bids received after the advertised time shall not be considered. Bidders shall be solely responsible for premature opening or late delivery of bids not properly marked, addressed, or directed.

2. WITHDRAWAL OF BID DUE TO MISTAKE

N.J.S.A. 40A:11-23.3 authorizes a bidder to request withdrawal of a public works bid due to a mistake on the part of the bidder. A mistake is defined by N.J.S.A. 40A:11-2(42) as a clerical error that is an **unintentional and substantial computational error**

or **an unintentional omission of a substantial quantity of labor, material, or both, from the final bid computation.**

A bidder claiming a mistake under N.J.S.A. 40A:11-23.3 must submit a request for withdrawal, **in writing,** by certified or registered mail to Michael M. Yuska, QPA, Director, Division of Purchasing, County of Union, New Jersey, Union County Administration Building, 10 Elizabethtown Plaza, Elizabeth, New Jersey 07207. The bidder must request withdrawal of a bid due to a mistake, as defined by the law, within five business days after the receipt and opening of the bids. Since the bid withdrawal request shall be effective as of the postmark of the certified or registered mailing, Michael M. Yuska, QPA, Director of the Division of Purchasing or his designee may contact all bidders, after bids are opened, to ascertain if any bidders wish to, or already have exercised a request to withdraw their bid pursuant to N.J.S.A. 40A:11-23.3.

A bidder's request to withdraw the bid **shall** contain evidence, including any pertinent documents, demonstrating that a mistake was made. Such documents and relevant written information shall be reviewed and evaluated by the County's designated staff pursuant to the statutory criteria of N.J.S.A. 40A:11-23.3.

The County will not consider any written request for a bid withdrawal for a mistake, as defined by N.J.S.A. 40A:11-2(42), by a bidder in the preparation of a bid proposal unless the postmark of the certified or registered mailing is within the five business days following the opening of bids.

3. QUALIFICATIONS OF BIDDERS AND REQUIRED SUBMISSIONS

The County may make such investigation as it deems necessary to determine the ability of the Bidders to perform the Work, which includes investigation of any and all subcontractors listed with the bid. The Bidder shall furnish any information and data for this purpose as the County may request.

4. INTERPRETATIONS AND ADDENDA

Any explanation desired by a bidder regarding the meaning or interpretation of the Contract Documents must be requested in writing to the County Engineer or Design Professional as the case may be and with reasonable time allowed for a reply to reach bidders before submission of their bids. Any interpretation or instruction made by the County Engineer will be in the form of an addendum to the Contract Documents or clarification and will be furnished to all prospective bidders. Oral explanations or instructions given before the award of the Contract will not be binding. Bidders are required to bring to the attention of the County Engineer, the discovery of any apparent ambiguity, inconsistency, error, discrepancy, omission in the Contract Documents for interpretation and correction at least ten (10) working days before opening of bids with the exception of Saturdays, Sundays and holidays.

All Addenda issued through the Offices of the County Engineer are amendments to the Contract Documents and shall be considered in preparing bids. Same shall become part of the Contract Documents.

Addenda take precedence over all earlier documents and over each other according to the latest date. Addenda unless themselves interpretive remain subject to interpretation the same as any other document incorporated in the Contract.

Addenda may be issued by the County Engineer up to seven (7) working days prior to the opening of bids. Failure of any bidder to receive an addendum shall not relieve such bidder from the obligation imposed by such addendum. Bidders are to keep themselves currently acquainted with the Contract Documents during the entire bidding period and make inquiry on their own initiative as to issuance of any Addenda. Receipts of all Addenda shall be acknowledged on the "*Acknowledgement of Receipt of Changes*" included in the bid package and must be submitted with the bid.

5. OBLIGATION OF BIDDER TO INSPECT SITE AND CONTRACT DOCUMENTS

At the time of the opening of bids, each Bidder will be presumed to have inspected the site(s) and to have read, and be thoroughly familiar with the Contract Documents. The failure or neglect of any Bidder to receive or examine any form, instrument, or document shall in no way relieve any Bidder from any obligation in respect to its bid.

The Bidder shall examine the contents of the Project Manual and the set of Drawings and assure itself that all pages of the Specifications, Drawings, and other Contract Documents are included in the documents obtained for bidding purposes. Should the Specifications, Drawings, and other Contract Documents be incomplete, the Bidder shall notify the County Engineer in writing, who will supply the Bidder with any missing pages of Specifications, Drawings, or other Contract Documents. The lack of such written notification by the Bidder will be construed as evidence that the Specifications, Drawings, or other Contract Documents supplied it for bidding purposes are full and complete and as a waiver of any subsequent claim to the contrary.

6. BID AND PERFORMANCE GUARANTEE

Each bidder must furnish a Bid Bond, Certified Check or Bank Cashier's Check in the amount of ten percent (10%) of the Bid. Checks shall be drawn to the order of the County of Union, New Jersey, not to exceed $20,000.

Each bidder must furnish with the bid a certificate from a Surety Company, i.e. Consent of Surety, stating that in the event of the contract being awarded to said bidder, such Surety Company will provide the Contractor with Bonds guaranteeing the faithful

performance of the Work in accordance with the plans and specifications, and the payment for labor, materials, and all other indebtedness which may accrue on the account of this Work. A Performance, Labor and Materials bond will be furnished by the Contractor upon an award of Contract, and will be in the amount of 100% of the contract price.

A one-year Maintenance Bond will be required upon acceptance of the Project by the County in the amount as stated in Section 17 of the General Specifications. Bonds will be written by a firm authorized to issue the bonds under the laws of the State of New Jersey and be in a form acceptable to the County Counsel.

N.J.S.A. 40A:11-1.1 et. seq. allows the prime Contractor to furnish the Performance Security for his Subcontractors. The County of Union requires Performance Security to be furnished by the prime contractor for the entire job in the total amount of the contract.

The County of Union shall award the contract or reject all bids within sixty (60) days; except that the bids of any bidders who consent thereto may, at the request of the County be held for consideration for such longer periods as may be agreed.

The County will return all certified checks or cashier's checks after the proposals have been opened, read, tabulated and checked except those of the three (3) bidders who have bid the lowest total price for carrying out the Project. The County will return the checks of these bidders when a contract is awarded to the successful bidder within ten (10) days after the award of the contract.

If the successful bidder refuses or neglects to sign the said Agreement and furnish the required bonds, the Bid Bond will be held and used by the County to offset any damages for such refusal or neglect.

7. COMMENCEMENT AND COMPLETION

Work will not commence until a Notice to Proceed is received from the County Engineer.

Upon substantial completion of the Project, the Contractor must request a joint inspection with the County Engineer. Upon completion of this inspection, the County Engineer will prepare a list of incomplete or incorrect items (punch list) and have Contractor initial and date same. The Contractor shall rectify all deficiencies noted on the punch list within 30 calendar days of receipt of the list. The County Engineer may approve extensions for extenuating circumstances.

8. BIDDER AFFIDAVIT

All Bidders are required to complete, sign, and submit with their Bid, the attached "Affidavit Regarding List of Debarred, Suspended or Disqualified Bidders". (See form enclosed)

9. CLASSIFICATION AND QUALIFICATION OF BIDDERS

Pursuant to Ordinance Number 557-2002 as adopted by the County on September 5, 2002, all bidders on contracts for public works shall be classified and qualified in accordance with NJSA 40A:11-25 as well as NJSA 52:35-1 et. seq. (See Section 52 of the General Specifications)

This provision shall not apply to subcontractors.

10. UNCOMPLETED CONTRACTS (BUILDING PROJECTS ONLY)

The Bidder shall submit a current Classification/Prequalification Certificate and accompanying form(s) indicating the dollar amount of uncompleted contracts, and a notarized and itemized list of these uncompleted contracts in the form provided, with their bid. (See form enclosed)

11. BID SECURITY

All Bidders are required to submit a form of Bid Security with their bids.
(Bid Bond or Certified Funds)

The Bid Security shall be in the amount of ten percent (10%) of the Bid, but not in excess of Twenty Thousand Dollars ($20,000.00), and payable to the order of the "County of Union."

12. LABOR AND MATERIALS

The prices will cover all costs of any nature incident to and growing out of the Work, including all labor, material, equipment, transportation, loss by damage or destruction of the Project, settlement of damages, and for replacement of defective work or materials. N.J.S.A. 54:32B-1 et seq. exempts all materials sold to the County of Union from sales or use taxes and should not be included in the prices provided on the Bidding Sheet.

13. INSURANCE REQUIREMENTS

The County of Union requires all contractors to be able to comply with the following insurance requirements. In the event a bid is accepted by the County, the contractor must accept the applicable insurance requirements, as set forth below, as part of any contract awarded to it by the County.

Contractor shall carry and maintain at all times while the contract is in full force and effect, the following insurance coverage with an insurance company or companies acceptable to the County, with limits not less than those shown below. A Certificate of Insurance, shall be filed with the County prior to commencement of any Work indicating the following:

a) Commercial General Liability (CGL): Coverage for all operations including, but not limited to, contractual, products and completed operations, and personal injury with limits no less than $5,000,000 per occurrence/$10,000,000 aggregate. The County of Union, its Board of Chosen Freeholders, officers, employees, agents and servants shall be included as an additional insured. Coverage is provided on a primary and on-contributory basis to the County of Union, et al.

b) Automobile Liability: Coverage for all owned, non-owned and hired vehicles with limits not less than $5,000,000 per occurrence, combined single limits (CSL) or its equivalent.

c) Workers Compensation: As required by the State of New Jersey and Employers Liability with limits not less than $1,000,000 per accident for bodily injury or disease.

d) Professional Liability (if design/build): Coverage with limits not less than $1,000,000 per occurrence or claim, $2,000,000 aggregate

e) Contractor's Pollution Legal Liability and/or Asbestos Legal Liability and/or Errors & Omissions (if project involves environmental hazards): Coverage with limits no less than $1,000,000 per occurrence or claim/$2,000,000 aggregate.

f) Builders Risk (for major renovations): During the course of construction utilizing an "All Risk" coverage form with limits equal to the completed value of the project and no coinsurance penalty provisions.

Where applicable, a waiver of subrogation in favor of the County of Union, its Board of Chosen Freeholders, officers, employees, agents, servants and the State of New Jersey is to be included in those policies of insurance where permitted by law.

Notice of Cancellation: Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the Entity.

Special Risks or Circumstances: The County reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

14. INDEMNIFICATION REQUIREMENTS

The County of Union requires all bidders to accept the following indemnification requirements in the event the County accepts their bid. The Contract awarded by the County to the successful bidder will contain the following provision:

> "To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the owner and the owner's consultants, agents, representatives, and employees from and against any and all claims, damages, losses, costs, and expenses, including, but not limited to attorneys' fees, legal costs and legal expenses arising out of or resulting from the performance of the Contractor's work under this contract, provided that such claim, damage, loss, cost, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) caused or alleged to be caused by the negligent acts, negligent omissions, and/or fault of the Contractor, anyone directly or indirectly employed or retained by the Contractor, or anyone for whose acts the Contractor may be liable regardless of whether caused in part by the negligent act or omission of a party indemnified hereunder provided it is not caused by the sole negligence of a party indemnified hereunder. Contractor shall further indemnify and hold harmless the County and the County's consultants, agents, representative, and employees from and against any and all claims, damages, losses, costs, and expenses, including, but not limited to attorneys' fees, legal costs and legal expenses, arising out of or resulting from performance of the work, provided that such claim, damage, loss, cost, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) caused or alleged to be caused by the negligent acts, negligent omissions, and/or fault of the County or the County's consultants, agents, representatives, or employees and arises out of this project and provided such claim, damage, loss, cost, or expense is not caused by the sole negligence of a party indemnified hereunder."

15. ROYALTIES AND PATENTS

The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall hold the County harmless from loss on account thereof.

16. PLANS AND SPECIFICATIONS

In carrying out the Work, the plan(s) and the specifications will be followed by the Contractor. Minor alterations in the plan may be made or permitted by the County Engineer from time to time and, if no additional Work is necessary, there will be no additional charge for carrying out such minor alterations.

The Contractor shall provide the County Engineer a set of reproducible as-built drawings upon completion of the Project. The Contractor shall maintain an updated construction progress plan in the Project field office at all times.

When applicable, The New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, as amended, and Supplemental Specifications for State Aid Projects, herein after referred to as the "Standard Specifications", are made a part of these specifications and contract for the improvements, and will govern the construction of this Project, the material used and the execution of this Project, except as revised and modified herein. The references to these specifications are given herein for the purpose of aiding in the rapid location of the description of the various items herein specified. The entire Work must be carried on and completed to the satisfaction of the County. The Standard Specifications are amended as follows:

> "Any reference to the Commissioner, Department, Department Laboratory, Engineer or Inspector should be redefined to be the County of Union".

17. GUARANTEE AGAINST DEFECTIVE WORK

Prior to final payment being made or before the release of the performance security required by Section 3 above, the Contractor and Surety shall execute and deliver to the County an original Maintenance Bond with an original signature and seal having a penal sum equal to:

A) One hundred percent (100%) of the final adjusted Contract amount, if such amount is $50,000.00 or less;
B) Fifty percent (50%) of the final adjusted Contract amount, if such amount be greater than $50,000.00 but less than $250,000.00; and,
C) Twenty-five percent (25%) of the final adjusted contract amount, if such amount is $250,000.00 or more.

The Bond and Surety shall be satisfactory to the Union County Counsel. The Surety shall hold a Certificate of Authorization to do business in the State of New Jersey and shall conform to P.L. 1995 c.384, codified as N.J.S.A. 2A:44-143, 144. The Surety Disclosure Statement and Certification required by N.J.S.A. 2A: 44-143, 144, shall be attached to the Bond. Such Maintenance Bond shall remain in full force and effect for a

period of one (1) year from the date of Final Completion. Such Maintenance Bond shall also provide that the Contractor and the Surety guarantee to replace for the said period of one (1) year from the date of Final Completion, all Work performed and/or all materials furnished that were not performed or were not furnished in accordance to the terms and performance requirements of the Contract Documents, and will make good any defects thereof which become apparent before the expiration of one (1) year. If, during that period, any part of the Project, in the judgment of the Engineer, is found defective, the Contractor will repair or replace same within five (5) days of receipt of notice from the County Engineer. If the Contractor refuses or neglects to do such Work in the time specified, the County Engineer may have the Work done by others and the Contractor or his Surety thereof will pay the cost.

The Contractor will furnish the County a Maintenance Bond for a percentage of the final adjusted contract price, as stated above. The one (1) year period will start the day of Final Completion of Project by the County. Final payment is conditional on the receipt of a maintenance bond in a form acceptable to County Counsel.

18. TRAFFIC AND STREET MAINTENANCE

The Work must be started and performed by the Contractor in such a manner as to minimize delays to the traveling public. It must be completed in a timely fashion, with little or no inconvenience to traffic and pedestrians, where such inconvenience may be avoided.

All municipal, county, and state roadways shall remain open to traffic unless otherwise provided for in the technical specifications.

If modified traffic patterns are authorized in order to provide a safe working or traveling environment, the Contractor is responsible for providing all equipment, barrels, cones, signs, and barricades to implement the work zone and detours, unless otherwise specified in the technical specifications. All work zones and detours shall be established in accordance with the technical plans and specifications if provided or in strict compliance with the current version of the Manual for Uniform Traffic Control Devices (MUTCD). The Contractor shall obtain approval for these work zones and detour plans from the Municipal Police or applicable police agency and the Union County Bureau of Traffic Maintenance prior to implementation.

All traffic control plans shall provide for safe movement of vehicular, bicycle, and pedestrian traffic. Particular attention shall be given to requirements of the Americans with Disabilities Act.

No portion of any street or alleyway may be used for the storage of any materials or equipment without the approval of the Municipal Police or other applicable police

agency. Sidewalks, gutters, drains, fire hydrants and private drives shall be maintained for their intended use unless specifically approved by the County Engineer.

Upon suspension of Work, at the end of the day or for protracted periods, the Contractor shall remove all rubbish and materials from the Work site to the approved storage/staging location. All road cuts, saw cuts, and trenches that may pose hazard to vehicular, pedestrian, or bicycle traffic, to include handicapped users, shall be filled to the surface of the roadway or sidewalk. At no time will steel plates or settled trenches be allowed at the daily suspension of Work, unless specifically approved by the County Engineer.

Use of Traffic Control Officers shall be determined by the County in accordance with the provisions of N.J.S.A. 40A:11-23.1(c). If applicable to the Project, the County shall have provided an allowance for same as set forth in the Bid Form.

With respect to pedestrian traffic, the Contractor shall install signs restricting access of the general public and, as necessary, Union County employees to the area of construction. The Contractor shall provide safe access to required areas and place physical barriers to restricted areas. These barriers may range from caution tape to actual barriers, at the direction of the County Engineer.

19. CONTRACTOR'S EMPLOYEES

The Contractor must employ only suitable and competent labor in the Work, and must remove from the Work any incompetent, unsuitable, or disorderly person upon complaint from the County Engineer.

The parties to any contract resulting from this proposal do hereby agree that the provisions of N.J.S.A. 10:2-1 through 10:2-4 (discrimination in employment on public works contracts): 34:11-56.25 et seq. (payment of prevailing rate of wages determined pursuant to N.J.S.A. 34:11-56.30 by the Commissioner), and the Rules and Regulations promulgated pursuant thereto, are hereby made a part of any contract and are binding upon them.

There will be no discrimination against any employee who is employed in the Work to be covered by any contract resulting from this bid because of age, race, creed, color, national origin, ancestry, marital status or sex.

Any person, firm, or corporation violating the provisions of this Section will be deemed and judged a disorderly person.

20. OWNERSHIP DISCLOSURES REQUIRED

Pursuant to P.L. 1977, N.J.S.A. 52:25-24.2, the Bidder shall submit with its Bid, or prior to receipt of bids, a statement setting forth the names and addresses of all stockholders in the corporation or partnership bidding who own ten percent (10%) or greater interest therein. (See forms attached)

21. NON-COLLUSION AFFIDAVIT

The Bidder shall submit with its bid either the attached completed "Non-Collusion Affidavit" or a statement of non-collusion with verbiage similar to same.

22. EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCES

The successful bidder shall be required to complete and submit an Initial Project Workforce Report, New Jersey Department of Treasury Form AA-201, upon notification of award. Failure to submit this completed form may result in the Contract being terminated.

The successful bidder shall also be required to submit a copy of its Monthly Project Workforce Report, New Jersey Department of Treasury Form AA-202, to the New Jersey Department of Treasury's Division of Public Contracts Equal Employment Opportunity Compliance and to the Board.

23. COMPLIANCE WITH NEW JERSEY PREVAILING WAGE ACT

The County of Union, in order to fulfill the requirements of N.J.S.A. 34:11-56a.25 et seq, requires that the following additional conditions be strictly followed. The bidders represent that he is not listed or is not on record in the Office of the Commissioner or the Department of Labor and Industry as one who failed to pay prevailing wages in accordance with the provisions of this Act. The bidder agrees to the inclusion of a contract provision upon award which specifically requires said Contractor to fully comply with each and all of the requirements of the aforesaid Act as it relates to prevailing rates of wages on public contracts as set forth in the New Jersey Prevailing Wage Act, P.L. 1963, Chapter 150 and P.L. 1974, Chapter 64.

A Copy of the Prevailing Wage Rates is attached for your reference. Applicable rates are those wages and fringe benefit rates in effect on the date the contract is awarded. All predetermined rate increases listed at the time the contract award must also be paid, beginning on the dates specified. Rates may change between the time of issuance of this determination and the award of the public works contract. Therefore, prior to the award of the contract, verification must be made with the Public Contracts section, to insure that the rates contained in this determination are still prevailing.

The Contractor agrees to abide and be bound by each and all of the said statutory provisions with respect to the payment of prevailing rates of wages, and acknowledges that the County reserves the right to terminate the Contractor's (or his subcontractors') right to proceed with the scope of Work, or such portion thereof that relates to the failure to pay prevailing rates of wages. In such event or under the terms of N.J.S.A. 34:11-56.27, the Contractor and his surety will be liable to the County of Union for any excess costs occasioned by such a violation.

The Contractor or subcontractors for this Project will post the Prevailing Wage Rates for each craft and classification involved as determined by the Commissioner of Labor and Industry, including the effective date of any changes thereof, in prominent and easily accessible places at the site of the Work or at such place or places as are used by them to pay workmen their wages.

The County of Union requires a copy of payroll records from the Contractor and subcontractors. Payroll records shall be submitted with each voucher request for payment. Prevailing wage rates may be obtained from the New Jersey Labor, Division of Workplace Standards, Public Contracts Section, (609-292-2259).

In addition to compliance with the New Jersey Prevailing Wage Act, the County requires compliance with Resolution No. 2014-0408 adopted by the Board of Chosen Freeholders on MAY 8, 2014. The resolution is furnished in Section 53 of these General Specifications.

UNION LABOR IS PREFERRED ON ALL COUNTY WORK AND, WHERE NOTED, SUBJECT TO A PROJECT LABOR AGREEMENT TO BE EXECUTED BY THE CONTRACTOR AND CONSTRUCTION MANAGER PRIOR TO COMMENCEMENT OF THE WORK. FAILURE OF ANY CONTRACTOR TO COMPLY WITH THIS PROVISION CONSTITUTES A DEFAULT, RESULTING IN IMMEDIATE STOPPAGE OF THE WORK. ANY LOSSES OR OTHER DAMAGES INCURRED BY OTHER PARTIES AS A RESULT OF SAID DEFAULT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. (See Section 56)

The foregoing reference to specific laws will not be deemed to be a limitation of obligation of the Contractor to perform his obligations in full compliance with the provisions and requirements of all federal and state statues and local ordinances applicable to the Work to be done under the contract.

It is agreed and understood that any contracts and/or orders placed as a result of this proposal will be governed and construed and the rights and obligations of the parties hereto will be determined in accordance with the laws of the State of New Jersey.

Upon completion of the Work, the Contractor will furnish a Certification of Compliance with the New Jersey Prevailing Wage Act. The certificate in a form acceptable to County Counsel is a condition of the final payment. (See form attached)

24. BRAND NAME OR EQUAL

When the Specifications, Forms, and other Contract Documents use "brand name or equivalent" or similar language, the listed brand name shall serve as a reference or point of comparison for the functional or operational characteristic desired for the goods or services being requested. Where a bidder attempts to submit an equivalent product for a brand name, it shall be the responsibility of the bidder to fully describe and document the product to be provided with the bid in order to establish the equivalence claim.

A. If the Bidder proposes to offer substitute goods as an equal to those specified herein, the bidder shall so indicate with the Bid Proposal. For the purposes of this paragraph, a proposed item shall be considered equal to goods specified herein if:

1. The County, in its sole discretion, determines that: (i) the goods conform substantially, even with deviations, to the brand name goods specified herein; (ii) the goods are equal to or greater than the brand name goods specified herein in terms of quality, durability, functionality, appearance, strength and design; (iii) the goods are capable, at least as well as the brand name goods specified herein, or performing with existing equipment; and (iv) the goods do not cost the County more than the brand name goods specified herein costs the County.

B. To offer substitute goods as an equal to those specified herein, it is necessary that:

1. The Bidder submits sufficient information with its bid to permit the County to determine that the goods are equivalent to the brand name goods specified herein, including, but not necessarily limited to the brand, catalog number and specifications/data sheets;

2. The Bidder fully identifies and describes the variations of the goods from the brand name goods specified herein on a separate sheet that is to be submitted with the bid proposal. Bidder's literature WILL NOT suffice in explaining exceptions to these specifications.

3. The Bidder certifies that the goods (i) are similar in substance to the brand name goods specified, and (ii) are suited to the same use as the item specified;

C. The County shall be allowed a reasonable time within which to evaluate the Bidder's proposal to offer substitute goods as an equal to those specified herein. The County shall be the sole judge of acceptability. No "or-equal" goods shall be ordered, delivered, assembled, set-up or utilized until the County's evaluation is complete. The County's determination as to equivalency shall be deemed final and absolute.

In the event the Bidder does not provide sufficient supporting documentation with the bid, it will be presumed and required that the brand name goods and services as described in the specifications will be provided.

25. LINES AND GRADES

Normally, horizontal and vertical control points will be provided in the technical specifications. All other surveying will be the responsibility of the Contractor unless otherwise noted.

26. NUMBER OF WORKING DAYS

In accordance with NJSA 40A:11-17, the Work for the within Project shall be completed as specified on the Time of Completion Form. See form attached.

There shall be taken a deduction from the contract price, or any wages paid by the County, to any inspector(s) necessarily employed by it on the Work, for any number of days in excess of the number allowed in the specifications.

27. PROMPT PAYMENT OF CONSTRUCTION CONTRACTS (NJ Prompt Payment Act)

Pursuant to NJSA 2A:30A-1 et. seq., payment to the Contractor, other than for Work done pursuant to a contact allowance, where applicable, shall be processed and paid as follows:

1. All contractor bills shall be either approved for payment, or notice provided as to why the bill or any portion of it will not be approved by the representative(s) of the governing body no later than the public meeting following 20 calendar days of the billing date as defined in the statute.

2. If the billing is approved, said bill shall be paid in the payment cycle following the meeting.

28. STOPPING WORK ON ACCOUNT OF BAD WEATHER

Work must only be performed in weather suitable for the type of construction planned or underway. Extremes in temperature, humidity, precipitation, evaporation, etc. can detrimentally affect the constructed product. Refer to the Standard and Technical Specifications for specific items.

29. ACCESS FOR OTHER CONTRACTORS

The Contractor for this Work will give proper access to other contractors who may be employed upon the Project and must not hinder or delay unnecessarily any Work that may be progressing under other contracts.

30. CONDEMNED MATERIALS AND WORK

Any materials and or part of the Work that may be condemned by the County Engineer will be removed and replaced by the Contractor or otherwise rectified, as may be directed by the County Engineer. No payment will be made upon the Work until such faulty work has been made good as may be directed. In the event the Contractor refuses or neglects to make good such faulty work, he will be deemed to have abandoned the contract and proceedings may be taken against him as provided herein.

31. STORAGE

In the event that it is necessary for the Contractor to stockpile or store materials or equipment on the job site, the Contractor shall inform the County of such necessity and the County may offer available space, if any, for storage of such materials or equipment. The Contractor shall use said space only for such purpose. Any and all materials which may be stored in such space or which may be brought onto the job site at any time by the Contractor will be at the Contractor's sole risk. The County will not be responsible for loss of or damage to said materials or equipment for any cause whatsoever. The Contractor shall take necessary measures to protect any such storage area and shall be responsible for any and all damages.

32. FINAL CLEAN UP

Upon completion of the Work, the Contractor will remove all equipment, unused materials, rubbish, etc., and will repair, or replace in an a manner acceptable to the County Engineer, all areas that may have been damaged in the prosecution of the Work. Same shall be a condition precedent to final payment. Should said Contractor

fail to comply with this requirement, the County shall undertake the clean-up with its own forces and charge the cost of same against the Contractor's contract balance.

33. SUB-LETTING OF WORK

Except for the List of Subcontractors, pursuant to NJSA 40A:11-16 (See form attached), no portion of the Work will be sublet by the Contractor to any other entities, except with the consent of the County Engineer. A complete list of subcontractors must be submitted to the County Engineer at the preconstruction meeting. If the job does not warrant a preconstruction meeting, the Contractor must submit such list prior to the start of Work.

All Subcontractors will be subject to NJSA 34:11-56 et al.

N.J.S.A. 40A:11-16 requires the bidder to list in the bid sheets the name or names of all subcontractors involved in the following types of Work: plumbing and gas fitting and all kindred work, steam and hot water heating, ventilating apparatus, steam power plants and kindred work, electrical work, ornamental iron work, and structural steel. In addition, the County may require the identification of specific additional subcontractors. If these trades are expected to be part of the contract, such subcontractors should be listed on the "Subcontractor Identification Statement List of Subcontractors" and Bidder shall certify same on the accompanying sheet titled "Subcontractor Identification Certification". (See forms attached) **Bidder's failure to submit these two forms shall be considered a material defect and result in rejection of Bidder's bid.** Substitutions of any listed subcontractors pursuant to NJSA 40A:11-16 will not be permitted except with the consent of the County Engineer.

34. SAFETY

The Contractor shall observe all rules and regulations of the Federal, State, and local health officials. Attention is directed to Federal, State, and local laws, rules, and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to the worker's health or safety.

The Contractor shall admit to the site, without delay and without the presentation of an inspection warrant, any inspector of OSHA or other legally responsible agency involved in safety and health administration upon presentation of proper credentials.

The Contractor shall make available to the Contractor's employees, subcontractors, the County Engineer, and the public, all information pursuant to OSHA 29 CFR Part 1926.59 of The Hazard Communication Standard 29 CFR 1910.1200, and shall also maintain a file on each job site containing all Material Safety Data Sheets (MSDS) for products in use at the Project. These Material Safety Data Sheets shall be made available to the Engineer upon request.

The Contractor shall at all times conduct the Work to provide for the safety and convenience of the general public and protection of persons and property. The safety provisions of applicable laws, OSHA regulations, building and construction codes, and the rules and regulations of the New Jersey Department of Labor and Commerce shall be observed.

35. QUALITY, SAFETY AND PERFORMANCE STANDARDS

All goods and services must be constructed and provided with the highest quality materials and workmanship. It is the intent of these specifications that only equipment equal to, or exceeding, the standard specified will be acceptable in order to protect the safety of the occupants of the Building.

36. MATTERS NOT MENTIONED IN CONTRACT DOCUMENTS

Any Work, material, or method, not specifically described in these specifications, but shown upon the plans of the Work, will be carried out as shown on said plan.

37. PERMITS

The Contractor will obtain all necessary permits required by law and provide the County with necessary approvals prior to commencement of permitted Work.

38. CONTRACTOR TO PROVIDE PROOF OF PAYMENT

Upon the completion of the Work, the Contractor will furnish a General Release as proof that all claims for labor, materials, etc., have been settled by the Contractor. The General Release, in a form acceptable to County Counsel, is a condition of final payment.

39. CHANGE ORDERS

Change Order Procedures shall comply with *N.J.A.C.* 5:30-11.1 *et seq.*, “Change Orders and Open End Contracts” and subsequent provisions of the New Jersey Administrative Code.

40. SUPPLEMENTAL WORK

In case any supplemental work is necessary, it will be performed by the Contractor at a price fixed by agreement between the Contractor and the County Engineer and approved by the County as specified in Section 38. The Contractor will do no supplemental work on any character, for which the Contractor will demand pay, except upon the written order of the County.

41. FORM OF CONTRACT

Contracts will be let on the attached Form of Agreement Between County ("Owner") and Contractor (AIA 101), and General Conditions (AIA 201), as supplemented.

The Contract will be subject to all statutory provisions on the matter of Public Works, Public Contracts, The Law Against Discrimination, the Laws Governing Affirmative Action and Prevailing Rates of Wages under the laws of New Jersey.

The Agreements shall be executed by both parties not later than twenty-one (21) days from the date of the award by the County (Sundays and holidays excluded); however, such time frame may be extended by agreement of the parties.

42. PROGRESS PAYMENTS

Monthly progress payments will be made based on the value of labor and materials incorporated in the Work and of materials suitably stored at the site. An itemized schedule of values shall be submitted with each Application for Payment.

(Refer to the Owner/Contractor Agreement for Retainage and other conditions pertaining to payment and the application of NJSA 2A:30A-1 et. seq.)

All Applications for Payment shall be accompanied by paid invoices for materials incorporated in the Work and for materials suitably stored at the site, and affidavit(s) by Subcontractors whose Work was included in the next to the last application to the effect such Work and such materials have been paid for.

No payment shall be made without Contractor having provided all submittals set forth in this Section, and the approval of same by the County.

For contracts exceeding $100,000.00, monthly payments will be made on the Work to the extent of 98% of the value of the Work done which is considered to be retainage.

For contracts less than $100,000.00, monthly payments will be on the Work to the extent of 90% of the value of the Work done. In lieu of the retainage, the Contractor will, at his option, deposit with the County Counsel negotiable bearer bonds of the State of New Jersey or any political subdivision thereof, equal to the amount otherwise withheld as retainage.

When the Project is completed, the final cost of the Project will be based on actual quantities of authorized Work done under each item scheduled in the bidding sheet and approved Change Orders, if any. The money due to the Contractor as

determined by said final certificate after deduction of previous monthly payments on account, will be paid to the Contractor in accordance with the terms of the contract dealing with Prompt Payment, providing, however that before such final payment is made, all outstanding claims against the Contractor must be satisfied. Before final payment is released, the Contractor must furnish: a**)** Maintenance Bond (see Section 17 of these general specifications); **b)** Certification of Compliance, New Jersey Prevailing Wage Act (see Sections 23 & 51); and **c)** General Release (see Section 38) in a form satisfactory to County Counsel; **d)** complete set of as-built plans in the latest AutoCad on compact disc; and e) a complete set of in-progress photos in jpg, jpeg, or bmp digital format on a compact disc.

43. INSPECTION

The Work must be done in accordance with the plans and specifications, and will be inspected by the County Engineer. An inspector may be placed upon the Work at any time by the County Engineer to see that the plans, specifications, and instructions of the County Engineer are carried out. In connection herewith, bidders are referred to N.J.S.A. 40A:11-17.

44. DAMAGES

The Contractor will be held responsible for all damages that may occur to Work, or to persons or property by reason of the nature of the Work or from the elements, or by reason of inadequate protection of the Work, or from any carelessness or negligence on his part or on the part of his employees. The County will withhold payments on the Work until all suits or claims for damages sustained on, or by reason of, this Work will have been settled by the Contractor.

The construction and final completion of this Work will be guaranteed by the Contractor. Any damages that may be done to the Work or any part thereof, by the elements or otherwise, during its construction, will be made good by the Contractor.

45. LIQUIDATED DAMAGES

If the Project is not completed within the time specified herein or within such further time as may have been granted by the County Engineer, then the Contractor hereby agrees to pay to the County as liquidated damages, but not as a penalty, $1,000.00 per day for each and every calendar day that he is in default on time to complete the Work. The said sum will be deducted from moneys due the Contractor and if the damages exceed this amount, then the Contractor or his Surety Company will pay the excess. These damages may be waived at the option of the County.

46. AFFIRMATIVE ACTION REQUIREMENTS

EXHIBIT B
(Revised 4/10)

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127)
N.J.A.C. 17:27

CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, up-grading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. l7:27-7.2; provided,

however, that the Division may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B and C, as long as the Division is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Division, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. l7:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

(l) To notify the public agency compliance officer, the Division, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;

(2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;

(3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;

(4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment

Service and other approved referral sources in the area;

(5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;

(6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:

(i) The contactor or subcontractor shall interview the referred minority or women worker.

(ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Division. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.

(iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Division, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.

(iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Division.

(7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Division and submitted promptly to the Division upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such

agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Division an initial project workforce report (Form AA 201) electronically provided to the public agency by the Division, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Division and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the-job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Division of Public Contracts Equal Employment Opportunity Compliance as may be requested by the Division from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Public Contracts Equal Employment Opportunity Compliance for conducting a compliance investigation pursuant to **Subchapter l0 of the Administrative Code (NJAC 17:27).**

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47. INVESTMENT ACTIVITIES WITH IRAN

Pursuant to P.L. 2012, c.25, codified as NJSA 52:32-55 *et seq*., prohibits State and local public contracts with persons or entities engaging in certain investment activities in energy or finance sectors of Iran.

48. COMPLIANCE WITH THE PUBLIC WORKS CONTRACTOR REGISTRATION ACT - (NJSA 34:11-56.48 et. seq.)

Pursuant to the above-referenced law, Bidders are required to be registered with the New Jersey Department of Labor and to possess a current certificate by said Department indicating compliance with the Act prior to the time and date that bids are received. Bidders are notified of this requirement of their compliance. Such certificates or applications shall also be provided for each Subcontractor furnishing plumbing and gas fitting, steam and hot water heating and ventilating apparatus, and all kindred work, steam power plants and kindred work, electrical work, structural steel and ornamental iron work, and such other subcontractors as the specifications require relative to prior identification.

49. UTILITIES

Attention of the bidder is directed to the fact that the approximate locations of known utility structures and facilities that may be encountered within and adjacent to the limits of the Work are shown on the plans and described herein. The accuracy and completeness of this information is not guaranteed by the County Engineer and the bidder is advised to ascertain for himself all the facts concerning the location of these and other utilities.

The Contractor will not proceed with his Work until he has made diligent inquiries of all public utility and municipal officials to determine the exact location of all-underground structures and pipes within the site of the Project. The Contractor will notify utility owners not less than ten (10) days in advance of the time he proposes to perform any Work that will endanger or affect their facilities in compliance with **New Jersey One-Call.** In excavating in any part of the Work, care must be taken not to remove or damage any gas, water, sewer, or other pipe, conduit, or structure, - public or private - without the concurrence of the owner and the County Engineer. The Contractor will, at his own expense, shore up, secure and maintain a continuous flow in such structures, and will keep them in repair until final acceptance of the Work.

When pipes or other structures are encountered or when the removal, relocation or protection of these utilities are necessary in carrying out the Project as planned, the Contractor will cooperate with the owner of said utilities and will permit the owners or their agents access to the site of the Work in order to relocate or protect their facilities and not hinder or delay unnecessarily the Work of the owners in moving same. No extra

allowance of payment will be made to the Contractor for the use of any materials, equipment, etc., or for the performance of any Work in connection with the moving of said structures unless the Contractor is specifically ordered by the County Engineer to furnish such materials, equipment, or services. If directed by the County Engineer to do any Work or furnish any materials or equipment, payment will be allowed the Contractor in accordance with the unit prices bid for such Work, or, if such items are not scheduled in the proposal, such Work shall be allowed "Supplemental Work" as provided in Section 39 of these general specifications. The corporations, companies, agencies or municipalities owning or controlling the utilities, and the name, and telephone numbers are listed in the beginning of the Technical Specifications.

50. MATERIAL COMPLIANCE AND SHOP DRAWINGS

The Contractor will require the manufacturer or supplier to furnish three (3) copies of Certification of Compliance with each delivery of materials, components and manufactured items for the Project. Two (2) copies will be furnished to the County Engineer; one copy will be retained by the Contractor. Certificates of Compliance will contain the following information:

1. Project to which material is consigned;
2. Name of the Contractor to which the material is supplied;
3. Kind of material supplied;
4. Quantity of material represented by the Certificate;
5. Means of identifying the consignment, such as label marking, seal number, etc.;
6. Date and method of shipment;
7. That the material is in conformity with the pertinent specifications stated in the certificate; and
8. Signature of a person having legal authority to bind the supplier.

The Contractor will submit to the County Engineer for his approval five (5) copies of complete and fully detailed shop or working drawings for those items listed in the beginning of the technical specifications.

Each drawing will identify the name of the job, location and Contractor.

All drawings will be approved in accordance with the standard specifications. Refer to the Technical Specifications for specific items.

All materials or articles used in the Work will be of American manufacture, insofar as same are available, in conformance with N.J.S.A. 40A:11-18.

51. PRECONSTRUCTION

In order to provide full coordination of this Project among the parties concerned, the County Engineer will arrange for a preconstruction meeting between the Contractor, County Engineer and other interested parties as soon as possible after the contract is executed. At this meeting the Contractor will present his proposed schedule of Work which shall be subject to review and approval of the County through its designated representatives.

52. DISPUTES UNDER THE CONTRACT

A dispute arising under the Contract shall be submitted in writing to the County Engineer with all facts and supporting data. The County Engineer will review the dispute and issue his decision or request additional facts or documentation after which he will render his decision.

In the event the dispute is not then resolved, the matter shall, pursuant to law, be submitted to mediation before being submitted to a court of competent jurisdiction venued in Union County.

The County Engineer will notify the County Counsel when a matter is to be submitted to mediation. The County Counsel will communicate with the parties and inform them of the procedures to be followed in making such a submission.

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53. ORDINANCE NO. 557-2002 ADOPTED ON SEPTEMBER 5, 2002 BY THE BOARD OF CHOSEN FREEHOLDERS

Ordinance No. 557-2002 adopted on September 5, 2002 by the Board of Chosen Freeholders on Preclassification of Bidders by the NJDPMC **(if applicable)** pursuant to Ordinance No. 557-2002, the County of Union requires all bidders on projects for the construction, reconstruction, demolition, alteration, repair or maintenance of public buildings to be preclassified by the State of New Jersey, Department of Treasury, Division of Property Management and Construction ("DPMC").

Bidders must provide proof of classification in the form of a Certificate/Notice of Classification from the DPMC showing a sufficient aggregate rating to cover their bid amount, which is active on the date of receipt of these bids. Further, Bidder must also provide proof of preclassification in the applicable/appropriate trade code necessary for Work on the Project.

AN ORDINANCE IN ACCORDANCE WITH N.J.S.A. 40A:11-25 ESTABLISHING REASONABLE REGULATIONS APPROPRIATE FOR CONTROLLING THE QUALIFICATIONS OF PROSPECTIVE BIDDERS UPON CONTRACTS TO BE AWARDED ON BEHALF OF THE CONTRACTING UNIT, BY THE CLASS OR CATEGORY OF GOODS AND SERVICES TO BE PROVIDED OR PERFORMED AND FIXING THE QUALIFICATIONS REQUIRED ACCORDING TO THE FINANCIAL ABILITY AND EXPERIENCE OF THE BIDDERS AND THE CAPITAL AND EQUIPMENT AVAILABLE TO THEM PERTINENT TO AND REASONABLY RELATED TO THE CLASS AND CATEGORY OF SERVICE TO BE PERFORMED IN THE PERFORMANCE OF ANY SUCH CONTRACT.

WHEREAS, N.J.S.A. 40A:11-25 provides that the governing body of any contracting unit may establish reasonable regulations appropriate for controlling the qualifications of prospective bidders upon contracts to be awarded on behalf of the contracting unit, by the class or category of goods and services to be provided or performed; and

WHEREAS, N.J.S.A. 40A:11-25 also states that the regulations established by the governing body may fix the qualifications required according to the financial ability and experience of the bidders and the capital and equipment available to them pertinent to and reasonably related to the class and category of service to be performed in the performance of any such contract; and

WHEREAS, N.J.S.A. 40A:11-25 also requires that prior to the adoption of any such regulations, a contracting unit shall submit them to a public hearing and notice and a general description of the subject matter shall be published in not less than two newspapers; and

WHEREAS, N.J.S.A. 52:35-1 et seq. and 18A:18A-27 et seq. establish qualifications for the experience and financial abilities of bidders and the capital and equipment available to them relative to the specific services to be performed; and

WHEREAS, currently state officials, under the Department of Treasury, Division of Property Management and Construction, classify all prospective bidders as to the character and

amount of public works on which they shall be qualified to submit bids and bids shall be accepted only from persons qualified in accordance with such classifications; and

WHEREAS, application for classification is open to all Contractors, regardless of the size of the business; and

WHEREAS, classification is based on general standards equally applicable to all Contractors; and

WHEREAS, classification is expressed in terms of trade and an aggregate rating determined on the basis of experience, financial ability, equipment and capital; and

WHEREAS, generally aggregate ratings can range from 0 to $200,000.00; and

WHEREAS, the County of Union will determine the aggregate rating it will require on contracts depending on the size and expense of the Project, but at no time shall the required aggregate rating exceed $25,000,000.00 for any one project; and

WHEREAS*,* such provisions are of considerable benefit to the County and to bidders by insuring that such bidders have the requisite experience, expertise and resources necessary to effectively perform the terms and conditions of the contract:

BE IT ORDAINED by the Board of Chosen Freeholders of the County of Union that it formally adopts as **Policy** that all prospective bidders for building construction projects be classified in accordance with the Department of Treasury – Division of Property Management and Construction pursuant to N.J.S.A. 52:35-1 *et seq*. and N.J.S.A. 18A:18A-27 *et seq*.

BE IT FURTHER ORDAINED that the Board of Chosen Freeholders of the County of Union hereby adopts the classification of bidders by the New Jersey Department of Treasury, Division of Property Management and Construction as a reasonable regulation for controlling the qualifications of prospective bidders upon contracts to be awarded for construction on behalf of the County of Union.

BE IT FURTHER ORDAINED that the provisions of this ordinance are severable. To the extent any clause, phrase, sentence, paragraph or provision of this ordinance shall be declared invalid, illegal or unconstitutional, the remaining provisions shall continue to be in full force and effect.

BE IT FURTHER ORDAINED that a public hearing shall be held on this ordinance on September 5, 2002 at the meeting of the Board of Freeholders, County Administration Building, Elizabeth, New Jersey.

BE IT FURTHER ORDAINED that the Clerk of the Board of Freeholders of the County is hereby directed to publish and post notice of this ordinance as required by law.

BE IT FURTHER ORDAINED that within 10 days hereof the Clerk of the Board of Freeholders of the County shall forward certified copies of this ordinance to the County Manager, Director of Finance, County Counsel, and Division of Local Government Services.

This ordinance shall take effect twenty (20) days after final adoption and publication in accordance with applicable law.

54. CONTRACTOR BUSINESS REGISTRATION CERTIFICATE
New Mandatory Requirement -Effective 1/18/2010

The recently enacted **P.L. 2009, c.315**, requires that effective January 18, 2010; a contracting agency must receive proof of the bidder's business registration prior to the award of a contract. However, the proof must show that the bidder was in fact registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

If subcontractors are named on the bid, proof of the business registration for each subcontractor must be provided prior to the award of bid. Similarly to the bidder, the proof must show that each subcontractor was registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

Proof of business registration shall be

- A copy of a Business Registration Certificate issued by the Department of the Treasury, Division of Revenue; or
- A copy of the web version provided by the NJ Division of Revenue, or

Register online at http://www.state.nj.us/treasury/revenue/busregcert.htm. Click the "online" link and then select "Register for Tax and Employer Purposes or call the Division at 609-292-1730.

Note: A NJ Certificate of Authority is <u>not</u> acceptable.

FAILURE to submit proof of registration of the bidder or any subcontractor named on the bid prior to the award of contract shall be cause to reject the bid.

FAILURE of the bidder or any subcontractor named on the bid to be <u>registered</u> prior to the receipt of bids is cause for a **MANDATORY REJECTION** of bids. (A NON-WAIVABLE DEFECT). This covers construction Work as well as non-construction bids.

IN ADDITION:

N.J.S.A. 52:32-44 imposes the following requirements on Contractors and all subcontractors that knowingly provide goods or perform services for a Contractor fulfilling this contract:

1) the Contractor shall provide written notice to its subcontractors and suppliers to submit proof of business registration to the Contractor;

2) subcontractors through all tiers of a project must provide written notice to their subcontractors and suppliers to submit proof of business registration and subcontractors shall collect such proofs of business registration and maintain them on file;

3) prior to receipt of final payment from a contracting agency, the Contractor must submit to the contacting agency an accurate list of all subcontractors and suppliers or attest that none was used; and,

4) during the term of this contract, the Contractor and its affiliates shall collect and remit, and shall notify all subcontractors and their affiliates that they must collect and remit, to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (*N.J.S.A*. 54:32B-1 *et seq*.) on all sales of tangible personal property delivered into this State.

A Contractor, subcontractor or supplier who fails to provide proof of business registration or provides false business registration information shall be liable to a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration copy not properly provided or maintained under a contract with a contracting agency. Information on the law and its requirements are available by calling (609) 292-9292.

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55. PROJECT LABOR AGREEMENT (To be signed where the overall project cost exceeds $5 Million, irrespective of Phasing)

An Executive Order of Governor James E. McGreevey dated January 17, 2002, requires the use of a Project Labor Agreement in public construction contracts. This Executive Order was codified as N.J.S.A. 52:38-1 et seq. as a result of P.L. 2002, Chapter 44. Contractor must be prepared to abide by the terms of the within Project Labor Agreement, including obtaining the necessary and applicable Letters of Assent from subcontractors (of any tier). Through said Letters of Assent the subcontractors (of any tier) also must be prepared to abide by the terms of the Project Labor Agreement.

Contractor's failure to enter into this Project Labor Agreement shall result in the County's valid refusal to enter into a contract, for the performance of the Work with Contractor and shall constitute a default under the Contract. In addition, Contractor will be required to submit the completed Letters of Assent to the County with the executed Project Labor Agreement. The Project Labor Agreement is to be executed only where the total Project cost is $5 Million or more, irrespective of Phasing.

ARTICLE 1 - PREAMBLE

WHEREAS, the COUNTY OF UNION, on behalf of itself, and Project Management Firms ("PMF") acting as Construction Managers, and reflecting the objectives of the COUNTY OF UNION ("UC"), as Owner, desires to provide for the efficient, safe, quality, and timely completion of a construction project for the County in a manner designed to afford lower reasonable costs to Union County, the Union County Freeholder Board, and the Public it represents, and the advancement of public policy objectives; **(See Project Labor Agreement attached)**

WHEREAS, this Project Labor Agreement will foster the achievement of these goals, inter alia by:

(1) ensuring a reliable source of skilled and experienced labor;
(2) standardizing the terms and conditions governing the employment of labor on the Project;
(3) permitting wide flexibility in Work scheduling and shift hours and times; from those which otherwise might obtain;
(4) receiving negotiated adjustments as to Work rules and staffing requirements from those which otherwise might obtain;
(5) providing comprehensive and standardized mechanisms for the settlement of Work disputes, including those relating to jurisdiction;
(6) avoiding the costly delays of potential strikes, slowdowns, walkouts, picketing and other disruptions arising from Work

disputes, and promote labor harmony and peace for the duration of the Projects.

(7) furthering public policy objectives as to improved employment opportunities for minorities, women and the economically disadvantaged in the construction industry;

(8) expediting the construction process; and,

WHEREAS, the signatory Unions desire the stability, security and Work opportunities afforded by a Project Labor Agreement; and

WHEREAS, the Parties desire to maximize Project safety conditions for both workers and the public,

NOW, THEREFORE, the Parties enter into this Agreement:

SECTION 1. PARTIES TO THE AGREEMENT

This is a Project Labor Agreement ("Agreement") entered into by and between UC and its successors and assigns, General Contractors to be named, for certain construction Work to be performed on construction performed pursuant to the “Local Public Contracts Law” in the State of New Jersey and by the Union County Building and Construction Trades Council, AFL-CIO, on behalf of itself and its affiliates and members.

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1. DEFINITIONS

Throughout this Agreement, the Union party and the Building Trades Council are referred to singularly and collectively as "the Union(s)" where specific reference is made to "Local Unions" that phrase is sometimes used; the term "Contractor(s)" shall include the Project Management Firm and all signatory Contractors, and their subcontractors of whatever tier, engaged in on-site Project construction Work within the scope of this Agreement as defined in Article 3; County of Union (UC) is referenced as (Owner); the Union County Building and Construction Trades Council, AFL-CIO is referenced as the BTC, and the Work covered by this Agreement (as defined in Article 3) is referred to as the "Project".

SECTION 2. CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

The Agreement shall not become effective unless executed by the BTC, the PMF, and the General Contractor and will remain in effect until the **final** completion of the **Project.**

SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on all signatory Unions and the Project Management Firms and all signatory Contractors performing on-site Project Work, including site preparation and staging areas, as defined in Article 3. The Contractors shall include in any subcontract that they let, for performance during the term of this Agreement, a requirement that their subcontractors, of whatever tier, become signatory and bound by this Agreement with respect to subcontracted Work performed within the scope of Article 3. This Agreement shall be administered by the PMF on behalf of all Contractors.

SECTION 4. SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements appended hereto as Schedule A represents the complete understanding of all signatories and supersedes any national agreement, local agreement or other collective bargaining agreement of any type which would otherwise apply to this Project, in whole or in part. Where a subject covered by the provisions, explicit or implicit, of this Agreement is also covered by a Schedule A, the provisions of this Agreement shall prevail. It is further understood that neither the PMF nor any Contractor shall be required to sign any other agreement as a condition of performing Work on this Project. No practice, understanding or agreement between a Contractor and Local Union, which is not explicitly set forth in this Agreement shall be binding on this Project unless endorsed in writing by the PMF.

SECTION 5. LIABILITY

The liability of any Contractor and the liability of any Union under this Agreement shall be several and not joint. The PMF and any Contractor shall not be liable for any violations of this Agreement by any other Contractor and the BTC and Local Unions shall not be liable for any violations of this Agreement by any other Union.

SECTION 6. THE CONSTRUCTION PROJECT MANAGER

UC shall require in its bid specifications for all Work within the scope of Article 3 that all successful bidders, and their subcontractors of whatever tier, become bound by, and signatory to, this Agreement. UC is not a party to and shall not be liable in any manner under this Agreement. It is understood that nothing in this Agreement shall be construed as limiting the sole discretion of UC in determining which Contractors shall be awarded contracts for Project Work. It is further understood that UC has sole discretion at any time to terminate, delay or suspend the Work, in whole or part, on this Project.

SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS

The Unions agree that this Agreement will be made available to, and will fully apply to any successful bidder for Project Work who becomes signatory thereto, without regard to whether that successful bidder performs Work at other sites on either a union or non-union basis and without regard to whether employees of such successful bidder are, or are not, members of any unions. This Agreement shall not apply to the Work of any Contractor or PMF, which is performed at any location other than the Project site, as defined in Article 3, Section 1.

ARTICLE 3 - SCOPE OF THE AGREEMENT

The Project Work covered by this Agreement shall be as defined and limited by the following sections of this Article.

SECTION 1: THE WORK

This Agreement shall apply to building construction conducted by the County of Union pursuant to the "Local Public Contracts Law" in the State of New Jersey**.** This scope of Work may be amended time to time by UC to include Work not performed under the "Local Public Contracts Law".

The scope of Work is confined to the on-site Project Work contained in the scope of the General Contractor's final construction contract.

SECTION 2. EXCLUDED EMPLOYEES

The following persons are not subject to the provisions of this Agreement, even though performing Work on the Project:

Superintendents, supervisors (excluding superintendents and general supervisors and forepersons specifically covered by a craft's Schedule A), engineers, inspectors and testers (excluding divers specifically covered by a craft's Schedule A), quality control/assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards, non-manual employees, and all professional, engineering, administrative and management persons;

Employees of UC or any State agency, authority or entity or employees of any municipality or county or other public employer;

Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of project components, materials, equipment or machinery, unless such offsite operations are covered by the

New Jersey Prevailing Wage Act by being dedicated exclusively to the performance of the public works contract or building project and are adjacent to the site of Work, or involved in deliveries to and from the Project site, excepting local deliveries of all major construction materials including fill, ready mix, asphalt and item 4 which are covered by this Agreement.

Employees of the PMF or General Contractor, excepting those performing manual, on-site construction labor who will be covered by this Agreement;

Employees engaged in on-site equipment warranty.

Employees engaged in geophysical testing (whether land or water) other than boring for core samples;

Employees engaged in laboratory or specialty testing or inspections;

Employees engaged in ancillary Project Work performed by third parties such as electric utilities, gas utilities, telephone utility companies, and railroads.

SECTION 3. NON-APPLICATION TO CERTAIN ENTITIES

This Agreement shall not apply to the parents, affiliates, subsidiaries, or other joint or sole ventures of any Contractor or of PMF, which do not perform Work at this Project. It is agreed, for the purposes of this Agreement only, that this Agreement does not have the effect of creating any joint employment, single employer or alter ego status among the owners, the PMF and/or any Contractor. The Agreement shall further not apply to UC or any other state or county agency, authority, or other municipal or public entity and nothing contained herein shall be construed to prohibit or restrict UC or its employees of any other state authority, agency or entity and its employees from performing on or off-site Work related to the Project. As the contracts which comprise the Project Work are completed and accepted, the Agreement shall not have further force or effect on such items or areas except where inspections, additions, repairs, modifications, check-out and/or warranty Work are assigned in writing (copy to Local Union involved) by the General Contractor for performance under the terms of this Agreement.

ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 1. PRE-HIRE RECOGNITION

The Contractors recognize the signatory Unions as the sole and exclusive bargaining representatives of all craft employees who are performing on-site Project Work within the scope of this Agreement as defined in Article 3.

SECTION 2. UNION REFERRAL

A. The Contractors agree to hire Project, craft employees covered by this Agreement through the job referral systems and hiring halls (where the referrals meet the qualifications set forth in items 1,2, and 4 subparagraph B) established in the Local Unions' area collective bargaining agreements (attached as Schedule A to this Agreement).

Notwithstanding this, the Contractors shall have sole rights to determine the competency of all referrals; the number of employees required (except with regard to pile driving); the selection of employees to be laid-off (subject to the applicable procedures in Schedule A for permanent and/or temporary layoffs and except as provided in Article 5, Section 3); and the sole right to reject any applicant referred by a Local Union, subject to the show-up payments required in the applicable Schedule A. In the event that a Local Union is unable to fill any request for qualified employees within a 48-hour period after such requisition is made by the Contractor (Saturdays, Sundays, and holidays excepted), the Contractor may employ qualified applicants from another competent source. In the event that the Local Union does not have a job referral system, the Contractor shall give the Local Union first preference to refer applicants, subject to the other provisions of this Article. The Contractor shall notify the Local Union of the Project, craft employees hired within its jurisdiction from any source other than referral by the Union.

B. A Contractor may request by name, and the Local will honor, referral of persons who have applied to the Local for Project Work and who meet the following qualifications as determined by a Committee of 3 designated, respectively, by the applicable Local Union, the PMF and a mutually selected third party or, in the absence of agreement, the permanent arbitrator (or designee) designated in Article 7:

(1) possess any license required by NJ law for Project Work to be performed;
(2) have worked a total of at least 1000 hours in the Construction craft during the prior 3 years;
(3) were on the Contractor's active payroll for at least 60 out of the 180 calendar days prior to the contract award;
(4) have demonstrated ability to safely perform the basic function of the applicable trade.

No more than 12 per centum of the employees covered by this Agreement, per Contractor by craft, shall be hired through the special provisions above (any fraction shall be rounded to the next highest whole number).

C. A certified MBE/WBE contractor may request from the Workforce Coordinator, through the PMF, an exception to, and waiver of, the above per centum limitation upon the number of its employees to be hired through the special provision of Section2.B above. This exception is based upon hardship and demonstration by the contractor that the Project Work would be the contractor's only job and that it would be obliged to lay off qualified minority and female employees in it's current workforce moving from the last job.

The exception and waiver are also conditioned upon the employees meeting the qualifications as set forth in Section 2.B above.

SECTION 3. NON-DISCRIMINATION IN REFERRALS

The Unions represent that their hiring halls and referral systems will be operated in a non-discriminatory manner and in full compliance with all applicable federal, state and local laws and regulations, which require equal employment opportunities. Referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's union membership, or lack thereof.

SECTION 4. MINORITY AND FEMALE REFERRALS

In the event a Union either fails, or is unable, to refer qualified minority or female applicants in percentages equaling Project affirmative action goals as set forth in UC's bid specifications, the Contractor may employ qualified minority or female applicants from any other available source as Apprentice Equivalents. Apprentice Equivalents will have completed a DOL approved training program, applied to take a construction Apprenticeship test, and will be paid at not less then the applicable equivalent Apprentice rate. With the approval of the Local Administrative Committee (LAC), experience in construction related areas may be accepted as meeting the above requirements.

SECTION 5. CROSS AND QUALIFIED REFERRALS

The Unions shall not knowingly refer to a Contractor an employee then employed by another Contractor working under this Agreement. The Local Unions will exert their utmost efforts to recruit sufficient numbers of skilled and qualified craft employees to fulfill the requirements of the Contractor.

SECTION 6. UNION DUES / WORKING ASSESSMENTS

All employees covered by this Agreement shall be subject to the union security provisions contained in the applicable Schedule A local agreements, as amended from time to time, but only for the period of time during which they are performing on-site Project Work and only to the extent of rendering payment of the applicable union dues and assessments uniformly required for union membership in the Local Union, signatory to this Agreement, which represents the craft in which the employee is performing Project Work. No employee shall be discriminated against at the Project site because of the employee's union membership or lack thereof. In the case of unaffiliated employees, the dues payment can be received by the Unions as a working assessment fee.

SECTION 7. CRAFT FOREPERSONS AND GENERAL FOREPERSONS

The selection of craft forepersons and/or general forepersons and the number of forepersons required shall be solely the responsibility of the Contractor except where otherwise provided by specific provisions of an applicable Schedule A. All forepersons shall take orders exclusively from the designated Contractor representatives. Craft foreperson shall be designated as working forepersons at the request of the Contractor, except when an existing local Collective Bargaining Agreement prohibits a foreperson from working when the craftsperson he is leading exceed a specified number.

ARTICLE 5 - UNION REPRESENTATION

SECTION 1. LOCAL UNION REPRESENTATIVE

Each Local Union representing on-site Project employees shall be entitled to designate, in writing (copy to General Contractor involved and the PMF), one representative, and the Business Manager, who shall be afforded access to the Project.

SECTION 2. STEWARDS

A. Each Local Union shall have the right to designate a working journey person as a Steward and an alternate, and shall notify the Contractor and PMF of the identity of the designated Steward (and alternate) prior to the assumption of such duties. Stewards shall not exercise supervisory functions and will receive the regular rate of pay for their craft classifications. There will be no non-working Stewards on the Project.

B. In addition to their Work as an employee, the Steward shall have the right to receive complaints or grievances and to discuss and assist in their

adjustment with the Contractor's appropriate supervisor. Each Steward shall be concerned with the employees of the Steward's Contractor and, if applicable, subcontractors of that Contractor, but not with the employees of any other Contractor. The Contractor will not discriminate against the Steward in the proper performance of Union duties.

C. The Stewards shall not have the right to determine when overtime shall be worked, or who shall work overtime, except pursuant to a Schedule A provision providing procedures for the equitable distribution of overtime.

SECTION 3. LAYOFF OF A STEWARD

Contractors agree to notify the appropriate Union, 24 hours prior to the layoff of a Steward, except in cases of discipline or discharge for just cause. If a Steward is protected against layoff by a Schedule A, such provisions shall be recognized to the extent the Steward possesses the necessary qualifications to perform the Work required. In any case in which a Steward is discharged or disciplined for just cause, the Local Union involved shall be notified immediately by the Contractor.

ARTICLE 6 - MANAGEMENT'S RIGHTS

SECTION 1. RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, Contractors retain full and exclusive authority for the management of their Project operations including, but not limited to: the right to direct the work force, including determination as to the number to be hired and the qualifications therefore; the promotion, transfer, layoff of its employees; or the discipline or discharge for just cause of its employees; the assignment and schedule of Work; the promulgation of reasonable Project Work rules; and, the requirement, timing and number of employees to be utilized for overtime work. No rules, customs, or practices, which limit or restrict productivity or efficiency of the individual, as determined by the Contractor, GC or PMF, and/or joint working efforts with other employees shall be permitted or observed.

SECTION 2. MATERIALS, METHODS & EQUIPMENT

There shall be no limitations or restriction upon the Contractors' choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials, tool, or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source. The on-site installation or application of such items shall be performed by the craft having jurisdiction over such Work; provided, however, it is recognized that other personnel having special qualifications may

participate, in a supervisory capacity, in the installation, check-out or testing of specialized or unusual equipment or facilities as designated by the Contractor. Notwithstanding the foregoing statement of Contractor rights, prefabrication issues relating to work traditionally performed at the job site shall be governed pursuant to the terms of the applicable Schedule A. There shall be no restrictions as to Work, which is performed off-site for the Project, except for work done in a fabrication center, tool yard, or batch plant dedicated exclusively to the performance of Work on the Project, and located adjacent to the "site of Work".

ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS

SECTION 1. NO STRIKES-NO LOCKOUT

There shall not be strikes, sympathy strikes, picketing, work stoppages, slowdowns, hand billing, demonstrations or other disruptive activity at the Project for any reason by any Union or employee against any Contractor or employer while performing Work at the Project. There shall be no other Union, or concerted or employee activity which disrupts or interferes with the operation of the existing free flow of traffic in the project area. Failure of any Union or employee to cross any picket line established by any union, signatory or non-signatory to this Agreement, or the picket or demonstration line of any other organization, at or in proximity to the Project site is a violation of this Article. There shall be no lockout at the Project by any signatory Contractor. Contractors and Unions shall take all steps necessary to ensure compliance with this Section 1 and to ensure uninterrupted construction and the free flow of traffic in the project area for the duration of this Agreement.

SECTION 2. DISCHARGE FOR VIOLATION

A Contractor may discharge any employee violating Section 1 above, and any such employee will not be eligible thereafter for referral under this Agreement for a period of 100 days.

SECTION 3. NOTIFICATION

If a Contractor contends that any Union has violated this Article, it will notify the appropriate district or area council of the Local Union involved advising of such fact, with copies of the notification to the Local Union and the BTC. The district or area council, and the BTC shall each instruct, order and otherwise use their best efforts to cause the employees, and/or the Local Unions to immediately cease and desist from any violation of this Article. A district or area council, or the BTC complying with these obligations shall not be liable for the unauthorized acts of a Local Union or its members.

SECTION 4. EXPEDITED ARBITRATION

Any Contractor or Union alleging a violation of Section 1 of this Article may utilize the expedited procedure set forth below (in lieu of, or in addition to, any actions at law or equity) that may be brought.

A. A party invoking this procedure shall notify J.J. Pierson who shall serve as Arbitrator under this expedited arbitration procedure. Copies of such notification will be simultaneously sent to the alleged violator and, if a Local Union is alleged to be in violation, it's International, UC, the PMF, the BTC, and the GC.

B. The Arbitrator shall thereupon, after notice as to time and place to the Contractor, the GC, the Local Union involved, the BTC, and the PMF, hold a hearing within 48 hours of receipt of the notice invoking the procedure it is contended that the violation still exists. The hearing will not, however, be scheduled for less than 24 hours after the notice to the district or area council required by Section 3 above.

C. All notices pursuant to this Article may be by telephone, telegraph, hand delivery, or fax, confirmed by overnight delivery, to the arbitrator, Contractor or Union involved. The hearing may be held on any day including Saturdays or Sundays. The hearing shall be completed in one session, which shall not exceed 8 hours duration (no more than 4 hours being allowed to either side to present their case, and conduct their cross examination) unless otherwise agreed. A failure of any Union or Contractor to attend the hearing shall not delay the hearing of evidence by those present or the issuance of an award by the Arbitrator.

D. The sole issue at the hearing shall be whether a violation of Section 1, above, occurred. If a violation is found to have occurred, the Arbitrator shall issue a Cease and Desist Award restraining such violation and serve copies on the Contractor and Union involved. The Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages, which issue is reserved solely for court proceedings, if any. The Award shall be issued in writing within 3 hours after the close of the hearing, and may be issued without an Opinion. If any involved party desires an Opinion, one shall be issued within 15 calendar days, but its issuance shall not delay compliance with, or enforcement of, the Award.

E. An Award issued under this procedure may be enforced by any court of competent jurisdiction upon the filing of the Agreement together with the Award. Notice of the filing of such enforcement proceedings shall be given to the Union or Contractor involved. In any court proceeding to obtain a temporary or preliminary order enforcing the arbitrator's Award as

issued under this expedited procedure, the involved Union and Contractor waive their right to a hearing and agree that such proceedings may be ex parte, provided notice is given to opposing counsel. Such agreement does not waive any party's right to participate in a hearing for a final court order of enforcement or in any contempt proceeding.

F. Any rights created by statue or law governing arbitration proceedings which are inconsistent with the procedure set forth in this Article, or which interfere with compliance thereto, are hereby waived by the Contractors and Unions to whom they accrue.

G. The fees and expenses of the Arbitrator shall be equally divided between the involved Contractor and Union.

SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION

Procedures contained in Article 9 shall not be applicable to any alleged violation of this Article, with the single exception that an employee discharged for violation of Section 1, above, may have recourse to the procedures of Article 9 to determine only if the employee did, in fact, violate the provisions of Section 1 of this Article; but not for the purpose of modifying the discipline imposed where a violation is found to have occurred.

ARTICLE 8. - LOCAL ADMINISTRATIVE COMMITTEE (LAC)

SECTION 1. THE LOCAL ADMINISTRATIVE COMMITTEE WILL MEET ON A REGULAR BASIS TO:

(1) Implement and oversee the Agreement procedures and initiatives;
(2) Monitor the effectiveness of the Agreement; and
(3) Identify opportunities to improve efficiency and Work execution.

SECTION 2. COMPOSITION

The LAC will be co-chaired by the President of the Building and Construction Trades Council or his designee, and designated official of UC. It will be comprised of representatives of the local unions signatory to the project labor agreement (PLA) and representatives of the PMF and other contractors on the Project.

ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE

SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES

Any question, dispute or claim arising out of, or involving the interpretation or application of this Agreement (other than jurisdictional disputes or alleged violations of Article 7, Section 1) shall be considered a grievance and shall be resolved pursuant to

the exclusive procedure of the steps described below; provided, in all cases, that the question, dispute or claim arose during the term of this Agreement.

Step 1:

(a) When any employee covered by this Agreement feels aggrieved by a claimed violation of this Agreement, the employee shall, through the Local Union business representative or job steward give notice of the claimed violation to the Work site representative of the involved Contractor. To be timely, such notice of the grievance must be given within 7 calendar days after the act, occurrence, or event giving rise to the grievance, or after the act, occurrence or event became known or should have become known to the Union. The business representative of the Local Union or the job steward and the Work site representative of the involved Contractor shall meet and endeavor to adjust the matter within 7 calendar days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party, may, within 7 calendar days thereafter, pursue Step 2 of the grievance procedure by serving the involved Contractor and the General Contractor with written copies of the grievance setting forth a description of the claimed violation, the date on which the grievance occurred, the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved, unless the settlement is accepted in writing, by the General Contractor, as creating a precedent.

(b) Should any signatory to this Agreement have a dispute (excepting jurisdictional disputes or alleged violations of Article 7, Section 1) with any other signatory to this Agreement and, if after conferring, a settlement is not reached within 7 calendar days, the dispute shall be reduced to writing and proceed to Step 2 in the same manner as outlined in subparagraph (a) for the adjustment of employee grievances.

Step 2:

The Business Manager or designee of the involved Local Union, together with representatives of the BTC, the involved Contractor, and the General Contractor shall meet in Step 2 within 5 calendar days of the written grievance to arrive at a satisfactory settlement.

Step 3:

(a) If the grievance shall have been submitted but not resolved in Step 2, any of the participating Step 2 entities may, within 14 calendar days after the initial Step 2 meeting, submit the grievance in writing (copies to other participants) to J.J. Pierson, who shall act as the Arbitrator under this procedure. The Labor Arbitration Rules of the American Arbitration Association shall govern the conduct of the arbitration hearing, at which all Step 2 participants shall be parties. The decision of the Arbitrator shall be final and binding on the involved Contractor, Local Union and employees and the fees and expenses of such arbitration's shall be borne equally by the involved Contractor and Local Union.

(b) Failure of the grieving party to adhere to the time limits set forth in this Article shall render the grievance null and void. These time limits may be extended only by written consent of the PMF, involved Contractor and involved Local Union at the particular step where the extension is agreed upon. The Arbitrator shall have authority to make decisions only on the issues presented to him and shall not have the authority to change, add to, delete or modify any provision of this Agreement.

SECTION 2. LIMITATION AS TO RETROACTIVITY

No arbitration decision or award may provide retroactivity of any kind exceeding 30 calendar days prior to the date of service of the written grievance on the construction Project Manager and the involved Contractor or Local Union.

SECTION 3. PARTICIPATION BY GENERAL CONTRACTOR

The General Contractor shall be notified by the involved Contractor of all actions at Steps 2 and 3 and, at its election, may participate in full in all proceedings at these Steps, including Step 3 arbitration.

ARTICLE 10 - JURISDICTIONAL DISPUTES

SECTION 1. NO DISRUPTIONS

There will be no strikes, sympathy strikes, work stoppages, slowdowns, picketing or other disruptive activity of any kind arising out of any jurisdictional dispute. Pending the resolution of the dispute, the Work shall continue uninterrupted and as assigned by the Contractor. No jurisdictional dispute shall excuse a violation of Article 7.

SECTION 2. ASSIGNMENT

A. There shall be a mandatory pre-job markup/assignment meeting prior to the commencement of any Work. Attending such meeting shall be designated representatives of the Union signatories to this Agreement, the PMF, and the involved Contractors. Best efforts will be made to schedule the pre-job meeting in a timely manner after Notice to Proceed is issued but not later then 30 days prior to the start of the Project.

B. All Project construction Work assignments shall be made by the Contractor according to the area practice.

SECTION 3. PROCEDURE FOR SETTLEMENT OF LABOR DISPUTES

A. Any Union having a jurisdictional dispute with respect to Project Work assigned to another Union will submit the dispute in writing to the Administrator, Plan for the Settlement of Jurisdictional Disputes in the Construction Industry ("the Plan") within 72 hours and send a copy of the letter to the other Union involved, the Contractor involved, the General Contractor, the BTC, and the district or area councils of the unions involved. Upon receipt of a dispute letter from any union, the Administrator will invoke the procedures set forth in the Plan to resolve the jurisdictional dispute. The jurisdictional dispute letter shall contain the information described in Article IV of the Plan.

B. Within 5 calendar days of receipt of the dispute letter, there shall be meeting of the General Contractor, the Contractor involved, the Local Unions involved and designees of the BTC and the district or area councils of the Local Unions involved for the purpose of resolving the jurisdictional dispute.

C. In order to expedite the resolution of jurisdictional disputes, the parties have agreed in advance to select Plan Arbitrator Pierson to hear all unsolved jurisdictional disputes arising under this Agreement. All other rules and procedures of the Plan shall be followed. If Plan Arbitrator Pierson is not available to hear the dispute within the time limits of the Plan, the Plan's arbitrator selection process shall be utilized to select another arbitrator. In the event that a union involved in the dispute is not a member of the BTC, the dispute shall be submitted directly to Arbitrator Pierson.

D. The Arbitrator will render a short-form decision within 5 days of the hearing based upon the evidence submitted at the hearing, with a written decision to follow within 30 days of the close of hearing.

E. This Jurisdictional Dispute Resolution Procedure will only apply to Work performed by Local Unions at the Project.

F. Any Local Union involved in a jurisdictional dispute on this Project shall continue working in accordance with Section 2 above and without disruption of any kind.

SECTION 4. AWARD

Any jurisdictional award pursuant to Section 3 shall be final and binding on the disputing Local Unions and the involved Contractor on this Project only, and may be enforced in any court of competent jurisdiction. Such award or resolution shall not establish a precedent on any other construction work not covered by this Agreement. In all disputes under this Article, the General Contractor and the involved Contractors shall be considered parties in interest.

SECTION 5. LIMITATIONS

The Jurisdictional Dispute Arbitrator shall have no authority to assign Work to a double crew, that is, to more employees than the minimum required by the Contractor to perform the Work involved; nor to assign Work to employees who are not qualified to perform the Work involved; not to assign Work being performed by non-union employees to union employees. This does not prohibit the establishment, with the agreement of the involved Contractor, of composite crews where more than 1 employee is needed for the job. The aforesaid determinations shall decide only to whom the disputed Work belongs.

SECTION 6. NO INTERFERENCE WITH WORK

There shall be no interference or interruption of any kind with the Work of the Project while any jurisdictional dispute is being resolved. The Work shall proceed as assigned by the Contractor until finally resolved under the applicable procedure of this Article. The award shall be confirmed in writing to the involved parties. There shall be no strike, work stoppage or interruption in protest of any such award.

ARTICLE 11 - WAGES AND BENEFITS

SECTION 1. CLASSIFICATION AND BASE HOURLY RATE

All employees covered by this Agreement shall be classified in accordance with the Work performed and paid the base hourly wage rates for those classifications as specified in the attached Schedules A, as amended during this Agreement.

Recognizing, however, that special conditions may exist or occur on the Project, the parties, by mutual agreement may establish rates and/or hours for one or more classifications, which may differ from Schedules A. Parties to such agreements shall be the General Contractor, the Contractor involved, the involved Local Unions and the BTC.

SECTION 2. EMPLOYEE BENEFIT FUNDS

A. The Contractors agree to pay contributions on behalf of all employees covered by this Agreement to the established employee benefit funds in the amounts designated in the appropriate Schedule A; provided, however, that the Contractor and the Union agree that only such bona fide employee benefits as are explicitly required under N.J.S.A 34:11-56.30 of the New Jersey State Labor Law shall be included in this requirement and paid by the Contractor on this Project. Bona fide jointly trusted fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if similarly protected under N.J.S.A. 34:11-56-30. Contractors shall not be required to contribute to non-N.J.S.A 34:11-56.30 benefits, trusts or plans.

B. The Contractor agrees to be bound by the written terms of the legally established Trust Agreements specifying the detailed basis on which payments are to be paid into, and benefits paid out of, such Trust Funds but only with regard to Work done on this Project and only for those employees to whom this Agreement requires such benefit Payments.

C. Should any Contractor or sub-contractor become delinquent in the payment of contributions to the fringe benefit funds, then the subcontractor at the next higher tier, or upon notice of the delinquency claim from the Union or the Funds, agrees to withhold from the subcontractor such disputed amount from the next advance, or installment payment for Work performed until the dispute has been resolved.

ARTICLE 12 - HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS

SECTION 1. WORK WEEK AND WORK DAY

A. The standard work week shall consist of 40 hours of work at straight time rates per one of the following schedules:
   1) Five-Day Work Week: Monday-Friday, 5 days, 8 hours plus 1/2 hour unpaid lunch period each day.
   (2) Four-Day Work Week: Monday-Thursday; 4 days, 10 hours plus 1/2 hour unpaid lunch period each day.

B. The Day Shift shall commence between the hours of 6:00 a.m. and 9:00 a.m. and shall end between the hours of 2:30 p.m. and 7:30 p.m. Starting and quitting times shall occur at the employees' place of work as may be designated by the Contractor.

C. Scheduling - The Contractor shall have the option of scheduling either a five-day work week, or four-day work week (when mutually agreed upon on a craft-by-craft basis). The Contractor shall also has the option to set the work day hours consistent with Project requirements, the Project schedule, and minimization of interference with County operations traffic flow. When conditions beyond the control of the Contractor, such as severe weather, power failure, fire or natural disaster, prevent the performance of Project Work on a regularly scheduled work day, the Contractor may, with mutual agreement of the Local Union on a craft-by-craft basis, schedule Friday (where on 4, 10's) during the calendar week in which a workday was lost, at straight time pay; providing the employees involved work a total of 40 hours or less during that work week.

D. Notice - Contractors shall provide not less than 5 days prior notice to the Local Union involved as to the work week and work hours schedules to be worked or such lesser notice as may be mutually agreed upon.

SECTION 2. OVERTIME

Overtime pay for hours outside of the standard work week and work day, described in paragraph A above, shall be paid in accordance with the applicable Schedule A. There will be no restriction upon the Contractor's scheduling of overtime or the non-discriminatory designation of employees who shall be worked, except as noted in Article 5, Section 2. There shall be no pyramiding of overtime pay under any circumstances. The Contractor shall have the right to schedule work so as to minimize overtime.

SECTION 3. SHIFTS

A. Flexible Schedules - Scheduling of shift work shall remain flexible in order to meet Project schedules and existing Project conditions including the minimization of interference with County operations. It is not necessary to work a day shift in order to schedule a second shift. Shifts must be worked a minimum of five consecutive work days, must have prior approval of the Construction Project Manager and must be scheduled with not less than five work days notice to the Local Union.

B. Second/Shift - The second shift (starting between 2 p.m. and 8p.m.) shall consist of 8 hours work (or 10 hours of work) for an equal number of hours pay at the straight time rate plus 15% in lieu of overtime and exclusive of a

1/2 hour unpaid lunch period.

C. Flexible Starting Times - Shift starting times will be adjusted by the Contractor as necessary to fulfill Project requirements subject to the notice requirements of paragraph A.

D. Four Tens - When working a four-day work week, the standard work day shall consist of 10 hours work for 10 hours of pay at the straight time rate exclusive of an unpaid 1/2 hour meal period and regardless of the starting time. This provision is applicable to night shifts only, and such night shifts are subject to the shift differential in paragraph B above.

E. It is agreed that when Project circumstances require a deviation form the above shifts, the involved unions, Contractors and the General Contractor shall adjust the starting times of the above shifts or establish shifts which meet the Project requirements. It is agreed that neither party will unreasonably withhold their agreement.

SECTION 4. HOLIDAYS

A. Schedule - There shall be 8 recognized holidays on the Project:

New Years Day	Labor Day
Presidents Day	Veterans Day
Memorial Day	Thanksgiving Day
Fourth of July	Christmas Day

*Work shall be scheduled on Good Friday pursuant to the craft's Schedule A.

All said holidays shall be observed on the dates designated by New Jersey State Law. In the absence of such designations, they shall be observed on the calendar date except those holidays which occur on Sunday shall be observed on the following Monday. Holidays falling on Saturday are to be observed on the preceding Friday.

B. Payment - Regular holiday pay, if any, and/or premium pay for work performed on such a recognized holiday shall be in accordance with the applicable Schedule A.

C. Exclusivity - No holidays other than those listed in Section 4-A above shall be recognized nor observed except in Presidential Election years when Election Day is a recognized holiday.

SECTION 5. REPORTING PAY

A. Employees who report to the Work location pursuant to regular schedule and who are not provided with work or whose work is terminated early by a Contractor, for whatever reason, shall receive minimum reporting pay in accordance with the applicable Schedule A.

B. When an employee, who has completed their scheduled shift and left the Project site, is "called back" to perform special Work of a casual, incidental or irregular nature, the employee shall receive pay for actual hours worked with a minimum guarantee, as may be required by the applicable Schedule A.

C. When an employee leaves the job or Work location of their own volition or is discharged for cause or is not working as a result of the Contractor's invocation of Section 7 below, they shall be paid only for the actual time worked.

D. Except as specifically set forth in this Article there shall be no premiums, bonuses, hazardous duty, high time or other special payments of any kind.

E. There shall be no pay for time not actually worked except as specifically set forth in this Agreement and except where an applicable Schedule A requires a full weeks pay for forepersons.

SECTION 6. PAYMENT OF WAGES

A. Payday - Payment shall be made by check, drawn on a New Jersey bank with branches located within commuting distance of the job site. Paychecks shall be issued by the Contractor at the job site by 10 a.m. on Thursdays. In the event that the following Friday is a bank holiday, paychecks shall be issued on Wednesday of that week. Not more than 3 days wages shall be held back in any pay period. Paycheck stubs shall contain the name and business address of the Contractor, together with an itemization of deductions from gross wages.

B. Termination-Employees who are laid-off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractors shall also provide the employee with a written statement setting forth the date of lay off or discharge.

SECTION 7. EMERGENCY WORK SUSPENSION

A Contractor or PMF may, if considered necessary for the protection of life and /or safety of employees or others, suspend all or a portion of Project Work. In such

instances, employees will be paid for actual time worked; provided, however, that when a Contractor request that employees remain at the job site available for Work, employees will be paid for "stand-by" time at their hourly rate of pay.

SECTION 8. INJURY/DISABILITY

An employee who, after commencing Work, suffers a work-related injury or disability while performing work duties, shall received no less than 8 hours wages for that day. Further, the employee shall be rehired at such time as able to return to duties provided there is still work available on the Project for which the employee is qualified and able to perform.

SECTION 9. TIME KEEPING

A Contractor may utilize brassing or other systems to check employees in and out. Each employee must check in and out. The Contractor will provide adequate facilities for checking in and out in an expeditious manner.

SECTION 10. MEAL PERIOD

A Contractor shall schedule an unpaid period of not more than 1/2 hour duration at the Work location between the 3rd and 5th hour of the scheduled shift. A Contractor may, for efficiency of operation, establish a schedule which coordinates the meal periods of two or more crafts. If an employee is required to work through the meal period, the employee shall be compensated in a manner established in the applicable Schedule A.

SECTION 11. BREAK PERIODS

There will be not rest periods, organized coffee breaks or other non-working time established during working hours. Individual coffee containers will be permitted at the employee's Work location. Local area practice will prevail for coffee breaks that are not organized.

ARTICLE 13 – APPRENTICES

SECTION 1. RATIOS

Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide craft entry opportunities for minorities, women and economically disadvantaged non-minority males, Contractors will employ apprentices in their respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications as are contained in the applicable Schedule A in a ratio

not to exceed 25% of the work force by craft (without regard to whether a lesser ratio is set forth in Schedule A), unless the applicable Schedules A provide for a higher percentage. Apprentices and such other classifications as are appropriate shall be employed in a manner consistent with the provisions of the appropriate Schedule A.

SECTION 2. DEPARTMENT OF LABOR

To assist the Contractors in attaining a maximum effort on this Project, the Unions agree to work in close cooperation with, and accept monitoring by, the New Jersey State and Federal Departments of Labor to ensure that minorities, women, or economically disadvantaged are afforded opportunities to participate in apprenticeship programs which result in the placement of apprentices on this Project. To further ensure that this Contractor effort is attained, up to 50% of the apprentices placed on this Project should be first year, minority, women or economically disadvantaged apprentices. The Local Unions will cooperate with Contractor request for minority, women or economically disadvantaged referrals to meet this Contractor effort.

ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1. SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA requirements and other requirements set forth in the contract documents are at all times maintained on the Project and the employees and Unions agree to cooperate fully with these efforts. Employees must perform their work at all times in a safe manner and protect themselves and the property of the Contractor and the Owner from injury or harm. Failure to do so will be grounds for discipline, including discharge.

SECTION 2. CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Contractors and the PMF for this Project. Such rules will be published and posted in conspicuous places throughout the Project.

SECTION 3. INSPECTIONS

The Contractors and PMF retain the right to inspect incoming shipments of equipment, apparatus, machinery and construction materials of every kind.

ARTICLE 15 - NO DISCRIMINATION

SECTION 1. COOPERATIVE EFFORTS

The Contractors and Unions agree that they will not discriminate against any

employee or applicant for employment because of race, color, religion, sex, national origin or age in any manner prohibited by law or regulation. It is recognized that special procedures maybe established by Contractors and Local Unions and the New Jersey State Department of Labor for the training and employment of persons who have not previously qualified to be employed on construction projects of the type covered by this Agreement. The parties to this Agreement will assist in such programs and agree to use their best efforts to ensure that the goals for female and minority employment are met on this Project.

SECTION 2. LANGUAGE OF AGREEMENT

The use of the masculine or feminine gender in this Agreement shall be construed as including both genders.

ARTICLE 16 - GENERAL TERMS

SECTION 1. PROJECT RULES

The Project Management Firm and the Contractors shall establish such reasonable Project rules as are appropriate for the good order of the Project, provided they do not violate the terms of this agreement. These rules will be explained at the pre-job conference and posted at the Project site and may be amended thereafter as necessary. Failure of an employee to observe these rules and regulations shall be grounds for discipline, including discharge. The fact that no order was posted prohibiting a certain type of misconduct shall not be a defense to an employee disciplined or discharged for such misconduct when the action taken is for cause.

SECTION 2. TOOLS OF THE TRADES

The welding/cutting torch and chain fall are tools of the trade having jurisdiction over the work performed. Employees using these tools shall perform any of the Work of the trade. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee or on the use of any tools or equipment for the performance of work within the employee's jurisdiction.

SECTION 3. SUPERVISION

Employees shall work under the supervision of the craft foreperson or general foreperson.

SECTION 4. TRAVEL ALLOWANCES

There shall be no payments for travel expenses; travel time, subsistence allowance or other such reimbursements or special pay except as expressly set forth in

this Agreement and in Schedule A limited to travel expenses.

SECTION 5. FULL WORK DAY

Employees shall be at their staging area at the starting time established by the Contractor and shall be returned to their staging area by quitting time after performing their assigned functions under the supervision of the Contractor. The signatories reaffirm their policy of a fair day's work for a fair day's wage.

SECTION 6. COOPERATION

The Project Management Firm and the Unions will cooperate in seeking any New Jersey statutory Department of Labor approvals that may be required for implementation of any terms of this Agreement.

ARTICLE 17 - SAVINGS AND SEPARABILITY

SECTION 1. THIS AGREEMENT

In the event that the application of any provision of this Agreement is enjoined, on either an interlocutory or permanent basis, or otherwise found in violation of law, the provision involved shall be rendered, temporarily or permanently, null and void but the remainder of the Agreement shall remain in full force and effect. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction where the Contractor voluntarily accepts the Agreement. The parties to this Agreement will enter into negotiations for a substitute provision in conformity with the law and the intent of the parties for contracts to be let in the future.

SECTION 2. THE BID SPECIFICATIONS

In the event that the General Contractor's bid specifications, or other action, requiring that a successful bidder become signatory to this Agreement is enjoined, on either an interlocutory or permanent basis, or otherwise found in violation of law such requirement shall be rendered, temporarily or permanently, null and void but the Agreement shall remain in full force and effect to the extent allowed by law. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in constructions where the Contractor voluntarily accepts the Agreement. The parties will enter in to negotiations as to modifications to the Agreement to reflect the court action taken and the intent of the parties for contracts to be let in the future.

SECTION 3. NON-LIABILITY

In the event of an occurrence referenced in Section 1 or Section 2 of this Article, neither UC, the Project Management Firm, or any Contractor, or any signatory Union

shall be liable, directly or indirectly, for any action taken, or not taken, to comply with any court order, injunction or determination. Project bid specifications will be issued in conformance with court orders in effect and no retroactive payments or other action will be required if the original court determination is ultimately reversed.

SECTION 4. NON-WAIVER

Nothing in this Article shall be construed as waiving the prohibitions of Article 7 as to signatory Contractors and signatory Unions.

ARTICLE 18 – FUTURE CHANGES IN SCHEDULE "A" AREA CONTRACTS

SECTION 1. CHANGES TO AREA CONTRACTS

A. Schedules "A" to this Agreement shall continue to full force and effect until the Contractor and/or Union parties to the Area Collective Bargaining Agreements which are the basis for Schedules A notify the General Contractor in writing of the mutually agreed upon changes in provisions of such agreements which are applicable to the Project, and their effective dates.

B. It is agreed that any provisions negotiated into Schedules "A" collective bargaining agreements will not apply to work on this Project than those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provisions be recognized or applied on this Project if it may be construed to apply exclusively, or predominantly, to work covered by this Project Agreement.

C. Any disagreement between signatories to this Agreement over the incorporation into Schedules "A" of provisions agreed upon in the negotiations of Area Collective Bargaining Agreements shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS

The Unions agree that there will be not strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 7 affecting the Project by any Local Union involved in the renegotiations of Area Local Collective Bargaining Agreements nor shall there be any lock-out on the Project affective a Local Union during the course of such renegotiations.

IN WITNESS WHEREOF the parties hereto have, either individually or by their duly authorized representative, caused this Agreement to be executed and to become effective as of the _____ day of _____, 2011.

ATTEST:

_____
JAMES E. PELLETTIERE, CLERK
Board of Chosen Freeholders

COUNTY OF UNION

By:_____
ALFRED J. FAELLA
County Manager

APPROVED AS TO FORM

_____
ROBERT E. BARRY, ESQ.
County Counsel

ATTEST:

CONTRACTOR

_____
Corporate Secretary/Notary Public

_____
President/Authorized Signatory

_____
Print Name

_____
Print Name

_____
Print Title

ATTEST:

CONSTRUCTION MANAGER FIRM

_____
Corporate Secretary/Notary Public

_____
President/Authorized Signatory

_____
Print Name

_____
Print Name

_____
Print Title

UNION COUNTY BUILDING & CONSTRUCTION TRADES COUNCIL
and on behalf of the following: Asbestos Local #32, Boilermakers Local #28, Bricklayers Local #4, Carpenters Local #715, Electricians Local #102, Elevator Construction Local #1, Ironworkers Local #480, Laborers Local #394, Operating Engineers Local #825, Painters Local #711, Plumbers Local #24, Roofers Local #4, Sheet Metal Workers Local #22, Sheet Metal Workers Local #25, Sheet Metal Workers Local #137, Sprinkler Fitters Local #696, Steam Fitters Local #475, Teamsters Local #408

ATTEST:

_____ _____

Witness

_____

Print Name

LETTER OF ASSENT REQUIRED FROM ALL SUBCONTRACTORS (OF ANY TIER)

County of Union Project Labor Agreement

The undersigned, as a Contractor(s) or Subcontractor(s) on a Contract which is part of the _____ Project, for and in consideration of the award of a Contract to perform Work on said Project, and in further consideration of the mutual promises made in the Project Labor Agreement, a copy of which was received and is acknowledged, hereby:

(1) On behalf of itself and all its employees, accepts and agrees to be bound by terms and conditions of the Project Labor Agreement, together with any and all amendments and supplements now existing or which are later made thereto, and understands that any act of non-compliance with all such terms and conditions, including but not limited to, evidence of compliance with the pre-employment controlled substance testing, will subject the non-complying Contractor or employee(s) to being prohibited from the Project Site until full compliance is obtained.

(2) Certified that it has no commitments or agreements, which would preclude its full compliance with the terms and conditions of said Project Labor Agreement.

(3) Agrees to secure from any Contractor(s) (as defined in said Project Labor Agreement) which is or becomes a Subcontractor(s) (of any tier), a duly executed Letter of Assent in form identical to this document prior to commencement of any Work.

DATED:

_____
Name of Contractor/Company

_____
Signature of Authorized Representative

_____
Print Name and Title

_____ _____
General Contractor Contract Number (BA#)

*** To be signed if Project is subject to Project Labor Agreement – See Section 56.**

56. BID PROTEST – LEGAL FEES AND COSTS

In the event a Bidder unsuccessfully challenges a Bid Submission by filing an action in a court of law concerning same, said Bidder shall be responsible for payment of reasonable legal costs and fees incurred by the County relating to said protest.

57. AMERICAN GOODS AND PRODUCTS WHERE POSSIBLE

Bidder shall comply with the requirements of NJSA 40A:11-18 and use only manufactured and farm products of the United States, wherever available, for the Project.

58. NEW JERSEY PAY-TO-PLAY REQUIREMENTS

This Contract is required by law to be publicly advertised for bids. As such, lists of political contributions pursuant to NJSA 19A:44A-1 et. seq. are NOT REQUIRED to be provided with the bids.

59. STATEMENT OF EQUIPMENT TO BE USED IN CONSTRUCTION

Pursuant to NJSA 40A:11-20 entitled Certificate of Bidder Showing Ability to Perform Contract, the County requires a Certification from all bidders submitting a bid showing that the Bidder owns, leases, or controls all necessary equipment required by the Project Plans and Specifications. All bidders shall provide this information at the time of the bid opening using the attached form entitled, “CERTIFICATE OF BIDDER SHOWING ABILITY TO PERFORM CONTRACT’.

If the Bidder is not the actual owner of the equipment, it shall state the source from which the equipment will be obtained and shall attach a certificate from the owner or person in control of the equipment demonstrating that the equipment owner has granted the Bidder control of the requisite equipment during such time as may be necessary for completion of the portion of the contract for which the equipment is necessary.

60. NEW JERSEY SALES AND USE TAX REQUIREMENTS,

Contractors are required to comply with the following:

New Jersey Sales and Use Tax Requirements: All contractors with subcontractors, or any of their affiliates, who enter into contracts for the provision of goods or services with or for New Jersey local government entities, are required to collect and remit to the New Jersey Director of Taxation in the Department of the Treasury the use tax due on all of their

sales of tangible personal property delivered into the State of New Jersey pursuant to the "Sales and Use Tax Act," (NJSA 54:32B-1 et, seq.), regardless of whether the tangible personal property is intended for a contract with the contracting agency. This tax shall be remitted for the term of the Contract.

For purposes herein "affiliate" shall mean any entity that: (a) directly, indirectly, or constructively controls another entity, (b) is directly, indirectly, or constructively controlled by another entity, or (c) is subject to the control of a common entity. For purposes of the immediately preceding sentence, an entity controls another entity if it owns, directly or indirectly, more than fifty percent (50%) of the ownership interest in that entity. NJSA 52:32-44(g)(3).

ALFRED J. FAELLA
COUNTY MANAGER

LAURA M. SCUTARI, QPA, MPA,
DIRECTOR / DIVISION OF PURCHASING

BID DOCUMENT SUBMISSION CHECKLIST

ALL SIGNATURES AND SEALS SHALL BE ORIGINALS UNLESS OTHERWISE SPECIFIED
BID SHEETS SHOULD NOT BE SUBMITED DOUBLE SIDED PAGES, (SINGLE SIDE ONLY)

EACH BIDDER SHOULD COMPLETE THIS FORM AND INITIAL EACH ENTRY.
DATE COMPLETED: _____

PLEASE SUBMIT BID DOCUMENTS ON SINGLE SIDED PAPER ONLY, WITH THE EXCEPTION OF THE SURETY AND BID BOND DOCUMENTS.

IN ACCORDANCE WITH THE BID SPECIFICATIONS I HAVE REVIEWED, COMPLETED / EXECUTED AND INCLUDED THE FOLLOWING FORMS:

_____ Bid Form Page **(Signed, Dated and Bid on all alternatives applicable to the Work)**.

_____ Security in the form of:
____ Bid bond in an amount equal to 10% of the total amount of this bid not to exceed $20,000.00; or
____ Certified check or cashier's check in the amount of 10% of this bid not to exceed $20,000.00

_____ Consent of Surety form signed by a Surety Company if the total amount of your Bid is over $36,000.00. If your bid is accepted, the Surety Company that provided the Consent shall be required to furnish a Performance, Labor and Materials Bond in the amount of 100% of the award of the contract. The County of Union has provided its Consent of Surety form for your use. The use of this form by your Surety Company will expedite the bid review process and eliminate the possibility of having your bid rejected. If, however, you should need to use another form, please use language similar to that used on the Union County form and avoid making any additions or deletions to the Union County form language. In lieu of the Consent of Surety you may submit a Certified Check in the full amount of the bid.

_____ STATEMENT OF BIDDER OWNERSHIP. Pursuant to N.J.S.A. 52:25-24.2, which includes **BOTH** of the following documents:

- Bidder Signature Page
- Bidder Disclosure Statement **(Fill out 2 pages completely)**

_____ SUBCONTRACTOR IDENTIFICATION. Pursuant to N.J.S.A. 40A:11-16, which includes **BOTH** of the following documents:

- Subcontractor Identification Statement: List of Subcontractors **(only for certain types of work)**
- Subcontractor Identification Certification

_____ Acknowledgement of Addendum form**: (This form is to be used only when an addendum has been added to the specifications)**.

_____ A copy of the State of New Jersey Department of the Treasury, Division of Revenue, **Business Registration Certificate ("BRC")** should be included with the bids as it must be received by the County prior to the award of the contract. The BRC provided must show that the Bidder was registered at the time of receipt of bids or the bid will be rejected.

_____ A copy of the State of New Jersey Department of the Treasury, Division of Revenue, **Business Registration Certificate ("BRC")** of all named or listed subcontractors (List of Subcontractors) in a Construction bid should be included with the bid as the BRC(s) must be received by the County prior to the award of the contract. Each subcontractor's certificate provided must show that the subcontractor was registered at the time of the receipt of bids or the bid will be rejected.

_____ Affirmative Action Requirement

_____ Experience Statement

_____ Certificate of Bidder showing ability to perform Contract

_____ Non-Collusion Affidavit – Fill out completely and notarize

_____ Certificates from New Jersey Department of Labor – Public Works Contractor Registration Act. **(Only for certain types of work)**

_____ Federal Attachments **(If applicable)**

_____ NJDPMC Certificate / Notice of Classification **(If applicable)**

_____ Americans with Disabilities Act

_____ Statement of Bidder's Qualifications

_____ Contractor Performance Record

_____ Affidavit Regarding List of Debarred, Suspended or Disqualified Bidders

_____ Prior Negative Experience Questionnaire

_____ Contractor's Certification of Compliance – New Jersey Prevailing Wage Act

_____ Uncompleted Contracts Affidavit **(For Bidder, if applicable) MUST ALSO PROVIDE DPMC FORM 701**

_____ Certificate of Insurance Statement

_____ Collection of Use Tax on Sales to Local Government Statement

_____ Acknowledgement of Project Labor Agreement (PLA)

_____ Time of Completion

_____ Disclosure of Investment Activities in Iran form

I HAVE TAKEN THE FOLLOWING ACTIONS:

_____ Visited the site and attended the **Pre-Bid Meeting**

_____ Reviewed the Contract Documents (including any permits the County or its professionals may have obtained), Work, Site, Locality, and Local Conditions and Laws and Regulations that in any manner may affect Cost, Progress, Performance or Furnishing of Work.

_____ Reviewed Bond Requirements

_____ Provided Proof of Compliance with New Jersey Prevailing Wage Act

_____ Reviewed Form of Owner/Contractor Agreement and General Conditions to the Contract

NOTE: QUESTIONS PERTAINING TO THIS BID ARE TO BE DIRECTED TO DIVISION OF ENGINEERING AT 908-789-3675

BIDDING DOCUMENTS

The Bidding Documents consist of the following items:

- **ADDENDA, if issued**
- **CLARIFICATIONS, if issued**
- **INSTRUCTION TO BIDDERS**
- **BID FORM**
- **OWNER-CONTRACTOR AGREEMENT (AIA 101) AND GENERAL CONDITIONS (AIA 201)**
- **SPECIFCATIONS: As outlined in the Table of Contents and included in the Project Manual.**
- **DRAWINGS: As per List of Drawings, indicated on the Project Title Sheet.**

Bidder's Name_____

BID FORM

I/We have carefully examined the plans, specifications, and advertisement for bid for the

ASHBROOK GOLF COURSE CLUBHOUSE
TOWNSHIP OF SCOTCH PLAINS, COUNTY OF UNION, NEW JERSEY
BA #39-2016; Union County Engineering Project #2015-035

that is on file in the Union County Division of Engineering. I/We have inspected the site of the work and will contract to do all the work and furnish all materials mentioned in said plans and specifications. Work will be accomplished in the manner prescribed therein.

BASE BID ITEMS

NO	ITEM DESCRIPTION	LUMP SUM BID PRICE
1	MOBILIZATION & DEMOBILIZATION	
2	INSURANCE AND BONDS	
3	GENERAL CONDITIONS	
4	TEMPORARY FACILITIES	
5	DIVISION 2 - EXISTING CONDITIONS	
6	DIVISION 3 - CONCRETE	
7	DIVISION 4 - MASONRY	
7	DIVISION 5 - METALS	
9	DIVISION 6 - WOOD, PLASTICS, AND COMPOSITES	
10	DIVISION 7 - THERMAL AND MOISTURE PROTECTION	
11	DIVISION 8 - OPENINGS	
12	DIVISION 9 - FINISHES	
13	DIVISION 10 - SPECIALTIES	
14	DIVISION 11 – EQUIPMENT	
15	DIVISION 12 - FURNISHINGS	
16	DIVISION 14 - CONVEYING EQUIPMENT	
17	DIVISION 21 - FIRE SUPPRESSION	
18	DIVISION 22 - PLUMBING	

19	DIVISION 23 – HVAC	
21	DIVISION 26 - ELECTRICAL	
22	DIVISION 28 - ELECTRONIC SAFETY AND SECURITY	
22	DIVISION 31 - EARTHWORK	
23	DIVISION 32 - EXTERIOR IMPROVEMENTS (INCL. DIV 34)	
24	DIVISION 33 – UTILITIES (INCL. DIV 13)	

I. TOTAL BASE BID (ITEMS 1-24)

_____ _____

WRITTEN FIGURES

II. TESTING ALLOWANCE

THIRTY THOUSAND DOLLARS $30,000

WRITTEN FIGURES

III. PERMIT FEES ALLOWANCE

FORTY THOUSAND DOLLARS $40,000

WRITTEN FIGURES

IV. BID CONTINGENCY (TO BE USED IF AND WHEN DIRECTED BY THE COUNTY)

THREE HUNDRED FIFTY THOUSAND DOLLARS $350,000

WRITTEN FIGURES

V. TOTAL LUMP SUM BID PRICE (I+II+III+IV)

_____ _____

WRITTEN FIGURES

Bidder's Name_____

Bidder's Name_____

BID ALTERNATES

Alternates may be deducted to the Total Base Bid Amount. The Bid will be awarded and / or alternates will be selected as follows:

1. Award Base Bid Only
2. Award Base Bid + Alternate Number 1
3. Award Base Bid + Alternate Number 2
4. Award Base Bid + Alternate Number 3
5. Award Base Bid + Alternate Number 1 and 2
6. Award Base Bid + Alternate Number 1 and 3
7. Award Base Bid + Alternate Number 2 and 3
8. Award Base Bid + Alternate Number 1, 2 and 3

Contractor must propose on the alternates listed below and as further described in Division 1 (Section 012300) of these Specifications.

ALTERNATE NUMBER 1: PROVIDE A DEDUCT LUMP SUM FOR ROOFING

DEDUCT: $_____ $_____
Written Figures

ALTERNATE NUMBER 2: PROVIDE A DEDUCT LUMP SUM FOR EXTERIOR SIDING

DEDUCT: $_____ $_____
Written Figures

ALTENATE NUMBER 3: PROVIDE A DEDUCT LUMP SUM FOR LIGHTNING PROTECTION

DEDUCT: $_____ $_____
Written Figures

CONSENT OF SURETY

TO ACCOMPANY PROPOSAL (BID)

_____ (hereinafter called Surety), organized and existing under the laws of the State of _____ duly authorized and qualified to transact business in the State of New Jersey, in consideration of the sum of One Dollar ($1.00), lawful money of the United States of America, to it in hand paid, receipt whereof is hereby acknowledged, and in consideration, hereby certifies and agrees that if the contract for which the attached proposal is made be awarded to _____ (hereinafter called Contractor) for the performance of certain work and labor or the supplying of certain materials, or both, as more particularly set forth in said proposal and described for purposes of this instrument as a proposal for _____ to the COUNTY OF UNION and if Contractor shall enter into the contract, Surety will become bound as surety for its faithful performance, labor and material payment and will provide the Contractor with a performance, labor and material payment bond in the full amount of the contract price.

NOTE:
Expiration date
Needed if Annual
Surety

_____

_____
NAME OF INSURANCE COMPANY

ADDRESS: _____
_____
_____

_____
ORIGINAL SIGNATURE
ATTORNEY-IN-FACT FOR INSURANCE CO.

NOTE: **PROOF OF AUTHORITY OF OFFICERS OF SURETY COMPANY TO EXECUTE THIS DOCUMENT MUST BE SUBMITTED.**

BIDDER SIGNATURE PAGE

THE BIDDER MUST READ THE FOLLOWING INSTRUCTIONS TO COMPLETE THIS PAGE:

1. If doing business under a **trade name, partnership or a sole proprietorship**, you must submit the bid under exact title of the trade name, partnership, or proprietorship, and the bid must be signed by either the **owner**, or a **partner** and **witnessed** by a **notary public**.

2. If a **Corporation**, the bid must be signed by the **President** or **Vice President** and **witnessed** by a **Corporate Secretary** (corporate title must be exact) and **affix corporate seal**. If a Corporate Secretary does not exist, President or Vice President's signature shall be witnessed by a Notary Public.

3. Other persons **authorized** by **corporate resolution** to execute agreements in its behalf may also sign the bid documents (pages). **Copy of a resolution must accompany the bid**.

4. The person who signs this bid form **must also** sign the **Non-Collusion Affidavit**.

5. You **cannot** witness your own signature.

_____

NAME OF BIDDER

_____

_____

_____

ADDRESS OF BIDDER

_____

ORIGINAL SIGNATURE
CORPORATE SECRETARY

_____

PRINT NAME AND TITLE
CORPORATE SECRETARY

TEL: _____
FAX: _____
E-Mail: _____

BY: _____

ORIGINAL SIGNATURE

Corporate Seal

_____

_____

PRINT OR TYPE NAME AND TITLE

WARNING: IF YOU FAIL TO FULLY, ACCURATELY, AND COMPLETELY SUPPLY THE INFORMATION REQUESTED ON THIS PAGE, YOUR BID MAY BE REJECTED.

Bidder's Name_____

STATEMENT OF OWNERSHIP DISCLOSURE

N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This statement shall be completed, certified to, and included with all bid and proposal submissions. Failure to submit the required information is cause for automatic rejection of the bid or proposal.

Name of Organization: _____

Organization Address: _____

Part I Check the box that represents the type of business organization:

☐ Sole Proprietorship (skip Parts II and III, execute certification in Part IV)

☐ Non-Profit Corporation (skip Parts II and III, execute certification in Part IV)

☐ For-Profit Corporation (any type) ☐ Limited Liability Company (LLC)

☐ Partnership ☐ Limited Partnership ☐ Limited Liability Partnership (LLP)

☐ Other (be specific): _____

Part II

☐ The list below contains the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be. (**COMPLETE THE LIST BELOW IN THIS SECTION**)

OR

☐ No one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be. (**SKIP TO PART IV**)

STATEMENT OF OWNERSHIP DISCLOSURE - CONTINUED

(Please attach additional sheets if more space is needed):

Name of Individual or Business Entity	Home Address (for Individuals) or Business Address

Part III DISCLOSURE OF 10% OR GREATER OWNERSHIP IN THE STOCKHOLDERS, PARTNERS OR LLC MEMBERS LISTED IN PART II

If a bidder has a direct or indirect parent entity which is publicly traded, and any person holds a 10 percent or greater beneficial interest in the publicly traded parent entity as of the last annual federal Security and Exchange Commission (SEC) or foreign equivalent filing, ownership disclosure can be met by providing links to the website(s) containing the last annual filing(s) with the federal Securities and Exchange Commission (or foreign equivalent) that contain the name and address of each person holding a 10% or greater beneficial interest in the publicly traded parent entity, along with the relevant page numbers of the filing(s) that contain the information on each such person. **Attach additional sheets if more space is needed**.

Website (URL) containing the last annual SEC (or foreign equivalent) filing	Page #'s

STATEMENT OF OWNERSHIP DISCLOSURE - CONTINUED

Please list the names and addresses of each stockholder, partner or member owning a 10 percent or greater interest in any corresponding corporation, partnership and/or limited liability company (LLC) listed in Part II **other than for any publicly traded parent entities referenced above**. The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member exceeding the 10 percent ownership criteria established pursuant to N.J.S.A. 52:25-24.2 has been listed. **Attach additional sheets if more space is needed.**

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Home Address (for Individuals) or Business Address

Part IV Certification

I, being duly sworn upon my oath, hereby represent that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I acknowledge: that I am authorized to execute this certification on behalf of the bidder/proposer; that the ***County of Union*** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the completion of any contracts with ***County of Union*** to notify the ***County of Union*** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the, permitting the ***County of Union*** to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	

Bidder's Name_____

SUBCONTRACTOR IDENTIFICATION STATEMENT

LIST OF SUBCONTRACTORS

This form is ONLY required for plumbing and gas fitting, steam and hot water heating and ventilating apparatus, steam power plants, electrical work, structural steel, ornamental iron work, and any other trades required to be identified by the specifications (including, but not limited, to satisfying any DPMC Classification requirements).

☐ **CHECK THIS BOX IF NONE OF THE ABOVE LISTED TRADES OR THOSE REQUIRED TO BE IDENTIFIED IN THE SPECIFICATIONS ARE TO BE USED TO PERFORM THE WORK**

In compliance with N.J.S.A. 40A:11-16 and the bid specifications, the undersigned hereby lists the name or names of the following subcontractors:

Company Name:_____

Address:_____

Telephone: _____ Subcontract Amount: $_____

Specific Scope of Work Subcontracted: _____

_____

License No. _____

Company Name:_____

Address: _____

Telephone: _____ Subcontract Amount: $_____

Specific Scope of Work Subcontracted: _____

_____

License No. _____

Company Name:_____

Address: _____

Telephone: _____ Subcontract Amount: $_____

Specific Scope of Work Subcontracted: _____

_____

License No. _____

IF MORE THAN THREE SUBCONTRACTORS, PLEASE COPY THIS SHEET AS NECESSARY AND ATTACH TO THE BID PACKAGE.

(Continued on following page)

Bidder's Name_____

SUBCONTRACTOR IDENTIFICATION CERTIFICATION

Note the law does not permit the listing of alternate subcontractors. However, multiple subcontractors for the same trade are permitted to be named provided the bidder meets the following requirements:

- Bidder identifies each subcontractor named for that category;
- Bidder states the scope of work, goods and services (the portion of the work) to be performed by each subcontractor; and
- Bidder provides the price quote provided by each subcontractor.

The bidder is advised that any change of subcontractor(s) from ones listed herein is subject to the County's approval. Change of subcontractor(s) will be approved only if made for good cause and not as a result of an arbitrary purpose.

The undersigned Bidder certifies and declares that the subcontractors listed above shall be used as subcontractors to complete certain portions of the work in this project as set forth in N.J.S.A. 40A: 11-16.

_____
Witness

Date _____

_____
NAME OF BIDDER

_____

_____
ADDRESS

By: _____
ORIGINAL SIGNATURE ONLY

_____

_____
PRINT NAME AND TITLE

Bidder's Name: _____

ACKNOWLEDGMENT OF ADDENDUM

COUNTY OF UNION

_____ _____

(Name of Construction /Public Works Project) **(Project or Bid Number)**

Pursuant to N.J.S.A. 40A:11-23.1a., the undersigned bidder, hereby acknowledges receipt of the following notices, revisions, or addenda to the bid advertisement, specifications or bid documents. By indicating date of receipt, bidder acknowledges the submitted bid takes into account the provisions of the notice, revision or addendum. Note that the County of Union's record of notice to bidders shall take precedence and that failure to include provisions of changes in a bid proposal may be subject for rejection of the bid.

Local Unit Reference Number or Title of Addendum/Revision	How Received (mail, fax, pick-up, etc.)	Date Received

ACKNOWLEDGMENT BY BIDDER:

NAME OF BIDDER: _____

ORIGINAL SIGNATURE: _____

PRINTED NAME AND TITLE:_____

DATE: _____

CONTRACTOR BUSINESS REGISTRATION CERTIFICATE

New Mandatory Requirement - Effective 1/18/2010

The recently enacted **P.L. 2009, c.315**, requires that effective January 18, 2010; a contracting agency must receive proof of the bidder's business registration prior to the award of a contract. However, the proof must show that the bidder was in fact registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

If subcontractors are named on the bid, proof of the business registration for each subcontractor must be provided prior to the award of bid. Similarly to the bidder, the proof must show that each subcontractor was registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

Proof of business registration shall be

- A copy of a Business Registration Certificate issued by the Department of the Treasury, Division of Revenue; or
- A copy of the web version provided by the NJ Division of Revenue, or

Register online at www.nj.gov/treasury/revenue/taxreg.htm. Click the "online" link and then select "Register for Tax and Employer Purposes or call the Division at 609-292-1730.
Note: A NJ Certificate of Authority is <u>not</u> acceptable.

FAILURE to submit proof of registration of the bidder or any subcontractor named on the bid prior to the award of a contract shall be cause to reject the bids.

FAILURE of the bidder or any subcontractor named on the bid to be <u>registered</u> prior to the receipt of bids is cause for a **MANDATORY REJECTION** of bids. (A NON-WAIVABLE DEFECT). This covers construction work as well as non-construction bids.

IN ADDITION:

The contractor shall provide written notice to all **subcontractors and suppliers** not specifically named on the bid of the responsibility to register and submit proof of business registration to the contractor. The requirement of proof of business registration extends down through all levels (tiers) of the project.

Before final payment on the contract is made by the contracting agency, the contractor shall submit an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of the contract, or shall attest that no subcontractors were used.

For the term of the contract, the contractor and each of its affiliates and a subcontractor and each of its affiliates [N.J.S.A. 52:32-44(g)(3)] shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property delivered into this State, regardless of whether the tangible personal property is intended for a contract with a contracting agency.

A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of P.L.2001,c.134 (C.52:32-44 et al.) or subsection e. or f. of section 92 of P.L.1977,c.110 (C.5:12-92), or that provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration copy not properly provided under a contract with a contracting agency.

Bidder's Name_____

BUSINESS REGISTRATION

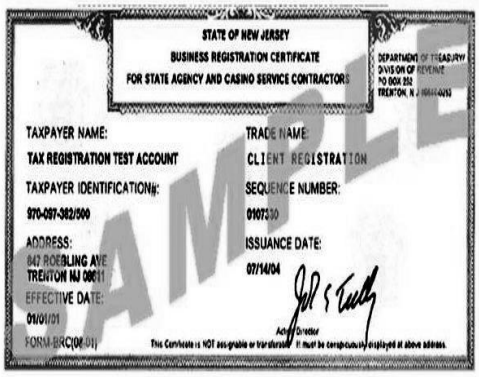
Mandatory Requirement

P.L. 2009, c.315, requires that effective January 18, 2010; a contracting agency must receive proof of the bidder's business registration prior to the award of a contract. However, the proof must show that the bidder was in fact registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

If subcontractors are named on the bid, proof of the business registration for each must be provided prior to the award of a contract. Similarly to the bidder, the proof must show that each subcontractor was registered with the State of New Jersey Department of the Treasury, Division of Revenue and obtained the business registration prior to the receipt of bids.

Proof of business registration shall be:

- A copy of a Business Registration Certificate issued by the Department of Treasury, Division of Revenue; or
- A copy of the web printed version provided by the NJ Division of Revenue


STATE OF NEW JERSEY
BUSINESS REGISTRATION CERTIFICATE
FOR STATE AGENCY AND CASINO SERVICE CONTRACTORS

TAXPAYER NAME:
TAX REGISTRATION TEST ACCOUNT

TRADE NAME:
CLIENT REGISTRATION

TAXPAYER IDENTIFICATION#:
970-087-382/000

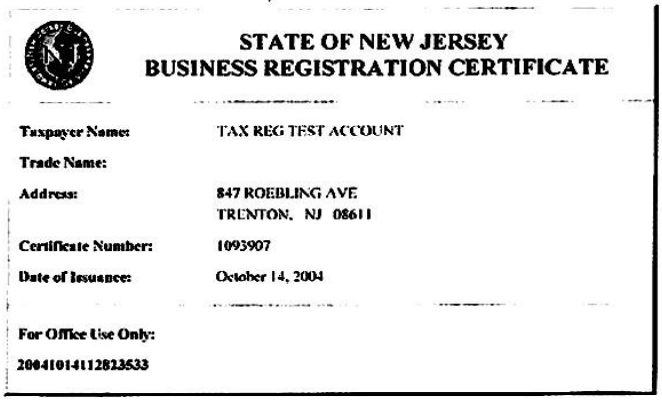
SEQUENCE NUMBER:
0107330

ADDRESS:
847 ROEBLING AVE
TRENTON NJ 08611

ISSUANCE DATE:
07/14/04

EFFECTIVE DATE:
01/01/01

SAMPLE


STATE OF NEW JERSEY
BUSINESS REGISTRATION CERTIFICATE

Taxpayer Name: TAX REG TEST ACCOUNT
Trade Name:
Address: 847 ROEBLING AVE
TRENTON, NJ 08611
Certificate Number: 1093907
Date of Issuance: October 14, 2004

For Office Use Only:
20041014112823533

ATTACH BRC HERE

Bidder's Name_____

AFFIRMATIVE ACTION REQUIREMENT

REQUIRED AFFIRMATIVE ACTION EVIDENCE

General Requirements of P.L. 1975, c. 127: You are hereby put on notice that:

CONSTRUCTION CONTRACTS: The successful contractor must submit within three (3) days of the notice of intent to award or the signing of the contract the initial project manning report (A.A.201). This report should be submitted at the time the signed contract is returned to the County of Union. Attention: *Affirmative Action Officer.*

If the successful contract does not submit the initial project manning report (A.A.201) within the three (3) days from the time the signed contract is returned to the County of Union, the County of Union WILL declare the contractor non-responsive and award the contract to the next lowest responsible bidder.

_____
NAME OF BIDDER

_____
ORIGINAL SIGNATURE

_____
PRINT OR TYPE NAME AND TITLE

_____
DATE THIS FORM IS COMPLETED

EXPERIENCE STATEMENT

I hereby certify that my company has performed the following private or public work, which is relevant to this bid. I further certify that my company has never defaulted under any contract. Should you not sign this form due to prior defaults, please provide details on an attached sheet.

Witness

Date

NAME OF BIDDER

ADDRESS

By:

ORIGINAL SIGNATURE ONLY

PRINT NAME AND TITLE

YOU MAY ATTACH ADDITIONAL SHEETS, BUT YOU MUST SIGN AND WITNESS THIS SHEET.

Bidder's Name_____

CERTIFICATE OF BIDDER SHOWING ABILITY TO PERFORM CONTRACT

STATE OF NEW JERSEY / _____)
Specify, if Other) SS:
COUNTY OF _____)

I, _____, of the (City, Town, Borough, etc.) of ___ _____ State of _____, of full age, being duly sworn according to law on my oath depose and say that:

I am _____ of the firm of _____, the Bidder making the proposal for the above named Project ("Contractor'), and that I executed said proposal with full authority to do so; and that said Contractor, pursuant to N.J.S.A. 40A:11-20, certifies that it owns, leases or controls all the necessary equipment required by the Plans, Specifications and Advertisements under this Bids are asked for.

If the Bidder is not the actual owner or lessee of any such equipment, then the Bidder shall attach to this Certificate information identifying the source from which the equipment will be obtained, and such information shall be accompanied by a certificate from the owner or person in control of the equipment definitively granting to the Bidder the control of the equipment required during such time as may be necessary for the completion of that portion of the contract.

_____
(Also type or print name of affiant under signature)

By:_____

Bidder's Name_____

NON-COLLUSION AFFIDAVIT

(N.J.S.A. 52:34-15)

STATE OF _____)
) **SS:**_____
COUNTY OF _____)

I _____, of the City of _____, in the County of _____, and the State of _____, of full age, being duly sworn according to law, on my oath depose and say that: I am _____ of the firm of _____, the bidder making the proposal for the above named project, and that I executed the said proposal for the above named project, and that I executed the said proposal with full authority to do so; that said bidder has not, directly or indirectly, entered into any agreement, participation in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the above named project; and that all statements contained in said proposal and in this Affidavit are true and correct, and made with full knowledge that the COUNTY OF UNION, NEW JERSEY relies upon the truth of the statements contained in said proposal and in the statements contained in the affidavit in awarding the contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bonafide established commercial or selling agencies maintained by _____ (N.J.S.A. 52:34-15).

_____

NAME OF BIDDER

_____

ORIGINAL SIGNATURE ONLY

NOTE: The person who signed the bidder signature page for the bidder should sign this form also.

Subscribed and sworn before me
this _____day of _____, 200____.

_____
Notary Public of the State of _____
My commission expires: _____

WARNING: IF YOU FAIL TO FULLY, ACCURATELY, AND COMPLETELY FILL OUT THIS AFFIDAVIT OF NON-COLLUSION, YOUR BID MAY BE REJECTED.

Contractor Registration Advisement

For Public Works Projects

A new law, known as "The Public Works Contractor Registration Act" (P.L. 1999, c.238), became effective April 11, 2000. Under the Act, no contractor/subcontractor will be permitted to bid on or engage in any contract for public work, as defined in Section 2 of P.L. 1963, c.150 (C:34:11-56.26), unless that contractor/subcontractor is registered with the New Jersey Department of Labor. The Act provides that upon registration with the Department, a public works contractor/subcontractor will be issued a certificate by the Department indicating compliance with the Act's requirements. The registration fee has been set at $300.00 per year. Upon the effective date of the Act, public bodies will be expected to request production of such a certificate from those bidding on or engaging in public works projects.

It is important to note that the term "contractor," is defined in the, Act as, "a person, partnership, association, joint stock company, trust, corporation or other legal business entity or successor thereof who enters into a contract which is subject to the provision of the "New Jersey Prevailing Wage Act," P.L. 1963, c.150 (C.34:11-56.25, et seq.) for the construction, reconstruction, demolition, alteration, repair or maintenance of a public building regularly open to and used by the general public or a public institution, and includes any subcontractor or lower tier subcontractor as defined herein: except that, for the purposes of the act, no pumping station, treatment plant or other facility associated with utility and environmental construction, reconstruction, demolition, alteration, repair or maintenance shall be regarded as a public building regularly open to and used by the general public or a public institution."

Registration forms, copies of the Act, and other relevant information can be obtained by contacting:

Contractor Registration Unit
New Jersey Department of Labor
Division of Wage & Hour Compliance
PO Box 389
Trenton, New Jersey 08625-0389
Telephone: 609-292-9464
Fax: 609-633-8591
E-mail: contreg@dol.state.nj.us

Bidder's Name_____

AMERICANS WITH DISABILITIES ACT

EQUAL OPPORTUNITY FOR INDIVIDUALS WITH DISABILITIES

The contractor and the County of Union (hereafter "Owner") do hereby agree that the provisions of Title II of the Americans With Disabilities Act of 1990 (the "Act") (42 U.S.C.S12.101 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs and activities provided or made available by public entities, and the rules and regulations promulgated pursuant thereunto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the Owner pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the Owner in any action or administrative proceeding commenced pursuant to this Act. The contractor shall indemnify, protect, and save harmless the Owner, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the Owner's grievance procedure, the contractor agrees to abide by any decision of the Owner which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the Owner, or if the Owner incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The Owner shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with full and complete particulars of the claim. If any action or administrative proceeding is brought against the Owner or any of its agents, servants, and employees, the Owner shall expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or process received by the Owner or its representatives.

It is expressly agreed and understood that any approval by the Owner of the services provided by the contractor pursuant to this contract will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the Owner pursuant to this paragraph.

It is further agreed and understood that the Owner assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the Owner from taking any other actions available to it under any other provisions of this Agreement or otherwise at law.

Name _____ **(Please print or type)**

Signature _____**Date** _____

Bidder's Name_____

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. Questions may be answered on separate attached sheets. The Bidder may submit any additional information it desires.

1. _____
   (Name of Bidder)

2. _____
   (Permanent Main Office Address)

3. _____
   (When Organized)

4. _____
   (If a Corporation, where incorporated)

5. Number of years your organization has been engaged in construction or contracting business under present firm or trade name? _____

6. How many years of experience in construction work has your organization had (a) as a general contractor? And/or (b) As a subcontractor?_____

7. Contracts on hand: (Attach a list or table showing gross amounts of each Contract and the appropriate dates of completion)_____

   _____

   _____

   _____

8. General character of work performed by you._____

   _____

9. Have you ever failed to complete any work awarded to you? _____

   _____

10. Have you ever defaulted on a Contract?_____ If so, complete details, including where and why?

    _____

    _____

Bidder's Name_____

STATEMENT OF BIDDER'S QUALIFICATIONS - (continued)

11. Has any officer or partner of your organization ever failed to complete a construction contract handled in its own name? If so, state name of individual, name of owner, location and type of project, and reason for the failure to complete._____

_____

_____

12. List your major equipment available for this Contract.

_____

_____

13. Experience in the construction work similar in importance to this Project.

_____

_____

14. Have you had any material adverse changes from the trades as listed in NJ Notice of Classification within last five (5) years? _____. If so, list prior classification.

15. Background and experience of the principal members of your organization, including the officers.

Individual's Name	Present Position or Office	Yrs. of Construction Experience	Magnitude & Type of Work	In What Capacity

16. Bank Reference. (Name, Address, Phone, Representative) _____

17. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the proper agency? _____

18. The undersigned, hereby authorizes and requests any person, firm or corporation to furnish any information requested by the proper agency in verification of the responses comprising this Statement of Bidder's Qualifications.

17. Bidder's telephone number, fax number and e-mail address (if applicable).

Phone _____

Fax _____

E-mail_____

Mobile _____

Dated at _____ this _____ day of _, 20__.

_____
BIDDER (Signature)

_____
BIDDER (Print Name)

Subscribed and sworn to before me
this _____ day of _____, 20__.

_____
(Seal) Notary Public of New Jersey/
Specify Other State
My Commission Expires_____, 20__.

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

CONTRACTOR PERFORMANCE RECORD

List all contracts completed by you below or provide separate form.

Name of Owner	Name & Location of Project: Type Of Work	Prime or Sub-Cont.	Engineer or Architect in Charge for Owner	Contract Price (Omit Cost)	Date Completed	Was Time* Extension Necessary	Were Any Penalties Imposed	Were Liens* Claims or Stop Notice Filed

* If answer is YES, provide explanation of details in connection with non-completion of contracts, time extensions, penalties imposed, labor troubles, liens, claims and notices filed against contracts listed in preceding item "Performance Record" on an attached sheet.

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

CONTRACTOR PERFORMANCE RECORD

CERTIFICATION

The information above is true and complete to the best of my knowledge and belief.

_____
(Name of Organization)

_____
(Signature)

_____
(Title)

Subscribed and sworn to before me
this _____ day of _____, 20__.

_____
(Seal) Notary Public of New Jersey/
Specify Other State

My Commission Expires_____, 20__.

Bidder's Name_____

AFFIDAVIT REGARDING LIST OF DEBARRED, SUSPENDED OR DISQUALIFIED BIDDERS

STATE OF NEW JERSEY / _____)
Specify, if other

SS:

COUNTY OF _____)

I, _____, of the (City, Town, Borough, etc.) of _____

_____ State of _____, of full age, being

duly sworn according to law on my oath depose and say that:

I am _____ of the firm of _____

_____, the Bidder making the Proposal for the above named Project. I have executed the said Proposal with full authority to do so. Said Bidder is not at the time of the making this bid included on the New Jersey State Treasurer's or the Federal Government's List of Debarred, Suspended or Disqualified Bidders as a result of action taken by any State or Federal Agency.

_____
Name of Contractor

By:_____
(Signature of Authorized Representative)

Subscribed and sworn to before me
this _____ day of _____, 20__.

_____
(Seal) Notary Public of New Jersey/
Specify Other State
My Commission Expires_____, 20__.

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

PRIOR NEGATIVE EXPERIENCE QUESTIONNAIRE

(N.J.S.A. 40A:11-4)

1. Within the past ten (10) years, have you been found, through either court adjudication, arbitration, mediation, or other contractually stipulated alternate dispute resolution mechanism, to have: failed to provide or perform goods or services; or failed to complete a contract in a timely manner; or otherwise performed unsatisfactorily under a prior contract with a public entity?

   _____ yes _____ no If yes, please provide full, detailed explanation.

   _____
   _____
   _____
   _____

2. Within the past ten (10) years, have you defaulted on a contract, thereby requiring a public entity to utilize the services of another contractor to provide the goods or perform the services or to correct or complete the contract?

   _____ yes _____ no If yes, please provide full, detailed explanation.

   _____
   _____
   _____
   _____

3. Within the past ten (10) years, have you defaulted on a contract, thereby requiring a public entity to look to your surety for completion of the contract or tender of the costs of completion?

   _____ yes _____ no If yes, please provide full, detailed explanation.

   _____
   _____
   _____
   _____

4. Within the past ten (10) years, have you been debarred or suspended from contracting with any of the agencies or department of the executive branch of the State of New Jersey at the time of the contract award, where the action was based on failure to perform a contact for goods or services with a public entity?

   _____ yes _____ no If yes, please provide full, detailed explanation.

   _____
   _____
   _____
   _____

Bidder's Name_____

PRIOR NEGATIVE EXPERIENCE CERTIFICATION

I hereby certify that the above statements are true and accurate as of this _____ day of _____, 20__.

_____
Name of Contractor

By_____
(Signature of Authorized Representative)

Subscribed and sworn to before me
This _____ day of _____, 20__.

_____
(Seal) Notary Public of New Jersey/
Specify Other State
My Commission Expires_____, 20__.

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

TO BE COMPLETED ONLY WHEN FINAL PAYMENT IS REQUESTED

CONTRACTOR'S CERTIFICATION OF COMPLIANCE - NEW JERSEY PREVAILING WAGE ACT

TO: County of Union
Division of Engineering
2325 South Avenue
Scotch Plains, New Jersey 07076

CONTRACT:

PROJECT:

In accordance with the requirements of the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56 et al *****, the undersigned contractor on the public work being performed for:

COUNTY OF UNION

hereby certifies that he/she has complied with the contract requirements regarding the payment of the minimum prevailing wages established under "The New Jersey Prevailing Wage Act" N.J.S.A. 34:11-56 et al.

CONTRACTOR: _____
ADDRESS: _____
_____

BY: _____
ORIGINAL SIGNATURE ONLY

STATE OF NEW JERSEY
COUNTY OF _____

Being by me duly sworn according to law, on his oath deposes and says that _____is _____ of _____the above named contractor, and that the facts set forth in the above statement are true.

Subscribed and sworn before me this ____day of _____, 200___.

_____

Notary Public: _____
My Commission Expires: _____

***** N.J.S.A. 34:11-56.33 requires the contractor and subcontractor to file written statements with the public body in form satisfactory to the Commissioner certifying to the amounts then due and owing from such contractor and subcontractor filing such statement to any and all workmen for wages due on account of the public work, setting forth therein the names of the persons whose wages are unpaid and the amount due to each respectively. Union County will withhold the amount so deducted for the benefit of the workmen whose wages are unpaid as shown by the verified statement filed, and will pay directly to any workman the amount shown by such statement to be due to him for such wages. Such payment shall thereby discharge the obligation of the contractor to the person receiving such payment to the extent of the amount thereof.

Bidder's Name_____

UNCOMPLETED CONTRACTS AFFIDAVIT

(To be Submitted with DPMC Form 701)

PURSUANT TO N.J.A.C. 17:19-2.13, BIDDER DECLARES THE FOLLOWING WITH RESPECT TO ITS UNCOMPLETED CONTRACTS, ON ALL WORK, FROM WHATEVER SOUCE (PUBLIC AND PRIVATE), BOTH IN NEW JERSEY AND FROM OTHER GOVERNMENTAL JURISDICTIONS				
ENTITY	**PROJECT TITLE**	**ORIGINAL CONTRACT AMOUNT**	**UNCOMPLETED AMOUNT AS OF BID OPENING DATE**	**NAME AND TELEPHONE NUMBER OF PARTY TO BE CONTACTED FRM ENTITY FOR VERIFICATION**

TOTAL AMOUNT OF UNCOMPLETED CONTRACTS $_____

Sworn and Subscribed to Before me

This _____day of _____20___

_____
Notary Public

BIDDER:

_____
(Signature)

_____
(Print Name)

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

CERTIFICATE OF INSURANCE STATEMENT

The Bidder fully understands the County of Union insurance requirements as stated in the Instructions to Bidders as well as the Owner/Contractor Agreement and agrees to provide all insurance required by these documents prior to the issuance of the Notice to Proceed.

_____
BIDDER (Signature)

_____
BIDDER (Print Name)

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

COLLECTION OF USE TAX ON SALES TO LOCAL GOVERNMENTS STATEMENT

The Bidder fully understands the requirements of the use tax on sales to local governments as stated in the General Conditions to the Contract for Construction and the Instructions to Bidders, and agrees at all times to comply with the "Contractor Use Tax Collection Legislation", as defined therein, and the terms relating thereto contained in the Contract Documents.

_____
BIDDER (Signature)

_____
BIDDER (Print Name)

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS DOCUMENT WITH YOUR PROPOSAL MAY RESULT IN A REJECTION OF YOUR BID.

Bidder's Name_____

ACKNOWLEDGEMENT OF PROJECT LABOR AGREEMENT
(Projects of $5 Million of more irrespective of Phasing)

Contractor _____, hereby acknowledges that the within Project, upon which the undersigned has submitted a Bid Proposal, requires the execution of a Project Labor Agreement and the utilization of union employees. The undersigned agrees to execute the PLA and comply with all terms and conditions of same in the performance of the Work.

Attest:

_____

Contractor:_____

By:_____

Bidder's Name_____

TIME OF COMPLETION

The undersigned proposed that if awarded the Contract, the scope of work will be started within ten (10) calendar days and will be substantially completed within **365 calendar days** from the date of the notice to proceed.

I, _____ of _____
NAME (Print or type) COMPANY

Agree to complete work in the time frame specified _____
SIGNATURE

SITE VISIT – GENERAL CONTRACTOR

I, _____ of _____
NAME (Print or type) COMPANY

Visited the site of the work on _____ _____
SIGNATURE

COUNTY OF UNION NEW JERSEY
Division of Purchasing
DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

Solicitation Number: _____ Bidder/Offeror: _____

_____

Pursuant to Public law 2012, c. 25, any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must complete the certification below to attest, under penalty of perjury, that the person or entity, or one of the person or entity's parents, subsidiaries, or affiliates, is not identified on a list created and maintained by the Department of the Treasury as a person or entity engaging in investment activities in Iran. If the Director finds a person or entity to be in violation of the principles which are the subject of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the person or entity.

I certify, pursuant to Public Law 2012, c. 25, that the person or entity listed above for which I am authorized to bid/renew:

☐ is not providing goods or services of $20,000,000 or more in the energy sector of Iran, including a person or entity that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipe lines used to transport oil or liquefied natural gas, for the energy sector of Iran,
AND

☐ is not a financial institution that extends $20,000,000 or more in credit to another person or entity, for 45 days or more, if that person or entity will use the credit to provide goods or services in the energy sector in Iran.

In the event that a person or entity is unable to make the above certification because it or one of its parents, subsidiaries, or affiliates has engaged in the above-referenced activities, a detailed, accurate and precise description of the activities must be provided in part 2 below to the Division of Purchase under penalty of perjury. Failure to provide such will result in the proposal being rendered as non-responsive and appropriate penalties, fines and/or sanctions will be assessed as provided by law.

PART 2: PLEASE PROVIDE FURTHER INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN. You must provide, accurate and precise description of the activities of the bidding person/entity, or one of its parents, subsidiaries or affiliates, engaging in the investment activities in Iran outlined above by completing the boxes below.

Name_____ Relationship to Bidder/Offeror_____

Description of Activities_____

Duration of Engagement_____Anticipated Cessation Date_____

Bidder/Offeror
Contact Name_____ Contact Phone Number_____

Certification: I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I attest that I am authorized to execute this certification on behalf of the above referenced person or entity. I acknowledge that Union County is relying on the information contained herein and hereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with the County to notify the County in writing of any changes to the answers of information contained herein. I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with Union County, New Jersey and that the County at its option may declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print) _____Signature_____

Title_____Date_____

STATE OF NEW JERSEY
Department of Labor and Workforce Development
Division of Wage and Hour Compliance - Public Contracts Section
PO Box 389
Trenton, NJ 08625-0389

PREVAILING WAGE RATE DETERMINATION

The New Jersey Prevailing Wage Act (N.J.S.A. 34:11-56.25 et seq.) requires that the Department of Labor and Workforce Development establish and enforce a prevailing wage level for workers engaged in public works in order to safeguard their efficiency and general well being and to protect them as well as their employers from the effects of serious and unfair competition.

Prevailing wage rates are wage and fringe benefit rates based on the collective bargaining agreements established for a particular craft or trade in the locality in which the public work is performed. In New Jersey, these rates vary by county and by the type of work performed.

Applicable prevailing wage rates are those wages and fringe benefits in effect on the date the contract is awarded. All pre-determined rate increases listed at the time the contract is awarded must also be paid, beginning on the dates specified. Rates that have expired will remain in effect until new rates are posted.

Prevailing Wage Rate

The prevailing wage rate for each craft will list the effective date of the rate and the following information:

W = Wage Rate per Hour **B** = Fringe Benefit Rate per Hour* **T** = Total Rate per Hour

* Fringe benefits are an integral part of the prevailing wage rate. Employers not providing such benefits must pay the fringe benefit amount directly to the employee each payday. Employers providing benefits worth less than the fringe benefit amount must pay the balance directly to the employee each payday.

Unless otherwise stated in the Prevailing Wage Rate Determination, the fringe benefit rate for overtime hours remains at the straight time rate.

When the Overtime Notes in the Prevailing Wage Rate Determination state that the overtime rates are "inclusive of benefits," the benefit rate is increased by the same factor as the wage rate (i.e. multiplied by 1.5 for time and one-half, multiplied by 2 for double time, etc.).

Apprentice Rate Schedule

An “apprentice” is an individual who is registered with the United States Department of Labor - Office of Apprenticeship and enrolled in a certified apprenticeship program during the period in which they are working on the public works project.

The apprentice wage rate is a percentage of the journeyman wage rate, unless otherwise indicated. The apprentice benefit rate is the full journeyman benefit rate, unless otherwise indicated.

If there is no apprentice rate schedule listed, the individual must be paid at least the journeyman rate even if that individual is in a certified apprentice program for that trade.

If there is no ratio of apprentices to journeymen listed for a particular craft, then the ratio shall be one (1) apprentice to every four (4) journeymen.

Comments/Notes

For each craft listed there will be comments/notes that cover the definition of the regular workday, shift differentials, overtime, recognized holidays, and any other relevant information.

Public Works Contractor Registration

The Public Works Contractor Registration Act (N.J.S.A. 34:11-56.48, et seq.) requires that **all** contractors, subcontractors, or lower tier subcontractors who are working on or who bid on public works projects register with the Department of Labor and Workforce Development. Applications are available at *www.nj.gov/labor* (click on Wage & Hour and then go to Registration & Permits).

Pursuant to N.J.S.A. 34:11-56.51:

No contractor shall bid on any contract for public work as defined in section 2 of P.L.1963, c. 150 (C.34:11-56.26) unless the contractor is registered pursuant to this act. No contractor shall list a subcontractor in a bid proposal for the contract unless the subcontractor is registered pursuant to P.L.1999, c.238 (C.34:11-56.48 et seq.) at the time the bid is made. No contractor or subcontractor, including a subcontractor not listed in the bid proposal, shall engage in the performance of any public work subject to the contract, unless the contractor or subcontractor is registered pursuant to that act.

Snow Plowing

Snow plowing contracts are <u>not</u> subject to the New Jersey Prevailing Wage Act or the Public Works Contractor Registration Act.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Air Conditioning & Refrigeration - Service and Repair **PREVAILING WAGE RATE**

	03/14/16	03/01/17
Journeyman (Mechanic)	W37.18 B21.68 T58.86	W37.48 B22.91 T60.39

Craft: Air Conditioning & Refrigeration - Service and Repair **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
As Shown	Mo. 1-3	Mo. 4-12	2nd Year	3rd Year	4th Year	5th Year		Wage = %	of Jnymn	Wage
Wage and Bene	50%	55%	60%	65%	75%	85%		Bene = %	of Jnymn	Bene

Ratio of Apprentices to Journeymen - 1:4

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES ENTERING PROGRAM AFTER 3-1-13:

INTERVAL	PERIOD AND RATES					
As Shown	1st Year	2nd Year	3rd Year	4th Year	5th Year	Wage =% of Jnymn Wage
Wage and Benefit	40%	50%	60%	70%	80%	Bene. =% of Jnymn Wage

Craft: Air Conditioning & Refrigeration - Service and Repair **COMMENTS/NOTES**

THESE RATES MAY BE USED FOR THE FOLLOWING:
- Service/Repair/Maintenance Work to EXISTING facilities.
- Replacement or Installation of air conditioning and refrigeration equipment when the combined tonnage does not exceed 15 tons for refrigeration, or 25 tons for air conditioning.
- Replacement or Installation of "packaged" or "unitary" rooftop-type units when the combined tonnage of the units does not exceed 75 tons.

NOTE: These rates may NOT be used for any work in new construction (including work on new additions).

The regular workday shall consist of 8 hours, starting between 6:00 AM and 10:00 AM, Monday through Friday.

SHIFT DIFFERENTIALS:
- The second and third shifts shall be paid an additional 15% of the hourly rate.
- All shifts must run for a minimum of 5 consecutive days.

OVERTIME:
Hours worked in excess of 8 per day or before or after the regular workday, that are not shift work, and all hours on Saturday shall be paid at time and one-half the hourly rate, inclusive of benefits. All hours on Sunday and holidays shall be paid at double the hourly rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Boilermaker **PREVAILING WAGE RATE**

	01/01/17
Foreman	W48.70 B41.32 T90.02
General Foreman	W50.70 B42.30 T93.00
Journeyman	W43.70 B39.72 T83.42

Craft: Boilermaker **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
1000 Hours	65%	70%	75%	80%	85%	90%	95%			
Benefit =	33.58	34.50	35.38	36.24	37.12	37.49	38.85			

Ratio of Apprentices to Journeymen - *

* 1 apprentice will be allowed for the first 5 journeymen, 1 apprentice for the next 10 journeymen and 1 apprentice for each succeeding 20 journeymen up to a maximum of 5 apprentices per contractor on any one job.

Craft: Boilermaker **COMMENTS/NOTES**

HIGH WORK: All apprentices working on the erection, repair, or dismantling of smoke stacks, standpipes, or water towers shall be paid the Journeyman rate.

The regular workday shall consist of 8 hours, between 8:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall work 7½ hours and receive 8 hours pay, at a rate equal to the regular hourly rate plus 10%.
- The third shift shall work 7 hours and receive 8 hours pay, at a rate equal to the regular hourly rate plus 20%.
- For "Municipal Water Works" projects only, the following shall apply: Two, four day, 10 hour shifts may be worked at straight time Monday through Thursday. The day shift shall work four days, at 10 hours, for 10 hours pay. The second shift shall work four days, at nine and a half hours, for 10 hours pay, plus 10% the hourly rate for new work and .25 cents on repair work. Friday may be used as a make-up day at straight time, due to weather conditions, hoilday or any other circumstances beyond the employer's control.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays (except Labor Day) shall be paid at double the hourly rate. All hours on Labor Day shall be paid at four times the hourly rate.
- If any other craft employed by the same contractor, or a subcontractor thereof, receives double time in lieu of time and one-half, then the Boilermaker shall receive double time in lieu of time and one-half.
- For "Municipal Water Works" projects only, the following shall apply: Four 10 hour days may be worked Monday through Thursday at straight time. Friday may be used as a make-up day for a day lost to inclement weather, holiday or other conditions beyond the control of the employer. Overtime shall be paid for any hours that exceed 10 hours per day or 40 hours per week.

RECOGNIZED HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Boilermaker - Minor Repairs **PREVAILING WAGE RATE**

	01/01/17
Foreman	W32.54 B16.17 T48.71
General Foreman	W33.04 B16.17 T49.21
Mechanic	W31.04 B16.17 T47.21

Craft: Boilermaker - Minor Repairs **COMMENTS/NOTES**

NOTE: These rates apply to MINOR REPAIR WORK ONLY (repair work in the field for which the contract amount does not exceed $125,000.00).

OVERTIME:
Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays (except Labor Day) shall be paid at double the hourly rate. All hours on Labor Day shall be paid at four times the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Washington's Birthday, Good Friday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Thanksgiving Day, day after Thanksgiving, Christmas Day. Saturday holidays observed the preceding Friday, Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Bricklayer, Stone Mason **PREVAILING WAGE RATE**

	11/01/16	05/01/17	05/01/18
Deputy Foreman	W43.00 B30.91 T73.91	W0.00 B0.00 T76.04	W0.00 B0.00 T78.23
Foreman	W46.00 B30.91 T76.91	W0.00 B0.00 T79.04	W0.00 B0.00 T81.23
Journeyman	W40.00 B30.91 T70.91	W0.00 B0.00 T73.04	W0.00 B0.00 T75.23

Craft: Bricklayer, Stone Mason **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
6 Months	40%	50%	55%	60%	65%	70%	75%	80%		
Benefits	3.72	4.65	5.12	5.58	20.48	21.83	23.18	24.52		

Ratio of Apprentices to Journeymen - 1:5

Craft: Bricklayer, Stone Mason **COMMENTS/NOTES**

The regular workday shall consist of 8 hours, between 6:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- When a 2 shift schedule (including a day shift) is established, the first, or day shift, shall be established on an 8 hour basis. The second shift shall be established on an 8 hour basis, and receive the regular rate plus 10%, inclusive of benefits.
- When a three shift schedule is established, the first shift shall be established on an 8 hour basis, the second shift on a 7.5 hour basis, and the third shift on a 7 hour basis. The first shift shall receive the regular hourly rate, the second shift shall receive the regular rate plus 10%, inclusive of benefits, and the third shift shall receive the regular rate plus 15%, inclusive of benefits.
- When there is no day shift, and a second or third shift is established, it shall be established on an 8 hour basis. The second shift shall receive the regular rate plus 10%, inclusive of benefits, and the third shift shall receive the regular rate plus 15%, inclusive of benefits.
- When an irregular shift must be established, this shift shall receive the regular rate plus 10%, inclusive of benefits.

OVERTIME:
- The first 2 hours in excess of 8 per day, or before or after the regular workday that are not shift work, Monday through Friday, shall be paid at time and one-half the regular rate, inclusive of benefits. Any additional overtime shall be paid at double the regular rate, inclusive of benefits. The first 10 hours on Saturday shall be paid at time and one-half the regular rate, inclusive of benefits. Any additional overtime shall be paid at double the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.
- Saturday may be used as a make-up day for hours lost to inclement weather.
- When Bricklayers/Stone Masons work on Saturday with Laborers, and no other crafts are working on the project for the day, benefits may be paid at straight time. If other crafts are present, the applicable overtime rate for benefits shall be paid.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Carpenter **PREVAILING WAGE RATE**

	11/01/16	05/01/17	11/01/17	05/01/18	11/01/18
Foreman	W53.42 B30.44 T83.86	W0.00 B0.00 T85.04	W0.00 B0.00 T86.04	W0.00 B0.00 T87.29	W0.00 B0.00 T88.54
Journeyman	W46.45 B26.48 T72.93	W0.00 B0.00 T74.23	W0.00 B0.00 T75.23	W0.00 B0.00 T76.48	W0.00 B0.00 T77.73

Craft: Carpenter **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	40%	55%	65%	80%	90%					
Benefit	57% of	Appren	tice	Wage Rate	for all	intervals				

Ratio of Apprentices to Journeymen - 1:3

Craft: Carpenter **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- When there are 2 or more Carpenters on a job, 1 shall be designated as a Foreman.
- When there are 21 or more Carpenters on a job, 2 shall be designated as Foremen.

The regular workday shall consist of 8 hours, starting between 7:00 AM and 9:00 AM.

SHIFT DIFFERENTIALS:
- When a 2 shift schedule (including a day shift) is established, the day shift shall be established on an 8 hour basis. The second shift shall be established on an 8 hour basis, and receive the regular rate plus 15%, inclusive of benefits.
- When a three shift schedule is established, the first shift shall be established on an 8 hour basis, the second shift on a 7.5 hour basis, and the third shift on a 7 hour basis. The first shift shall receive the regular hourly rate, the second shift shall receive the regular rate plus 15% and the third shift shall receive the regular rate plus 20%, inclusive of benefits.
- When there is no day shift, and a second or third shift is established, it shall be established on an 8 hour basis. The second shift shall receive the regular rate plus 15% and the third shift shall receive the regular rate plus 20%, inclusive of benefits.

OVERTIME:
- All hours in excess of 8 per day, or before or after an established shift that are not shift work, and all hours on Saturdays shall be paid at time and one-half the hourly rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the hourly rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday to Thursday, at straight time. Friday may be used as a make-up day for a day lost due to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Carpenter - Resilient Flooring **PREVAILING WAGE RATE**

	11/01/16	05/01/17	11/01/17	05/01/18	11/01/18
Foreman	W53.42 B30.44 T83.86	W0.00 B0.00 T85.04	W0.00 B0.00 T86.04	W0.00 B0.00 T87.29	W0.00 B0.00 T88.54
Journeyman	W46.45 B26.48 T72.93	W0.00 B0.00 T74.23	W0.00 B0.00 T75.23	W0.00 B0.00 T76.48	W0.00 B0.00 T77.73

Craft: Carpenter - Resilient Flooring **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	40%	55%	65%	80%	90%					
Benefit	57%	of	Appren	tice	Wage Rate	for all	intervals			

Ratio of Apprentices to Journeymen - *

* 1 apprentice shall be allowed to every 2 journeymen or major fraction therof. No more than 3 apprentices on any one job or project.

Craft: Carpenter - Resilient Flooring **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- On any job where there are 4 or more Carpenters of Resilient Flooring, 1 must be designated a Foreman.

FOR SYNTHETIC TURF INSTALLATION ONLY:
- The rate shall be 90% of the wage and benefit rate.

The regular workday consists of 8 hours, starting between 6:00 AM and 9:00 AM.

SHIFT DIFFERENTIALS:
- When a 2 shift schedule (including a day shift) is established, the day shift, shall be established on an 8 hour basis. The second shift shall be established on an 8 hour basis, and receive the regular wage rate plus 15%.
- When a three shift schedule is established, the first shift shall be established on an 8 hour basis, the second shift on a 7.5 hour basis, and the third shift on a 7 hour basis. The first shift shall receive the regular wage rate, the second shift shall receive the regular wage rate plus 15% and the third shift shall receive the regular wage rate plus 20%.
- When there is no day shift, and a second or third shift is established, it shall be established on an 8 hour basis. The second shift shall receive the regular wage rate plus 15% and the third shift shall receive the regular wage rate plus 20%.

OVERTIME:
- Hours in excess of 8 per day or 40 per week, or before or after the regular workday, Monday through Friday, shall be paid at time and one-half the wage rate. Saturday may be used as a make-up day, at straight time, up to 8 hours, for hours lost to reasons beyond the control of the employer, up to a total of 40 hours per week; hours in excess of 8 on Saturday shall then be paid at time and one-half the wage rate. If Saturday is not a make-up day, all hours on Saturday shall be paid at time and one-half the wage rate. All hours on Sundays and holidays shall be paid at double the wage rate.
- Four 10-hour days may be worked, Monday to Thursday, at straight time. Friday may be used as a make-up day for hours lost to reasons beyond the control of the employer. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the wage rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Cement Mason **PREVAILING WAGE RATE**

See "Bricklayer, Stone Mason" Rates

Craft: Cement Mason **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									

Ratio of Apprentices to Journeymen - 1:4

Craft: Cement Mason **COMMENTS/NOTES**

See "Bricklayer, Stone Mason" Rates

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Diver **PREVAILING WAGE RATE**

	11/29/16	05/01/17	11/01/17	05/01/18	11/01/18
Diver	W56.34 B44.37 T100.71	W0.00 B0.00 T101.91	W0.00 B0.00 T103.11	W0.00 B0.00 T104.36	W0.00 B0.00 T105.61
Tender	W44.60 B44.37 T88.97	W0.00 B0.00 T90.17	W0.00 B0.00 T91.37	W0.00 B0.00 T92.62	W0.00 B0.00 T93.87

Craft: Diver **COMMENTS/NOTES**

NOTE: All dive crews must consist of a Tender, a Diver, and a standby Diver (standby Diver is the same rate as a Diver).

DEPTH & PENETRATION RATES: Divers shall be paid the following depth and penetration rates, in addition to the regular hourly rate, when applicable:

AIR DIVES:
0-59 feet: No additional wage
60-74 feet: + $0.25 per foot
75-125 feet: + $0.78 per foot

MIXED GAS DIVES:
0-74 feet: No additional wage
75-125 feet: + $1.00 per foot
126-200 feet: + $2.00 per foot

PENETRATION DIVES:
126-200 feet: + $1.50 per foot
201-275 feet: + $1.75 per foot
276-350 feet: + $2.00 per foot
351-425 feet: + $2.50 per foot

OVERTIME:
Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Presidential Election Day, Thanksgiving Day, Christmas Day. Veterans' Day may be switched with the day after Thanksgiving.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Dockbuilder **PREVAILING WAGE RATE**

	11/29/16	05/01/17	11/01/17	05/01/18	11/01/18
Foreman	W51.29 B44.37 T95.66	W0.00 B0.00 T96.79	W0.00 B0.00 T97.99	W0.00 B0.00 T99.24	W0.00 B0.00 T100.49
Foreman (Concrete Form Work)	W50.14 B31.56 T81.70	W0.00 B0.00 T82.90	W0.00 B0.00 T84.10	W0.00 B0.00 T85.35	W0.00 B0.00 T86.60
Journeyman	W44.60 B44.37 T88.97	W0.00 B0.00 T90.17	W0.00 B0.00 T91.37	W0.00 B0.00 T92.62	W0.00 B0.00 T93.87
Journeyman (Concrete Form Work)	W43.60 B31.56 T75.16	W0.00 B0.00 T76.36	W0.00 B0.00 T77.56	W0.00 B0.00 T78.81	W0.00 B0.00 T80.06

Craft: Dockbuilder **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	17.84	22.30	28.99	35.68						
Benefit	29.95	for all	intervals		Concrete	Form Work	Only Ben.	= 21.81	for all	intervals

Ratio of Apprentices to Journeymen - *

* When there are 4 or fewer Dockbuilders on a job, no more than 1 may be an apprentice. When there are 5 or more Dockbuilders, there may be 1 apprentice for every 5 Dockbuilders.

Craft: Dockbuilder **COMMENTS/NOTES**

CREOSOTE HANDLING:
When handling creosote products on land piledriving, floating marine construction, and construction of wharves, the worker shall receive an additional $0.25 per hour.

HAZARDOUS WASTE WORK:
- Hazardous waste removal work on a state or federally designated hazardous waste site where Level A, B, or C personal protection is required: an additional 20% of the hourly rate, per hour.
- Hazardous waste removal work in Level D, or where personal protection is not required: an additional $1.00 per hour.

CERTIFIED WELDER: When required on the job by the project owner, a Certified Welder shall receive an additional $1.00 per hour.

FOREMAN REQUIREMENTS:
The first Dockbuilder on the job shall be designated a Foreman.

OVERTIME:
Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Presidential Election Day, Thanksgiving Day, Christmas Day. Veterans' Day may be switched with the day after Thanksgiving.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Drywall Finisher **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W42.55 B23.10 T65.65	W44.30 B22.60 T66.90
General Foreman	W44.45 B23.10 T67.55	W46.20 B22.60 T68.80
Journeyman	W38.75 B23.10 T61.85	W40.50 B22.60 T63.10

Craft: Drywall Finisher **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
4 Months	30%	40%	50%	60%	70%	75%	80%	85%	90%	
Benefits	Intervals	1 to 3 =	9.85	Intervals	4 to 6 =	12.28	Intervals	7 to 9 =	14.95	

Ratio of Apprentices to Journeymen - 1:4

Craft: Drywall Finisher **COMMENTS/NOTES**

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.
- When 3 shifts are worked, the second shift shall receive 8 hours pay for 7.5 hours of work, and the third shift shall receive 8 hours pay for 7 hours of work.
- Shift work must run for a minimum of 5 consecutive workdays.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.
- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.

RECOGNIZED HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician **PREVAILING WAGE RATE**

	05/30/16	05/29/17	05/28/18
Cable Splicer	W58.71 B33.74 T92.45	W60.08 B34.53 T94.61	W61.52 B35.35 T96.87
Foreman	W59.77 B34.34 T94.11	W61.17 B35.15 T96.32	W62.64 B35.98 T98.62
Journeyman	W53.37 B30.67 T84.04	W54.62 B31.39 T86.01	W55.93 B32.13 T88.06

Craft: Electrician **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	40%	49%	58%	68%	80%		of Jour	neyman	Wage	Rate
Benefit	40%	49%	58%	68%	80%		of Jour	neyman	Benefit	Rate

Ratio of Apprentices to Journeymen - 2:3

Craft: Electrician **COMMENTS/NOTES**

THESE RATES ALSO APPLY TO THE FOLLOWING:
-All burglar and fire alarm work.
-All fiber optic work.
-Teledata work in new construction.
-Teledata work involving 16 Voice/Data Lines or more.

The regular workday shall be 8 hours, between 8:00 AM and 4:30 PM.

FOREMAN REQUIREMENTS:
- On any job where there are 1 to 10 Journeymen electricians, 1 shall be designated a Foreman.

SHIFT DIFFERENTIALS:
- Shift work must run for a minimum of 5 consecutive workdays.
- 2nd Shift (4:30 PM to 12:30 AM) shall receive 8 hours pay for 7.5 hours work + an additional 10% of the regular rate, per hour, inclusive of benefits.
- 3rd Shift (12:30 AM to 8:00 AM) shall receive 8 hours pay for 7 hours work + an additional 15% of the regular rate, per hour, inclusive of benefits.

OVERTIME:
Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, and all hours on Saturdays, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician - Teledata (15 Voice/Data Lines & Less) **PREVAILING WAGE RATE**

	11/01/16
Master Technician/General Foreman	W52.18 B28.69 T80.87
Senior Technician/Lead Foreman (21-30 Workers on Job)	W47.77 B26.26 T74.03
Technician A/Foreman (11-20 Workers on Job)	W45.76 B25.16 T70.92
Technician B/Working Foreman (4-10 Workers on Job)	W43.75 B24.06 T67.81
Technician C/Journeyman (1-3 Workers on Job)	W40.14 B22.07 T62.21

Craft: Electrician - Teledata (15 Voice/Data Lines & Less) **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
6 Months	20.14	21.48	23.72	26.41	29.54	32.23	35.36	38.49		
Benefits	7.85	8.38	9.25	10.29	11.52	12.56	13.79	15.01		

Ratio of Apprentices to Journeymen - 2:3

Craft: Electrician - Teledata (15 Voice/Data Lines & Less) **COMMENTS/NOTES**

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES ENTERING PROGRAM AFTER 10-31-14:

INTERVAL	PERIOD AND RATES							
6 Months	17.90	19.25	21.48	24.17	27.30	29.99	33.12	36.26
Benefits	6.98	7.51	8.38	9.42	10.65	11.69	12.92	14.13

NOTES:
- These rates are for service, maintenance, moves, and/or changes affecting 15 Voice/Data (teledata) lines or less. These rates may NOT be used for any teledata work in new construction (including additions) or any fiber optic work.
- The number of Teledata workers on the jobsite is the determining factor for which Foreman category applies .

The regular workday shall be 8 hours, between 8:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for a minimum of 5 consecutive workdays.

- 2nd Shift (4:30 PM to 12:30 AM) shall receive 8 hours pay for 7.5 hours work + an additional 10% of the regular rate, per hour, inclusive of benefits.
- 3rd Shift (12:30 AM to 8:00 AM) shall receive 8 hours pay for 7 hours work + an additional 15% of the regular rate, per hour, inclusive of benefits.

OVERTIME:
Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, and all hours on Saturdays, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

County - UNION

Craft: Electrician - Teledata (16 Instruments & More) **PREVAILING WAGE RATE**

See "Electrician" Rates

Craft: Electrician - Teledata (16 Instruments & More) **COMMENTS/NOTES**

See ELECTRICIAN Rates

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician- Outside Commercial **PREVAILING WAGE RATE**

	05/30/16	05/29/17	05/28/18
Cable Splicer	W58.99 B33.46 T92.45	W60.37 B34.24 T94.61	W61.82 B35.06 T96.88
Certified Welder	W56.31 B31.94 T88.25	W57.62 B32.68 T90.30	W59.01 B33.47 T92.48
Equipment Operator	W53.63 B30.42 T84.05	W54.88 B31.13 T86.01	W56.20 B31.88 T88.08
Foreman (1-10 Journeyman workers on job)	W60.07 B34.07 T94.14	W61.47 B34.86 T96.33	W62.94 B35.70 T98.64
Foreman (11-20 Journeyman workers on job)	W61.67 B34.98 T96.65	W63.11 B35.79 T98.90	W64.63 B36.66 T101.29
General Foreman (21-30 Journeyman workers on job)	W63.28 B35.89 T99.17	W64.76 B36.73 T101.49	W66.32 B37.61 T103.93
General Foreman (31-60 Journeyman workers on job)	W68.65 B38.94 T107.59	W70.25 B39.84 T110.09	W71.94 B40.80 T112.74
General Foreman (61+ Journeyman workers on job)	W69.72 B39.54 T109.26	W71.34 B40.46 T111.80	W73.06 B41.44 T114.50
Groundman	W32.18 B18.26 T50.44	W32.93 B18.68 T51.61	W33.72 B19.13 T52.85
Journeyman Lineman/Technician	W53.63 B30.42 T84.05	W54.88 B31.13 T86.01	W56.20 B31.88 T88.08
Sub-Foreman	W60.07 B34.07 T94.14	W61.47 B34.86 T96.33	W62.94 B35.70 T98.64

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician- Outside Commercial **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
1000 Hours	60%	65%	70%	75%	80%	85%	90%			
Benefits	56.4% of	Journey	man	wage	+ $.01					

Craft: Electrician- Outside Commercial **COMMENTS/NOTES**

EFFECTIVE 5-30-16- The apprentice benefit rate shall be 56.7% + $.01.
EFFECTIVE 5-29-17- The apprentice benefit rate shall be 56.7% + $.01.
EFFECTIVE 5-28-18- The apprentice benefit rate shall be 56.7% + $.01.

* FOR UTILITY WORK PLEASE SEE STATEWIDE RATES

The regular worday shall be 8 hours, between 8:00 AM and 4:30 PM.

FOREMAN REQUIREMENTS:
On jobs where there are 2 Journeymen, one shall be a Foreman. The following number of Foreman, General Foreman, Assistant General Foreman and Sub-Foreman shall be required with respect to number of Journeymen on site:
2-10 Journeymen (1 Foreman)
11-20 Journeymen (1 Foreman and 1 Sub-Foreman)
21-30 Journeymen (1 Foreman and 2 Sub-Foremen)

SHIFT DIFFERENTIALS:
Shift work must run for a minimum of 5 consecutive workdays.
2nd Shift (4:30 PM to 12:30 AM): 8 hrs. pay for 7.5 hrs. work + an additional 10% of the regular rate, inclusive of benefits.
3rd Shift (12:30 AM to 8:00 AM): 8 hrs. pay for 7 hrs. work + an additional 15% of the regular rate per hour, inclusive benefits.

OVERTIME:
Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, and all hours on Saturdays, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS:
New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day and Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician-Utility Work (North) **PREVAILING WAGE RATE**

Rates are located in the "Statewide" rate package

Craft: Electrician-Utility Work (North) **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
6 Months	60%	65%	70%	75%	80%	85%	90%			
Benefits	62.5% of	Appren	tice	Wage	Rate	for all	intervals			

Craft: Electrician-Utility Work (North) **COMMENTS/NOTES**

Electrician-Utility Work (North) rates are located in the "Statewide" rate package.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Electrician-Utility Work (South) **PREVAILING WAGE RATE**

Rates are located in the "Statewide" rate package

Craft: Electrician-Utility Work (South) **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
6 Months	27.37	29.65	31.93	34.21	36.49	38.77	41.05			
Benefits	24.01	25.34	26.73	28.09	29.43	30.80	32.18			

Craft: Electrician-Utility Work (South) **COMMENTS/NOTES**

Electrician-Utility Work (South) rates are located in the "Statewide" rate package.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Elevator Constructor **PREVAILING WAGE RATE**

	03/17/16	03/17/17	03/17/18
Journeyman	W60.96 B39.77 T100.73	W62.64 B41.56 T104.20	W64.48 B43.36 T107.84

Craft: Elevator Constructor **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	27.22	33.53	39.62	45.72						
Benefits	31.75	32.88	34.41	35.93						

Ratio of Apprentices to Journeymen - 1:1

Craft: Elevator Constructor **COMMENTS/NOTES**

The regular workday shall consist of either 7 or 8 hours to be established at the beginning of the project, between 7:00 AM and 4:30 PM.

OVERTIME:
For all hours worked before or after the regular workday, Monday through Friday, and all hours on Saturday and Sunday , shall be paid at double the hourly rate. Holiday pay is one days wages (8 hours) plus double the hourly rate for all hours worked.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Saturday holidays shall be observed on the previous Friday and Sunday holidays shall be observed on the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Elevator Modernization & Service **PREVAILING WAGE RATE**

	03/17/16	03/17/17	03/17/18
Journeyman	W47.91 B38.17 T86.08	W49.14 B39.91 T89.05	W50.49 B41.66 T92.15

Craft: Elevator Modernization & Service **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	27.22	26.35	31.14	35.93						
Benefits	31.68	31.99	33.37	34.74						

Ratio of Apprentices to Journeymen - 1:1

Craft: Elevator Modernization & Service **COMMENTS/NOTES**

MODERNIZATION (addition, replacement, refurbishing, relocation, or changes in design or appearance, of elevator equipment in existing buildings):

- The regular workday consists of 8 hours, between 7:00 AM and 4:30 PM.

- Overtime:
Hours in excess of 8 per day, or before or after the regular workday, Monday through Friday, and all hours on Saturday and Sunday shall be paid at time and one-half the hourly rate. Holiday pay is one days wages (8 hours) plus time and one-half the hourly rate for all hours worked.

SERVICE (repair or replacement of parts for the purpose of maintaining elevator equipment in good operating condition):

- The regular workday consists of 8 hours, between 6:00 AM and 6:00 PM.

- Overtime:
Hours in excess of 8 per day, or before or after the regular workday, Monday through Friday, and all hours on Saturday shall be paid at time and one-half the hourly rate. All hours on Sunday and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS (Modernization and Service): New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Saturday holidays shall be observed on the previous Friday and Sunday holidays shall be observed on the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Glazier **PREVAILING WAGE RATE**

	06/20/16
Foreman	W47.39 B23.26 T70.65
General Foreman	W49.39 B23.50 T72.89
Journeyman	W43.39 B22.78 T66.17

Craft: Glazier **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
4 Months	30%	40%	50%	60%	70%	75%	80%	85%	90%	
Benefits	Intervals	1 to 3 =	6.51	Intervals	4 to 6 =	9.33	Intervals	7 to 9 =	11.67	

Ratio of Apprentices to Journeymen - 1:4

Craft: Glazier **COMMENTS/NOTES**

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES ENTERING PROGRAM AS OF 5-1-14:

INTERVAL	PERIOD AND RATES							
6 Months	50%	55%	60%	65%	70%	75%	80%	90%
Benefits	8.10	8.10	10.34	10.34	11.51	11.51	14.62	14.62

Hazard/Height Pay: +$1.00 per hour

FOREMAN REQUIREMENTS:
- When there are 4 or more Glaziers on a job, 1 must be designated a Foreman.
- When there are 15 or more Glaziers on a job, 1 must be designated a General Foreman.

The regular workday shall consist of 8 hours, between 7:00 AM and 5:30 PM, Monday to Friday.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.
- When 3 shifts are worked, the second shift shall receive 8 hours pay for 7.5 hours of work, and the third shift shall receive 8 hours pay for 7 hours of work.

OVERTIME:
Hours in excess of 8 per day, or before or after the regular workday Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the regular rate. All hours on Sundays and holidays shall be paid at double the regular rate.

RECOGNIZED HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, General Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Heat & Frost Insulator **PREVAILING WAGE RATE**

	10/17/16
Foreman	W52.52 B30.17 T82.69
General Foreman	W55.07 B31.28 T86.35
Journeyman	W51.24 B29.61 T80.85

Craft: Heat & Frost Insulator **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	23.77	28.19	34.05	39.96						
Benefits	17.83	21.08	23.21	25.16						

Ratio of Apprentices to Journeymen - 1:3

Craft: Heat & Frost Insulator **COMMENTS/NOTES**

NOTE: These rates apply to the installing of insulation on hot and cold mechanical systems.

The regular workday shall be 8 hours between 8:00 AM and 4:30 PM.

SHIFT DIFFERENTIAL:
- Shift work must run for a minimum of 5 consecutive workdays.
- Second Shift shall work 7.5 hours and receive 8 hours pay, at the regular rate, plus 25% per hour.
- Third Shift shall work 7 hours and receive 8 hours pay, at the regular rate, plus 30% per hour.

OVERTIME:
The first 2 hours in excess of 8 per day, hours outside of the regular workday Monday through Friday that are not shift work, and the first 10 hours on Saturday, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours in excess of 10 per day, and all hours on Sunday and holidays (except Labor Day) shall be paid at double the regular rate, inclusive of benefits. All hours on Labor Day shall be paid at triple the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Presidential Election Day, Thanksgiving Day and Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Heat & Frost Insulator - Asbestos Worker **PREVAILING WAGE RATE**

	10/17/16
Asbestos Helper Abatement	W33.52 B22.69 T56.21
Firestop/Hazmat	W26.93 B9.25 T36.18
Foreman	W52.52 B30.17 T82.69

Craft: Heat & Frost Insulator - Asbestos Worker **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
	SEE	HEAT &	FROST	INSULATOR						

Ratio of Apprentices to Journeymen - 1:3

Craft: Heat & Frost Insulator - Asbestos Worker **COMMENTS/NOTES**

NOTE: These rates apply only to the removal of insulation materials/asbestos from mechanical systems, including containment erection and demolition, and placing material in appropriate containers.

The regular workday shall be 8 hours between 8:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for a minimum of 5 consecutive workdays.
- The second shift shall work 7.5 hours and receive 8 hours pay at the regular rate, plus 25% per hour.
- The third shift shall work 7 hours and receive 8 hours pay at the regular rate, plus 30% per hour.

OVERTIME: The first 2 hours in excess of 8 per day, hours outside of the regular workday Monday through Friday that are not shift work, and the first 10 hours on Saturday, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours in excess of 10 per day, and all hours on Sunday and holidays (except Labor Day) shall be paid at double the regular rate, inclusive of benefits. All hours on Labor Day shall be paid at triple the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Presidential Election Day, Thanksgiving Day and Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Ironworker **PREVAILING WAGE RATE**

	08/02/16	07/01/17
Rod /Fence Foreman	W42.24 B44.27 T86.51	W0.00 B0.00 T88.51
Rod/Fence Journeyman	W39.24 B44.27 T83.51	W0.00 B0.00 T85.51
Structural Foreman	W44.54 B44.27 T88.81	W0.00 B0.00 T90.56
Structural Journeyman	W41.54 B44.27 T85.81	W0.00 B0.00 T87.56

Craft: Ironworker **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
6 Months	50%	60%		Yearly	70%	80%	90%			

Ratio of Apprentices to Journeymen - 1:4

Craft: Ironworker **COMMENTS/NOTES**

HAZARDOUS WASTE WORK: On hazardous waste removal work on a state or federally designated hazardous waste site where the Ironworker is required to wear Level A,B, or C personal protection: + $3.00 per hour

The regular workday consists of 8 hours between 6:00 AM and 4:30 PM.

FOREMAN REQUIREMENTS:
When there are 2 or more Ironworkers on a job, 1 shall be designated a Foreman.

SHIFT DIFFERENTIALS:
- When a 2 shift schedule is established, the first, or day shift , shall be established on an 8 hour basis .The second shift shall be established on an 8 hour basis, and receive the regular rate plus 15%.
- When a three shift schedule is established, the first shift shall be established on an 8 hour basis, the second shift on a 7.5 hour basis, and the third shift on a 7 hour basis. The first shift shall receive the regular hourly rate, the second shift shall receive the regular rate plus 15%, and the third shift shall receive the regular rate plus 20%.
- When there is no day shift, and a second or third shift is established, it shall be established on an 8 hour basis.
- When an irregular shift is established for the Ironworker (Structural) classification, the rate shall be paid at time and one-half the regular rate, inclusive of benefits. When an irregular shift is established for the Rod /Fence classification, the shift shall be established on an 8 hour basis and receive the regular rate, plus 20%.

OVERTIME:

- All hours in excess of 8 per day, or before or after an established shift that are not shift work, and all hours on Saturday, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sunday and holidays shall be paid at double the hourly rate, inclusive of benefits. Saturday may be used as a make-up day for a day lost to inclement weather. If Saturday is not a make-up day, all hours on Saturday shall be paid at time and one-half the hourly rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday to Thursday, at straight time. Friday may be used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Laborer - Asbestos & Hazardous Waste Removal **PREVAILING WAGE RATE**

	01/26/17
Journeyman (Handler)	W30.88 B21.91 T52.79

Craft: Laborer - Asbestos & Hazardous Waste Removal **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	18.53	21.62	24.70	27.79						
Benefits	20.26	for	all	intervals						

Ratio of Apprentices to Journeymen - *

* Ratio of apprentices to journeymen shall not be more than one apprentice for the first journeyman and no more than (1) apprentice for each additional three (3) journeymen.

Craft: Laborer - Asbestos & Hazardous Waste Removal **COMMENTS/NOTES**

NOTE: These rates apply to work in connection with Asbestos, Radiation, Hazardous Waste, Lead, Chemical, Biological, Mold Remediation and Abatement.

The regular workday shall be 8 hours between 6:00 AM and 6:00 PM.

OVERTIME:
- Hours in excess of 8 per day, Monday through Saturday, and all hours on Sunday and holidays shall be paid at time and one-half the regular rate.
- When the owner (Public Body) mandates that work is to be performed on Sunday, those hours may be worked at straight time, up to 8 hours per day, up to 40 hours per week.
- Benefits on ALL overtime hours shall be paid at straight time.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Good Friday, Easter, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Laborer - Building **PREVAILING WAGE RATE**

	11/01/16	05/01/17	11/01/17	05/01/18
Class A Journeyman	W31.55 B27.22 T58.77	W0.00 B0.00 T59.67	W0.00 B0.00 T60.72	W0.00 B0.00 T62.57
Class B Journeyman	W31.05 B27.22 T58.27	W0.00 B0.00 T59.17	W0.00 B0.00 T60.22	W0.00 B0.00 T62.07
Class C Journeyman	W26.43 B27.22 T53.65	W0.00 B0.00 T54.55	W0.00 B0.00 T55.60	W0.00 B0.00 T57.45
Foreman	W35.46 B27.22 T62.68	W0.00 B0.00 T63.58	W0.00 B0.00 T64.63	W0.00 B0.00 T66.48
General Foreman	W39.38 B27.22 T66.60	W0.00 B0.00 T67.50	W0.00 B0.00 T68.55	W0.00 B0.00 T70.40

Craft: Laborer - Building **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
6 Months	60%	70%	80%	90%						
Benefit	23.97	23.97	23.97	23.97						

Ratio of Apprentices to Journeymen - *

* Ratio of apprentices to journeymen shall not be more than one apprentice for the first journeyman and no more than (1) apprentice for each additional three (3) journeymen.

Craft: Laborer - Building **COMMENTS/NOTES**

CLASS A: Specialist laborer including mason tender or concrete pour crew; scaffold builder (scaffolds up to 14 feet in height); operator of forklifts, Bobcats (or equivalent machinery), jack hammers, tampers, motorized tampers and compactors, vibrators, street cleaning machines, hydro demolition equipment, riding motor buggies, conveyors, burners; and nozzlemen on gunite work.
CLASS B: Basic laborer - includes all laborer work not listed in Class A or Class C.
CLASS C: Janitorial-type light clean-up work associated with the TURNOVER of a project, or part of a project, to the owner. All other clean-up work is Class B.

The regular workday shall be 8 hours between 6:00 AM and 6:00 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for a minimum of 5 consecutive workdays.
- When a 2-shift schedule is worked, including a day shift, both shifts shall be establised on the basis of 8 hours pay for 8 hours worked. The second shift shall receive the regular rate plus an additional 10%.
- When a 3-shift schedule is worked, the day shift shall be established on the basis of 8 hours pay for 8 hours worked, the second shift shall be established on the basis of 8 hours pay for 7.5 hours worked, and the third shift shall be established

on the basis of 8 hours pay for 7 hours worked. The day shift shall receive the regular rate, the second shift shall receive the regular rate plus an additional 10%, and the third shift shall receive the regular rate plus an additional 15%.
- When a second or third shift is worked with no day shift, the second or third shift shall be established on the basis of 8 hours pay for 8 hours worked. The second shift shall receive the regular rate plus an additional 10%, and the third shift shall receive the regular rate plus an additional 15%.

OVERTIME:
- Hours in excess of 8 per day, or outside the regular workday that are not shift work, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the regular rate. Saturday may be used as a make-up day (paid at straight time) for a day lost to inclement weather, or for a holiday that is observed during the work week, Monday through Friday. All hours on Sundays and holidays shall be paid at double the regular rate.
- Four 10-hour days may be worked Monday to Thursday, at straight time, with Friday used a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the regular rate.
- Benefits on ALL overtime hours shall be paid at time and one-half.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Laborer - Heavy & General **PREVAILING WAGE RATE**

Rates are located in the
"Statewide" rate package

Craft: Laborer - Heavy & General **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
1000 Hours	60%	70%	80%	90%						
Benefit	18.78	for	all	intervals						

Ratio of Apprentices to Journeymen - *

* No more than 1 apprentice for the first journeyman and no more than 1 apprentice for each additional 3 journeymen.

Craft: Laborer - Heavy & General **COMMENTS/NOTES**

Heavy & General Laborer rates are located in the "Statewide" rate package.

With respect to the APPRENTICE RATE SCHEDULE, the following shall apply:

On 3-1-17- benefits shall be $19.53.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Laborer-Residential and Modular Construction **PREVAILING WAGE RATE**

	01/05/17	04/01/17
* Skilled Tradesman (only applies to Modular Construction)	W25.25 B5.45 T30.70	W25.55 B5.45 T31.00
Foreman (person directing crew, regardless of his skill classification)	W25.25 B5.45 T30.70	W25.55 B5.45 T31.00
Laborer	W21.25 B5.45 T26.70	W21.55 B5.45 T27.00
Laborer (for single family and stand-alone duplex owned by single owner)	W16.55 B2.95 T19.50	W17.05 B2.95 T20.00

Craft: Laborer-Residential and Modular Construction **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
As shown	800 hours	600 hours	600 hours							
wage & benefits	70%	80%	90%							

Ratio of Apprentices to Journeymen-

One (1) apprentice shall be allowed for the first journeyman on site and no more than one (1) additional apprentice for each additional three (3) journeymen on site.

Craft: Laborer-Residential and Modular Construction **COMMENTS/NOTES**

* SKILLED TRADESMAN-
any worker doing work not typically done by a Building Laborer. Some examples are installing interior doors, sheet rock, hooking up appliances, installing light fixtures, installing railing systems, etc. Please note where local building codes require that certain work be performed under the supervision of a licensed tradesman (i.e. Plumber, Electrician, etc.) Laborers shall work under such supervision.

RESIDENTIAL CONSTRUCTION- All residential construction (not commercial), single-family, stand-alone duplex houses, townhouses and multi-family buildings of not more than four (4) floors, includimg basement levels. Please note the construction must be residential in nature for ALL FLOORS at an elevation of no more than FOUR (4) FLOORS, INCLUDING BASEMENT. In addition, barracks and dormitories are not considered residential projects.

MODULAR RESIDENTIAL CONSTRUCTION- all aspects of modular residential construction (not commercial) at the site of installation of structures of no more than four (4) stories, including all excavation and site preparation, footings and foundation systems whether poured on-site or prefabricated, all underground waterproofing, underground utilities, concrete slabs, sidewalks, driveways, paving, hardscape and landscaping. Please note the construction must be residential in nature for ALL STORIES at an elevation of no more than FOUR (4) STORIES. All work performed by the Set Crew (the crew of workers who set the modular boxes on the foundation), including the rigging, setting, attaching and assembly of all modules and structural members, preparation of the foundation to accept modules, such as sill plates, connection of all in-module and under-module connections including, but not limited to, plumbing, electrical, HVAC, fire suppression, CATS,

telephone, television/internet, and fiber optic, the building or installation of any porches or decks regardless of material or method of construction, the on-site installation of, or completion of any roof system, doors, windows and fenestrations, including flashing, gutter and soffit systems, waterproofing, insulation and interior and exterior trim work, and painting. Please note that modular construction does not include on-site stick built construction, tip up construction or panel built construction.

The regular workday shall be 8 hours between 6:00 AM and 6:00 PM.

OVERTIME:
Hours worked in excess of 8 per day/40 per week, Monday through Saturday, and all hours worked on Sunday and holidays shall be paid at time and one-half the hourly rate.

RECOGNIZED HOILDAYS:
New Year's Day, Martin Luther King Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Millwright **PREVAILING WAGE RATE**

	11/01/16
Foreman	W53.53 B31.65 T85.18
Journeyman	W46.55 B27.60 T74.15

Craft: Millwright **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
6 Months	40%	45%	50%	55%	60%	65%	70%	75%	85%	95%
Benefits	58% of	Appren	tice	Wage	Rate	for all	intervals	+ $.60		

Ratio of Apprentices to Journeymen - 1:3

Craft: Millwright **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- When there are 2 or more Millwrights on a job, 1 shall be designated as a Foreman.
- When there are 21 or more Millwrights on a job, 2 shall be designated as Foremen.

The regular workday shall consist of 8 hours, starting between 7:00 AM and 9:00 AM.

SHIFT DIFFERENTIALS:
- When a 2 shift schedule (including a day shift) is established, the day shift shall be established on an 8 hour basis. The second shift shall be established on an 8 hour basis, and receive the regular rate plus 15%, inclusive of benefits.
- When a three shift schedule is established, the first shift shall be established on an 8 hour basis, the second shift on a 7.5 hour basis, and the third shift on a 7 hour basis. The first shift shall receive the regular hourly rate, the second shift shall receive the regular rate plus 15% and the third shift shall receive the regular rate plus 20%, inclusive of benefits.
- When there is no day shift, and a second or third shift is established, it shall be established on an 8 hour basis. The second shift shall receive the regular rate plus 15% and the third shift shall receive the regular rate plus 20%, inclusive of benefits.

OVERTIME:
- All hours in excess of 8 per day, or before or after an established shift that are not shift work, and all hours on Saturdays shall be paid at time and one-half the hourly rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the hourly rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday to Thursday, at straight time. Friday may be used as a make-up day for a day lost due to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Operating Engineer **PREVAILING WAGE RATE**

Rates are located in the
"Statewide" rate package

Craft: Operating Engineer **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	60%	70%	80%	90%						

Ratio of Apprentices to Journeymen - *

* 1 apprentice for each piece of heavy equipment. At least 10 pieces of heavy equipment or a minimum of 5 Operating Engineers must be on site.

Craft: Operating Engineer **COMMENTS/NOTES**

Operating Engineer rates are located in the "Statewide" rate package.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Operating Engineer - Field Engineer **PREVAILING WAGE RATE**

Rates are located in the
"Statewide" rate package

Craft: Operating Engineer - Field Engineer **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	70%	75%	of Rod/	Chainman	Wage					
Yearly			80%	90%	Transit/	Instrument	man	Wage		

Ratio of Apprentices to Journeymen - *

* No more than 1 Field Engineer Apprentice per Survey Crew.

Craft: Operating Engineer - Field Engineer **COMMENTS/NOTES**

Operating Engineer - Field Engineer rates are located in the "Statewide" rate package.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter - Bridges **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W57.38 B26.92 T84.30	W61.13 B25.67 T86.80
General Foreman	W59.38 B26.92 T86.30	W63.13 B25.67 T88.80
Journeyman	W52.38 B26.92 T79.30	W56.13 B25.67 T81.80

Craft: Painter - Bridges **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
6 Months	40%	50%			60%	70%		80%	90%	
Benefits	Intervals	1 to 2 =	8.88	Intervals	3 to 4 =	10.81	Intervals	5 to 6 =	13.48	

Ratio of Apprentices to Journeymen - 1:4

Craft: Painter - Bridges **COMMENTS/NOTES**

These rates apply to: All bridges that span waterways, roadways, railways and canyons. All tunnels, overpasses, viaducts and all appurtenances.

FOREMEN REQUIREMENTS:
- When there are 4 or more Painters on a job, 1 shall be designated a Foreman.
- When there are 15 or more Painters on a job, 1 shall be designated a General Foreman.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays and Sundays shall be paid at time and one-half the regular rate. All hours on holidays shall be paid at double the regular rate.
- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter - Line Striping **PREVAILING WAGE RATE**

	12/29/16
Apprentice (1st year)	W24.45 B10.75 T35.20
Apprentice (2nd year)	W28.45 B16.80 T45.25
Foreman (Charge Person)	W36.60 B17.08 T53.68
Journeyman 1 (at least 1 year of working exp. as a journeyman)	W32.33 B17.08 T49.41
Journeyman 2 (at least 2 years of working exp. as a journeyman)	W36.10 B17.08 T53.18

Craft: Painter - Line Striping **COMMENTS/NOTES**

OVERTIME:
Hours in excess of 8 per day, Monday through Saturday, and all hours on Sundays and holidays shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day. Veterans Day may be substituted for the day after Thanksgiving.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter - New Construction **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W42.26 B22.94 T65.20	W44.39 B22.35 T66.74
General Foreman	W46.10 B23.40 T69.50	W48.43 B22.81 T71.24
Journeyman	W38.42 B22.49 T60.91	W40.36 B21.90 T62.26

Craft: Painter - New Construction **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
4 Months	30%	40%	50%	60%	70%	75%	80%	85%	90%	
Benefits	Intervals	1 to 3 =	8.00	Intervals	4 to 6 =	10.00	Intervals	7 to 9 =	11.00	

Ratio of Apprentices to Journeymen - 1:4

Craft: Painter - New Construction **COMMENTS/NOTES**

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES ENTERING PROGRAM ON 5-1-14:

INTERVAL	PERIOD AND RATES							
6 Months	40%	45%	55%	65%	70%	75%	80%	90%
Benefits	8.00	8.00	10.00	10.00	11.00	11.00	14.00	14.00

Spraying, sandblasting, lead abatement, work on tanks or stacks, work performed above 3 stories or 30 feet in height, or using swing scaffolds requires an additional 10% of the wage rate.

FOREMEN REQUIREMENTS:
- When there are 4 or more Painters on a job, 1 shall be designated a Foreman.
- When there are 15 or more Painters on a job, 1 shall be designated a General Foreman.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, or before or after the regular workday, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the regular rate. All hours on Sundays and holidays shall be paid at double the regular rate.

- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, General Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter - Repainting **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W31.59 B18.45 T50.04	W34.17 B18.45 T52.62
General Foreman	W34.45 B18.87 T53.32	W37.39 B18.45 T55.84
Journeyman	W28.74 B18.87 T47.61	W31.16 B18.45 T49.61

Craft: Painter - Repainting **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
	SEE	PAINTER	NEW	CONSTR UC	TION					

Ratio of Apprentices to Journeymen - 1:4

Craft: Painter - Repainting **COMMENTS/NOTES**

NOTE: These rates may only be used on jobs where no major alterations occur, and where not more than 3 other trades are present on the job, but may NOT, under any circumstances, be used for work on bridges, stacks, elevated tank, or generating stations.

Spraying, sandblasting, lead abatement, work on tanks or stacks, work performed above 3 stories or 30 feet in height, or using swing scaffolds requires an additional 10% of the wage rate.

FOREMEN REQUIREMENTS:
- When there are 4 or more Painters on a job, 1 shall be designated a Foreman.
- When there are 15 or more Painters on a job, 1 shall be designated a General Foreman.

OVERTIME:
- Hours in excess of 8 per day and 40 per week shall be paid at time and one-half the regular rate. All hours on Sundays and holidays shall be paid at double the regular rate.
- Four 10-hour days may be worked, at straight time, Monday through Sunday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, General Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter- Containment **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Journeyman	W33.43 B23.92 T57.35	W37.68 B22.92 T60.60

Craft: Painter- Containment **COMMENTS/NOTES**

NOTE: These rates shall require no painting, but used in a supporting capacity only, such as wrapping, boxing, fencing, etc. on tanks.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays and Sundays shall be paid at time and one-half the regular rate. All hours on holidays shall be paid at double the regular rate..
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day President's Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter-Elevated Water Tanks **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W47.17 B24.17 T71.34	W50.92 B22.92 T73.84
General Foreman	W49.17 B24.17 T73.34	W52.92 B22.92 T75.84
Journeyman	W42.17 B24.17 T66.34	W45.92 B22.92 T68.84

Craft: Painter-Elevated Water Tanks **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
	SEE	PAINTER	BRIDGES							

Craft: Painter-Elevated Water Tanks **COMMENTS/NOTES**

These rates apply to: All new and repaint elevated water tanks (interior and exterior).

FOREMEN REQUIREMENTS:
- When there are 4 or more Painters on a job, 1 shall be designated a Foreman.
- When there are 15 or more Painters on a job, 1 shall be designated a General Foreman.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays and Sundays shall be paid at time and one-half the regular rate. All hours on holidays shall be paid at double the regular rate.
- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Painter-Structural Steel **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W46.12 B24.51 T70.63	W49.87 B23.26 T73.13
General Foreman	W48.12 B24.51 T72.63	W51.87 B23.26 T75.13
Journeyman	W41.12 B24.51 T65.63	W44.87 B23.26 T68.13

Craft: Painter-Structural Steel **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
	SEE	PAINTER	BRIDGES							

Craft: Painter-Structural Steel **COMMENTS/NOTES**

These rates apply to: All work in power plants (any aspect). On steeples, on dams, on hangers, transformers, substations, etc. and on open steel, whether new or repaint. All new work (excluding traditional commercial painting work) in refineries, tank farms, water/sewerage treatment facilities and on pipelines.

FOREMEN REQUIREMENTS:
- When there are 4 or more Painters on a job, 1 shall be designated a Foreman.
- When there are 15 or more Painters on a job, 1 shall be designated a General Foreman.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays and Sundays shall be paid at time and one-half the regular rate. All hours on holidays shall be paid at double the regular rate.
- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Saturday holiday observed the preceding Friday. Sunday holiday observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Paperhanger - New Construction **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W43.25 B22.59 T65.84	W45.32 B21.44 T66.76
Journeyman	W39.32 B22.59 T61.91	W41.20 B22.01 T63.21

Craft: Paperhanger - New Construction **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
4 Months	30%	40%	50%	60%	70%	75%	80%	85%	90%	
Benefits	Intervals	1 to 3 =	8.00	Intervals	4 to 6 =	10.00	Intervals	7 to 9 =	11.00	

Ratio of Apprentices to Journeymen - 1:4

Craft: Paperhanger - New Construction **COMMENTS/NOTES**

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES ENTERING PROGRAM ON 5-1-14:

INTERVAL	PERIOD AND RATES							
6 Months	40%	45%	55%	65%	70%	75%	80%	90%
Benefits	8.00	8.00	10.00	10.00	11.00	11.00	14.00	14.00

FOREMEN REQUIREMENTS:
- When there are 4 or more Paperhangers on a job, 1 shall be designated a Foreman.

The regular workday shall consist of 8 hours between 7:00 AM and 5:30 PM.

SHIFT DIFFERENTIALS:
- The second shift shall receive an additional 10% of the hourly rate, per hour, and the third shift shall receive an additional 15% of the hourly rate, per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the regular rate. All hours on Sundays and holidays shall be paid at double the regular rate.
- Saturday or Sunday may be used to make up a day lost to inclement weather, at straight time.
- Four 10-hour days may be worked, at straight time, Monday through Friday.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day, July 4th, Labor Day, General Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Paperhanger - Renovation **PREVAILING WAGE RATE**

	05/01/16	05/01/17
Foreman	W32.39 B18.96 T51.35	W35.06 B18.53 T53.59
Journeyman	W29.45 B18.96 T48.41	W31.88 B18.53 T50.41

Craft: Paperhanger - Renovation **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
	SEE	PAPER-	HANGER	NEW	CONSTR UC	TION				

Ratio of Apprentices to Journeymen - 1:4

Craft: Paperhanger - Renovation **COMMENTS/NOTES**

NOTE: These rates may only be used on jobs where no major alterations occur, and where not more than 3 other trades are present on the job, but may NOT, under any circumstances, be used for work on bridges, stacks, elevated tanks, or generating stations.

FOREMEN REQUIREMENTS:
- When there are 4 or more Paperhangers on a job, 1 shall be designated a Foreman.

OVERTIME:
- Hours in excess of 8 per day and 40 per week shall be paid at time and one-half the regular rate.
- Four 10-hour days may be worked, at straight time, Monday through Sunday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Pipefitter **PREVAILING WAGE RATE**

	05/04/16	05/01/17	05/01/18	05/01/19
Foreman	W51.07 B40.18 T91.25	W0.00 B0.00 T93.35	W0.00 B0.00 T95.57	W0.00 B0.00 T97.79
Journeyman	W47.32 B37.25 T84.57	W0.00 B0.00 T86.67	W0.00 B0.00 T88.89	W0.00 B0.00 T91.11

Craft: Pipefitter **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	35%	45%	55%	65%	75%					
Benefit	14.46	18.16	21.89	25.48	27.82					

Ratio of Apprentices to Journeymen - 1:5

Craft: Pipefitter **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- When there are 2 or more Journeyman Pipefitters on a job, 1 shall be designated a Foreman.
- There shall be a Foreman for every 8 Journeyman Pipefitters on a job.

The regular workday shall be 8 hours between 7:00 AM and 3:30 PM.

SHIFT DIFFERENTIAL:
- 2nd Shift (3:30 PM-11:30 PM) shall work 7.5 hours and receive 8 hours pay at the regular rate, plus 25% per hour.
- 3rd Shift (11:30 PM-7:00 AM) shall work 7 hours and receive 8 hours pay at the regular rate, plus 30% per hour.

OVERTIME:
- All hours worked in excess of 8 per day, Monday through Friday, and all hours worked on Saturday, shall be paid at time and one-half, inclusive of benefits. All hours on Sunday and holidays shall be paid at double time, inclusive of benefits.
- By mutual agreement, employees may work four 10-hour days, Monday to Thursday, at straight time rate. Friday may be used as a make-up day for a day lost to inclement weather, and may be paid at straight time. If Friday is not a make-up day, the first 8 hours shall be paid at time and one-half, inclusive of benefits; hours in excess of 8 shall be paid at double time, inclusive of benefits.

SHIFT DIFFERENTIAL (Maintenance Work Only):
- 2nd Shift (3:30 PM-11:30 PM) shall work 7.5 hours and receive 8 hours pay at the regular rate, plus 10% per hour.
- 3rd Shift (11:30 PM-7:00 AM) shall work 7 hours and receive 8 hours pay at the regular rate, plus 15% per hour.

OVERTIME (Maintenance Work Only):
- All hours in excess of 8 per day, Monday through Saturday, shall be paid at time and one-half, inclusive of benefits. All hours on Sundays and holidays shall be paid at double time, inclusive of benefits.

NOTE: Maintenance work is work to repair, restore, or improve the efficiency of existing facilities. This does NOT apply to

ANY new construction.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays are observed the following Monday.

County - UNION

Craft: Plasterer **PREVAILING WAGE RATE**

See Bricklayer, Stone Mason Rates

Craft: Plasterer **COMMENTS/NOTES**

See BRICKLAYER, STONE MASON Rates

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Plumber **PREVAILING WAGE RATE**

	05/04/16
Foreman	W55.52 B32.99 T88.51
General Foreman	W59.12 B32.99 T92.11
Journeyman	W51.41 B32.99 T84.40

Craft: Plumber **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
Yearly	30%	45%	55%	65%	75%					
Benefits	12.77	18.77	20.44	22.13	23.80					

Ratio of Apprentices to Journeymen - *

* Employers may employ 1 apprentice on any job where 1 or 2 journeymen are employed. Thereafter, 1 apprentice may be employed for every 4 journeymen.

Craft: Plumber **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- On any job having 2 or more Plumbers, 1 must be designated a Foreman.
- On any job having 9 or more Plumbers, 2 shall be designated as Foremen.

The regular workday shall consist of 8 hours between 7:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must continue for a minimum of 5 consecutive workdays.
- When two shifts are worked, the second shift shall work 7.5 hours and receive 8 hours pay, at a rate equal to the hourly rate plus 10%, inclusive of benefits.
- When a third shift is worked, the third shift shall work 7 hours and receive 8 hours pay, at a rate equal to the hourly rate plus 15%, inclusive of benefits.

OVERTIME:
- All hours in excess of 8 per day, or before of after the regular workday that are not shift work, Monday through Friday, and all hours on Saturday, shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sunday and holidays, shall be paid at double the hourly rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday to Thursday, at straight time. Friday may be used as a make-up day for a day lost due to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Roofer **PREVAILING WAGE RATE**

	06/06/16
Foreman	W36.52 B25.03 T61.55
Journeyman	W35.52 B25.03 T60.55

Craft: Roofer **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
6 Months	14.21	17.76	21.31	24.86	28.42	31.97				
Benefits	2.10	2.10	22.28	22.28	22.28	22.28				

Ratio of Apprentices to Journeymen - *

* A) For roofing jobs that are of the 1 or single ply nature: 1:2 or fraction thereof
B) For roofing jobs on new built up roofs: 1:3 or fraction thereof
C) For roofing jobs that are of a tear-off nature: 1:2 or fraction thereof
D) For roofing jobs {not requiring complete removal of existing systems, installation done over existing roof}: 1:3 or fraction thereof

Craft: Roofer **COMMENTS/NOTES**

Pitch: +.50 per hour

Mop Man: +.30 per hour

The regular workday consists of 8 hours between 8:00 AM and 4:30 PM.

OVERTIME:
Hours in excess of 8 per day, or before or after the regular workday, Monday through Friday, and all hours on Saturdays, Sundays, and holidays shall be paid at time and one-half the regular rate.

RECOGNIZED HOLIDAYS: New Year's Day, Good Friday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Sheet Metal Sign Installation **PREVAILING WAGE RATE**

	10/31/16
Foreman	W33.79 B31.82 T65.61
Journeyman	W32.54 B31.82 T64.36

Craft: Sheet Metal Sign Installation **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
1000 hours	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%
Benefits	10.28	11.73	13.18	14.65	16.47	17.96	19.44	20.93	22.40	23.89

Ratio of Apprentices to Journeymen - 1:3

Craft: Sheet Metal Sign Installation **COMMENTS/NOTES**

FOREMAN REQUIREMENT:
When there are 6 or more Sheet Metal Sign Installers on a job, 1 shall be designated a Foreman.

The regular workday consists of 8 hours, between 7:00 AM and 3:30 PM.

OVERTIME:
Hours before or after the regular workday, Monday though Friday, and all hours worked on Saturday shall be paid at time and one-half the hourly rate. All hours on Sunday and holidays shall be paid at double the hourly rate.

Four(4) 10 hour days may be worked, Monday through Friday, at straight time, for projects lasting at least one week in duration. The fifth day may be used as a make-up day at straight time for a day lost due to inclement weather. However, if the fifth day is not a make-up day, all hours worked will be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Saturday holidays observed the preceding Friday, Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Sheet Metal Worker **PREVAILING WAGE RATE**

	08/02/16	06/01/17
Foreman	W49.99 B38.73 T88.72	W0.00 B0.00 T91.22
General Foreman	W50.99 B38.73 T89.72	W0.00 B0.00 T92.22
Journeyman	W46.49 B38.73 T85.22	W0.00 B0.00 T87.72

Craft: Sheet Metal Worker **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
Yearly	35%	45%	55%	65%	of	Journey	man	Wage	Rate	
Benefit	35%	45%	55%	65%	of	Journey	man	Benefit	Rate	

Ratio of Apprentices to Journeymen - 1:4

Craft: Sheet Metal Worker **COMMENTS/NOTES**

FOREMAN REQUIREMENTS:
- When there are 2 or more Sheet Metal Workers on a project, 1 must be designated a Foreman.
- When there are 17 or more Sheet Metal Workers on a project, 1 must be designated a General Foreman.
- When there is only 1 Sheet Metal Worker (1 Journeyman) on a project, he/she shall receive $1.00 more than the regular Journeyman's rate.

The regular workday is 8 hours between 7:00 AM and 4:30 PM.

SHIFT DIFFERENTIAL:
- 2nd Shift (3:30 PM - 12:00 AM) : +17% of regular hourly rate
- Shift work must run for a minimum of 5 consecutive workdays.

OVERTIME:
- Hours in excess of 8 per day, or before or after the regular workday, that are not shift work, and the first 10 hours on Saturdays shall be paid at time and one-half of the regular rate, inclusive of benefits. Hours in excess of 10 per day on Saturday, and all hours on Sundays and holidays shall be at double the regular rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday through Friday, at straight time, with hours in excess of 10 per day, and hours in excess of 40 per week paid at the overtime rates listed above.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Sprinkler Fitter **PREVAILING WAGE RATE**

	01/01/17	07/01/17	01/01/18	07/01/18	01/01/19
Foreman	W62.93 B26.12 T89.05	W64.93 B26.12 T91.05	W64.38 B26.67 T91.05	W66.63 B26.67 T93.30	W66.08 B27.22 T93.30
General Foreman	W65.93 B26.12 T92.05	W67.93 B26.12 T94.05	W67.38 B26.67 T94.05	W69.63 B26.67 T96.30	W69.08 B27.22 T96.30
Journeyman	W58.83 B26.12 T84.95	W60.83 B26.12 T86.95	W60.28 B26.67 T86.95	W62.53 B26.67 T89.20	W61.98 B27.22 T89.20

Craft: Sprinkler Fitter **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
1000 Hours	9.50	11.25	50%	55%	60%	65%	70%	75%	80%	85%
Benefits	10.67	10.67	21.22	21.22	21.22	21.22	Intervals	7 to 10	Jourymn	Ben.

APPRENTICE RATE SCHEDULE FOR THOSE APPRENTICES REGISTERED AS OF 7-1-13:

INTERVAL	PERIOD AND RATES									
1000 hours	25%	30%	40%	45%	55%	60%	70%	75%	85%	90%
Benefits	10.67	10.67	21.22	21.22	21.22	21.22	Intervals 7 to 10 receive Journeyman Ben.			

Craft: Sprinkler Fitter **COMMENTS/NOTES**

The regular workday consists of 8 consecutive hours between 6:00 AM and 4:30 PM.

FOREMAN REQUIREMENTS:
- The first Sprinkler Fitter on the job must be designated a Foreman.
- On any job having 12 or more Sprinkler Fitters, one must be designated a General Foreman.

SHIFT DIFFERENTIALS:
- Shift work must run for a minimum of 2 consecutive workdays.
- 2nd and 3rd shift shall receive an additional 15% of the regular rate, per hour.
- Any "off hours" shift starting at 8:00 PM or later shall receive an additional 25% of the regular rate, per hour.

OVERTIME:
The first 2 hours in excess of 8 per day, after the regular workday that are not shift work, Monday through Friday, shall be paid at time and one-half the regular rate. Hours worked in excess of 10 per day, Monday through Friday, and all hours on Saturday, Sunday and holidays, shall be paid double the regular rate.
Four 10 hour days may be worked, Monday through Thursday, at striaght-time.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Tile Finisher-Marble **PREVAILING WAGE RATE**

	01/01/17	07/01/17	01/01/18
Finisher	W46.01 B32.68 T78.69	W46.32 B33.44 T79.76	W46.66 B34.18 T80.84

Craft: Tile Finisher-Marble **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
750 Hours	50%	55%	65%	70%	75%	85%	90%	95%		

Ratio of Apprentices to Journeymen - 1:4

Craft: Tile Finisher-Marble **COMMENTS/NOTES**

OVERTIME:
Hours in excess of 7 per day, Monday through Friday, and the first 7 hours on Saturdays shall be paid at time and one half the regular rate, inclusive of benefits. Hours in excess of 7 on Saturdays and all hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Tile Setter - Ceramic **PREVAILING WAGE RATE**

	12/08/16
Finisher	W43.36 B29.09 T72.45
Setter	W56.13 B32.39 T88.52

Craft: Tile Setter - Ceramic **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
750 Hours	50%	55%	60%	65%	70%	75%	85%	95%	100%	

Ratio of Apprentices to Journeymen - 1:4

Craft: Tile Setter - Ceramic **COMMENTS/NOTES**

OVERTIME:
Hours in excess of 7 per day, and the first 10 hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Saturdays after 10 hours shall be paid double the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, Christmas Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Tile Setter - Marble **PREVAILING WAGE RATE**

	01/01/17	07/01/17	01/01/18
Tile Setter	W57.74 B34.26 T92.00	W58.18 B35.27 T93.45	W58.53 B36.37 T94.90

Craft: Tile Setter - Marble **APPRENTICE RATE SCHEDULE**

INTERVAL	**PERIOD AND RATES**									
750 Hours	50%	55%	65%	70%	75%	85%	90%	95%		

Ratio of Apprentices to Journeymen - 1:4

Craft: Tile Setter - Marble **COMMENTS/NOTES**

OVERTIME:
Hours in excess of 7 per day, Monday through Friday, and the first 7 hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. Hours in excess of 7 on Saturdays, and all hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Tile Setter - Mosaic & Terrazzo **PREVAILING WAGE RATE**

	01/01/17
Grinder or Assistant	W50.86 B34.14 T85.00
Mechanic	W52.46 B34.16 T86.62

Craft: Tile Setter - Mosaic & Terrazzo **APPRENTICE RATE SCHEDULE**

INTERVAL	PERIOD AND RATES									
750 Hours	50%	55%	65%	70%	75%	85%	90%	95%		

Ratio of Apprentices to Journeymen - 1:5

Craft: Tile Setter - Mosaic & Terrazzo **COMMENTS/NOTES**

The regular workday consists of 7 hours, between 8:00 AM and 3:30 PM.

OVERTIME:
- Hours in excess of 7 per day, or before or after the regular workday, Monday through Friday, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Good Friday, Monday after Easter, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day and the day after, Christmas Day. Sunday holidays observed the following Monday.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Truck Driver **PREVAILING WAGE RATE**

	11/01/16	05/01/17	11/01/17	05/01/18	11/01/18
Bucket, Utility, Pick-up, Fuel Delivery trucks	W36.40 B33.01 T69.41	W36.83 B33.78 T70.61	W36.83 B34.58 T71.41	W37.26 B35.40 T72.66	W37.66 B35.80 T73.46
Dump truck, Asphalt Distributor, Tack Spreader	W36.40 B33.01 T69.41	W36.83 B33.78 T70.61	W36.83 B34.58 T71.41	W37.26 B35.40 T72.66	W37.66 B35.80 T73.46
Euclid-type vehicles (large, off-road equipment)	W36.55 B33.01 T69.56	W36.98 B33.78 T70.76	W36.98 B34.58 T71.56	W37.41 B35.40 T72.81	W37.81 B35.80 T73.61
Helper on Asphalt Distributor truck	W36.40 B33.01 T69.41	W36.83 B33.78 T70.61	W36.83 B34.58 T71.41	W37.26 B35.40 T72.66	W37.66 B35.80 T73.46
Slurry Seal, Seeding/Fertilizing/ Mulching truck	W36.40 B33.01 T69.41	W36.83 B33.78 T70.61	W36.83 B34.58 T71.41	W37.26 B35.40 T72.66	W37.66 B35.80 T73.46
Straight 3-axle truck	W36.45 B33.01 T69.46	W36.88 B33.78 T70.66	W36.88 B34.58 T71.46	W37.31 B35.40 T72.71	W37.71 B35.80 T73.51
Tractor Trailer (all types)	W36.55 B33.01 T69.56	W36.98 B33.78 T70.76	W36.98 B34.58 T71.56	W37.41 B35.40 T72.81	W37.81 B35.80 T73.61
Vacuum or Vac-All truck (entire unit)	W36.40 B33.01 T69.41	W36.83 B33.78 T70.61	W36.83 B34.58 T71.41	W37.26 B35.40 T72.66	W37.66 B35.80 T73.46
Winch Trailer	W36.65 B33.01 T69.66	W37.08 B33.78 T70.86	W37.08 B34.58 T71.66	W37.51 B35.40 T72.91	W37.91 B35.80 T73.71

Craft: Truck Driver **COMMENTS/NOTES**

BLENDED RATE:
When a truck driver is performing work on the site and also serving as a material delivery driver, the driver shall be paid a "blended rate" which shall be 80% of the above-listed wage rates, plus the full benefit rate. This rate shall be used when the driver "round robins" for a minimum of 6 hours during the work day.

HAZARDOUS WASTE REMOVAL:
- On hazardous waste removal work on a State designated hazardous waste site where the driver is in direct contact with hazardous materials and when personal protective equipment is required for respiratory, skin, and eye protection, the driver shall receive an additional $3.00 per hour (with or without protective gear).
- A hazardous waste related certified worker at a designated hazardous waste site who is not working in a zone requiring level A, B or C personal protection shall receive an additional $1.00 per hour.

TRUCK FOREMAN: $.75 cents per hour above regular rate. Overtime shall be increased accordingly.

The regular workday shall be 8 hours, starting between 6:00 AM and 8:00 AM.

SHIFT DIFFERENTIAL:
- Shifts starting at 4:00 PM (2nd Shift): + $2.50 per hour.
- Shifts starting at 12:00 AM (midnight/3rd Shift): time and one-half the hourly rate.
- Shifts starting at a time other than from 6:00 AM to 8:00 AM, when such hours are mandated by the project owner: + $2.50 per hour.

OVERTIME:
- Hours in excess of 8 per day, or before or after the regular workday, Monday through Friday, that are not shift work, and all hours on Saturdays shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Employees may work four 10-hour days at straight time, Monday through Thursday, with Friday used as a make-up day for a lost day. If Friday is not a make-up day, then all hours on Friday shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day (Decoration Day), July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday. The day after Thanksgiving may be substituted for Veterans' Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT

PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Truck Driver-Material Delivery Driver **PREVAILING WAGE RATE**

	05/01/12
Driver	W22.90 B10.17 T33.07

Craft: Truck Driver-Material Delivery Driver **COMMENTS/NOTES**

BLENDED RATE:
When a truck driver is performing work on the site and also serving as a material delivery driver, the driver shall be paid a "blended rate". See the "Truck Driver" craft for the blended rates.

Truck Foreman/Shop Steward: +$0.25 per hour

SHIFT DIFFERENTIALS:
- 2nd Shift shall receive an additional $0.50 per hour
- 3rd Shift shall receive time and one-half the hourly rate.

OVERTIME:
- Hours in excess of 8 per day, or before or after the regular workday that are not shift work, Monday through Friday, and all hours on Saturday shall be paid at time and one-half the hourly rate. All hours on Sunday and holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, President's Day, Memorial Day (Decoration Day), July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays will be observed the following Monday. The day after Thanksgiving may be substituted for Veterans' Day.

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
PREVAILING WAGE RATE DETERMINATION

County - UNION

Craft: Welder **PREVAILING WAGE RATE**

Welder

Craft: Welder **COMMENTS/NOTES**

Welders rate is the same as the craft to which the welding is incidental.

STATEWIDE RATES

TERRITORY
ENTIRE STATE

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
PREVAILING WAGE RATE DETERMINATION

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

{For apprentice rates refer to "Operating Engineers" apprentice rates in any county rate package}

On all machines, including pile drivers with booms of 100 feet and over (including jib) the Operating Engineer shall receive the regular hourly rate plus: $1.00 per hour on rigs with 100 foot Boom (including jib) up to 139 feet, and $2.00 per hour on rigs with 140 foot Boom (including jib) and over. On all hoists where "Cat Head" or "Sheave Point" is 100 feet or more above ground level, the same differential pay shall apply as applicable to booms 100 feet and over.

The regular workday consists of 8 hours, Monday to Friday, between 6:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for 5 consecutive workdays.
- When 2 shifts are worked, the second shift shall receive an additional 10% of the regular rate inclusive of benefits, per hour.
- When 3 shifts are worked, the second shift shall receive 8 hours pay for 7.5 hours of work, plus an additional 10% of the regular rate inclusive of benefits, per hour. The third shift shall receive 8 hours pay for 7 hours of work, plus an additional 15% of the regular rate inclusive of benefits, per hour.
- When such hours are mandated by the project owner, a shift that starts between 8:00 PM and midnight and ends by 6:00 AM Saturday, or that starts after 8:00 PM on Sunday, provided there are consecutive hours of work within the shift, shall receive an additional 15% of the regular rate, inclusive of benefits.
- On Highway, Road, Street, and Sewer projects irregular shifts starting between 5:00 PM and 12:00 AM may be worked Monday through Friday, and shall receive an additional 15% of the regular rate, inclusive of benefits. When working with other trades that receive a higher irregular shift rate, the Operating Engineer shall also receive the higher irregular shift rate.

OVERTIME:
- Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, that are not shift work, and all hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with all hours on Friday paid at time and one-half the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

On hazardous waste removal work or asbestos removal work, on a state or federally designated hazardous waste site, where the operating engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin, and eye protection, the operating engineer shall receive an additional 20% of the hourly wage, per hour.

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
47.63	30.63	78.26

CLASSIFICATIONS:

A-Frame

Backhoe (combination)

Boom Attachment on loaders (Except pipehook)

Boring & Drilling Machine

Brush Chopper, Brush Shredder, Tree Shredder

Bulldozer, finish grade

Cableway

Carryall

Concrete Pump

Concrete Pumping System (Pumpcrete & similar types)

Conveyor, 125 feet or longer

Drill Doctor (Duties include dust collector and maintenance)

Front End Loader (2 cu. yds. but less than 5 cu. yds.)

Grader, finish

Groove Cutting Machine (ride-on type)

Heater Planer

Hoist (all types including steam, gas, diesel, electric, air hydraulic, single and double drum, concrete, brick shaft caisson, snorkle roof, and other similar types, Except Chicago-boom type)

Hydraulic Crane (10 tons & under)

Hydro-Axe

Hydro-Blaster

Jack (screw, air hydraulic, power-operated unit, or console type, Except hand jack or pile load test type)

Log Skidder

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
47.63	30.63	78.26

CLASSIFICATIONS:

Pan

Paver, concrete

Plate & Frame Filter Press

Pumpcrete (unit type)

Pumpcrete, Squeezecrete, or Concrete Pumping machine (regardless of size)

Scraper

Side Boom

Straddle Carrier (Ross and similar types)

Vacuum Truck

Whiphammer

Winch Truck (hoisting)

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
45.72	30.63	76.35

CLASSIFICATIONS:

Asphalt Curbing Machine

Asphalt Plant Engineer

Asphalt Spreader

Autograde Curb Trimmer & Sidewalk Shoulder Slipform (CMI & similar types)

Autograde Curecrete Machine (CMI & similar types)

Autograde Tube Finisher & Texturing Machine (CMI & similar types)

Bar Bending Machines (Power)

Batcher, Batching Plant, & Crusher [On Site]

Belt Conveyor System

Boom-Type Skimmer Machine

Bridge Deck Finisher

Bulldozer (all sizes)

Captain (Power Boats)

Car Dumper (railroad)

Compressor & Blower unit for loading/unloading of concrete, cement, fly ash, or similar type materials (used independently or truck-mounted)

Compressor (2 or 3 battery)

Concrete Breaking Machine

Concrete Cleaning/Decontamination Machine

Concrete Finishing Machine

Concrete Saw or Cutter (ride-on type)

Concrete Spreader (Hetzel, Rexomatic & similar types)

Concrete Vibrator

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
45.72	30.63	76.35

CLASSIFICATIONS:

Conveyors - under 125 feet

Crane Signalman

Crushing Machine

Directional Boring Machine

Ditching Machine - Small (Ditchwitch, Vermeer or similar types)

Dope Pot - Mechanical (with or without pump)

Dumpster

Elevator

Fireman

Fork Lift (Economobile, Lull & similar types)

Front End Loader (1 cu. yd. and over but less than 2 cu. yds.)

Generator (2 or 3 battery)

Giraffe Grinder

Grader & Motor Patrols

Grout Pump

Gunnite Machine (Excluding nozzle)

Hammer - Vibratory (in conjunction with generator)

Heavy Equipment Robotics - Operator/Technician

Hoist (roof, tugger, aerial platform hoist, house car)

Hopper

Hopper Doors (power operated)

Ladder (motorized)

Laddervator

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
45.72	30.63	76.35

CLASSIFICATIONS:

Locomotive (Dinky-type)

Maintenance Utility Man

Master Environmental Maintenance Technician

Mechanic

Mixer (Except paving mixers)

Pavement Breaker (truck-mounted or small self-propelled ride-on type)

Pavement Breaker - maintenance of compressor or hydraulic unit

Pipe Bending Machine (power)

Pitch Pump

Plaster Pump (regardless of size)

Post Hole Digger (post pounder, auger)

Roller (black top)

Scale (power)

Seamen Pulverizing Mixer

Shoulder Widener

Silo

Skimmmer Machine (boom type)

Steel Cutting Machine (service & maintenance)

Tamrock Drill

Tractor

Transfer Machines

Tug Captains

Tug Master (Power Boats)

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
45.72	30.63	76.35

CLASSIFICATIONS:

Ultra High Pressure Waterjet Cutting Tool System - Operator/Maintenance Technician

Vacuum Blasting Machine - Operator/Maintenance Technician

Vibrating Plant (used with unloading)

Welder & Repair Mechanic

Effective Dates:

02/15/2017

Rate	Fringe	Total
42.38	30.63	73.01

CLASSIFICATIONS:

Assistant Engineer/Oiler

Driller's Helper

Field Engineer - Transit man or Instrument man

Maintenance Apprentice (Deckhand)

Maintenance Apprentice (Oiler)

Mechanic's Helper

Off Road Back Dump

Effective Dates:

02/15/2017

Rate	Fringe	Total
39.80	30.63	70.43

CLASSIFICATIONS:

Field Engineer - Rodman or Chainman

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
49.96	30.63	80.59

CLASSIFICATIONS:

Lead Engineer, Foreman Engineer, Safety Engineer (minimum)

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
49.22	30.63	79.85

CLASSIFICATIONS:

Autograde Pavement Profiler (CMI & similar types)

Autograde Pavement Profiler - Recycle Type (CMI & similar types)

Autograde Placer/Trimmer/Spreader Combination (CMI & similar types)

Autograde Slipform Paver (CMI & similar types)

Backhoe (Excavator)

Central Power Plant

Concrete Paving Machine

Draglines

Drill, Bauer, AMI and similar types

Drillmaster, Quarrymaster

Drillmaster/Quarrymaster (down-the-hole drill), rotary drill, self-propelled hydraulic drill, self-powered drill

Elevator Grader

Field Engineer-Chief of Party

Front End Loader (5 cu. yards or larger)

Gradall

Grader, Rago

Helicoptor Co-Pilot

Helicoptor Communications Engineer

Juntann Pile Driver

Locomotive (large)

Mucking Machine

Pavement & Concrete Breaker (Superhammer & Hoe Ram)

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
49.22	30.63	79.85

CLASSIFICATIONS:

Pile Driver

Prentice Truck

Roadway Surface Grinder

Scooper (loader & shovel)

Shovel (Excavator)

Trackhoe (Excavator)

Tree Chopper with boom

Trenching Machine (cable plow)

Tunnel Boring Machine

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
44.09	30.63	74.72

CLASSIFICATIONS:

Chipper

Compressor (single)

Concrete Spreader (small type)

Conveyor Loader (Except elevator graders)

Engines, Large Diesel (1620 HP) & Staging Pump

Farm Tractor

Fertilizing Equipment (operation & maintenance)

Fine Grade Machine (small type)

Form Line Grader (small type)

Front End Loader (under 1 cubic yard)

Generator (single)

Grease, Gas, Fuel, & Oil Supply Trucks

Heaters (Nelson or other type)

Lights - portable generating light plant

Mixer, Concrete (small)

Mulching Equipment (operation & maintenance)

Power Broom or Sweeper

Pump (diesel engine & hydraulic - regardless of power)

Pump (larger than 2 inch suction, including submersible pumps)

Road Finishing Machine (small type)

Roller - grade, fill, or stone base

Seeding Equipment (operation & maintenance)

Sprinkler & Water Pump Trucks

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
44.09	30.63	74.72

CLASSIFICATIONS:

Steam Generator or Boiler

Stone Spreader

Tamping Machine (vibrating ride-on type)

Temporary Heating Plant (Nelson or other type, including proprane, natural gas, and flow-type units)

Water or Sprinkler Truck

Welding Machine (gas, diesel, or electric convertor, of any type)

Welding System - Multiple (rectifier transformer type)

Wellpoint Systems (including installation by bull gang and maintenance)

Effective Dates:

02/15/2017

Rate	Fringe	Total
51.04	30.63	81.67

CLASSIFICATIONS:

Helicoptor Pilot/Engineer

Effective Dates:

02/15/2017

Rate	Fringe	Total
55.72	30.63	86.35

CLASSIFICATIONS:

Cranes, Derricks, Pile Driver (all types), over 100 tons and TOWER CRANE with boom (including jib and/or leads) 140 ft. and over

Effective Dates:

02/15/2017

Rate	Fringe	Total
54.72	30.63	85.35

CLASSIFICATIONS:

Cranes, Derricks, Pile Driver (all types), over 100 tons and TOWER CRANE with boom (including jib and/or leads) from 100 ft. to 139 ft.

OPERATING ENGINEERS **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
51.22	30.63	81.85

CLASSIFICATIONS:

Cranes, Derricks, Pile Driver (all types) , under 100 tons with a boom (including jib and/or leads) 140 ft. and over

Effective Dates:

02/15/2017

Rate	Fringe	Total
53.72	30.63	84.35

CLASSIFICATIONS:

Cranes, Derricks, Pile Driver (all types), over 100 tons and TOWER CRANE with a boom (including jib and/or leads) under 100 ft.

Effective Dates:

02/15/2017

Rate	Fringe	Total
50.22	30.63	80.85

CLASSIFICATIONS:

Cranes, Derricks, Pile Driver (all types), under 100 tons with a boom (including jib and/or leads) from 100 ft. to 139 ft.

STRUCTURAL STEEL ERECTION **Rates Expiration Date : 06/30/2017**

{For apprentice rates refer to "Operating Engineers" apprentice rates in any county rate package}

The regular workday consists of 8 hours, Monday to Friday, between 6:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for 5 consecutive workdays.
- When 2 shifts are worked, the second shift shall receive an additional 10% of the regular rate inclusive of benefits, per hour.
- When 3 shifts are worked, the second shift shall receive 8 hours pay for 7.5 hours of work, plus an additional 10% of the regular rate inclusive of benefits, per hour. The third shift shall receive 8 hours pay for 7 hours of work, plus an additional 15% of the regular rate inclusive of benefits, per hour.
- When such hours are mandated by the project owner, a shift that starts between 8:00 PM and midnight and ends by 6:00 AM Saturday, or that starts after 8:00 PM on Sunday, provided there are consecutive hours of work within the shift, shall receive an additional 15% of the regular rate, inclusive of benefits.
- On Highway, Road, Street, and Sewer projects irregular shifts starting between 5:00 PM and 12:00 AM may be worked Monday through Friday, and shall receive an additional 15% of the regular rate, inclusive of benefits. When working with other trades that receive a higher irregular shift rate, the Operating Engineer shall also receive the higher irregular shift rate.

OVERTIME:
- Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, that are not shift work, and all hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with all hours on Friday paid at time and one-half the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

On hazardous waste removal work or asbestos removal work, on a state or federally designated hazardous waste site, where the operating engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin, and eye protection, the operating engineer shall receive an additional 20% of the hourly wage, per hour.

Effective Dates:

	02/15/2017	
Rate	Fringe	Total
52.85	30.63	83.48

CLASSIFICATIONS:

Helicopter Pilot or Engineer

STRUCTURAL STEEL ERECTION **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
48.79	30.63	79.42

CLASSIFICATIONS:

A-Frame

Cherry Picker -10 tons or less (Over 10 tons use crane rate)

Hoist (all types Except Chicago-boom)

Jack (screw, air hydraulic, power-operated unit or console type, Except hand jack or pile load test type)

Side Boom

Straddle Carrier

Effective Dates:

02/15/2017

Rate	Fringe	Total
46.13	30.63	76.76

CLASSIFICATIONS:

Aerial Platform Used On Hoists

Apprentice Engineer/Oiler with Compressor or Welding Machine

Captain (Power Boats)

Compressor (2 or 3 in battery)

Conveyor or Tugger Hoist

Elevator or House Car

Fireman

Forklift

Generator (2 or 3)

Maintenance Utility Man

Tug Master (Power Boats)

Welding Machines, Gas or Electric Converters on any type-2 or 3 in battery including diesels

STRUCTURAL STEEL ERECTION **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
44.60	30.63	75.23

CLASSIFICATIONS:

Compressor (Single)

Generators

Welding Machines, Gas, Diesel, Or Electric Converters of any type-single

Welding System, Multiple (Rectifier Transformer Type)

Effective Dates:

02/15/2017

Rate	Fringe	Total
42.84	30.63	73.47

CLASSIFICATIONS:

Assistant Engineer/Oiler

Drillers Helper

Field Engineer - Transit/Instrument Man

Maintenance Apprentice (Deckhand)

Maintenance Apprentice (Oiler)

Effective Dates:

02/15/2017

Rate	Fringe	Total
50.41	30.63	81.04

CLASSIFICATIONS:

Lead Engineer, Foreman Engineer, Safety Engineer (Minimum)

Effective Dates:

02/15/2017

Rate	Fringe	Total
39.80	30.63	70.43

CLASSIFICATIONS:

Field Engineer - Rodman or Chainman

STRUCTURAL STEEL ERECTION **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
49.55	30.63	80.18

CLASSIFICATIONS:

Field Engineer-Chief of Party

Effective Dates:

02/15/2017

Rate	Fringe	Total
57.74	30.63	88.37

CLASSIFICATIONS:

Cranes (all cranes, land or floating with booms, including jib, 140 ft. and over, above ground). Derricks (all derricks, land, floating or Chicago Boom type with booms including jib, 140 ft. and over, above ground), and Pile Drivers (all types) over 100 tons and Tower Cranes.

Effective Dates:

02/15/2017

Rate	Fringe	Total
56.08	30.63	86.71

CLASSIFICATIONS:

Cranes (all cranes, land or floating with booms including jib, less than 140 ft. abovr ground), Derricks (all derricks. land, floating or Chicago Boom type with booms including jib, less than 140 ft. above ground), Pile Drivers (all types), over 100 tons and Tower Crane.

Effective Dates:

02/15/2017

Rate	Fringe	Total
53.24	30.63	83.87

CLASSIFICATIONS:

Cranes (all cranes, land or floating with booms including jib, 140 ft. and over, above ground), Derricks (all derricks, land, floating or Chicago Boom type with booms including jib, 140 ft. and over, above ground), Pile Drivers (all types), under 100 tons.

Effective Dates:

02/15/2017

Rate	Fringe	Total
51.58	30.63	82.21

CLASSIFICATIONS:

Cranes (all cranes, land or floating with booms including jib, less than 140 ft. above ground), Derricks (all derricks, land, floating or Chicago Boom type with booms including jib, less than 140 ft. above ground), Pile Drivers (all types), under 100 tons.

STRUCTURAL STEEL ERECTION **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
53.24	30.63	83.87

CLASSIFICATIONS:

Helicopter Co-Pilot

Helicopter Communications Engineer

TEST BORING PRELIMINARY TO CONSTRUCTION-SOUTH/WEST **Rates Expiration Date : 06/30/2017**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Hunterdon, Mercer, Monmouth, Ocean, Salem, Sussex, Warren

On all machines, including pile drivers with booms of 100 feet and over (including jib) the Operating Engineer shall receive the regular hourly rate plus: $1.00 per hour on rigs with 100 foot Boom (including jib) up to 139 feet, and $2.00 per hour on rigs with 140 foot Boom (including jib) and over. On all hoists where "Cat Head" or "Sheave Point" is 100 feet or more above ground level, the same differential pay shall apply as applicable to booms 100 feet and over.

The regular workday consists of 8 hours, Monday to Friday, between 6:00 AM and 4:30 PM.

SHIFT DIFFERENTIALS:
- Shift work must run for 5 consecutive workdays.
- When 2 shifts are worked, the second shift shall receive an additional 10% of the regular rate inclusive of benefits, per hour.
- When 3 shifts are worked, the second shift shall receive 8 hours pay for 7.5 hours of work, plus an additional 10% of the regular rate inclusive of benefits, per hour. The third shift shall receive 8 hours pay for 7 hours of work, plus an additional 15% of the regular rate inclusive of benefits, per hour.
- When such hours are mandated by the project owner, a shift that starts between 8:00 PM and midnight and ends by 6:00 AM Saturday, or that starts after 8:00 PM on Sunday, provided there are consecutive hours of work within the shift, shall receive an additional 15% of the regular rate, inclusive of benefits.
- On Highway, Road, Street, and Sewer projects irregular shifts starting between 5:00 PM and 12:00 AM may be worked Monday through Friday, and shall receive an additional 15% of the regular rate, inclusive of benefits. When working with other trades that receive a higher irregular shift rate, the Operating Engineer shall also receive the higher irregular shift rate.

OVERTIME:
- Hours in excess of 8 per day, or outside of the regular workday, Monday through Friday, that are not shift work, and all hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with all hours on Friday paid at time and one-half the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

On hazardous waste removal work or asbestos removal work, on a state or federally designated hazardous waste site, where the operating engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin, and eye protection, the operating engineer shall receive an additional 20% of the hourly wage, per hour.

Effective Dates:

02/15/2017

Rate	Fringe	Total
49.22	30.63	79.85

CLASSIFICATIONS:

Driller

TEST BORING PRELIMINARY TO CONSTRUCTION-SOUTH/WEST **Rates Expiration Date : 06/30/2017**

Effective Dates:

02/15/2017

Rate	Fringe	Total
42.38	30.63	73.01

CLASSIFICATIONS:

Driller's Helper

FREE AIR TUNNEL JOBS **Rates Expiration Date : 08/31/2017**

{For apprentice rates refer to "Heavy & General" apprentice rates in any county rate package}

The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.

SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.

Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

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Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
40.35	27.78	68.13	70.53

CLASSIFICATIONS:

Walking Boss & Superintendent

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
40.05	27.78	67.83	70.23

CLASSIFICATIONS:

Heading Foreman, Shaft Foreman, Rod Foreman, Electrician Foreman, Rigging Foreman

FREE AIR TUNNEL JOBS **Rates Expiration Date : 08/31/2017**

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
39.55	27.78	67.33	69.73

CLASSIFICATIONS:

Iron Foreman, Caulking Foreman, Form Foreman, Cement Finishing Foreman, Concrete Foreman, Track Foreman, Cleanup Foreman, Grout Foreman

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
42.05	27.78	69.83	72.23

CLASSIFICATIONS:

Blaster

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
39.00	27.78	66.78	69.18

CLASSIFICATIONS:

Top Labor Foreman

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
38.65	27.78	66.43	68.83

CLASSIFICATIONS:

Skilled Men (including Caulker, Powder Carrier, all other skilled men)

Skilled Men (including Miner, Drill Runner, Iron Man, Conveyor Man, Manitenance Man, Safety Miner, Rigger, Block Layer, Cement Finisher, Tod Man)

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
38.50	27.78	66.28	68.68

CLASSIFICATIONS:

Semi-Skilled Men (including Bell or Signal Man Top or Bottom, Form Worker & Mover, Concrete Worker, Shaft Man, Tunnel Laborer, Caulker's Helper, all other semi-skilled)

Semi-Skilled Men (including Miner's Helper, Chuck Tender, Track Man, Nipper, Brake Man, Derail Man, Cable Man, Hose Man, Gravel Man, Form Man)

FREE AIR TUNNEL JOBS **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.00	27.78	65.78	68.18

CLASSIFICATIONS:

All Others (including Powder Watchman, Change House Attendant, Top Laborer)

DRILL FOR GROUND WATER SUPPLY **Rates Expiration Date : 06/30/2017**

The well driller and/or helper may perform all work relative to the construction, finishing, and servicing of wells, pumps and borings for ground water supply. The present methods of well drilling entailing as they do, many diverse job operations calling for drilling, pump discharge, piping, and the operation of various types of related power equipment, shall all be within the job duties and functions of the well driller and/or helper. In the event that an extension of work should occur beyond water well drilling functions, into the field of general construction work, such extension of work would come under the appropriate rates listed elsewhere in this wage determination.

- For Work Hours, Shift Differentials, Overtime Rates, and Recognized Holidays see the "Operating Engineers" section of this wage determination.

Effective Dates:

02/15/2017

Rate	Fringe	Total
47.97	30.63	78.60

CLASSIFICATIONS:

Driller

Effective Dates:

02/15/2017

Rate	Fringe	Total
41.13	30.63	71.76

CLASSIFICATIONS:

Driller's Helper

OPERATING ENGINEERS MARINE-DREDGING **Rates Expiration Date : 09/30/2018**

NOTE: Boat crews carrying explosive material (dynamite, pourfex, and other similar materials) shall be paid at 120% of the hourly wage rate for hours engaged in handling of said materials. Employees required to possess a Hazardous Material Certification as a condition of employment shall be compensated at 120% of the hourly wage rate.

OVERTIME:
Hours in excess of 40 per week, and all hours on Saturdays and Sundays, shall be paid at time and one-half the hourly rate. All hours on holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Martin Luther King Day, Good Friday, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday.

Effective Dates:

	10/01/2016		**10/01/2017**
Rate	Fringe	Total	Total
37.25	13.78	51.03	52.51

CLASSIFICATIONS:

Lead Dredgerman, Operator, Leverman

Licensed Tug Operator (over 1000 HP)

Effective Dates:

	10/01/2016		**10/01/2017**
Rate	Fringe	Total	Total
32.22	13.38	45.60	46.95

CLASSIFICATIONS:

Derrick Operator, Spider/Spill Barge Operator

Engineer, Electrician, Chief Welder, Chief Mate

Fill Placer, Operator II

Licensed Boat Operator

Maintenance Engineer

Effective Dates:

	10/01/2016		**10/01/2017**
Rate	Fringe	Total	Total
30.33	13.23	43.56	44.86

CLASSIFICATIONS:

Certified Welder

OPERATING ENGINEERS MARINE-DREDGING **Rates Expiration Date : 09/30/2018**

Effective Dates:

10/01/2016			10/01/2017
Rate	Fringe	Total	Total
29.50	12.86	42.36	43.64

CLASSIFICATIONS:

Mate, Drag Barge Operator, Steward, Assistant Fill Placer

Welder

Effective Dates:

10/01/2016			10/01/2017
Rate	Fringe	Total	Total
28.54	12.78	41.32	42.58

CLASSIFICATIONS:

Boat Operator

Effective Dates:

10/01/2016			10/01/2017
Rate	Fringe	Total	Total
23.71	12.10	35.81	36.92

CLASSIFICATIONS:

Shoreman, Deckhand, Rodman, Scowman

MICROSURFACING/SLURRY SEAL **Rates Expiration Date : 02/28/2018**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, Salem
IN ALL OTHER COUNTIES use the Heavy and General Laborers - North "Slurry Seal Laborer" rates.

SHIFT DIFFERENTIALS:
Any shift starting at 3:30 PM or later shall receive an additional $0.35/hr

OVERTIME:
Hours in excess of 8 per day or 40 per week shall be paid at time and one-half the hourly rate. All hours on holidays shall be paid at double the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day.

Effective Dates:

	03/01/2016		03/01/2017
Rate	Fringe	Total	Total
35.75	20.35	56.10	57.77

CLASSIFICATIONS:

Foreman

Effective Dates:

	03/01/2016		03/01/2017
Rate	Fringe	Total	Total
33.10	20.35	53.45	55.07

CLASSIFICATIONS:

Box man

Effective Dates:

	03/01/2016		03/01/2017
Rate	Fringe	Total	Total
31.10	20.35	51.45	53.02

CLASSIFICATIONS:

Microsurface/Slurry Preparation

Effective Dates:

	03/01/2016		03/01/2017
Rate	Fringe	Total	Total
31.10	20.35	51.45	53.02

CLASSIFICATIONS:

Squeegee man

NEW JERSEY DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
PREVAILING WAGE RATE DETERMINATION

MICROSURFACING/SLURRY SEAL **Rates Expiration Date : 02/28/2018**

Effective Dates:

03/01/2016			03/01/2017
Rate	Fringe	Total	Total
29.60	20.35	49.95	51.57

CLASSIFICATIONS:

Cleaner, Taper

ASPHALT LABORERS - SOUTH **Rates Expiration Date : 08/31/2017**

"THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, Salem
{For apprentice rates refer to "Laborer - Heavy & General" apprentice rates in any county rate package}
The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.
SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.
OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.
RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.
Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
39.85	27.78	67.63	70.03

CLASSIFICATIONS:

Paving Foreman

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
38.40	27.78	66.18	68.58

CLASSIFICATIONS:

Head Raker

Effective Dates:

	09/01/2016		03/01/2017
Rate	Fringe	Total	Total
38.25	27.78	66.03	68.43

CLASSIFICATIONS:

Raker, Screedman, Luteman

ASPHALT LABORERS - SOUTH **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.00	27.78	65.78	68.18

CLASSIFICATIONS:

Tampers, Smoothers, Kettlemen,
Painters, Shovelers, Roller Boys

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.10	27.78	65.88	68.28

CLASSIFICATIONS:

Milling Controller

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

Traffic Control Coordinator

TEST BORING PRELIMINARY TO CONSTRUCTION-NORTH **Rates Expiration Date : 10/16/2018**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Bergen, Essex, Hudson, Middlesex, Morris, Passaic, Somerset, Union

SHIFT DIFFERENTIAL:
Employees on a shift other than between the hours of 8:00 AM and 5:00 PM shall receive an additional $1.00 per hour.

OVERTIME:
Hours in excess of 8 per day, Monday through Friday, and all hours on Saturday shall be paid at time and one-half the regular rate. All hours on Sundays and holidays shall be paid at double the regular rate.

RECOGNIZED HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day. Sunday holidays observed the following Monday.

Hazardous Waste Pay (for Levels A, B, and C): an additional 10% of the hourly rate, per hour.

A newly hired Helper with no experience in the industry shall be paid as follows:
1st year on the job - 70% of Helper wage rate
2nd year on the job - 80% of Helper wage rate
3rd year on the job - 90% of Helper wage rate
All helpers receive full fringe benefit rate.

Effective Dates:

11/01/2016			10/17/2017
Rate	Fringe	Total	Total
30.96	24.76	55.72	57.17

CLASSIFICATIONS:

Helper (4th year helper)

Effective Dates:

11/01/2016			10/17/2017
Rate	Fringe	Total	Total
38.82	24.76	63.58	65.24

CLASSIFICATIONS:

Driller

Effective Dates:

11/01/2016			10/17/2017
Rate	Fringe	Total	Total
44.64	24.76	69.40	71.28

CLASSIFICATIONS:

Foreman

HEAVY & GENERAL LABORERS - NORTH **Rates Expiration Date : 08/31/2017**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, Warren

{For apprentice rates refer to "Laborer - Heavy & General" apprentice rates in any county rate package}

The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.

SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.

Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
37.60	27.78	65.38	67.78

CLASSIFICATIONS:

"D" Rate:
basic, landscape, asphalt, slurry seal, or railroad track laborer; utility meter installer; traffic director/flagman; salamander tender; pitman; dumpman; rakers or tampers on cold patch work; wrappers or coaters of pipe; waterproofer; timberman; wagon drill or drill master helper; powder carrier; magazine tender; signal man; power buggy operator; tree cutter; operator of basic power tools

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

"C" Rate:
pipe layer; laser man; conduit or duct line layer; operator of jack hammer, chipping hammer, pavement breaker, concrete cutter, asphalt cutter, sheet hammer, or walk-behind saw cutter; sandblaster; acetylene cutting or burning; wagon drill, directional drill, or hydraulic drill operator; drill master; core driller; traffic control coordinator; asphalt raker or lute man

HEAVY & GENERAL LABORERS - NORTH **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.55	27.78	66.33	68.73

CLASSIFICATIONS:

"B" Rate:
concrete finisher; setter of brick or stone pavers; stone cutter; form setter; manhole, catch basin, or inlet builder; asphalt screedman; rammer; hardscaping; gunite nozzle man

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
42.10	27.78	69.88	72.28

CLASSIFICATIONS:

"A" Rate:
blaster

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
39.85	27.78	67.63	70.03

CLASSIFICATIONS:

"FOREMAN" Rate:
labor foreman, asphalt foreman, drill foreman, pipe foreman, grade foreman, finisher foreman, concrete foreman

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
40.85	27.78	68.63	71.03

CLASSIFICATIONS:

"GENERAL FOREMAN" Rate

HEAVY & GENERAL LABORERS - SOUTH **Rates Expiration Date : 08/31/2017**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, Salem

{For apprentice rates refer to "Laborer - Heavy & General" apprentice rates in any county rate package}

The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.

SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.

Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
37.60	27.78	65.38	67.78

CLASSIFICATIONS:

basic, landscape, or railroad track laborer; utility meter installer; traffic director/flagman; salamander tender; pitman; dumpman; rakers or tampers on cold patch work; wrappers or coaters of pipe; waterproofers

tree cutter, timberman

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

wagon drill or drill master helper; powder carrier; magazine tender; signal man

HEAVY & GENERAL LABORERS - SOUTH **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

pipe layer; laser man; conduit or duct line layer; operator of jack hammer, chipping hammer, pavement breaker, concrete cutter, asphalt cutter, sheet hammer, or walk-behind saw cutter; sandblaster; acetylene cutting or burning

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

wagon or directional drill operator; drill master

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
42.10	27.78	69.88	72.28

CLASSIFICATIONS:

blaster

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
39.85	27.78	67.63	70.03

CLASSIFICATIONS:

labor foreman, drill foreman, pipe foreman, grade foreman, finisher foreman, concrete foreman

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
40.85	27.78	68.63	71.03

CLASSIFICATIONS:

general foreman

HEAVY & GENERAL LABORERS - SOUTH **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
38.55	27.78	66.33	68.73

CLASSIFICATIONS:

concrete finisher; setter of brick or stone pavers; stone cutter; form setter; manhole, catch basin, or inlet builder; rammer; gunite nozzle man

PIPELINE - MAINLINE TRANSMISSION **Rates Expiration Date : 06/04/2017**

These rates apply to the following: welding on Transportation Mainline pipe lines (cross-country pipe lines, or any segments thereof, transporting coal, gas, oil, water or other transportable materials, vapors or liquids, including portions of such pipe lines within private property boundaries up to the final metering station or connection - the point where a valve, consumer connection, or town border station divides mainline transmission lines or higher pressure lateral and branch lines from lower pressure distribution systems).

PER DIEM PAYMENT:
In addition to the total wage rate paid for each craft, the following per diem (per day) amounts must also be paid - Pipeline Journeyman: $42.50; Pipeline Journeyman Welder: $102.50; and Pipeline Helper: $42.50. Note: in order to receive the per diem payment an employee must work a minimum of 8 hours in a 24 hour period.

NOTES:
- Journeymen employed as "stringer bead" welders and journeymen who are regularly employed as "hot-pass" welders shall receive $1.00 per hour more than other journeymen.
- Welders running "stringer bead" or "hot-pass" on "cutouts" or "tie-ins" on a production basis shall be paid $1.00 per hour above the journeymen rate.
- Whenever a welder helper is employed using a power buffer or power grinder immediately behind the stringer bead and/or hot-pass welders, and the pipe gang is set on a production basis, the helper shall be paid $2.00 per hour above the helper rate.
- If back welding is performed inside a pipe under either or both of the following conditions, the welder engaged in the welding will receive $3.00 per hour above the regular rate for the job only for the days on which such back welding is performed:
  - The employer elects, as a regular procedure, to back weld each line-up. This condition is not intended to apply to occasional back welding performed by the pipe gang to repair a bead, to rectify a "high-lo" condition or wall thickness, etc.
  - A welder is required to back weld a completed weld behind the firing line.
- If the welder helper is required to go inside the pipe for the purpose of brushing, buffing and grinding the weld, they shall receive a wage rate $1.00 per hour above the regular
helper rate for the days involved.
- Welders working on "hot work" shall be paid $2.00 per hour above the regular rate for each day engaged in such work. "Hot work' is defined as work on lines in service where there is the danger of fire or explosion.

The regular workday shall be 8 hours, between 8:00 AM and 4:30 PM.

OVERTIME:
Hours in excess of 8 per day, and all hours on Sundays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day. Sunday holidays observed the following Monday.

Effective Dates:

06/01/2016

Rate	Fringe	Total
54.56	26.59	81.15

CLASSIFICATIONS:

Pipeline Journeyman Welder

PIPELINE - MAINLINE TRANSMISSION **Rates Expiration Date : 06/04/2017**

Effective Dates:

06/01/2016

Rate	Fringe	Total
54.56	26.59	81.15

CLASSIFICATIONS:

Pipeline Journeyman

Effective Dates:

06/01/2016

Rate	Fringe	Total
32.99	18.73	51.72

CLASSIFICATIONS:

Pipeline Helper

PIPELINE - GAS DISTRIBUTION **Rates Expiration Date : 10/31/2017**

These rates apply to the following: welding on gas line distribution systems (that portion of the gas distribution system placed in streets, roads, subways, tunnels, viaducts, highways and easements which serves the users of gas).

SHIFT DIFFERENTIALS:
An "irregular" shift may start any time from 5:00 PM to 12:00 AM, Monday through Friday, and shall receive an additional 15% of the regular rate per hour, inclusive of benefits.

OVERTIME:
Hours in excess of forty per week, and all hours on Saturdays shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the regular rate, inclusive of benefits.

RECOGNIZED HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day. Sunday holidays observed the following Monday.

Effective Dates:

11/01/2016

Rate	Fringe	Total
57.58	21.55	79.13

CLASSIFICATIONS:

Pipeline Journeyman Welder

Effective Dates:

11/01/2016

Rate	Fringe	Total
57.58	21.55	79.13

CLASSIFICATIONS:

Pipeline Journeyman

Effective Dates:

11/01/2016

Rate	Fringe	Total
37.16	15.74	52.90

CLASSIFICATIONS:

Pipeline Helper

ASPHALT LABORERS- NORTH **Rates Expiration Date : 08/31/2017**

THESE RATES APPLY IN THE FOLLOWING COUNTIES ONLY:
Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, Warren
{For apprentice rates refer to "Laborer - Heavy & General" apprentice rates in any county rate package}
The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.
SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.
OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.
RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.
Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
39.85	27.78	67.63	70.03

CLASSIFICATIONS:

Asphalt Foreman

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
38.55	27.78	66.33	68.73

CLASSIFICATIONS:

Asphalt Screedman

Effective Dates:

	09/01/2016		**03/01/2017**
Rate	Fringe	Total	Total
38.30	27.78	66.08	68.48

CLASSIFICATIONS:

Asphalt Raker or Lute Man

ASPHALT LABORERS- NORTH **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
37.60	27.78	65.38	67.78

CLASSIFICATIONS:

Asphalt Laborer

ELECTRICIAN- UTILITY WORK (NORTH) **Rates Expiration Date : 12/03/2017**

Electrician-Utility Work (North)
(For apprentice rates refer to Electrician-Utility Work (North) in any county rate package).
These rates apply to work contracted for by the following utility companies:
Public Service Electric & Gas Co. of NJ, GPU Energy, Borough of Madison Electric Department, Sussex Rural Electric Cooperative, Rockland Utilities, and Butler Municipal Electric Co.
These rates do not apply to work on substations or switching stations.
For Utility work contracted for by a utility company other than those listed above or those listed under "Electrician-Utility Work (South), see the "Outside Commercial Rates" for the county in which the jobsite is located.

* FOR OUTSIDE COMMERCIAL RATES PLEASE SEE COUNTY RATES

The regular workday is 8 hours, between 6:00 AM and 6:00 PM.
FOR EMERGENCY WORK ONLY: (emergency work is defined as work caused by storm, catastrophe, act of god, and circumstances beyond the control of the employer)-all hours of work shall be paid at double the hourly rate.
SHIFT DIFFERENTIALS:
Shift work must run for a minimum of 5 consecutive workdays.
2nd shift (between the hours of 4:30 PM and 1:00 AM): 8 hours of work + 17.3% of the regular rate, inclusive of benefits.
3rd shift (between the hours of 12:30 AM and 9:00 AM): 8 hours of work + 31.4% of the regular rate per hour, inclusive of benefits.

OVERTIME:
Hours in excess of 8 per day, or before or after the regular wokday Monday through Friday, that is not shift work, and all hours on Saturday shall be paid at time and one-half the regular rate, inclusive of benefits. All hours on Sundays and holidays shall be paid at double the hourly rate, inclusive of benefits.
Four 10-hour days may worked, at straight time, between 7:00 AM and 6:30 PM, Monday through Thursday.

RECOGNIZED HOLIDAYS:
New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day and Christmas Day, or day on which they are legally observed.

Effective Dates:

12/04/2016

Rate	Fringe	Total
52.26	35.01	87.27

CLASSIFICATIONS:

Chief Lineman

Effective Dates:

12/04/2016

Rate	Fringe	Total
49.31	33.03	82.34

CLASSIFICATIONS:

Journeyman Lineman

ELECTRICIAN- UTILITY WORK (NORTH) **Rates Expiration Date : 12/03/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
49.31	33.03	82.34

CLASSIFICATIONS:

Special License Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
48.81	32.70	81.51

CLASSIFICATIONS:

Transit Man

Effective Dates:

12/04/2016

Rate	Fringe	Total
47.33	31.71	79.04

CLASSIFICATIONS:

Line Equipment Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
41.42	27.75	69.17

CLASSIFICATIONS:

Dynamite Man

Effective Dates:

12/04/2016

Rate	Fringe	Total
58.18	38.98	97.16

CLASSIFICATIONS:

General Foreman

Effective Dates:

12/04/2016

Rate	Fringe	Total
56.70	37.98	94.68

CLASSIFICATIONS:

Assistant General Foreman

ELECTRICIAN- UTILITY WORK (NORTH) **Rates Expiration Date : 12/03/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
55.22	36.99	92.21

CLASSIFICATIONS:

Line Foreman

Effective Dates:

12/04/2016

Rate	Fringe	Total
39.94	26.75	66.69

CLASSIFICATIONS:

Straight Light Mechanical Leader

Effective Dates:

12/04/2016

Rate	Fringe	Total
37.97	25.43	63.40

CLASSIFICATIONS:

Groundman Winch Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
37.97	25.43	63.40

CLASSIFICATIONS:

Groundman Truck Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
37.47	25.10	62.57

CLASSIFICATIONS:

Straight Light Mechanic

Effective Dates:

12/04/2016

Rate	Fringe	Total
37.47	25.10	62.57

CLASSIFICATIONS:

Line Equipment Mechanic

ELECTRICIAN- UTILITY WORK (NORTH) **Rates Expiration Date : 12/03/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
32.05	21.47	53.52

CLASSIFICATIONS:

Groundman 2nd Year

Effective Dates:

12/04/2016

Rate	Fringe	Total
29.58	19.81	49.39

CLASSIFICATIONS:

Groundman 1st Year

Effective Dates:

12/04/2016

Rate	Fringe	Total
48.81	32.70	81.51

CLASSIFICATIONS:

Line Equipment Foreman

ELECTRICIAN- UTILITY WORK (SOUTH) **Rates Expiration Date : 12/02/2017**

Electrician-Utility Work (South)
(For apprentice rates refer to Electrician-Utility Work (South) in any county rate package).
These rates apply to work contracted for by the following utility company:
Atlantic City Electric.
These rates do not apply to work on substations or switching stations.
For utility work contracted for by a utility company other than the one listed above or those listed under "Electrician-Utility Work (North), see the "Outside Commercial Rates" for the county in which the jobsite is located.

* FOR OUTSIDE COMMERCIAL RATES PLEASE SEE COUNTY RATES

The regular workday is 8 hours, between 7:00 AM and 4:30 PM.
FOR EMERGENCY WORK ONLY: (emergency work is defined as work caused by storm, catastrophe, act of god, and circumstances beyond the control of the employer)- all hours of work shall be paid at double the hourly rate.
SHIFT DIFFERENTIALS:
Shift work must run for a minimum of 5 consecutive workdays.
When two (2) or three (3) shifts are worked the following shall apply:
1st shift (between the hours of 8:00 AM and 4:30 PM)
2nd shift (between the hours of 4:30 PM and 12:30 AM): 8 hours of work + 10% of the regular rate of pay for 7.5 hours worked.

3rd shift (between the hours of 12:30 AM and 8:00 AM): 8 hours of work + 15% of the regular rate of pay for 7 hours worked.

OVERTIME:
Hours in excess of 8 per day, or before or after the regular wokday Monday through Friday, that is not shift work, and all hours on Saturday shall be paid at time and one-half the regular rate. All hours on Sundays and Holidays shall be paid double the hourly rate.

Four 10-hour days may be worked, at straight time, between 6:00 AM and 6:00 PM, Monday through Thursday with Friday used as a make-up day.

RECOGNIZED HOLIDAYS:
New Year's Day, Memorial Day, July 4th, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day or on days celebrated.

WORKING RULES:
There shall be a Foreman in charge of each work crew. No crews are to exceed twelve (12) men, including Foremen.

There shall be a General Foreman designated for transmission work when three (3) or more crews are on the same job and for distribution work where there are are more than twenty (20) employees on site.
A small job crew shall consist of five (5) or less employees, one (1) of the Journeyman Linemen in the crew shall be designated as a Small Job Foreman.
Work performed from ladders and/or mechanical lift equipment shall be the work of Linemen and/or Apprentices.
On new construction, fitting and framing poles, towers or structures may be done by Journeymen and/or Apprentices. Groundmen may assist, but may not perform any work which would be performed by Linemen if assembled in the air.
There shall be a Journeyman Lineman in each pole setting, erection, grounding, wire and cable-pulling crew of more than three (3) men.

Effective Dates:

12/04/2016

Rate	Fringe	Total
58.38	45.19	103.57

CLASSIFICATIONS:

General Foreman

ELECTRICIAN- UTILITY WORK (SOUTH) **Rates Expiration Date : 12/02/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
52.00	41.37	93.37

CLASSIFICATIONS:

Foreman

Effective Dates:

12/04/2016

Rate	Fringe	Total
49.26	39.74	89.00

CLASSIFICATIONS:

Small Job Foreman

Effective Dates:

12/04/2016

Rate	Fringe	Total
45.61	37.54	83.15

CLASSIFICATIONS:

Heavy Equipment Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
45.61	37.54	83.15

CLASSIFICATIONS:

Cable Splicer

Effective Dates:

12/04/2016

Rate	Fringe	Total
45.61	37.54	83.15

CLASSIFICATIONS:

Journeyman Lineman

Effective Dates:

12/04/2016

Rate	Fringe	Total
45.61	37.54	83.15

CLASSIFICATIONS:

Journeyman Welder

ELECTRICIAN- UTILITY WORK (SOUTH) **Rates Expiration Date : 12/02/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
45.61	37.54	83.15

CLASSIFICATIONS:

Journeyman Painter

Effective Dates:

12/04/2016

Rate	Fringe	Total
36.49	32.08	68.57

CLASSIFICATIONS:

Light Equipment Operator

Effective Dates:

12/04/2016

Rate	Fringe	Total
31.93	29.37	61.30

CLASSIFICATIONS:

Groundman Truck Driver

Effective Dates:

12/04/2016

Rate	Fringe	Total
29.65	27.99	57.64

CLASSIFICATIONS:

Groundman 3rd Year

Effective Dates:

12/04/2016

Rate	Fringe	Total
27.37	26.66	54.03

CLASSIFICATIONS:

Groundman 2nd Year

Effective Dates:

12/04/2016

Rate	Fringe	Total
25.09	25.29	50.38

CLASSIFICATIONS:

Groundman 1st Year

ELECTRICIAN- UTILITY WORK (SOUTH) **Rates Expiration Date : 12/02/2017**

Effective Dates:

12/04/2016

Rate	Fringe	Total
20.07	22.27	42.34

CLASSIFICATIONS:

Flagman

HEAVY & GENERAL LABORERS- NEW TRANS HUDSON TUNNELS **Rates Expiration Date : 08/31/2017**

THESE RATES APPLY TO CONSTRUCTION ON NEW TRANS HUDSON TUNNELS ONLY

{For apprentice rates refer to "Laborer - Heavy & General" apprentice rates in any county rate package}

The regular workday consists of 8 hours, starting at 7:00 AM or 8:00 AM.

SHIFT DIFFERENTIALS:
- Shifts must start at 3:00 PM, 4:00 PM, 12:00 AM, or 1:00 AM, to be considered shift work, except when the project owner mandates special hours of work in the job specifications, in which case those hours may be considered shift work.
- When such hours are mandated by the project owner, a shift that begins before midnight on Friday and ends on Saturday morning, or that begins at or after 8:00 PM on Sunday and ends on Monday morning may be paid at the shift differential rate.
- Shifts shall receive an additional $2.50 per hour.

OVERTIME:
- Hours in excess of 8 per day, Monday through Friday, or outside of the regular workday that are not shift work, and all hours on Saturdays, shall be paid at time and one-half the hourly rate. All hours on Sundays and holidays shall be paid at double the hourly rate.
- Four 10-hour days may be worked, Monday through Thursday, at straight time, with Friday used as a make-up day for a day lost to inclement weather. If Friday is not a make-up day, all hours on Friday shall be paid at time and one-half the hourly rate.

RECOGNIZED HOLIDAYS: New Year's Day, Presidents' Day, Memorial Day, July 4th, Labor Day, Presidential Election Day, Veterans' Day, Thanksgiving Day, Christmas Day. Sunday holidays observed the following Monday. Veterans Day may be substituted for the day after Thanksgiving. However, in the trading of Veterans Day for the day after Thanksgiving, if overtime is worked on Veterans Day, it shall be paid at double the hourly rate.

Hazardous Waste Work:
-where Level A, B, or C protection is required: + $3.00/hr
-other Hazardous Waste site: + $1.00/hr

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
60.53	27.78	88.31	91.28

CLASSIFICATIONS:

Walking Boss & Superintendent

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
60.08	27.78	87.86	90.83

CLASSIFICATIONS:

Heading Foreman, Shaft Foreman, Rod Foreman, Electrical Foreman, Rigging Foreman

HEAVY & GENERAL LABORERS- NEW TRANS HUDSON TUNNELS **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
59.33	27.78	87.11	90.08

CLASSIFICATIONS:

Iron Foreman, Caulking Foreman, Form Foreman, Cement Finishing Foreman, Concrete Foreman, Track Foreman, Clean-up Foreman, Grout Foreman

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
63.08	27.78	90.86	93.83

CLASSIFICATIONS:

Blaster

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
58.50	27.78	86.28	89.26

CLASSIFICATIONS:

Top Labor Foreman

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
57.98	27.78	85.76	88.73

CLASSIFICATIONS:

Skilled Men (including Caulker, Powder Carrier, all other skilled men)
Skilled Men (including Miner, Drill Runner, Iron Man, Conveyor Man, Maintenance Man, Safety Miner, Rigger, Block Layer, Cement Finisher, Rod Man)

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
57.75	27.78	85.53	88.51

CLASSIFICATIONS:

Semi-Skilled Men (including Bell or Signal Man top or bottom, Form Worker & Mover, Concrete Worker, Shaft Man, Tunnel Laborer, Caulker's Helper, all other semi-skilled)
Semi-Skilled Men (including Miner's Helper, Chuck Tender, Track Man, Nipper, Brake Man, Derail Man, Cable Man, Hose Man, Gravel Man, Form Man)

HEAVY & GENERAL LABORERS- NEW TRANS HUDSON TUNNELS **Rates Expiration Date : 08/31/2017**

Effective Dates:

09/01/2016			03/01/2017
Rate	Fringe	Total	Total
57.00	27.78	84.78	87.76

CLASSIFICATIONS:

All others (including Powder Watchman, Change House Attendant, Top Laborer, Job Steward)

STANDARD SPECIFICATIONS

The Standard Specifications for Road and Bridge Construction of New Jersey Department of Transportation, 2007 Edition; is added to and/or amended elsewhere herein by the Notice to Contractors (Advertisement), Proposal, Information for Bidders, General Conditions, Special Provisions, Project Plans, and Supplementary Specifications; shall, insofar as technical requirements are involved, govern in the execution of this project.

Such Standard Specifications are made a part of these Specifications by this reference and will not be repeated herein. It is the responsibility of prospective bidders to familiarize themselves with these Standard Specifications, copies of which may be examined at the office of the Engineer and may be obtained, upon payment of the cost thereof, from:

Department of Transportation
State of New Jersey
1035 Parkway Avenue
Trenton, New Jersey 08625

The Notice to Bidders (Advertisement), Proposal, General Conditions, Instructions to Bidders, Special Provisions, Project Plans and/or Technical Specifications shall govern and prevail in the case of conflict between them and the Standard Specifications.

In these Standard Specifications the words "COMMISSIONER" or "DEPARTMENT" shall refer to and mean the person, persons, body, board or agent legally empowered to enter into contracts and otherwise legally act for the Owner. The words "RESIDENT ENGINEER (RE)", "ENGINEER" or "STATE" shall refer to and mean the professional engineering representative of the Owner as hereinbefore defined and the word "INSPECTOR" shall mean the authorized project representative of the Engineer with the authority as hereinbefore defined. The word "LABORATORY" shall mean and refer to the Engineer who may, at his discretion, and with the consent of the Owner, employ qualified technical personnel or testing laboratories to assist him in fulfilling the duties normally assigned to the "LABORATORY" in these Standard Specifications.

When reference is made herein to the bulletins, standards, specifications, publications or requirements of the Manual on Uniform Traffic Control Devices (MUTCD), Institute of Traffic Engineers (ITE), Federal Highway Administration (FHWA), American Association of State Highway Officials (AASHO), the American Concrete Institute (ACI), the American Society of Civil Engineers (ASCE) or similar national or regional societies, associations, institutes or organizations; the requirements of the bulletins, specifications, publications or requirements referred to shall be considered a part of these Specifications by such reference and shall not be repeated herein but shall have the same import and be as binding as if herein set forth in full.

DRAFT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

«County of Union»
« »
« »

The County Engineer or his designee:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. The Contractor will not be compensated for labor or materials outside the scope of work that is not properly authorized.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a Notice to proceed issued by the Owner, which is anticipated to be on or about

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows: Not applicable.

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

Portion of Work	Substantial Completion Date
Entire Work	TBD

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« » Should the Contractor fail to complete fully, and in conformity with all provisions of the Contract within the Contract Time, the Contractor shall, and hereby agrees to pay the Owner One Thousand Dollars ($1,000.00) per day for as liquidated damages, for each consecutive calendar day beyond the number of days allowed by the Contract, which sum is agreed upon as reasonable and proper measure of damages that the Owner will sustain per diem by failure of Contractor to complete Work within time as stipulated; it is being recognized by Owner and Contractor that the injury to Owner that could result from a failure of the Contractor to complete on schedule, is uncertain and cannot be computed exactly. In no way shall costs of Liquidated Damages to be construed as a penalty to the Contractor. (See Bid Documents)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the County Engineer or his designee by the Contractor and Certificates for Payment issued by the County Engineer or his designee, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 The Contractor shall submit a Preliminary Payment Request (Pencil Requisition) to the County Engineer or his designee on the twenty-fifth (25th) day of any given calendar month for Work performed during that month,

Upon receipt of the Pencil Requisition from the Contractor, the County Engineer or his designee shall review the Pencil Requisition and approve or disapprove of it in whole or in part as set forth hereafter. Within (4) calendar days of receipt of the Pencil Requisition from the Contractor, the County Engineer or his designee shall return the Pencil Requisition to the Contractor, with those charges that are approved or disapproved, if any, by the County Engineer or his designee, for the Contractor's incorporation into an Application for Payment . Within two (2) calendar days of return of the Pencil Requisition from the County Engineer or his designee, the Contractor shall submit a formal application for Payment to the County Engineer or his designee for review and approval by the County Engineer or his designee incorporating any revisions made by the County Engineer or his designee in the Pencil Requisition submission. Within five (5) calendar days of receipt of Contractor's Application for Payment, the County Engineer or his designee shall take any one of the following actions:

1) Certify the entire Application for Payment;

2) Certify partial payment and provide the Contractor with reasons for withholding the remaining portion of the payment; or

3) Withhold certification of the entire Application for Payment and provide the Contractor with reasons for withholding the entire payment,

Once the Application for Payment id certified either in whole or in part, the County Engineer or his designee shall transmit the Certified Payment Application within three (3) calendar days to the Owner for its review and payment. The Owner shall make payment to the Contractor for the Certified Payment Amount by no later than the time period set forth in the New Jersey Prompt Payment Act following receipt of the Certificate for Payment from the County Engineer or his designee. The Owner shall not be obligated to pay any Application for Payment until the Application for Payment is certified by the County Engineer or his designee. Approval of any Application for Payment may be withheld should the Contractor fail to submit Manning Reports in a timely manner.

Pursuant to N.J.S.A. 2A:30A-1 et seq. (the "Prompt Payment Act"), a public or governmental entity that requires the entity's governing body to vote on authorizations for each periodic payment, final payment, or retainage monies, such as the Owner, is excepted from the timing requirements of the Act. Accordingly, the Owner shall not approve the Contractor's Application for Payment until it is certified by the County Engineer or his designee in accordance herewith and shall not approve the Contractor's Certified Payment Application until the next scheduled public meeting of the Owner following the Owner's receipt of the Certified Payment Application from the County Engineer or his designee. The Owner shall not make payment to the Contractor for the Certified Payment Amount until the Owner's subsequent payment cycle following its approval of the Payment Application.

Pursuant to this same Act, if a payment due pursuant to the provisions herein is not made in a timely manner, the Owner shall be liable for the amount of money owed under the contract, plus interest at a rate equal to the prime rate plus one percent (1%), notwithstanding anything to the contrary in the Contract Documents. Interest on amounts due pursuant to the Act shall be paid to the prime contractor for the period beginning on the day after the required payment date and ending on the day on which the check for payment is received by the Contractor.

Pursuant to this same Act, disputes regarding whether a party has failed to make payments required by the Act may be submitted to a process of alternative dispute resolution, notwithstanding anything to the contrary in the contract documents, where the parties agree to same. Alternative dispute resolution permitted by the Act shall not apply to disputes concerning any other matters that may arise under or from this Contract. Any civil action brought to collect payments shall be conducted in Union County, State of New Jersey, and the prevailing party shall be awarded reasonable costs and attorneys' fees.

§5.1.4 The County Engineer or his designee may decide not to certify payment and may withhold a Certificate for Payment, in whole or in part, to the extent reasonably necessary to protect the Owner if, in the County Engineer or his designee's opinion, the representations as described in Section 5.1.5 below cannot be made to the Owner. If the County Engineer or his designee withholds a Certificate for Payment, the County Engineer or his designee will notify the Contractor and Owner as provided in Section 5.1.3 above. If the Contractor and County Engineer or his designee cannot agree on a revised amount, the County Engineer or his designee will issue a Certificate for Payment for the amount for which the County Engineer or his designee is able to make such representations to the Owner as set forth in Section 5.1.3 above. The County Engineer or his designee may also decide to withhold certifying

payment in whole or in part, or, because of subsequently discovered evidence or subsequent observations, to such extent as may be necessary in the County Engineer or his designee's opinion to protect the Owner from loss because of:

.1 Defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims;
.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials, or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or another contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or Liquidated Damages for the anticipated delay;
.7 failure to carry out the Work in accordance with the Contract Documents;
.8 avoidable delay in the progress of the Work;
.9 deliberate delay in the submission for approval of names of Subcontractors, materialmen, sources of supply, shop drawings, and samples;
.10 failure to maintain the Project Site in a safe and satisfactory condition in accordance with good construction practices as determined by the County Engineer or his designee; or
.11 failure to submit updates as required by the General Conditions.

When the foregoing reasons for withholding certification are resolved, certification will be made for amounts previously withheld in the manner set forth in Section 5.1.3 above.

§5.1.5 The issuance of a separate Certificate for Payment will constitute representations made separately by the County Engineer or his designee to the Owner, based on its individual observations at the site and the data comprising the Application for Payment submitted by the Contractor, that the Work has progressed to the point indicated and that, to the best of the County Engineer or his designee's knowledge, information and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contact Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the County Engineer or his designee. The issuance of a separate Certificate of Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a separate Certificate for Payment will not be a representation that the County Engineer or his designees has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed the Contractor's construction means, methods, techniques, sequences or procedures; (3) reviewed copies of requisitions received from Subcontractor's and materials suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§5.1.6 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the County Engineer or his designee may require. This schedule, unless objected to by the County Engineer or his designee, shall be sued as a basis for reviewing the Contractor's Applications for Payment.

§5.1.7 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.8 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of [redacted] percent ([redacted] %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of [redacted] percent ([redacted] %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the County Engineer or his designee has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§5.1.9 The progress payment amount determined in accordance with Section 5.1.8 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the County Engineer or his designee shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§5.1.10 Retainage shall be determined as follows: Pursuant to N.J.S.A. 40A:11-6.1, the Owner will withhold two percent (2%) of the amount due on each partial payment when the outstanding balance of the Contract exceeds One Hundred Thousand Dollars ($100,000.00.

§5.1.11 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the County Engineer or his designee.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the County Engineer or his designee's final Certificate for Payment, or as follows:

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The County Engineer or his designee will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the County Engineer or his designee.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

Except as provided in Section 5.1.3 of the Standard Form of Agreement between the Owner and Contractor, all claims, disputes or other matters in question between the parties to this Contract, arising out of or relating to the Project or to the Contract, or the alleged breach hereof, shall be subject one to mediation, and if not resolved, then same shall be decided in a Court of competent jurisdiction venued in Union County, New Jersey. No party may be compelled to submit any dispute concerning the Project to arbitration. In the event any claim arising from the Project is beyond the jurisdiction of the court, the Contract consents to joinder as a party to such action or alternative dispute proceeding.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall in no instance bear interest, except as required by law in accordance with Section 5.1.3 hereof.

§8.3 The Contractor shall ensure that the Project Site is maintained in a clean and safe condition at all times, based upon Owner's sole discretion. If the Contractor fails to keep the Project Site in a clean and safe condition, said failure shall result in the following:

.1 all claims resulting from the Contractor's failure shall be the Contractor's responsibility;
.2 said failure shall constitute an act of default and a substantial breach of the Contract giving the Owner remedies under the contract Documents; and
.3 the Owner shall have the right to withhold any payments until the Contractor cures its failure.

Failure to do so shall authorize the Owner to withhold any Applications for payment until such time as the Contractor has rectified same. Further, if the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

§8.4 Indemnification – See Indemnification Requirements in Bid Documents.

§8.5 The within contract shall be governed by and interpreted pursuant to the law of the State of New Jersey.

§8.6 The Contractor shall comply with the anti-discrimination provisions of N.J.S.A. 10:2-1 et seq., the New Jersey Law Against Discrimination, N.J.S.A. 10:5-1 et seq., N.J.A.C. 17:27-1.1 et seq. and shall guarantee to afford equal opportunity in performance of the Work in accordance with an affirmative action program approved by the State Treasurer. (See Page G-21).

§8.7 The Contractor shall submit proof of Business Registration for itself and it subcontractors to the Owner and shall provide written notice to its subcontractors and suppliers of the responsibility to submit proof of business registration to the contractor. The requirement of proof of Business Registration extends down through all levels (tiers) of the Project.

The Contractor agrees to comply with the rules and regulations promulgated pursuant to the Contractor Use Tax Collection Legislation.

For the term of the contract, the Contractor, any subcontractor, and each of their affiliates [N.J.S.A. 52:32-44(g)93)], shall collect and remit to the New Jersey Director of the Division of Taxation in the Department of Treasury, the use tax due pursuant to the "Sales and Use Tax Act," P.L. 1966, c. 30 (C.54:32B-1 et seq.) on all of their sales of tangible personal property delivered into the State of New Jersey, regardless of whether the tangible personal property is intended for a contract with a contracting agency. For purposes herein, "affiliate" shall mean any entity that: (a)

directly, indirectly or constructively controls another entity; (b) is directly, indirectly, or constructively controlled by another entity; or (c) is subject to the control of a common entity. For purposes of the immediately preceding sentence, an entity controls another entity if it owns, directly or indirectly, more than fifty percent (50%) of the Ownership interest in that entity.

§8.8 This Standard Form of Agreement and the General Conditions set forth in the Bid Documents shall control in the case of conflict between these documents and the Project Specifications, the Project Manual, and any other exhibits incorporated by reference in this Contract.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below, and incorporated herein as if set forth in their entirety.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« See Specifications as referenced by Exhibit B »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« See List of Drawings, annexed hereto as Exhibit C »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

« »

.2 Other documents, if any, listed below:

« »

ARTICLE 10 INSURANCE AND BONDS

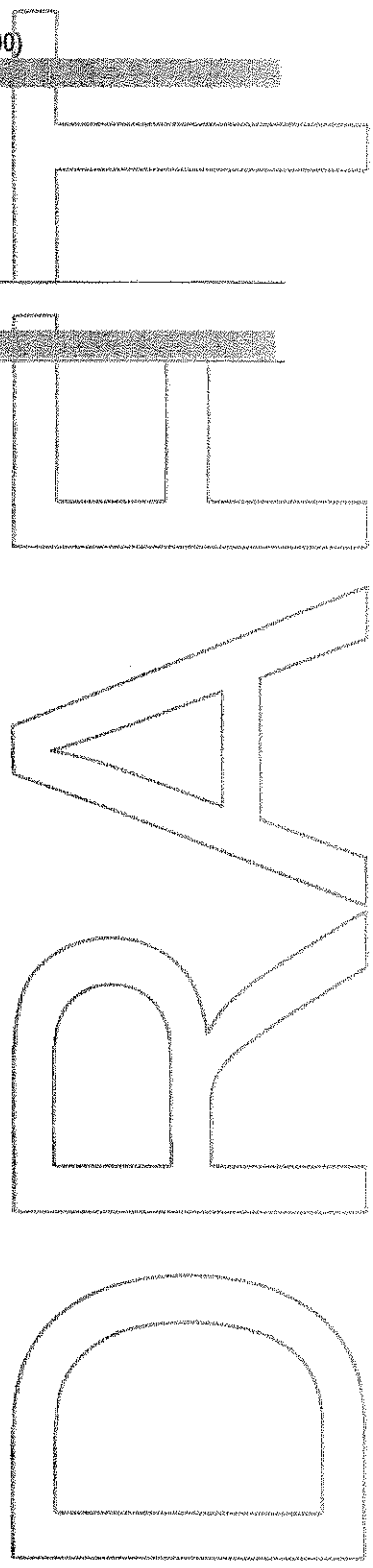
The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	CONTRACTOR *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*



DRAFT

AIA® Document A201™ - 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
«County of Union»
« »

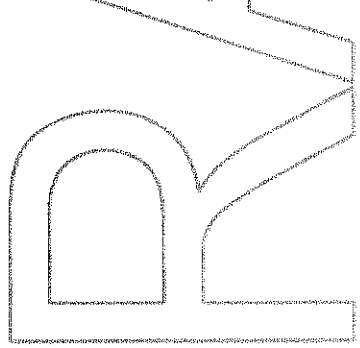
THE OWNER:
(Name, legal status and address)
« »« »
« »

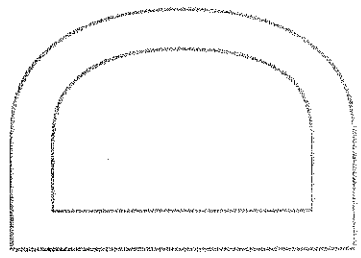
THE ENGINEER, OR HIS DESIGNEE :
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.





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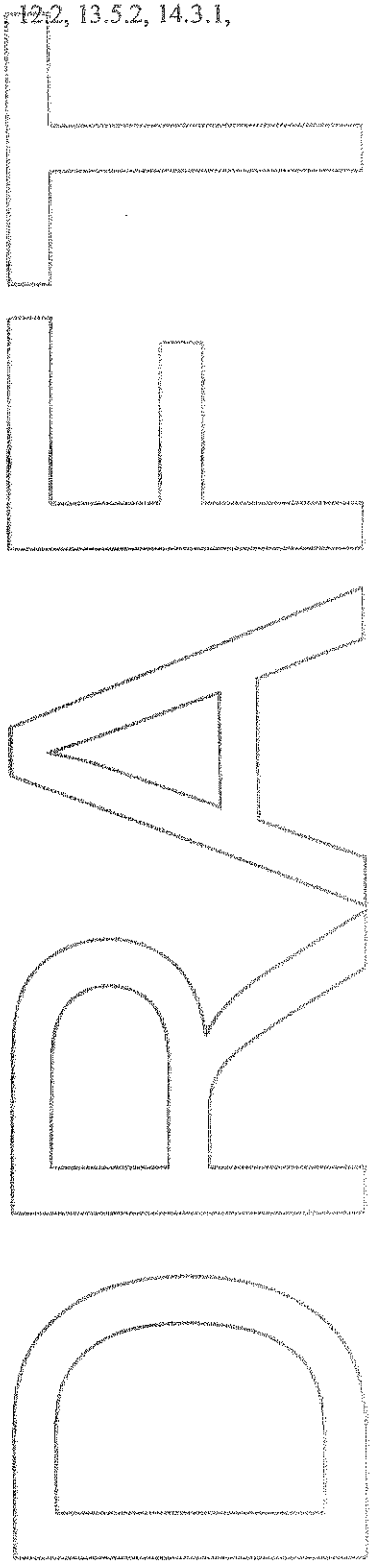
(Topics and numbers in bold are section headings.)



ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect or Engineer Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Engineer, or his designee or the Engineer, or his designee 's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Engineer, or his designee or the Engineer, or his designee 's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Engineer, or his designee s hall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Engineer, or his designee 's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Engineer, or his designee and the Engineer, or his designee 's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent

consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Engineer, or his designee s.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Engineer, or his designee and the Engineer, or his designee 's consultants shall be deemed the authors and Owners of their respective Instruments of Service, including the Drawings and Specifications. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Engineer, or his designee or Engineer, or his designee 's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Engineer, or his designee and the Engineer, or his designee 's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided elsewhere in the Contract Documents, the Engineer, or his designee does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 The Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only in the event that: (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 If readily available, the Owner shall furnish surveys describing physical characteristics and legal limitations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work. The Contractor shall be responsible for requesting and obtaining a utility mark-out.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Article 12 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6. Owner shall in no way be responsible for any delays or claims arising from delays for enforcement of this Section.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Engineer, or his designee 's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located and shall maintain as current any approvals or certifications that may be required to perform the Work. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Engineer, or his designee in the Engineer, or his designee 's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Engineer, or his designee any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Engineer, or his designee may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a Contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Engineer, or his designee any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Engineer, or his designee may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Engineer, or his designee issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Engineer, or his designee for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Engineer, or his designee and shall not proceed with that portion of the Work without further written instructions from the Engineer, or his designee . If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Engineer, or his designee in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after

evaluation by the Engineer, or his designee and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Engineer, or his designee that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Engineer, or his designee , the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Such warranty shall continue for a period of one (1) year from the date of Substantial Completion of the Work. Under this warranty, the Contractor shall remedy at his expense any such failure for the Work to be conforming to the requirement of the Contract, or any other defect appearing in the Work. In addition, the Contractor shall remedy at his own expense, any damage to Owner's owned, controlled, real or personal property, when that damage is the result of the Contractor's failure to proved conforming Work as it relates to the Contract Documents or any other defect of equipment, material, workmanship or design. The Contractor shall also restore any Work damaged in fulfilling its obligations under the terms of this provision. The Contractor's warranty with respect to the Work repaired or repaced hereunder will run for a period of one (1) year from the date of repair or replacement.

§ 3.6 TAXES

The Contractor shall pay use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Engineer, or his designee before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Engineer, or his designee will promptly investigate such conditions and, if the Engineer, or his designee determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Engineer, or his designee determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Engineer, or his designee shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Engineer, or his designee 's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Engineer, or his designee . Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2. The unused balance of any allowance shall be deducted from the Contract Sum upon completion and acceptance of the Work by Change Order.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Engineer, or his designee the name and qualifications of a proposed superintendent. The Engineer, or his designee may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Engineer, or his designee has reasonable objection to the proposed superintendent or (2) that the Engineer, or his designee requires additional time to review. Failure of the Engineer, or his designee to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Engineer, or his designee has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Engineer, or his designee 's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Engineer, or his designee 's approval. The Engineer, or his designee 's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Engineer, or his designee reasonable time to review submittals. If the Contractor fails to submit a submittal

schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Engineer, or his designee .

§3.10.4 Should the Contractor responsible for the scheduling requirements of Article 3 herein fail to comply with said scheduling requirements, said failure shall result in the following:

.1 all claims resulting from the Contractor's failure to prepare or submit a schedule shall be the Contractor's responsibility;

.2 shall constitute an act of default and a substantial breach of the Contract giving the Owner remedies under the Contract Documents; and

.3 the Owner shall have the right to withhold any payments until the Contractor complies with the scheduling requirements of Article 3 herein.

§3.10.5 In the event of a Five Prime Contract, the General Contractor shall be responsible for the preparation and submittal of the schedule.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Engineer, or his designee and shall be delivered to the Engineer, or his designee for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Engineer, or his designee is subject to the limitations of Section 4.2.7. Informational submittals upon which the Engineer, or his designee is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Engineer, or his designee without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Engineer, or his designee Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Engineer, or his designee or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Engineer, or his designee that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Engineer, or his designee .

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer, or his designee 's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer, or his designee in writing of such deviation at the time of submittal and (1) the Engineer, or his designee has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer, or his designee 's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Engineer, or his designee on previous submittals. In the absence of such written notice, the Engineer, or his designee 's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of Engineer, or his designee ure or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer, or his designee will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer, or his designee . The Owner and the Engineer, or his designee shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Engineer, or his designee have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Engineer, or his designee will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

§3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Owner before using any portion of the Site.

§3.13.3 The Contractor shall store its apparatuses, materials, supplies, and equipment in such orderly fashion at the Site of the Work, if permitted, as will not unduly interfere with the progress of the Work or ongoing operations. The Contractor shall provide protective fencing around the designated storage areas.

§3.13.4 The Contractor shall see that stockpiles of materials and storage of equipment are kept to a minimum and neatly stored where directed by the Owner and the Engineer, or his designee.

§3.13.5 If the Work is to be executed in areas occupied by the Owner, the Contractor shall inform the Owner in advance of the areas scheduled to be worked on, so that the Owner's personnel may make proper preparations to protect equipment and records.

§3.13.6 The Contractor understands that some or all the Work of the Contract may be performed while the facilities are occupied by personnel, and accordingly shall make all reasonable and necessary provisions to ensure that the contract Work will be of minimal disruption to the environment.

§3.13.7 Materials and equipment that are to be used only directly in the Work, shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project Site. Protection of construction materials and equipment stored at the Project Site from weather, theft, damage and all other adversity is solely the Contractor's responsibility. The Contractor shall bear the responsibility to replace all such materials that may be lost, damaged, or stolen at its expense, whether such materials or equipment have been entirely or partially paid for by the Owner.

§3.13.8 The Contractor and any entity for whom the Contractor is responsibility, shall not erect any sign on the Project Site without the prior written consent of the Owner, which may be withheld in the sole discretion of the Owner.

§3.13.9 Contractor shall ensure that the Work is performed at all times in a manner that affords reasonable access, both vehicular and pedestrian, to the Site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the Site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

§3.13.10 Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project Site, including, without limitation, the lavatories, toilets, entrances, and parking areas, other than those designated by the Owner. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project Site and the Building, as amended from time to time. The Contractor shall immediately notify the Owner in writing, if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable. This notification shall set forth the problems of such compliance and shall suggest alternatives through which the same results intended by such portions of the rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations. The Contractor shall also comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project Site and the Building.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents. Any costs incrred by the Onwer for defective cutting or patching shall be borne by the Contractor responsible therefore.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate Contractor except with written consent of the Owner and of such separate Contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor, or shall be entitled to reduce the Contract Amount in an amount equal to the Owner's cost to clean up.

§3.15.3 The Contractor shall, on a daily basis, clean debris resulting from its Work, and protect construction in progress and maintain adjoining materials in place during handling and installation, and provide protective covering where required to assure protection from damage or deterioration until Substantial Completion.

§3.15.4 The Contractor shall clean and provide maintenance on completed construction, after installation, as frequently as necessary through the remainder of the construction period.

§3.15.5 The Contractor shall supervise its construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. The term "clean" shall include the removal of debris from the work area to dumpsters furnished by the Prime General Work Contractor or the Contractor for Single Overall Contract Work, whichever contracting method shall apply.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Engineer, or his designee access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Engineer, or his designee harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Engineer, or his designee . However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Engineer, or his designee .

§ 3.18 INDEMNIFICATION

§ 3.18.1 The County of Union requires all bidders to accept the following indemnification requirements in the event the County accepts their bid. The Contract awarded by the County to the successful bidder will contain the following provision:

> "To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner and Owner's consultants, agents, representatives, and employees from and against any and all claims, damages, losses, costs, and expenses, including, but not limited to attorney's fees, legal costs and legal expenses arising out of or resulting from the performance of the Contractor's work under this contract, provided that such claim, damage, loss, cost or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than work itself) caused or alleges to be caused by the negligent acts, negligent omissions, and/or fault of the Contractor, anyone directly or indirectly employed or retained by the Contractor, or anyone for whose acts the Contractor may be liable regardless of whether caused in part by the negligent act or omission of a party indemnified hereunder provided it is not caused by the sole negligence of a party indemnified hereunder. Contractor shall further indemnify and hold harmless the Owner and the Owner's consultants, agents, representative, and employees from and against any and all claims, damages, losses, costs, and expenses, including, but not limited to attorneys' fees, legal costs and legal expenses, arising out of or resulting from performance of the work, provided that such claims, damage, loss, cost, or expense is attributable to bodily injury, sickness, disease or death, or to injury to destruction of tangible property (other than work itself) caused or alleged to be caused by the negligent acts, negligent omissions, and/or fault of the Owner or the Owner's consultants, agents, representatives, or employees and arises out of this project and provided such claim, damage, loss, cost, or expense is not caused by the sole negligence of a party indemnified hereunder."

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ENGINEER, OR HIS DESIGNEE OR ENGINEER

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an Engineer, or his designee lawfully licensed to practice Engineer, or his designee ure or an entity lawfully practicing Engineer, or his designee are in the jurisdiction where the Project is located. That person or entity is identified as the Engineer, or his designee in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Engineer, or his designee as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Engineer, or his designee . Consent shall not be unreasonably withheld.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Engineer, or his designee will provide administration of the Contract as set forth in its respective Agreements with the Owner and as described in the Contract Documents.

§ 4.2.2 The Engineer, or his designee will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Engineer, or his designee will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Engineer, or his designee about matters arising out of or relating to the Contract. Communications by and with the Engineer, or his designee 's consultants shall be through the Engineer, or his designee . Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Engineer, or his designee 's evaluations of the Contractor's Applications for Payment, the Engineer, or his designee will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Engineer, or his designee has authority to reject Work that does not conform to the Contract Documents. Whenever the Engineer, or his designee considers it necessary or advisable, the Engineer, or his designee will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Engineer, or his designee nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Engineer, or his designee to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Engineer, or his designee will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Engineer, or his designee 's action will be taken in accordance with the submittal schedule approved by the Engineer, or his designee or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Engineer, or his designee 's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Engineer, or his designee 's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Engineer, or his designee 's review shall not constitute

approval of safety precautions or, unless otherwise specifically stated by the Engineer, or his designee , of any construction means, methods, techniques, sequences or procedures. The Engineer, or his designee 's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Engineer, or his designee will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7. The Engineer, or his designee will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Engineer, or his designee will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Engineer, or his designee agree, the Engineer, or his designee will provide one or more project representatives to assist in carrying out the Engineer, or his designee 's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in the Owner's Agreement with the Engineer, or his designee

§ 4.2.11 The Engineer, or his designee will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Engineer, or his designee 's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Engineer, or his designee will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Engineer, or his designee will endeavor to secure faithful performance by both Owner and Contractor and will not show partiality.

§ 4.2.13 The Engineer, or his designee will review and respond to requests for information about the Contract Documents. The Engineer, or his designee 's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Engineer, or his designee will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate Contractor or subcontractors of a separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Identification of Subcontractors required by N.J.S.A. 40A:11-16 shall be provided with the bid submission in accordance with the requirements of that statute. Names of persons or entities for any Subcontractor not covered by N.J.S.A. 18A-18 shall be furnished within thirty (30) thirty days of notification of Award of Contract. The Engineer, or his designee will notify the Contractor in wiring if the Owner or Engineer, or his designee , after due investigation, has reasonable objection to any such proposed person or entity. The list of proposed Subcontractors shall include a description of the materials and equipment each proposes to furnish and install in the Work. The description shall be insufficient detail to allow the Engineer, or his designee to determine general conformance to Contract requirements. Approval of the submittals as required under this Article shall not relieve the Contractor from conformance to Contract requirements.

§5.2.2 Subcontractors shall comply with the statutory requirements of N.J.S.A. 34:11-56.25 and N.J.S.A. 34:11-56.48. Any subcontractors who fail to comply with those statutory provisions shall be rejected.

§5.2.3 Written confirmation of award of each major subcontract shall be submitted to the Owner by the Contractor, in form subject to his approval, within seven (7) days after receipt of Owner's approval of proposed Subcontractor list as provided under this Article. Every subcontract shall be in writing, shall be submitted to Owner for review and approval prior to execution, and shall specifically provide that the Owner is an intended third (3rd) party beneficiary of such subcontract.

§ 5.2.4 The Contractor shall not contract with a proposed person or entity to whom the Owner or Engineer, or his designee has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.5 If the Owner or Engineer, or his designee has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Engineer, or his designee has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.6 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Engineer, or his designee makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

§5.3.1By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents assumes toward the Owner and Engineer, or his designee . Each subcontract agreement shall preserve and protect the rights of the Owner and Engineer, or his designee under the Contract Documents and at law. No Subcontract shall diminish in any way any rights or benefits conferred upon the Owner by these Contract Documents. The Contractor shall make all Contract Documents available to the Subcontractors.

§5.3.2 Where the Contractor sublets portions of the Work, the entire responsibility for the subdividing of Work rests with the Contractor. The Owner and the Engineer, or his designee are not responsible for the manner of the subdivision of the Work, nor will they enter into or settle disagreements or disputes between Contractor and Subcontractors. The Contractor is, and will be held, responsible for the proper execution of the Work of all Subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing.

§ 5.4.2 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site.

§ 6.1.2 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Engineer, or his designee apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§6.2.4.1 Should the Contractor cause damage to the Work or property of any separate Contractor on the Project, the Contractor shall promptly settle with such other Contractor by agreement, or otherwise resolve the dispute. If such separate Contractor institutes any legal proceeding against the Owner on account of any damage alleged to have been so sustained, the Contractor shall, indemnify, defend, or bear the cost of defense as the Owner shall in its own discretion determine, and hold the Owner's harmless. Said Indemnification shall be governed by Section 13, Page G7 of the Instructions to Bidders.

§ 6.2.5 The Owner and each separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Engineer, or his designee will allocate the cost among those responsible, which amounts the Owner shall be entitled to reduce the Contract Amounts of the various contracts of those responsible. .

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Change Orders and Construction Change Directives shall be subject to and processed in accordance with N.J.A.C. 6A:23-7 and N.J.A.C. 6A:26-4.9, where applicable.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Engineer, or his designee ; a Construction Change Directive requires a written agreement by the Owner and Engineer, or his designee and may or may not be agreed to by the Contractor; an order for a minor change in the Work which does not extend the Contract Time, increase the Contract Sum or change the Project Scope may be issued by the Engineer, or his designee alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§7.1.4 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also. In no case will a change be approved without such itemization.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Engineer, or his designee and signed by the Owner, Contractor and Engineer, or his designee stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

A Change Order shall not require consent of the Owner if the Owner has provided an allowance for such a change.

§7.2.2 Methods used in determining adjustments to the Contract Sum shall be those listed in Section 7.3.3.

§7.2.3 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change, and any and all adjustments to the Contract Sum and the construction schedule. In the event a Change Order increases the Contract Sum, Contractor shall include the Work covered by such Change Orders in Applications for Payment as if such Work were originally part of the Contract Documents.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Engineer, or his designee and signed by the Owner and Engineer, or his designee , directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. A Construction Change Directive shall not require the Agreement of the Engineer, or his designee if the Owner specifically waives their consent in writing. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.6.

§ 7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Engineer, or his designee of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time. The Contractor's failure to comply with a Construction Change Directive shall constitute an incident of default and cause for termination by the Owner.

§ 7.3.5 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Engineer, or his designee shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Engineer, or his designee may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.6 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; and

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work.

§ 7.3.7 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Engineer, or his designee . When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.8 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Engineer, or his designee will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Engineer, or his designee determines, in the Engineer, or his designee 's professional judgment, to be reasonably justified. The Engineer, or his designee 's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.9 When the Owner and Contractor agree with a determination made by the Engineer, or his designee concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Engineer, or his designee will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§7.3.10 In subparagraphs 7.3.3 and 7.3.6, the allowance for overhead and profit combined shall be based upon the following schedule:

.1 For the Contractor, for work performed by his own forces, 10% of cost.

.2 For each Subcontractor, for the work performed by his own forces, 10% of cost.

.3 For the Contractor, for work performed by a subcontractor, 5% of cost.

§7.3.11 Lump sum quotations for changes in the Work will not be accepted. Proposals shall be completely itemized and broken down. They shall be accompanied by such supporting data as the Engineer, or his designee may require, such as copies of subcontractor's or vendor's quotations, quantity take-off sheets, or other similar information.

§ 7.4 MINOR CHANGES IN THE WORK

The Engineer, or his designee has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Engineer, or his designee and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work and services as required by the Contract

Documents, Substantial Completion of the Work shall be accomplished within the period of consecutive calendar days (or by the date), as stated in the Agreement, plus any authorized extension(s) of time as approved by written agreement. Final Completion of the Work shall be no later than thirty (30) consecutive calendar days from the date of Substantial Completion of the Work, unless otherwise set forth in Article 3.2 of the Owner/Contractor Agreement.

§ 8.1.2 Intentionally omitted

§ 8.1.3 Intentionally omitted.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work. There will be no bonus or incentives paid, should the Work, or any portion thereof, be completed in advance of the specified activity milestone dates.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 Intentionally omitted

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 Intentionally omitted

§8.3.4 No payment, compensation, or adjustment of any kind shall be made to the Contractor by the Owner for damages resulting from hindrances or delays caused by the delays of other contractors, or from foreseeable circumstances not attributable to the Owner's conduct. The Contractor agrees that it will make no claim against the Owner for payment, compensation, damages, mitigation of Liquidated Damages, or adjustment of any kind for such hindrances or delays, and will accept such extensions of time as may be granted by the Owner in the Owner's sole discretion in full satisfaction for any and all alleged claims against the Owner for any and all such hindrances or delays. For purposes of this Agreement, disputes arising between contractors before or during construction, adverse weather conditions, and delays on the part of local authorities issuing permits shall be considered foreseeable circumstances. Notwithstanding the foregoing, nothing herein shall limit the Contractor's remedies for Owner's negligence, bad faith, active interference, tortuous conduct, or other reasons uncontemplated by the parties that delay expenditures paid by the Owner to the Engineer, or his designee , other individual or entity, or to any inspector or inspectors necessarily employed by it on the Work, for any number of days in excess of the Contract Time, shall be deducted for the Contract Sum.

§8.3.5 The provisions of this Article shall not be so interpreted or construed as to preclude or prevent the Contractor from making and prosecuting any claim against any separate Contractor engage or employed by the Owner for damages alleged to have been caused or occasioned by any such separate Contractor.

§8.3.6 To the extent permitted by law, the Owner may suspend the whole or any part of the Work, if it shall deem it for the best interest of the Owner to do so, without compensation to the Contractor for such suspension, other than extending the time for completion of the Work as much as it may have been delayed by such suspension. During such suspension, all materials delivered upon, but no placed in the Work shall be neatly piled by the Contractor so as not to obstruct public travel, or shall be removed from the line of Work at the direction of the Owner and, unless the

materials be moved by the Contractor upon such direction, the materials shall be removed by the Owner and expense thereof will be charged to the Contractor.

§8.4.1 Should the Contractor fail to complete fully, and in conformity with all provisions of the Contract within the Contract Time, the Contractor shall, and hereby agrees to, pay the Owner one thousand dollars ($1,000.00) per day, for each consecutive calendar day beyond the number of days allowed by the Contract, which sum is agreed upon as reasonable and proper measure of damages that the Owner will sustain per diem by failure of Contractor to complete Work within time as stipulated; it being recognized by Owner and Contractor that the injury to Owner that could result from a failure of the Contractor to complete on schedule, is uncertain and cannot be computed exactly, In no way shall costs of Liquidated Damages be construed as a penalty to the Contractor.

§8.4.2 It is expressly understood and agreed by and between the Contractor and Owner that the Contract Time prescribed herein is a reasonable time for the completion of the Work.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Engineer, or his designee , before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Engineer, or his designee may require. This schedule, unless objected to by the Engineer, or his designee , shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 See Article 5 of Standard Form of Agreement between Owner/Contractor.

§ 9.3.1.1 Applications for Payment may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.

§ 9.3.1.2 Such applications may not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

§ 9.3.1.3 All applications for payment shall be accompanied by the Application and Certificate of Payment, AIA Document G702, and the Continuation Sheet, AIA Document G703, fully completed as required or such other application for Payment as the Owner's representative shall use.

§9.3.1.4 In cases where the work is awarded on a Single Overall Contract basis, payments shall be made in accordance with applicable State of New Jersey statutes.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§9.3.3.1 All municipal mechanic's liens filed by a lien claimant shall be governed by N.J.S.A. 2A:44-125 et seq. In the event a municipal mechanic's lien is filed, the Owner reserves the right to withhold the full amount of the lien. The Owner may release the funds to the party against whose account the lien is claimed, only after that party files with the Owner's financial officer, a bond in an amount double of all sums claimed ("Double Bond") under the lien, and such bond's form has been approved by the Owner's chief law officer and financial officer, per N.J.S.A. 2A:44-130 or if an acceptable release of liens is filed by the lien claimant.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 See Article 5 of Standard Form of Agreement between Owner and Contractor.

§ 9.4.2 See Article 5 of Standard Form of Agreement between Owner and Contractor

§9.4.3 See Article 5 of Standard Form of Agreement between Owner and Contractor.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 See Article 5 of Standard Form of Agreement between Owner and Contractor

§ 9.5.2 See Article 5 if Standard Form of Agreement between Owner and Contractor.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Engineer, or his designee has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Engineer, or his designee .

§ 9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work and shall certify same to Owner. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Engineer, or his designee will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner and Engineer, or his designee on account of portions of the Work done by such Subcontractor.

§ 9.6.4 Neither the Owner nor Engineer, or his designee shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

§ 9.6.5 Payment to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.7 FAILURE OF PAYMENT

If the Engineer, or his designee does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Engineer, or his designee or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Engineer, or his designee , stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§9.7 REIMBURSEMENT TO OWNER

§9.7.1 If the Owner is entitled to any reimbursement or payment from the Contractor under, or pursuant to, the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that which the Owner is entitled from any

payment then, or thereafter, due the Contractor from the Owner; or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that a condition precedent to Substantial Completion shall be the Owner's receipt of all certificates of occupancy (permanent or temporary) and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the occupancy of the Project. The Owner may withhold a certification of Substantial Completion if temporary installations or temporary construction exists in areas requesting certification, or if certificates of occupancy are temporary or conditional.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Engineer, or his designee shall prepare a comprehensive list of items to be completed or corrected ("Punch List"). The Contractor shall proceed immediately to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the list, the Engineer, or his designee, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Engineer, or his designee 's inspection discloses any item, whether or not included on the list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Engineer, or his designee . The Contractor shall then submit a request for another inspection by the Engineer, or his designee to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Engineer, or his designee will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the List accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Contractor for its written acceptance and to the Owner for its approval and acceptance as required by Section 9.8.1 No Certificate of Substantial Completion shall be deemed effective unless executed by both Owner and Contractor.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, who shall obtain all necessary modifications to its insurance coverage to permit such occupancy or use. In addition, Contractor shall obtain consent of those public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete pursuant to the terms of that Agreement. When the Contractor considers a portion substantially complete, the Engineer, or his designee shall prepare a Punch List as provided under Section 9.8.2 Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Engineer, or his designee shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§9.9.4 The occupancy of any portion of the Work shall not constitute acceptance of any Work, except as hereinafter stated, nor does it waive the Owner's right to Liquidated Damages. Final Acceptance of the Work shall be for the whole Work only and not part.

§9.9.5 Occupancy by the Owner shall not be deemed to constitute a waiver of existing claims on behalf of the Owner or Contractor against each other.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Engineer, or his designee a written notice that the Work is ready for final inspection and acceptance and shall also forward to the Engineer, or his designee a final Contractor's Application for Payment. The Engineer, or his designee will promptly make such inspection. When the Engineer, or his designee finds the Work acceptable under the Contract Documents and the Contract fully performed, the Engineer, or his designee will promptly issue a final Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their observations and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Engineer, or his designee 's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor complies with all requirements set forth in Section 6 of the Standard From of Agreement between Owner and Contractor and the Contractor submits to the Engineer, or his designee (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 Intentionally omitted

§ 9.10.4 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Engineer, or his designee for review and coordination with the safety programs of other Contractors.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

.4 **Construction or operations by the Owner or other Contractors.**

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4, except damage or loss attributable to acts or omissions of the Owner or Engineer, or his designee or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Engineer, or his designee .

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Engineer, or his designee in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Engineer, or his designee the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance.

§ 10.3.3 Intentionally omitted

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 Intentionally omitted

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The County of Union requires all bidders to be able to comply with the following insurance requirements. In the event a bid is accepted by the County, the bidder must accept the applicable insurance requirements, as set forth below, as part of any contract, awarded to it by the County.

1. Automobile Liability Insurance in any amount of not less than $1,000,000.00 combined single limits for Bodily Injury and Property Damage Liability. A certificate of such current insurance will be provided to the County and will reflect the provision of at least thirty (30) days notice to the County before any major cancellation or major change may be made the policy.

2. Workers Compensation Insurance insuring the obligations of the Contractor and all Subcontractors under the New Jersey Workers Compensation and Occupational Disability Laws as respects to Work performed under the Contract. Insurance will be extended to include any obligations under the United States Longshoremen's and Harbor Workers Act or any maritime act, when applicable.

3. General Liability Insurance will be provided on a Comprehensive General Liability form with a combined single limit of $3,000,000.00 per occurrence for Bodily Injury Liability and Property Damage Liability and will include the interest of the County with respect to Work emanating from the Contract with the County. The insurance will include the following:

a) Personal Injury Liability
b) Blanket Contractual Liability applies to assumption of liability under any written Contract
c) Coverage for A, X, C, U exposures, relating to excavation, blasting underground damage
d) Broad Form Property Damage Liability
e) Products and/or Completed Operations Liability

A Certificate of Insurance will be filed with the County prior to commencement of any Work. This certificate will contain a provision that insurance afforded under the policies will not be canceled without at least (30) days prior written notice being given to the County.

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§ 11.1.2 The insurance required by Section 11.1.1 shall remain in effect for the duration of the project, i.e., from beginning of construction until final payment and closeout.

§ 11.1.3 All insurance required by Section 11.1.1 shall be issued by insurance companies authorized to do business in the State of New Jersey and rated as "A' or better as determined by A.M. Best Company.

§ 11.1.4 The Contractor waives all rights against the Owner for damages caused by fire or other perils to the extent covered by insurance provided under this Article. Any deductibles, co-insurance, or contribution to the loss will be borne solely by the Contractor.

§11.1.5 A certificate of insurance evidencing the coverages required by Section 11.1.1 shall be submitted to the Owner's attorney for approval and transmittal to the Owner and Engineer, or his designee prior to the commencement of the Work. The certificate must be submitted on the ACORD from Certificate of Insurance. Theses certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least thirty (30) days' written notice has been given to the Owner. If requested by the Owner, the Contractor shall provide complete copies of any policies of insurance required by this Contract to be obtained by the Contractor and Subcontractor(s). Information concerning any reduction of coverage shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

§ 11.2 PROPERTY INSURANCE

§ 11.2.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance in the amount of the initial Contract Sum as well as subsequent modifications thereto for the entire Work at the site on a replacement cost

basis without voluntary deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurance interest in the property required by this Section 11.2 to be covered, whichever is earlier. This insurance shall include the interest of the Owner, Contractor, Subcontractor(s), and Sub-Contractor(s) in the Work.

§ 11.2.1.1 Property insurance shall be on an "all-risk" policy form and shall against the perils of fire and extended coverage and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, falsework, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Engineer, or his designee 's services and expenses required as a result of such insured loss. Coverage for all other perils shall not be required unless otherwise provided in the Contract Documents.

§ 11.2.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance which will protect the interests of the Contractor, Subcontractor(s) and Sub-subcontractor(s) in the Work,.. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.2.1.3 If the property insurance requires minimum deductibles, and such deductibles are identified in the Contract Documents, the Contractor shall pay costs not covered because of such deductibles. If the Owner or insurer increases the required minimum deductibles over the amounts so identified or of the Owner elects to purchase this insurance with voluntary deductible amounts, the Owner shall be responsible for payment of the additional costs not covered because of such increased or voluntary deductibles.

§ 11.2.1.4 Unless otherwise provided in the Contract documents, this property insurance shall cover portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also portions of the Work in transit.

§ 11.2.1.5 A loss insured under Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgage clause and of Section 11.3.10. The Contractor shall pay Subcontractor(s) their just shares of insurance proceeds received the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractor(s) to make payments to their Sub-Contractor(s) in a similar manner.

§ 11.2.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds. The Owner as fiduciary shall have the power to adjust and settle a loss with insurers.

§ 11.2.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused.

§ 11.2.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3 PERFORMANCE BOND, PAYMENT BOND AND MAINTENANCE BOND

§ 11.3.1Contractor, at its sole expense, shall furnish bonds covering faithful performance of the contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract, including material and labor..

§ 11.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be made

§11.3.3 The Contractor shall file with the Owner, as a condition of final acceptance, a statement from the Surety of its Performance Bond and Payment Bond, that the Surety is satisfied that all claims for labor and material supplied under its contract have been satisfactorily settled.

§11.3.4 As a condition of Substantial Completion of the Work, the Contractor shall provide an acceptable Maintenance Bond in accordance with section 16, page G-9 of the Instructions to Bidders .

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work uncovered is contrary to the Engineer, or his designee 's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Engineer, or his designee , be uncovered for the Engineer, or his designee 's examination and be replaced at the Contractor's expense without change in the Contract Time or Contract Sum.

§ 12.1.2 If a portion of the Work has been covered that the Engineer, or his designee has not specifically requested to examine prior to its being covered, the Engineer, or his designee may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate Contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

The Contractor shall promptly correct Work rejected by the Engineer, or his designee or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Engineer, or his designee 's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. The Owner shall give such notice promptly after discovery of the non-conforming work. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after the receipt of notice from the Owner or Engineer, or his designee , the Owner may correct it in accordance with Section 2.4. This obligation under Section 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 Intentionally omitted.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged work, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work, nor to any deficient Work discovered after the one-year period that could not have readily been discovered.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work, that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made. However, there shall be no implied or expressed acceptance of Work not in compliance with applicable law. The amount of said reduction will be within the exclusive determination of the Owner as it representative.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

§ 13.1.1The Contract shall be governed by the laws of the State of New Jersey.

§ 13.1.2 Nothing in the Contract Documents shall be construed to permit deviation from the governing law.

§ 13.1.3 In accordance with N.J.S.A. 40A:11-18, American manufactured products or materials shall be used in the Work, wherever possible.

13.1.4 RATE OF WAGES

Where the Project is not subject to a Project Labor Agreement, wage notes shall be paid pursuant to the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq, the Contractor and Subcontractor are required to do the following:

§ 13.1.4.1 Pay to all workmen engaged engaged in the performance of services, directly upon a public work, the prevailing rate of wages, which shall be those in effect for the Project site(s) on the Contract Date and such rates shall remain in effect for (2) years, unless superseded by a subsequent determination.

§ 13.1.4.2 Before final payment, furnish Owner with an affidavit stating that all workmen have been paid the prevailing rate of wages specified in the contract.

§ 13.1.4.3 Keep an accurate record showing the name, craft, or tradeand actual hourly rate of wages paid to each workman employed by it in connection with any public work. Records shall be preserved for two (2) years from date of payment.

§ 13.1.4.4 Post the prevailing wage rated for each craft and classification involved as determined by the Commissioner of Labor and Industry, including the effective date of any changes thereof in prominent and easily accessible places at the site of the Work, and at such place or places as are used by them to pay workmen their wages.

§ 13.1.4.5 Submit the Owner, certified payroll records for each payroll period within ten (10) date of the payment of wages. A certified payroll record is defined as "a payroll record that is attested by the employer or the Owner of the company doing business as the employer, or a corporate officer of such company, or an authorized agent of the employer". A copy of the certified payroll form for submission of the payroll records may be obtained by contacting the Department of Labor, Division of Workplace Standards at 609.292.2259.

§ 13.1.4.6 In the event the Owner finds that any workers employed by the Contractor or Subcontractor, covered by the said contract, have been paid a rate off wages less than the prevailing wage required to be paid by such contract, the Ownert may terminate the Contractor's or Subcontractor's right to proceed with the Work, or such part of the

Work as to where there has been a failure to pay required wages, and to prosecute the Work to completion or otherwise, the Contractor and its sureties shall be liable to the Owner for any excess costs occasioned thereby,

§ 13.1.4.7 a current wage rate determination is on file at the offices of the Owner for inspection and Contractor's use.

§ 13.1.5 SAFETY AND HEALTH REGULATIONS (OSHA)

§ 13.1.5.1 The Contractor shall comply with the laws, rules, regulations and codes dealing with occupational safety and health, including, but not limited to, the latest amendments of the following:

§ 13.1.5.2 Williams – Steiger Occupational Safety and Health Act of 1970, Public Law 91-595.

§ 13.1.5.3 Part 1910 – Occupational Safety and Health Standards Chapter XV11 of Title 29, Code of Federal Regulations.

§ 13.1.5.4 Part 126 – Safety and Heath Regulations for Construction, Chapter XVII of Title 29, Code of Federal Regulations.

§ 13.1.5.3 N.J.A.C. 8:59-5.1-5.109requirements properly label any substances stored in containers) of the Woker and Community Right to Know Act, P.L. 1983, c.315.

§13.1.6 ENVIRONMENTAL REGULATIONS

§13.1.6.1 The Contractor shall comply with laws, rules, regulations, and codes dealing with the prevention of environmental pollution and the preservation of public natural resources, including but not limited to, the latest amendments of the following:

§13.1.6.2 Chapter 251, public Law of 1975 of the State of New Jersey, "soil Erosion and Sediment Control Act."

§13.1.7 AFFIRMATION ACTIONE EMPLOYMENT LAW

Contractor agrees to comply with the terns of the Mandatory Equal Employment Opportunity Language, a copy of which is annexed to the Contract Documents as Exhibit F and incorporated as if set forth herein.

§13.1.7.1 Contractor shall submit a copy of the Monthly Project Workforce Report, New Jersey Department of Treasury Form AA-202, to the New Jersey Department of Treasury's Division of Public Contracts Equal Employment Opportunity Compliance and to the Owner

§13.1.7.2 Contractor shall complete and submit to the Owner an Initial Project Workforce Report, New Jersey Department of Treasury Form AA 201, upon notification of award and no later than the execution of this Agreement. Failure to submit this completed form may result in this Agreement being terminated.

§ 13.2. SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. neither party to the Contract shall assign the Contract as a whole without written consent of the other, unless as may be provided for elsewhere in the Contract Documents. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Engineer, or his designee or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Engineer, or his designee timely notice of when and where tests and inspections are to be made so that the Engineer, or his designee may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Engineer, or his designee , Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Engineer, or his designee will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Engineer, or his designee of when and where tests and inspections are to be made so that the Engineer, or his designee may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Engineer, or his designee 's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Engineer, or his designee .

§ 13.5.5 If the Engineer, or his designee is to observe tests, inspections or approvals required by the Contract Documents, the Engineer, or his designee will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Except as required by Section 5.1.3 of the Owner Contractor Agreement and not withstanding anything to the contrary contained in the Contract Documents and related documents, the Owner will pay no interest whatsoever for any payments due.

§ 13.7 TIME LIMITS ON CLAIMS

Intentionally deleted.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

§ 14.1.2 Intentionally deleted

§ 14.1.3 If one of the reasons described in Section 14.1.1 exists, the Contractor may, upon thirty (30) days' written notice to the Owner and Engineer, or his designee , terminate the Contract

§ 14.1.4 Intentionally deleted.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor after Notice and an opportunity to cure.

.1 refuses or fails to supply enough properly skilled workers or proper materials;
.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
.3 disregards laws, ordinances, rules or regulations, or orders of a public authority having jurisdiction;
.4 fails to furnish the Owner with assurances satisfactory to the Owner, evidencing the Contractor's ability to complete the Work in compliance with all requirements of the Contract Documents;
.5 fails after commencement of the Work, to proceed continuously with the construction and completion of the Work, for more than three (3) days, except as permitted by the Contract Documents;
.6 disregards orders of the Owner or Engineer, or his designee ;
.7 fails to maintain the Site in a clean , safe and orderly manner;
.8 fails to comply with a Construction Change Directive; or
.9 otherwise is guilty of any breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 Accept assignment of subcontracts pursuant to Section 5.4; and
.3 Finish the Work by whatever reasonable method the Owner may deem expedient. And charge the costs incurred against the Contractor's Contract balance

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished. The Engineer, or his designee 's certification issued pursuant to Section 14.2.2 shall be given a presumption of correctness.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Engineer, or his designee 's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Engineer, or his designee , upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 Intentionally deleted.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking adjustment or interpretation of Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract. Any Contractor Claim seeking the payment of money shall not include consequential damages, which Contractor hereby waives, and shall be calculated in accordance with Section 7.3.6 and Section 7.3.10 hereof.

§ 15.1.2 DECISION OF ENGINEER, OR HIS DESIGNEE

Owner and Contractor agree that the Engineer, or his designee shall be the initial arbiter of all Claims, including those alleging error or omission by the Engineer, or his designee . All claims, shall be referred, initially to the Engineer, or his designee for action as provided in Article 4 and shall be required as a condition precedent to litigation of a Claim between the Contractor and Owner to all such matters arising prior to the date final payment is due, regardless of: (1) whether such matters relate to execution and progress of the Work; or (2) the extent to which the work has been completed. The decision by the Engineer, or his designee in response to a Claim shall not be a condition precedent to litigation in the event: (1) the position of the Engineer, or his designee is vacant; (2) the Engineer, or his designee has not received evidence or has failed to render a decision within agreed time limits; (3) the Engineer, or his designee has failed to take action required under Article 4 within thirty (30) days after the Claim is made; (4) forty-five (45) days have passed after the Claim has been referred to the Engineer, or his designee ; or, (5) the claim relates to a mechanic's lien.

§ 15.1.3 TIME LIMITS ON CLAIMS

Claims must be within twenty one (21) calendar days after the occurrence of the event giving rise to the Claim or within twenty-one (21) calendar days after the claimant first becomes aware of the condition giving rise to the Claim, whichever is later. There shall be no time limitation upon any Claims made by the Owner. Claims must be made by written notice to the Engineer, or his designee . An additional Claim made after the initial Claim has been implemented by Change Order will not be considered unless submitted pursuant to the requirements of this Paragraph. Notice shall be deemed effective upon the Engineer, or his designee 's receipt of the Notice.

§ 15.1.4 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments to the extent required by the Contract Documents.

§15.1.5 CLAIMS FOR CONCEALED OR UNKNOWN CONDITIONS

If conditions are encountered at the Site which are: (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents; or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for the Contract Documents, the Owner and Contractor mutually agree to give written notice to each other; including the Engineer, or his designee and any affected Contractor or subcontractor, upon the observation of the condition within twenty-four (24) hours if first observation of the condition., The Engineer, or his designee will investigate such conditions within seventy-two (72) hours and will diligently process and render a recommendation within twenty-one (21)days unless otherwise agreed in writing. If the Engineer, or his designee determines that the condition at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified the Engineer, or his designee shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in

opposition to such determination must be made within seven (7) days after the Engineer, or his designee has given notice of the decision.

§ 15.1.6 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum written notice as provided herein shall be given before proceeding to execute the Work. All documentation in support of the Contractor's request shall, likewise be provided at the time said written request is made. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3 or elsewhere in the Contract Documents..

§ 15.2 CLAIMS FOR ADDITIONAL TIME

§ 15.2.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work, , all documentation in support of the Contractor's request shall, likewise be provided at the time said written request is made. In the case of a continuing delay, only one Claim is necessary.

§ 15.2.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction. The term "abnormal" as used here shall be construed according to the following formula: average rainfall (or snow, low temperature, etc) for the past five (5) years for the month in question, plus ten percent (10%). Accordingly, weather is not deemed to be abnormal unless it is ten percent (10%) worse than the average for the month over the past five (5) years. Claims relating to weather must be submitted within seven (7) calendar days of the occurrence of any such delays.

§ 15.3 CLAIMS FOR INJURY OR DAMAGE TO PERSON OR PROPERTY. If either Party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party, including the Engineer, or his designee , within a reasonable time not exceeding twenty-one (21) days after first occurrence, unless another time period is required by law. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided for in Article 15.

§ 15.3.2 The Owner is not required to institute a claim under this section in order to terminate this Agreement.

§ 15.4 RESOLUTION OF CLAIMS AND DISPUTES

The Engineer, or his designee will review Claims and take one or more of the following preliminary actions with ten (10) days of receipt of a Claim: (1) request additional supporting data from the claimant; (2) reject the Claim in who or in part, stating reasons for rejection ; (3) recommend approval of the Claim by other party; or (4) suggest a compromise.

§ 15.4.2 If a Claim has been resolved, the Engineer, or his designee will prepare or obtain appropriate documentation in consultation with Owner's counsel as circumstances dictate.

§ 15.4.3 If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Engineer, or his designee , the Engineer, or his designee will notify the parties in writing that the Engineer, or his designee 's decision will be made within seven (7) days, which decision shall be final. Upon expiration of such time period, the Engineer, or his designee will render to the parties the Engineer, or his designee 's written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both.

§ 15.5. CLAIMS FORUM

Unless otherwise required by Section 5.1.3 of the Standard Form of Agreement between the Owner and Contractor, claims, disputes, or other matters in question between the parties to this Contract arising out of or relating to the Project or to this Contract, or the alleges breach thereof, shall be subject in the first instance to mediation and failing that, there in, a Court of competent jurisdiction venued in Union County, New Jersey. The Owner may not be compelled to submit any dispute concerning the Project to arbitration. By accepting award of the Contract and executing the Agreement, the Contractor consents to its joinder as a party in any litigation, mediation, arbitration or any other legal proceeding involving the Project and any references in the Contract documents.

§ 16.1 INTERPRETATIONS IN WRITING

§ 16.1.1 Neither the price bid for the work of any Contract, nor the Contract Sum, shall be based in any manner upon oral opinions, or real or alleged instructions of an oral nature, regardless if whether such opinions or instructions are expressed by the Owner, the Engineer, or his designee or its Consultants, the Contractor, or agents or representative of any of them and no such oral communication shall form the basis of a Claim.

§ 16.1.2 These provisions do not intend to deny, on an oral basis, normal discussion, recommendations, explanations, suggestions, approvals, rejections, and similar activity in pursuit if the work of the Project, such as at job conferences and otherwise at the Site. In such instances, the written minutes, correspondence, shop drawing records, written field orders, and other written data shall govern over personal claims regarding statements made contrary to the written data.

§ 17.1 JOB SITE MEETINGS

§ 17.1.1 Job site meetings, when called by the Engineer, or his designee , shall be held at a location and time convenient to the Owner's representatives, the Engineer, or his designee , and Contractor(s). Each Contractor shall attend such meeting, or be represented by a person in authority who is thoroughly familiar with the Project and who can speak and make decisions for the Contractor. In the instance of a Single Overall Contract, each of the major Subcontractors-Structural Steel, and ornamental iron work, plumbing, gas fitting and all kindered work and steam power plants, steam, and hot water heating and ventilating apparatus and Electrical-shall have a person in authority who is thoroughly familiar with the Project attend the meetings.

§ 18.1 MANDATORY LAW AGAINST DISCRIMINATION LANGUAGE
PROCUREMENT, PROFESSIONAL AND SERVICE CONTRACTS
(N.J.A.C. 13:6-1.3)

§ 18.1.1 The parties of this contract do hereby agree that the provision of N.J.S.A. 10:2-1 through N.J.S.A. 10:2-4 dealing with discrimination in employment on public contracts, and the rules and regulations promulgated pursuant thereunto, are hereby made a part of this contract and are binding upon them.

§ 18.1.1 Pursuant to the provision of N.J.S.A. 10:2-1 through N.J.S.A. 10:2-4, during the performance of this contract, the Contractor agrees as follows:

§ 18.2.1.1 In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no Contractor, including without limitation, the Contractor, nor any person acting on behalf of such Contractor or subcontractor, shall by reason of race, creed, color national origin, ancestry, Marital status, gender identity or expression, affectional or sexual orientation, or sex, discriminate against any person who is qualified and available to perform the Work, to which the employment relates;

§ 18.2.1.2 No Contractor, including, without limitation, the Contractor, Subcontractor, nor any person acting on its behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this Contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such Contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation, or sex;

§ 18.2.1.3 There may be deducted from the amount payable to the Contractor by the Owner, under the Contract, a penalty of $50.00 (fifty dollars) for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the Contract; and

§ 18.2.1.4 This contract may be canceled or terminated by the Owner, and all the money due or to become due hereunder may be forfeited, for any violation of this section of the Contract occurring after notice to the Contractor from the contracting public agency or any prior violation of this section of the Contract.

§ 19.1 CONTRACTOR AND SUBCONTRACTOR COLLECTION OF USE TAX TO LOCAL GOVERNMENTS

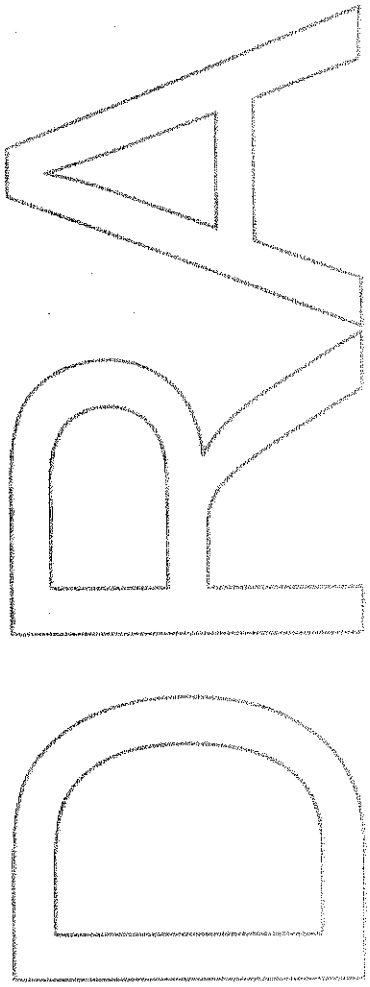
§ 19.1.1 The Contractor acknowledges and agrees that pursuant to P.L. 2004, c. 57, enacted by the State of New Jersey on June 29, 2004, contractors or contractors with subcontractors, or their affiliates, who enter into contracts

with New Jersey local government entities, including without limitation, boards of education, are, effective as of September 1, 2004, required to collect and remit to the New Jersey Director of Taxation in the Department of the Treasury the use tax pursuant to the "sales and Use Tax Act," P.L. 1966, c. 30 (C.54:32B-1 et. seq.) on all their sales of tangible personal property delivered into the State of New Jersey (hereinafter referred to as the "Contractor Use Tax Collection Legislation").

§ 19.2.1 The Contractor hereby covenants and agrees that the Contractor, any subcontractor and each of their affiliates, shall collect and remit to the New Jersey Director of the Division of Taxation in the Department of Treasury, the use tax due pursuant to the "Sales and Use Tax Act, " P.L. 1966, c. 30 (C.54:32B-1 et. seq.) on all their sales of tangible personal property delivered into the State of New Jersey. For purposes herein, "affiliate" shall mean any entity that : (a) directly, indirectly or constructively controls another entity; (b) is directly, indirectly, or constructively controlled by another entity; or (c) is subject to the control of a common entity. For purposes of the immediately preceeding sentence, an entity controls another entity if it owns, directly or indirectly, more than fifty percent (50%) of the Ownership interest in that entity.

§ 19.3.1 The parties intend that this Article 19 shall comply with the rules and regulations promulgated pursuant to the Contractor Use Tax Collection Legislation and shall be interpreted consistent therewith.

§ 19.4 Notwithstanding anything contained in the Agreement to the contrary, the Contractor hereby agrees to indemnify and hold the Owner harmless from and against any and all fines, taxes, penalties, interest, claims, losses. Costs, expenses, liabilities, or damages arising out of or in connection with the Contractor's failure to comply with the terms and condition of Sections 19.1 and 19.2 to the fullest extent permitted by law and public policy.



SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Purchase contracts.
5. Access to site.
6. Work restrictions.
7. Specification and drawing conventions. B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: New Ash Brook Golf Course Clubhouse

1. Project Location: 1210 Raritan Road, Scotch Plains, NJ

B. Owner: County of Union

C. Architect: Netta Architects

D. Project Manager: Cumming Construction Management

200 South Avenue East, Suite 302, Cranford, NJ 908-516-7017

1. Project Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor.

E. Project Web Site: Omitted

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. **General Construction:** Demolition of the existing multi-story masonry clubhouse and one-story masonry cart barn, and construction of an approximate 20,300 SF building consisting of Two (2) floors (no basement), in the building. Construction will consist of (but not be limited to) landscaping, pavement, earthwork, exterior improvements, utilities, concrete, masonry steel, moisture protection, doors/windows, finishes, equipment, conveying systems, plumbing, fire protection, HVAC, electrical, fire alarm, communication, and safety & security consistent with bid documents.

B. Type of Contract

1. Project will be constructed under a single prime contract.

1.5 WORK BY OWNER (in conjunction with Contractor)

A. General: If applicable, cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Contractor is responsible to coordinate their Work of this Contract, through the Construction Manager, with the preceding work to be performed by Owner.

1.6 CONTRACTS

A. General: Omitted

1.7 ACCESS TO AREAS

A. General: Contractor shall have access to the areas for construction during the time periods as shown on the approved logistics plan.

1. Golf Course Access: Access to the golf course must be kept clear and unrestricted at all times between March 1st and December 1st. The golf course will remain operational during the course of construction via a temporary clubhouse trailer to be put in place by owner. At no time should construction activity restrict access to the course and/or the temporary clubhouse.

B. Use of Area:

1. Operations are to be within contract limits identified on plans.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: As allowed Per Ordinances,

1. Weekend Hours: Per Township Ordinance and Subject to Review & Approval by Owner.
2. Early Morning / Late Night Hours: Per Ordinance and Subject to Review & Approval by Owner.
3. Hours for Utility Shutdowns: Per Ordinance and Subject to Review & Approval by Owner.

C. Shift Work (2nd & 3rd shifts)

1. N/A

D. Existing Utility Interruptions: N/A

E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Construction Manager not less than three (3) days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.
3. Contractor to comply with Local Ordinances.

F. Nonsmoking Building: Smoking is not permitted within the building site or building and within 25 feet of entrances, operable windows, or outdoor air intakes.

G. Controlled Substances: It shall be the Contractor’s responsibility to prevent illegal drug use on the Project. Use of illegal drugs or substances on the Project site by any employee of the Contractor or any subcontractor, shall subject the employee to permanent removal from the site. Persistent use of illegal drugs or substances by employees of the Contractor or any of its subcontractors, shall be default under the construction contract.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order. B. Types of allowances include the following:

1. Lump-sum allowances.
2. Contingency allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, insurance and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Construction Manager for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lowerpriced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Roofing.

1. Base Bid: Provide standing-seam metal roofing as specified in Division 07 Section "Standing-Seam Metal Roof Panels."

2. Alternate: In lieu of standing-seam metal roofing, provide asphalt shingle roofing as specified in Division 07 Section "Asphalt Shingles."

B. Alternate No. 2: Exterior Siding.

1. Base Bid: Provide cement board siding as specified in Division 07 Section "Composite Siding."
2. Alternate: In lieu of cement board siding, provide wood siding as specified in Division 06 Section "Exterior Finish Carpentry."

C. Alternate No. 3: Lightning Protection.

1. Base Bid: Provide lightning protection as specified in Division 26 Section.
2. Alternate: Eliminate lightning protection from the Project Scope

END OF SECTION 012300

SECTION 012500 – "OR EQUAL" SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the acceptance of "Or Equal" substitutions.

B. Related Requirements:

1. See Section 012100 "Allowances" for products selected under an allowance.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: See below
2. Documentation: Show compliance with all specified requirements for "Or Equal" substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples.
f. Certificates and qualification data.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with IBC 2006.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

4. Architect or his consultant will evaluate and render only one (1) decision on any “Or Equal” Substitution. Re-evaluation of any “Or Equal” Substitution will be paid for by the Contractor at a rate of $155.00 dollars an hour for reimbursement to the Architect.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. If a product or material requires testing to evidence that it is an equivalent, engage a qualified testing agency to perform compatibility tests recommended by Architect.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided for achieving LEED prerequisites and credits.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2. Additional Responsibilities: Contractor shall be responsible to compensate the Owner for Architect redesign and evaluation services, increased cost of other construction by Owner, and similar considerations due to Contractor’s requests for substitution.

B. “Or Equal” Substitutions: Architect will consider requests for substitution if received within 21 days after the Notice of Contract Award. Requests received after the 21 days will be rejected by the Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided for achieving LEED prerequisites and credits.
c. Substitution request is fully documented and properly submitted. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - COMPENSATION (Not used)

END OF SECTION 012500

PROJECT NAME: _____

PROJECT #: _____

CONTRACT NO. _____

SUBSTITUTION NO. _____

REQUEST FOR SUBSTITUTION / "OR EQUAL"

Submit a copy of this form for each requested substitution within 21 days after Notice of Contract Award. Fill in all blanks, check all boxes that apply and attach all necessary supporting data.

Specified Item: _____

Specification Section(s)/Paragraph(s): _____

Drawing Number(s): _____

Proposed Substitute: _____

(include, as applicable, manufacturer's name & address, trade name & model number of product and name of fabricator or supplier)

Reason for Proposed Substitution: _____

_____

_____

Net Change to Contract Sum: ☐ No Change ☐ Deduct $_____ ☐ Add $ _____

Change to Contract Time: ☐ No Change ☐ _____ Days ☐

The following required supporting documents are attached (Check all that apply):

☐ Complete Product Data

☐ Detailed Itemized comparison of all properties of proposed product vs. the specified product. All information required is the responsibility of the contractor.

☐ List of other projects on which proposed has been used, with project name, design professional's name and owner contact.

☐ List of maintenance services and replacement materials available.

☐ Statement of effect of substitution on construction schedule.

☐ Description of change that will be required in other work or products if substitute product is approved.

FOR SUBSTITUTION REQUEST

The undersigned testifies that he/she:

- Is submitting this substitution request within the limits set forth in the Contract Documents. ▪ Has investigated the proposed product and determined that it is equal or better than the specified product.
- Will provide the same warranty for the proposed product as for the specified product.
- Will coordinate installation and make other changes as required for the work to be complete in all respects, including: (a) redesign and (b) additional components and capacity required by other work affected by the change.
- Waives all claims for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.
- Will reimburse the Architect for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.

Contractor's Signature: _____

Typed or Printed Name: _____

Title: _____

Company: _____

Address: _____

Phone Number: _____

Owner Approval: _____ Date: _____

Construction Manager Approval: _____ Date: _____

If Applicable

Architects Approval: _____ Date: _____

Consulting Engineer Approval: _____ Date: _____

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications. B. Related Requirements:

1. Section 012500 "Or Equal" Substitution Procedures for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract Documents, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

C. Contractor Responsibilities: Contractor shall compensate the Architects and/or his consultants at a cost of $175.00 per hour for all re-designs. Contractor shall not be required to compensate the Architect and/or his consultants if a re-design is required because of a latent or changed condition.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.6 CHANGE ORDER PROCEDURES

A. Omitted

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on AIA Document G714/CMa-1992. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment for review & approval
3. Sub schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub schedules showing values coordinated with each phase of payment.
4. Sub schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub schedules showing values coordinated with each element.
5. Sub schedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide sub schedules showing values coordinated with the scope of each design services contract as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 CMa version.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest onehundredth percent, adjusted to total 100 percent.

        1) Labor.
        2) Materials.
        3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

a. Include separate line items under principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 CHANGES IN THE WORK

A. When a change in the Work includes a category or categories of Work both added to and deducted from the Contract, the total quantities of added Work and of deleted Work shall be determined separately for each category and the appropriate unit price or net cost of the Work shall be applied to the difference between the two total quantities.

B. Unit prices shall be inclusive of all costs and shall be applied to units of measure as defined in the Specifications for each category of Work.

C. For all extra Work performed by Contractor, the gross cost to the Owner shall include the net cost of the Work to the Contractor plus an allowance for overhead and profit (inclusive of Bond / Insurance) not to exceed 15% of the net cost.

D. For all extra Work performed by a Subcontractor, the gross cost to the Owner shall include the net cost of the Work to the Subcontractor plus an allowance for overhead and profit not to

exceed 5% of the net cost, plus the Contractor's overhead and profit (inclusive of Bond / Insurance) not to exceed 10% of the Subcontractor's cost.

E. Net cost of extra Work shall be the actual or pro-rated cost of:

1. Labor, including foreman, at the prevailing rate of wages, contributions and taxes.
2. Materials entering permanently into the Work, including delivery to the site.
3. The ownership or rental cost of construction equipment and expendable tools, pro-rated for the time necessary for the Work.
4. Power and consumable supplies for the operation of power equipment, pro-rated for the time necessary for the Work. Insurance and Bonds.
5. Contractor to provide detailed breakdown & back up for Items 1-3 when submitting their change order request.

F. Gross costs shall be net costs plus the allowances described above, such allowances being inclusive, of all cost of superintendence, supervision, engineering, overhead, profit, administrative and site office expenses and all other general expenses.

1.6 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Construction Manager monthly, date to be agreed with Owner. The period covered by each Application for Payment is one month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G732-2009 and AIA Document G703 CMa version as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed which is stored on-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.

14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
   5. AIA Document G706A, "Contractor's Affidavit of Release of Liens." 6. AIA Document G707, "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other firealarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: DWG, Version , operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and Portable Data File (PDF) format.

4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
b. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketch.

D. RFI Forms: RFI’s will be submitted through Construction Manager’s Project Management Web-based platform.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.

b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

H. Excessive RFI: Upon receipt of the Architects decision on the RFI, Architect’s response shall be deemed final. Excessive re-reviews of an RFI shall, at the discretion of the Architect, require the Contractor to compensate the Owner for the Architect’s Services at a rate of $155.00 dollars per hour to perform the re-review.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner, CM, and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner Architect, and their consultants; Construction Manager, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. LEED requirements.
    m. Preparation of record documents.
    n. Use of the premises.
    o. Work restrictions.
    p. Working hours.
    q. Owner's occupancy requirements.
    r. Responsibility for temporary facilities and controls.
    s. Procedures for moisture and mold control.
    t. Procedures for disruptions and shutdowns.
    u. Construction waste management and recycling.
    v. Parking availability.
    w. Office, work, and storage areas.
    x. Equipment deliveries and priorities.
    y. First aid.
    z. Security. aa. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following: a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. LEED requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility requirements.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   p. Compatibility of materials.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner, Construction Manager, and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including, but not limited to, all items in Section 017700 Closeout Procedures, and the following:
    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for completing LEED documentation.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for delivery of material samples, attic stock, and spare parts.
    g. Requirements for demonstration and training.
    h. Preparation of Contractor's punch list.
    i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    j. Submittal procedures.
    k. Coordination of separate contracts.
    l. Owner's partial occupancy requirements.
    m. Installation of Owner's furniture, fixtures, and equipment.
    n. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss

whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Status of LEED documentation.
6) Deliveries.
7) Off-site fabrication.
8) Access.
9) Site utilization.
10) Temporary facilities and controls.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at regular intervals as required. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float. E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float. F.

Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at monthly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including interim milestones.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Limitations of continued occupancies.

c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use of premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following: a. Subcontract awards.

b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following: a. Structural completion.

b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

9. Other Constraints: .

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.

2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using Microsoft Project 2013 or newer.

1. Utilize Microsoft Project 2013 or newer.

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice of Award.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, LEED documentation, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

    a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
    b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
   1. Contractor or subcontractor and the Work or activity.
   2. Description of activity.
   3. Main events of activity.
   4. Immediate preceding and succeeding activities.
   5. Early and late start dates.
   6. Early and late finish dates.
   7. Activity duration in workdays.
   8. Total float or slack time.
   9. Average size of workforce.
   10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

   1. Identification of activities that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   4. Changes in activity durations in workdays.
   5. Changes in the critical path.
   6. Changes in total float or slack time.
   7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

   1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
   2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
   3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
   4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

      a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
      b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report through Oracle’s Primavera Contract Management Program to record the following information concerning events at Project site:

   1. List of subcontractors at Project site.

2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.

2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue a hard copy of the schedule as well as an electronic file of the P6 schedule one week before each regularly scheduled progress meeting.
   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

   1. Post copies in Project meeting rooms and temporary field offices.
   2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Progress construction photographs.
3. Final completion construction photographs. B. Related Requirements:

1. Section 013300"Submittal Procedures" for submitting photographic documentation.
2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
3. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 PHOTOGRAPHS

A. Basis for Bids: Base number of construction photographs on average of 20 photographs per week over the duration of Project.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For photographer.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

C. Digital Photographs: Submit image files within three days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:
   a. Name of Project.

b. Name and contact information for photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

D. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.

1. Format: 8-by-10-inch smooth-surface matte prints on single-weight, commercial-grade photographic paper punched for standard three-ring binder.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information: a. Name of Project.

b. Name and contact information for photographer.
c. Name of Architect and Construction Manager.
d. Name of Contractor.
e. Date photograph was taken if not date stamped by camera.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

1.5 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.6 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

D. Preconstruction Photographs: Before commencement of excavation, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag excavation areas before taking construction photographs.
2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Construction Progress Photographs: Take 20 photographs monthly (hard copies and CD to be submitted), coinciding, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take 20 color photographs (hard copies and CD to be submitted) after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

1. Do not include date stamp.

H. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.

3. Circumstances that could require additional photographs include, but are not limited to, the following:

    a. Special events planned at Project site.
    b. Immediate follow-up when on-site events result in construction damage or losses.
    c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
    d. Substantial Completion of a major phase or component of the Work.
    e. Extra record photographs at time of final acceptance.
    f. Owner's request for special publicity photographs.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 21 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal review is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

    a. Architect or his consultant(s) will review a maximum of one (1) resubmittal. Additional re-submittal reviews will be paid for by the general contractor to the at a rate of $175.00 dollars an hour for reimbursement to the Architect or his consultant(s).
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Contractor signature indication that submittal is in conformance to the specifications.
3. Provide a space approximately [6 by 8 inches] on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
4. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.

5. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

6. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor. a. Transmittal Form for Paper Submittals: Use AIA Document G810.

b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Name and address of Architect.
6) Name of Construction Manager.
7) Name of Contractor.
8) Name of firm or entity that prepared submittal.
9) Names of subcontractor, manufacturer, and supplier.
10) Category and type of submittal.
11) Submittal purpose and description.
12) Specification Section number and title.
13) Specification paragraph number or drawing designation and generic name for each of multiple items.
14) Drawing number and detail references, as appropriate.
15) Indication of full or partial submittal.
16) Transmittal number, numbered consecutively.
17) Submittal and transmittal distribution record.
18) Remarks.
19) Signature of transmitter.

E. Electronic Submittals: N/A

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Action Submittals: Submit four (4) paper copies of each submittal unless otherwise indicated. Architect will return one (1) copy to Contractor.
2. Informational Submittals: Submit four (4) paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.

    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

    a. Four (4) paper copies of Product Data unless otherwise indicated. Architect will return one (1) copy to Contractor.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable: a. Identification of products.

    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

    a. Four (4) copies of each submittal. Architect will return one (1) copy to Contractor.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for qualitycontrol comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

    b. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01770 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. LEED Submittals: Comply with requirements specified in Section 018113 "Sustainable Design Requirements - LEED for New Construction and Major Renovations".

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other qualityassurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data : For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-forceresisting system quality-assurance plan prepared by Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will not furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders. Contractor to submit proposals from three qualified firms, the project manager will decide which firm to proceed with.
3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar qualitycontrol services required by the Contract Documents as a component of Contractor's qualitycontrol plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied

directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and upto-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
SD	State Department www.state.gov	(202) 647-4000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800)8722253
	Architectural Barriers Act (ABA)	(202)2720080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	
CFR	Code of Federal Regulations	(866)5121800
	Available from Government Printing Office	(202)5121800
	www.gpoaccess.gov/cfr/index.html	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215)6972664
	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	
	Available from Defense Standardization Program www.dsp.dla.mil	

	Available from General Services Administration	(202)6198925
	www.gsa.gov	
	Available from National Institute of Building Sciences	(202)2897800
	www.wbdg.org/ccb	
FTMS	Federal Test Method Standard (See FS)	
UFAS	Uniform Federal Accessibility Standards	(800)8722253
	Available from Access Board	(202)2720080
	www.access-board.gov	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel. Clear path from temporary clubhouse trailer (see bid set site plan) to golf course must be kept active at all times during golfing season as outlined in the project summary.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flamespread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

E. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Definition: Prefabricated, mobile units, or office space adjacent to Project Site with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Field Office: The Contractor shall provide in his Base Bid the cost to provide and maintain in good condition (1) one field office trailer for the exclusive use of the Construction Manager. The field office shall be ready no later than (30) thirty days after Notice to Proceed, and it is estimated that the field office will be required (2) two months after substantial completion.

C. The Construction Manager’s Field Office Trailer will be located in the parking lot (exact location in lot to be determined) across from the project site and shall be a weatherproof

construction, having a floor area of not less than 360 SF (10'x 36') and a ceiling height of 7 ½ feet, having two partitions and doors providing two rooms, one for an office and the other to hold meetings. The field office shall have (1) one clothes closet of ample size and all stairs shall have safety rails installed. The bathroom should be in good working order for the project duration and stocked with all lavatory supplies as needed for the project duration. The Contractor will be responsible to install and pay for all utilities for the trailer for the project duration and will be required to disconnect all utilities upon project completion. Doors and windows shall be equipped with adequate locks and all keys shall be given to the Construction Manager.

Provide the following items & equipment in the Construction Manager's Field Office as part of the Contractor's Base Bid:

a. Provide heating sufficient to maintain a minimum of 70 degrees F interior temperature during the winter. Provide air conditioning sufficient to maintain a maximum of 75 degrees F interior temperature during the summer.
b. Provide coffee machine with coffee service for project duration.
c. Provide water cooler with bottled water service for project duration.
d. Provide small refrigerator
e. Provide weekly Cleaning Services of Trailer
f. Provide the following new or reconditioned furnishings for the Construction Manager's exclusive use:
    1. (2) Two 3' x 6' metal desks
    2. (2) Two high-back swivel chair and (2) side chairs
    3. (1) Drafting table and (1) chair for standard size plans
    4. (1) conference table and chairs to accommodate 12 persons
    5. (1) mobile plan rack with twelve 30" sticks
    6. (1) One fire resistant 36" wide legal 4 drawer lateral file cabinets with locks and hanging file folders.
    7. One 36"x48" commercial grade melamine dry-erase board and a four (4) pack of assorted color dry-erase markers.
    8. One metal bookshelf with 4 shelves (min of 20 l.f.)
    9. (1) One First Aid kit.
    10. (2) Two trash receptacles and (2) two display boards.
    11. Fire Extinguishers as required.
    12. Internet Service: Provide DSL, cable modem or broadband service in each field office with a static I.P. address

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01770 "Closeout Procedures".

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 01011 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION (All temp services paid for by Contractor) A.

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities:

1. Toilets: Contractor to provide the required amount of temporary toilets for the workforce.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.

b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

J. Telephone Service: Provide as listed in 2.2 Temporary Facilities

K. It is an absolute requirement of the Contractor to utilize the Construction Manager's Project Management web-based platform through the entire duration of the project.

L. Contractor to provide various electrical equipment & office supplies for the exclusive use of the Construction Manager. These items are to be provided through the Construction Management Office Supplies & Equipment. This includes, but is not limited to:

(2) Laptop computers approved by CM.
(2) Laptop Bags
(1) Xerox Network Capable / Commercial Color Copier / Printer (8 ½ x 11, 8 ½ x 14, 11 x 17) Automatic Feeder, Scanner, Fax, Stapler & Stand (Floor Model)
(1) Wireless Router

The Contractor is required to utilize the Construction Manager's Project Management Software through the construction manager license to be provided by the Owner.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
b. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
c. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
d. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

a. Protect existing site improvements to remain including curbs, pavement, and utilities.
b. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: No on-site or off- site parking will be provided. Employees of the Contractor and Subcontractors are responsible for their own parking.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

a. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
b. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

a. Identification Signs: Provide Project identification signs as indicated on Drawings.
b. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

c. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01730 "Execution." U. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

V. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

W. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Section "Site Clearing."

D. Storm water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses. B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 015639 - TREE AND VEGETATION PROTECTION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work includes the protection of existing trees and vegetation not identified for removal on the Plans or as reasonably inferred to complete the work noted on the plans. Work under this item includes construction and maintenance of tree protection fencing, tree trunk protection and root zone protection to protect the root zones of existing trees and other plantings, and construction and maintenance of tree trunk protection. Any damage to existing trees during construction shall be the Contractor's responsibility. The Contractor shall perform remedial work to damaged trees at the Contractor's expense; this work shall meet all of the Engineer's requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Contractor is responsible for the protection of all trees and vegetation to remain as work is completed. Contractor shall contact the Engineer at least 48 hours prior to the start of mobilization to discuss problems with overhanging branches and vegetation that might be damaged in spite of his/her exercising care during construction.

B. Prepatory pruning work shall be performed only when directed by the Engineer. This work shall be performed in accordance with ANSI A300 standards and by a qualified, licensed and insured arborist or certified tree expert.

C. Tree Trunk Protection

1. Trees shall receive tree trunk protection as indicated on the plans. The Contractor shall provide 5-inch by 8-inch by 8-foot boards, banded continuously around each trunk to prevent scarring of trees shown on the plans or designated by the Landscape Architect. Burlap shall be placed against the tree trunk prior to installing boards. For multi-stem trees, saplings, and shrubs to be protected within the area of construction, temporary fencing may be used for trunk protection.

2. The Contractor shall repair or replace any and all damaged plant material determined by a Certified Arborist, whose cost is paid for by the Contractor, to any existing or newly installed plant material at its own expense. Unnecessary damage to ground cover or turf shall be repaired or replaced as specified for restoration of similar areas within the plans, or as directed by the Certified Arborist.

D. Root Zone Protection

1. During the entire construction period all reasonable efforts shall be made to protect from damage those trees and their root system designated to remain. Around the trees to be protected, the Contractor shall avoid excessive excavation or compaction and damage during the removal of trees and shrubs designated to be removed. All plant material designated to be saved, or outside of the limits of construction,

shall be protected during subsequent construction work. Work under these items will include construction and maintenance of tree protection fencing to protect the root zones of existing trees and other plantings, construction and maintenance of tree trunk protection.

2. The Contractor shall take extreme care to protect the root systems of the existing trees. Bulk material, equipment, scaffold footings, or vehicles shall not be stockpiled or parked within the critical root zone (CRZ) of any tree, or within ten (10) feet of the trunk (whichever is greater). This is done to minimize surface and subsurface root and soil compaction. This applies to all CRZs within or outside the project limit line. Every inch of DBH (diameter breast height) of the tree represents on required radial foot of tree protection.

3. **If any machinery is operating within the CRZ the affected area shall be covered with mulch to a depth of at least twelve (12) inches and covered with plywood or metal plates to distribute weight in order to protect roots from damage caused by heavy equipment. Such covering shall be maintained during the course of construction and removed by hand or as specified by the Engineer with associated photos reported accordingly. Heat sources, flames, ignition sources, and smoking are prohibited within the CRZ and within the above mentioned mulched area.**

4. If stockpiling occurs within the CRZ, a stop work order shall be issued immediately. Additional violations may be issued and may require remedial work to remain within the Engineer's prescribed timeframe. Work shall not re-commence until all stockpiled material is removed from the CRZ and tree remediation is satisfied.

5. Roots over one (1) inch in diameter shall not be cut without the written permission of the Engineer.

6. To best protect tree roots, the Contractor shall exercise extreme care in removing concrete or asphalt within the CRZ of existing trees. Pavement shall be lifted rather than dragged. Any excavation within the CRZ, or elsewhere on site, shall be done by hand or pneumatic excavation and in the presence of the Engineer with associated photos and report.

7. The Excavation area within the CRZ shall be backfilled immediately and / or roots shall be kept constantly moist with burlap covered with white plastic and checked a minimum of two (2) times a day, once in the morning and once in the afternoon, for a maximum of forty-eight (48) hours, until backfill is complete as directed by the Engineer. If directed, soaker hoses shall be installed to facilitate property moist conditions. No pooling of water of continuous running water shall occur within the drip line of existing trees or within the tree protection zones other than that during the irrigation process.

8. If roots are to be exposed for a period greater than forty-eight (48) hours, the exposed area shall be covered with at least six (6) inches of mulch and maintained moist during the course of construction until the area can be properly backfilled. Photos to be taken periodically and reported to the Engineer.

9. No runoff or spillage of noxious materials while mixing, placing, or storing construction material shall occur within the tree pit or CRZ. No ponding, eroding, or excessive wetting caused by dewatering operations shall occur within tree pit or critical root zone.

10. All existing trees being protected on proposed jobsite are to be watered 20 gallons once weekly between March 1 and October 30 accordingly to best preserve existing trees during demolition and construction processes. Watering shall be done in a manner that there should not be standing water around the tree.

E. Tree Protection Fence

1. Tree protection fence shall be installed around each tree or tree grouping, shrubs and other vegetation within ten (10) feet of the limit of disturbance. The tree protection shall be installed prior to the actual construction start and maintained for the duration of the project.

2. Tree protection fencing shall be constructed of orange snow fencing securely fastened to fence posts spaced a maximum of eight (8) feet on center. Post shall be six feet in length with two feet set into the ground and four feet extending above the ground. The fencing shall be attached to the post with a minimum of four nylon-locking ties evenly placed at each post.

3. Do not store construction material, debris or excavated material inside tree protection zones. Do not permit vehicles or feet traffic within tree protection zones; prevent soil compaction over root systems.

4. The Contractor shall exercise care to assure tree trunks, branches, and roots are not damaged by its operation.

F. Required repair and replacements

1. Any damage to tree branches or tree trunks to a tree to remain of any size by the Contractor shall require the installation of shade trees at 2”- 2.5” caliper to equal the caliper / diameter at breast height of damaged tree. Tree installation locations to be as identified by the Landscape Architect. Damage shall be defined as any disturbance to the existing condition not identified in the initial site walk-thru at the site kick-off meeting.

2. Promptly repair trees damaged by construction operations within 24 hours. Contractor shall treat damaged trunks, limbs, and roots according to arborist's written instructions. All pruning activities shall conform to the National Arborist Association Class II (Standard Pruning) and Class III (Hazard Pruning) standards and American National Standard Institute (ANSI) A300 standards. Contractor shall pay for arborist consultation and report and the tree repair. The repair of said tree(s) still requires the installation of the seven (7) shade trees noted above.

3. Remove and replace trees indicated to remain that die or are damaged during construction operations that Engineer determines are incapable of restoring to normal growth pattern. Provide new trees of same size and species as those being replaced; plant and maintain as specified in “Landscaping.”

4. Provide new shrubs of equal size and of a species selected by Engineer when vegetation other than trees are damaged. Quantity of replacement vegetation shall be calculated using a 1:1 ratio of height/spread depending upon the vegetation type, i.e. two – four foot height shrubs would be required to replace one eight foot height shrub. Plant and maintain new shrubs as specified in "Landscaping."

END OF SECTION 015639

SECTION 015640 - TREE ROOT PRUNING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work includes pruning existing tree roots prior to excavation operations and tree removal operations.

PART 2- PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Before any trenching or excavation of pavements or removal of trees indicated for removal, root pruning shall occur along the entire length of excavation as indicated on the plans. Tree roots shall be cut with appropriate root pruning equipment to a minimum of 18” deep.

END OF SECTION 015640

SECTION 015953 – SAFETY & HEALTH

PART 1 - GENERAL

1.1 COMPLIANCE WITH REGULATIONS

A. Contractor Responsibility: The Contractor shall assume full responsibility and liability for compliance with all applicable codes, standards and regulations pertaining to the health and safety of personnel during execution of the Work, and shall hold the Owner harmless for any action on the Contractor's part, including employees or subcontractors, that results in illness, injury or death. All Contractors shall comply with Occupational Safety and Health Administration (OSHA) requirements. The Contractor shall provide a copy of their Corporate Safety & Health Plan for record.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION OF PERSONNEL

A. The Contract shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.

B. Wherever practical, the work area shall be fenced, barricaded or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area.

3.2 ENVIRONMENTAL PROTECTION

A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.

END OF SECTION - 015953

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; and special warranties. B. Related Requirements:

1. Section 012100 "Allowances" for products selected under an allowance.
2. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of the date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected. C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

END OF SECTION 016000

SECTION 017123.13 – CONSTRUCTION LAYOUT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Under this item, the Contractor shall provide all work required in connection with the layout for construction of the project, using the control points and data furnished by the Project Surveyor for the existing conditions and data furnished by the Engineer for the proposed conditions.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 METHOD OF STAKEOUT

A. The Contractor shall submit all necessary computations to establish the exact position of all the work from the control points furnished by the Project Surveyor, along with construction grade sheets, prepared by a licensed land surveyor, to the Engineer for approval prior to the start of construction.

B. The Contractor shall maintain the line and grade stakes furnished by the Engineer for his use in staking out the work. If such control points are damaged, lost, displaced or removed, they shall be reset or replaced at a charge to the Contractor for the actual cost of the work.

C. The Contractor shall be responsible for maintaining the points he has established. Any error or apparent discrepancies found in the plans or specifications shall be called to the Engineer's attention in writing for interpretation prior to proceeding with the work.

END OF SECTION 017123.13

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work. B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.

d. Fire-suppression systems.

e. Mechanical systems piping and ducts.
f. Control systems.
g. Communication systems.
h. Fire-detection and -alarm systems.
i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Section 018113.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 018113 "Sustainable Design Requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and

duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

4. Maintain minimum headroom clearance of 96 inches in occupied spaces and in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels in excess of local city ordinances.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces. E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls" and Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity. END

OF SECTION 017300

SECTION 017329 – SAWCUTTING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Sawcutting shall consist of the cutting of sidewalks, concrete, driveways, curbs and pavements of whatever nature in order to maintain a clean finished look when matching into existing areas of concrete and asphalt where directed by the Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Concrete or bituminous surfaces shall be cut through the entire pavement thickness in a straight neat line using diamond-tipped blades with water, as approved by the Engineer.

***PLEASE NOTE THAT JACK-HAMMERED OR BROKEN EDGES WILL NOT BE ACCEPTED UNDER ANY CIRCUMSTANCES.**

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous construction waste.
2. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1. Construction Waste:

a. Masonry and CMU.
b. Lumber.

c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Insulation.
g. Carpet and pad.
h. Gypsum board.
i. Piping.
j. Electrical conduit.
k. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Polystyrene packaging.
5) Wood crates. 6) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste recycled, both estimated and actual in tons.
5. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEEDAccredited Professional, certified by the USGBC, as waste management coordinator. Waste management coordinator may also serve as LEED coordinator.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from recycled materials.

5. Savings in hauling and tipping fees by donating materials.
6. Savings in hauling and tipping fees that are avoided.

7. Handling and transportation costs. Include cost of collection containers for each type of waste.
8. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

A. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

B. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners. C. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

3.4 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood. B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.6 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-3 for construction waste reduction work plan.

C. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

D. Form CWM-7 for construction waste

END OF SECTION 017419

SECTION 017426 – FINAL CLEANUP/SITE RESTORATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Under this item, the Contractor shall restore the work site and access area to its original condition including, but not limited to, installation of both temporary and permanent striping, relocate existing monuments and setting them on six-inch-thick concrete pads, resetting of signs, benches, hole markers, bollards, topsoil and hydro-seeding, fences, hedges, guide rail, re-grading, repair of pavement and sidewalks, roadways, curbs, cleaning and removal of stockpiles and equipment, any underground electrical conduit servicing the site and all else not specifically covered elsewhere in these specifications. All on-site catch basins and pipes along the access driveway shall be cleaned of all debris and televised. The downstream sanitary sewer main shall be cleaned and televised to the next downstream manhole. All soil erosion and traffic control devices along the perimeter of the project site shall be removed and pavement restored within its vicinity.

PART 2 – PRODUCTS

2.1 MATERIALS

A. NJDOT Standard Specifications.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. The site shall be returned to its original condition. Fences shall be reinstalled with posts in concrete footings in accordance with specifications herein. Hedges shall be reinstalled where possible or replaced in-kind and in the same locations as existing. Lawn areas disturbed by Contractor's activities shall be re-graded, and hydro-seeded and mulched as per section 329010. Temporary safety fence shall be removed and the holes repaired. All pavement and sidewalk where construction fence was previously located shall be repaired. Cleaning shall include hand-brooming of sidewalk and pavement areas. Adjacent structures shall be cleaned, as necessary, by a method approved by the Engineer. Sidewalks shall be replaced with four-inch-thick concrete walk in evenly-sized slabs, sawcut where necessary, only to the extent damaged by the construction. Both concrete and bituminous concrete shall be repaired as specified by the Engineer, sawcut where necessary, only to the extent damaged by the construction. All construction equipment and stockpiles shall be removed from the site and disposed of by the Contractor in a suitable and timely manner.

END OF SECTION 017426

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. The Maintenance Bond and all Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. C. Related Requirements:

1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017300 "Execution" for progress cleaning of Project site.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit sustainable design submittals required in Section 018113 "Sustainable Design Requirements - LEED for New Construction and Major Renovations" and in individual Sections.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01790 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01290 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. MS Excel electronic file. Architect will return annotated file.
    b. Three paper copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

    1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01500 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." And Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
   1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
   2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

      a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

   3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
   4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals. B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit Operations and Maintenance Manuals, Operations Manuals, Product Maintenance Manuals, System & Equipment Manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Crossreference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.

5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties. D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates. B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.

9. Complete nomenclature and number of replacement parts. C. Operating Procedures:

Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and

flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 01783 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:
1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:
1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous recordkeeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.

k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file and paper copy.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file and paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator and instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.

b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.
f. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01400 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.

5. Adjustments: Include the following:

   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:

   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:

   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data." B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to.mp4 format file type, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Pre-produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

TABLE OF CONTENTS

SECTION 008000 - SUPPLEMENTARY GENERAL CONDITIONS AND SCHEDULE FOR ASBESTOS ABATEMENT WORK

PART 1 - GENERAL

1.1 DEFINITIONS

A. The Asbestos Abatement Work shall be defined as that Work which encompasses the specified pre-demolition and asbestos abatement, all preparatory and cleaning activities associated with or otherwise motivated by the activities, and the handling, transportation, and disposal of demolition debris and of asbestos-containing and asbestos-contaminated materials. The term "Work" may be utilized herein, and in the Technical Specifications, to refer to Demolition and/or Asbestos Abatement Work.

B. The Restoration Work shall be defined as that Work which is performed to restore the areas where the Asbestos Removal Work was performed and that were otherwise utilized by the Contractor or a Subcontractor, to original conditions less the value of the Work specified, as well as specified restoration activities, including temporary weatherproofing.

C. In case of a discrepancy between the technical specifications and any other sections of the specification document, the more stringent requirement shall govern.

1.2 OWNER RIGHT TO CARRY OUT THE WORK

A. If the Contractor neglects to carry out the activities related to the Demolition and Asbestos Abatement Work which would cause endangerment to public health or continual non-compliance with regulatory requirements, the Owner may, in accordance with the General Conditions, or prejudice to other remedies the Owner may have, act to correct such deficiencies on an immediate basis.

B. In the above cases an appropriate Change Order or Construction Change Directive shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Asbestos Abatement Consultant's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

1.3 OWNER EXPENSE BACKCHARGES

A. The Contractor shall bear the cost of analysis of all clearance samples that indicate non-compliance with the promulgated clearance air sample standard appropriate to each subject work area and/or specified enclosure. The backcharge cost shall not exceed $20.00 for each sample analyzed utilizing Phase Contrast Microscopy (PCM) or $150.00 for each sample analyzed Utilizing Transmission Electron Microscopy (TEM), and $120.00 per hour for Asbestos Safety Technician straight time and $180.00 per hour for Asbestos Safety Technician overtime for conducting the sampling.

B. The Contractor shall bear the cost of the Owner's and the Owner's consultant's response to release of contamination during the Asbestos Abatement Work. The backcharge cost for the Owner's asbestos management consultant shall not exceed $120.00 per hour for Asbestos Safety Technician straight time and $180.00 per hour for Asbestos Safety Technician overtime, and those rates listed in Subparagraph 1.3A for air sample analysis.

C. The backcharges shall be processed as deduct change orders to the Contractor's account.

1.4 INSURANCE

A. In addition to the Insurance requirements in the General Conditions, the Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project site is located, such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by anyone directly employed by any of them, or by anyone form whose acts any of them may be liable.

Contractor's asbestos abatement liability insurance in the occurrence from, $1,000,000.00 per occurrence, $1,000,000.00 aggregate.

B. The existence of the above insurance shall in no way relieve the Contractor or any Subcontractor or sub-Subcontractor of any responsibility for which they are liable in excess of the amount recoverable under the insurance provided above.

C. Any increase of limits of liability of any type of insurance not described above that any Subcontractor may require for its own protection or on account of statute, shall be its own responsibility and at its own expense. Any policy covering any Subcontractor's own equipment against loss by physical damage shall include an endorsement providing that the underwriters waive their right of subrogation against the Owner, other Subcontractors or sub-Subcontractors (or replacement or renewal thereof with respect to the Project).

D. All insurance required by these Supplementary General Conditions or any other insurance required by the Contract Documents shall be provided by insurers acceptable to the Owner.

E. All certificates of insurance provided shall the Owner, Netta Architects, LLC and T&M Associates, Inc. each as an "Additional Insured".

1.5 SCHEDULING REQUIREMENTS AND NOTIFICATION FEES

A. Commence with on-site operations, specifically the Asbestos Abatement Work specified, within 10 business days after issuance of the Owner's initial Notice-to-Proceed.

B. Complete the Asbestos Abatement Work specified within seven (7) business days of the project start (first day of mobilization). The seventh (7^{th}) business day of the project, counting the day of the project start, is defined as the "Asbestos Abatement Deadline".

C. Post all fees required by the New Jersey Department of Labor and Workforce Development in relation to the filing of asbestos abatement notices and amendments. The Owner shall not be responsible for notice re-filing fees incurred by the Contractor for any reason.

END OF SECTION 008000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Roofing.

1. Base Bid: Provide standing-seam metal roofing as specified in Division 07 Section "Standing-Seam Metal Roof Panels."

2. Alternate: In lieu of standing-seam metal roofing, provide asphalt shingle roofing as specified in Division 07 Section "Asphalt Shingles."

B. Alternate No. 2: Exterior Siding.

1. Base Bid: Provide cement board siding as specified in Division 07 Section "Composite Siding."
2. Alternate: In lieu of cement board siding, provide wood siding as specified in Division 07 Section "Exterior Finish Carpentry."

C. Alternate No. 3: Lightning Protection.

1. Base Bid: Provide lightning protection as specified in Division 26 Section.
2. Alternate: Eliminate lightning protection from the Project Scope

END OF SECTION 012300

SECTION 023219 – TEST PITS (IF AND WHERE DIRECTED)

PART 1 – GENERAL

1.1 DESCIPRTION

A. Test pits shall consist of the furnishing or all materials, labor, equipment necessary for the performance of all work to properly perform test pits in locations, if and where directed by the Engineer.

B. A total of five (5) test pits, approximately 6-feet by 6-feet, dug to a max depth of 15 feet shall be provided, if and where directed by the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Borrow material required for backfill of test pits shall conform to Section 204 of the NJDOT Standard Specifications. The Contractor shall provide the Engineer with certification attesting that said material is free of contaminants and suitable for this application. The soil shall be smooth, soft and free of depressions, clods, mounds, stones, or other debris as approved by the Engineer.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Test pits shall be excavated as directed by the engineer.

B. When backfilling the test pit, the soil shall be placed uniformly in layers not to exceed twelve (12) inches loose thickness. Each layer shall be compacted to 95% density in accordance with Section 204 of the NJDOT Standard Specifications.

C. The Contractor shall make provisions to implement approved dust control measures while performing this work as not to impact surrounding residences. Should the Contractor fail to implement these measures, he will be responsible to power-wash all structures, at no additional cost to the Owner.

END OF SECTION 023219

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary construction, protection facilities, and environmental-protection measures for building demolition operations.
2. Division 22 Sections for demolishing or relocating site plumbing items.
3. Division 26 Sections for demolishing or relocating site electrical items.
4. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

A. Demolish: Completely remove and legally dispose of off-site.

B. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

C. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to building demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

1.7 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.

2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

    a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

E. On-site storage or sale of removed items or materials is not permitted.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Division 31 Section "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

C. Existing Utilities: Refer to Divisions 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

E. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

    a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least three hours after flame cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site. See Division 01 Section "Construction Waste Management and Disposal" for recycling and disposal of demolition waste.

B. Do not burn demolished materials.

3.9 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 024116

SECTION 025613 - UNIVERSAL WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Read this Section as part of the overall contract documents.

1.2 SCOPE OF UNIVERSAL WASTE MANAGEMENT WORK

A. Work required by this section includes removal, handling and disposal/recycling of all Universal Wastes to include but not be limited to: mercury-containing fluorescent light tubes, PCB-containing light fixture ballasts switches, transformers, and oils/varnishes impacted by the renovations specified. The Contractor is responsible to furnish all labor, materials, facilities, equipment, services, permits and agreements necessary to perform the work required for removal of PCB-containing ballasts, mercury-containing light tubes and mercury-containing thermostat devices in accordance with these specifications, and all local, state and federal regulations; (40 CRF 761, Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce and Use Prohibitions); (49 CRF 178, Shipping Container Specifications).

B. For the purpose of this project, all ballasts which do not have the term “No PCB’s” printed on the label must be assumed to be PCB-containing and be removed and disposed of as such. Ballasts which have the term “No PCB’s” printed on the label may be disposed of as construction and demolition waste. Intact, non-leaking PCB containing ballasts (small capacitor) may be disposed of as municipal solid waste. It is recommended that mercury florescent bulbs and mercury switch items shall be recycled, as applicable, as opposed to being treated as a universal waste items per EPA disposal requirements as outlined in Part 6.

C. The Scope of Work includes the removal, containerization and disposal/recycling of the following elements from the existing Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road, Scotch Palins, Union County, New Jersey:

Brook Golf Course Clubhouse

TYPE OF MATERIAL/EQUIPMENT	LOCATION	APPROX. AMOUNT
Suspected (likely) PCB-containing light ballasts	Throughout the subject building structure	46 ballasts (estimated)
Fluorescent light tubes	Throughout the subject building structure	122 light tubes (estimated)
Compact Fluorescent light bulbs	Throughout the subject building structure	87 light bulbs (estimated)
Suspected Mercury-containing thermostats	Throughout the subject building structure	2 thermostats

Golf Cart Garage

TYPE OF MATERIAL/EQUIPMENT	LOCATION	APPROX. AMOUNT
Suspected (likely) PCB-containing light ballasts	Throughout the subject building structure	12 ballasts
Fluorescent light tubes	Throughout the subject building structure	24 light tubes

D. The Contractor shall be responsible to verify all material quantities and to determine job site conditions.

E. Provide copies of all manifests and/or recycling data to the Owner at the completion of the work.

PART 2 – PRODUCTS

A. ENVIRONMENTAL REQUIREMENTS

1. Use special clothing, including but not limited to: disposable gloves (polyethylene) and eye protection.
2. Comply with all applicable local, state, and federal requirements.

PART 3 - EXECUTION

3.1. WORK OPERATIONS

A. Ensure that work operations or processes involving PCB ballasts, PCB-contaminated materials and mercury are conducted in accordance with 40 CRF 761 and the applicable requirements of this section, including but not limited to:

B. Obtaining advance arrangements of recycling / disposal sites.

C. Notifying Owner or authorized representative prior to commencing the operation.

D. Reporting leaks and spills to the Owner or authorized representative.

E. Cleaning up spills.

F. Inspecting waste containers for leaks and forwarding copies of inspection reports to the Owner or authorized representative.

G. Maintaining inspection, inventory and spill records.

H. Recover and properly handle/dispose of all fluids and/or oils contained within any transformer. Assume any such fluid to be PCB containing.

3.2 SPILL/CLEANUP REQUIREMENTS

A. Immediately report to the Owner any mercury spills / leaks.

B. Rope off area around edges of leak or spill and post caution signs at the area.

C. Initiate cleanup of spills as soon as possible. Mop up any liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid waste.

D. Document the cleanup with records of decontamination in accordance with 40 CRF 761, Section 125, Requirements for PCB Spill Cleanup. Provide certification of decontamination.

3.3 STORAGE/LABELING OF CONTAINERS

A. Store materials in DOT Specification 5, 5B or 17C containers with removable heads – 49 CFR 178. Boxes shall be suitable for fluorescent light tubes. Label containers with the following:

B. Date the item was placed in storage and the name of the cognizant activity and building.

C. Affix caution labels to all universal waste containers.

3.4 IDENTIFICATION NUMBER

A. Identification Number – Federal regulations require that generators, transporters, commercial storers and disposers of regulated hazardous waste possess U.S. EPA identification numbers. The Contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste Manifest (EPA form 8700-22). If not, the Contractor shall advise the activity that it must file and obtain an identification number with EPA prior to commencement of removal work. (Not applicable to item listed in 6.01).

3.5 TRANSPORTER CERTIFICATION/CERTIFICATE OF DISPOSAL

A. Comply with disposal requirements and procedures as outlined in 40 CFR.

B. Certificate for the waste materials disposed of / recycled shall include:

C. The identity of the disposal facility, by name, address and EPA identification number.

D. The identity of the universal waste affected by the Certificate of Disposal including reference to the manifest number for shipment.

E. A statement certifying the fact of disposal / recycling of the identified universal waste, including the dates of disposal and identifying the disposal process used.

END OF SECTION 026513

SECTION 028213 - ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 ABATEMENT: This section covers the abatement of potential hazards relating to materials previously determined to be asbestos-containing materials (ACMs) pursuant to applicable regulations associated with the structures described in these specifications.

1.2 DESCRIPTION OF WORK

A. Work: This section details all areas where Asbestos Abatement Work is to be performed and lists areas requiring special protection during the Asbestos Abatement Work. Furnish all labor, materials, services, training, insurance, and equipment as needed to complete removal of asbestos-containing and asbestos-contaminated materials located as indicated below. Follow all Federal, State and local ordinances, regulations and rules pertaining to asbestos, including its storage, transportation, and disposal.

1. Work Area: The Work area includes the following:

- The existing Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road in Scotch Plains, Union County, New Jersey.

2. Removal: Remove the following asbestos-containing materials:

Note: sf = square feet; lf = linear feet

Ash Brook Golf Course Clubhouse

TYPE OF ACM	LOCATION	APPROXIMATE AMOUNT
Brown composite flooring material	First Floor; Managers Office (below carpeting)	750 sf
	First Floor; Hallway outside Manager's Office (below carpeting)	60 sf
	First Floor; Large Open Area (below carpet and tan 9"x9" floor tile)	2,100 sf
Tan 9"x9" floor tile and associated black asphaltic mastic	First Floor; Large Open Area Kitchen Counter area	420 sf
	First Floor; Kitchen	225 sf
White cementitious window caulking compound	Basement; associated with three (3) Rear Windows	Not Quantified (associated with three (3) 2'x4' window assemblies)

3. The "Approximate Amount(s)" of ACM listed in Paragraph 1.2.A.(2) above are merely to provide a general and relative frame of reference. No attempt has been made to quantify the exact amount of ACM in the above mentioned locations. The Contractor is expected to have acquainted itself with the spaces involved, and to have investigated the location and amount of all identified materials. The Approximate Amounts shall not in any way be construed or applied so as to limit the Contractor's obligation to remove and dispose

of, or otherwise treat as specified, all ACM so identified, nor to form the basis for any change of the Contract Sum or Time.

4. It is the Contractor's sole responsibility to arrange for the Asbestos Abatement Work scope to be completed in an expeditious and cost effective manner. A critical consideration is the definition of the work to be sufficient to allow for all Asbestos Abatement Work for a given work area or phase to be completed as part of one mobilization. The Owner shall not be held responsible for delays and duplicative costs associated with the possible eventuality that the Contractor needs to arrange for some Asbestos Abatement Work to be completed at a time following the initial Asbestos Abatement Work due to the Contractor's failure to properly define and execute the Asbestos Abatement Work as part of that first mobilization. Rather, the Contractor shall bear the costs incurred by the Owner for the Owner to arrange for its consultants to participate in arrangement and monitoring of Asbestos Abatement Work conducted to remedy improper initial definition of the Asbestos Abatement Work Scope.

B. Sequencing/Scheduling

1. Abatement times - All asbestos abatement activities shall be performed between the hours of 7:00 am and 5:00 pm, Monday through Friday, except in cases of emergency.

2. Complete all Asbestos Abatement Work prior to commencing with any building demolition activities.

3. Complete the Asbestos Abatement Work over one continuous seven (7) business day period scheduled specifically within the overall time period of the contract. (Also see Section 00800).

4. Complete all Asbestos Abatement Work scheduled for the building's interior prior to beginning any Asbestos Abatement Work scheduled for the building's exterior.

5. Weekend and overtime work is not expected on this Project and will require special notification. Should the Contractor wish to work outside the hours of 7:00 am through 5:00 pm, Monday through Friday, or at any time on a Saturday, Sunday, or legal holiday, it shall notify the Owner and the ASCM at least 24 hours in advance, except in cases of emergency. Weekend, holiday, off-hour, and extended work hours shall be subject to the Owner's prior approval.

C. Occupancy

As the subject building is scheduled for complete demolition following this Asbestos Abatement Work with no intervening building occupancy, this project is not within the regulatory scope of the New Jersey Asbestos Hazard Abatement Subcode (N.J.A.C. 5:23-8, the "Subcode).

1.3 DOCUMENTS

The current issue of each document incorporated by reference herein shall govern. Where conflict among requirements or with the specification exists, the more stringent requirements shall apply.

A. OSHA regulations Provide special attention the following:

1. CFR 1910 (general industry).
2. CFR 1910.134 (respiratory protection)
3. CFR 1910.141 (sanitation)
4. CFR 1910.300-399 (electrical)
5. CFR 1910.1001 (asbestos)
6. CFR 1910.1200 (hard communication)
7. CFR 1926 (construction safety)
8. CFR 1926.52 (noise)

9. CFR 1926.62 (lead)
10. CFR 1926.1101 (asbestos)
11. CFR 1926.59 (hazard communication)
12. CFR 1926.40-449 (electrical)
13. CFR 1926.450-452 (ladders and scaffolding)

B. EPA regulations Provide special attention to the following:

1. NESHAP Asbestos National Emission Standards for Hazardous Air Pollutants. 40 CFR 61, Subparts A (General Provisions, Sections 01-10) and M (Asbestos, Sections 140-157).

C. DOT regulations Provide special attention to the Hazardous Materials Regulations, 49 CFR 171-180, in particular:

1. CFR 171.14(b)(4) (placarding)
2. CFR 172.300-308, 324 (marking)
3. CFR 174.400, 466 (labeling)
4. CFR 172.500, 504, 560 (placarding)

D. Other Standards

1. American National Standards Institute

a. ANSI Standard Z9.2 Fundamentals Governing the Design and Operation of Local Exhaust Systems.
b. ANSI Standard A40.8 National Plumbing Code.

2. National Fire Protection Association
3. NFPA 70 National Electrical Code
4. NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces.

E. New Jersey Regulations Provide special attention to the following:

1. N.J.A.C. 12:120 and N.J.A.C. 8:60 (licensing)
2. N.J.A.C. 7:26-1 et.seq. (waste transport)

1.4 DEFINITIONS

1. The definitions utilized in this Section of these Specifications are verbatim with those of the New Jersey Asbestos Hazard Abatement Subcode of the New Jersey Uniform Construction Code, otherwise referred to as "Subchapter 8" or the "Subcode" (N.J.A.C. 5:23-8). Note: The Subcode is not applicable to this work. The Subcode is referenced here for use of its definitions and terms, and later for certain sections of the Subcode adopted by specification.

1.5 SUBMITTALS - Approval by the Owner of the following submittals is required before initiation of any work of this section.

A. Work schedule, identifying firm start and end dates, the hours to be worked on a daily basis, and the Contractor's plans for complete the Work, including:

1. Sequencing - Sequencing of Asbestos Abatement Work.
2. Shifts - Length and projected times of day of work shifts.
3. Interfacing - Interface of trades involved in the work.

4. Special procedures - A detailed description of any proposed methods of special asbestos abatement procedures, such as glovebag work, mechanical flooring removal, etc., where used. Submit manufacturer's technical specifications and product description literature for the methods and equipment used.

B. Copies of all notifications as required by these Specifications including identification of the Contractor's waste hauler, the hauler's NJDEP identification number, and the intended disposal site of the contaminated wastes, and all applicable permits.

C. Copies of the Contractor's New Jersey Asbestos "A" license and respiratory protection program.

D. The name of the testing laboratory providing the Contractor's OSHA compliance monitoring.

E. The name and qualifications of the individual who will act as the project supervisor during the asbestos abatement portion of this Project.

F. Information, including copies of applicable certificates and licenses from training agencies and/or manufacturers, concerning the qualifications of the Contractor, and Subcontractor, either's personnel, relative to their ability to execute the electrical, plumbing, and mechanical installation or dismantlement directly specified or otherwise necessary to complete the specified Work.

G. Material Safety Data sheets for all hazardous chemicals to be used on the Project.

1.6 PERFORMANCE REQUIREMENTS

A. Project/site conditions

1. As the subject buildings are scheduled for demolition, the Contractor shall not be held responsible for cosmetic damage to the building that may be caused by the Asbestos Abatement Work that is of no consequence to later use of the site. The Contractor shall be held responsible for any damage or loss of value to the subject site, including damage to adjacent structures and utilities due to its activities. Further, the Contractor shall be responsible for correction of any unsafe conditions caused at the site, or any surrounding areas, by its activities.

2. The Contractor shall accept the site and the buildings "as is", and shall be responsible for (i) all dismantlement and limited demolition necessary to access the ACM as well as the disposal or other handling of any other items stored in the building to the extent necessary to complete the Work specified, and (ii) and any all activities related to site safety, including all safety procedures relative to establishment of safe interior work area enclosures as well as all safety procedures related to the exterior Work.

B. Utilities

1. Be aware that active electrical service may not exist at the site at the time of abatement start. Provide electrical service at the time of abatement start as necessary to complete the Work. The contractor shall provide for on-site electrical generators or temporary utility hook-up. Also, provide electrical service sufficient for the monitoring firm to provide clearance air sampling (approximately 40 amp service distributed amongst at least 3 circuits).

2. Provide water supply as necessary to complete the Work specified. Be aware that active water service may not exist at the site.

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

A. Delivery - Deliver all materials in the original packages, containers, or bundles, bearing the name of the manufacturer, the brand name and any Material Safety Data Sheets which pertain to the materials.

B. Storage - Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.

C. Protection - Damaged or deteriorating materials shall not be used and shall be removed from the premises. Materials that become contaminated with asbestos shall be disposed of in accordance with applicable regulations.

D. Owner's items - No materials, equipment or tools belonging to the Owner shall be used by the Contractor, except in case of an emergency and upon explicit authorization by the Owner.

2.2 MATERIALS

A. All materials utilized on this Project must meet the requirements of the Subcode.

B. For construction of the work area enclosure, and installation of any materials that otherwise be maintained in-place for at least one workshift, utilize solely materials (e.g., polyethylene sheeting, lumber, etc.) rated to be fire retardant, as tested by ASTM standard E-84. Utilize only the polyethylene sheeting shall conform to the requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame Resistant Textiles and Films.

2.3 TOOLS AND EQUIPMENT

A. All tools and equipment utilized on this Project must meet the requirements of the Subcode.

PART 3 - EXECUTION

3.1 WORK AREA PREPARATION

A. Protection - Provide for adequate lighting during all phases of the set-up, abatement, clearance and following the work.

B. Signage - Post adequate warning signs denoting the potential danger of airborne asbestos at designated entrances to work areas including, as a minimum, those described at 29 CFR 1926.1101, and State occupational safety and health and fire safety regulations (where applicable), and shall prevent access to posted areas by unauthorized or inadequately protected persons.

C. Fire equipment - Maintain adequate portable fire extinguisher equipment within the work area meeting at least the requirements of 29 CFR 1910.157 and State occupational safety and health regulations and fire safety regulations.

D. Contaminated surfaces - Clean surfaces of contaminated containers and equipment by wet sponging and/or HEPA vacuuming before moving them to uncontaminated areas.

3.2 WORK AREA PROCEDURES: GENERAL

A. Complete Asbestos Abatement Work utilizing the following methods specified for each location/type of material:

1. BUILDING INTERIOR – COMPOSITE FLOORING MATERIAL AND FLOOR TILE AND ASSOCIATED MASTIC REMOVAL: Complete the composite flooring material and floor tile and associated mastic removal within the Ash Brook Golf Course Clubhouse building structure in conjunction with the construction of one (1) negative pressure enclosures (NPE) within the building, established and maintained in accordance with the OSHA Asbestos Construction Standard 29 CFR 1926.1101 and these Specifications.

2. BUILDING EXTERIOR – WINDOW CAULKING COMPOUND REMOVAL: Complete the removal of the exterior window caulking compound from the exterior of the Ash Brook Golf Course Clubhouse building structure utilizing non-friable methods pursuant to OSHA 29 CFR 1926.1101 and these specifications, with no specific work area enclosures specified.

3.3 BUILDING INTERIOR - NEGATIVE PRESSURE ENCLOSURE (NPE)

A. Establish a decontamination unit immediately adjacent to the work area and within the subject building structure.

B. Install the electrical distribution panel within or adjacent to the decontamination unit, with suitable security measures. The electrical installation scheme may be subject to the Owner's prior approval, and all electrical equipment installed may be subject to the Owner's prior review and approval.

C. Prepare all windows and doorways with two layers of independently affixed polyethylene sheeting.

D. Critical barriers shall only need to be established over interior equipment and other surfaces that the Contractor does not desire to clean and encapsulate as work area surface.

E. Install sufficient negative air filtration units to establish four air-changes per hour and OSHA-required negative air pressure (at 0.02 W.C.) within the work area.

F. Perform demolition of any and all materials, as necessary, to access any concealed asbestos-containing materials.

G. Cut any carpeting concealing asbestos-containing flooring materials into manageable sections and remove carpeting using care to limit any breakage or delamination of the flooring systems below. If any tiles and/or flooring materials are adhered to any carpeting, then that carpeting shall be containerized properly and disposed of as asbestos-containing waste.

H. Utilize a commercially-available low-odor solvent to remove any asbestos-containing floor tile mastic adherent to any concrete decking.

I. Following the establishment of appropriate negative air and work area preparation, the Contractor, may begin the removal of the asbestos-containing materials within the NPE.

J. Upon completion of removal; complete cleaning, encapsulation, etc., in accordance with OSHA Asbestos Construction Standard 29 CFR 1926.1101 and the Subcode as adopted by specification.

3.4 REMOVAL OF ASBESTOS-CONTAINING WINDOW CAULKING COMPOUND

A. Post OSHA approved asbestos hazard warning signs at the perimeter of the abatement area. Control access into the secured area to properly trained and protected personnel only.

B. Establish and maintain a facility for showering and changing clothes at the abatement location so that workers can shower after performing asbestos related Work. Maintain the shower of sufficient size, equipped with hot and cold water, soap, and towels so that personnel can properly shower.

C. Remove the asbestos-containing materials utilizing two person teams. Continually mist the materials with amended water during removal.

D. Promptly containerize debris. Place material in two independently sealed six mil polyethylene bags with OSHA approved warning labels.

E. Containers shall be lowered to the ground by appropriate methods subject to the approval of the Owner's representative. Do not drop, throw, or otherwise handle containers in such a manner as to jeopardize their integrity.

F. Should the Contractor maintain that the landfill accepting the asbestos waste would accept it in containerization other than the doubled polyethylene bags, the Contractor must provide confirmable documentation in support of the claim to the Owner. Regardless of whether or not the Owner may accept a containerization scheme differing from that described here, the Contractor shall not be allowed to pass loose asbestos-containing waste off the roofing levels.

3.5 AIR MONITORING - EXTENSION OF SUBCODE REQUIREMENTS

A. These Specifications adopt the progress air sampling requirements of the Subcode (N.J.A.C. 5:23-8.21 et.seq.) for use by the Owner at its discretion during the course of the Work specified for the building structure’s interior.

1. The interior removal work areas shall be subject to Subcode progress air sampling utilizing Phase Contrast Microscopy (PCM) at the Owner’s discretion.

B. Clearance sampling shall be conducted as required in N.J.A.C. 8:60/12:120 Asbestos Licenses and Permits Regulations.

1. The interior removal work areas shall be subject to clearance sampling utilizing PCM or Transmission Electron Microscopy (TEM) as a matter of Code.

C. Respond to unacceptable progress or clearance air sampler results obtained by the monitoring firm during any portion of this Work as required by the Subcode.

3.6 DISPOSAL AND WASTE TRANSPORT

A. ON-SITE STORAGE

1. Provide lockable, six-sided waste containers to accept containerized asbestos-contaminated waste. Maintain asbestos containers left on-site in secure locations.

B. ASBESTOS WASTE SHIPMENT RECORDS. A copy of the waste manifest indicating the chain of custody, final disposal site and date shall be provided to the Owner for each waste container or truck containing asbestos-containing or asbestos-contaminated waste within 15 days from when the container or truck leaves the worksite.

3.7 OCCUPANCY CONDITIONS PRIOR TO BUILDING WIDE DEMOLITION

A. All persons entering the subject building structures after abatement and prior to demolition shall be required to wear appropriate NIOSH approved respiratory protection.

END OF SECTION 028213

SECTION 028313 - LEAD-BASED PAINT MANAGEMENT

PART 1 - GENERAL

1.1 Lead-based paint (LBP) was found to be associated with the following building elements addressed by the investigations at the existing Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road, Union County, New Jersey:

Ash Brook Golf Course Clubhouse
LBP was identified to be associated with the following building elements addressed by this investigation at the Ash Brook Golf Course Clubhouse:

- the subject building structure's various metal beam elements; and
- the subject building structure's exterior wooden door molding elements.

No LBP was identified to be associated with the other building elements addressed by this investigation at the Ash Brook Golf Course Clubhouse.

Golf Cart Garage
No LBP was identified to be associated with the building elements addressed by this investigation at the Golf Cart Garage.

A. The Lead-Based Paint Management Work, or "LBP Work", shall be defined as the Work that encompasses the handling of lead-based paint (LBP), materials to which LBP is applied, and any waste and contamination resulting from the handling or disturbance of LBP, or any other lead-bearing surface.

B. It is not the intent of this section to define or require a LBP abatement project or LBP hazard abatement project as may be defined by the New Jersey Lead Hazard Evaluation and Abatement Subcode (N.J.A.C. 5:17). Further, these Contract Documents are not meant to require the Contractor to retain a New Jersey-licensed lead abatement contractor to complete the LBP Work as specified. This statement, nor any other in the Contract Documents, does not limit the Contractor's responsibility to act in a manner pursuant to N.J.A.C. 5:17, or any other regulations, depending upon conditions resulting from the Contractor's performance of the Work and other activities.

C. This section pertains to all Work for this project involving the disturbance of paint, and related dust/debris. All painted surfaces are likely to contain some concentration of lead. There are also surfaces that may be contaminated with lead containing dust and/or debris. As part of the performance of this Work, incorporate appropriate lead paint/dust testing, containment, worker protection and disposal procedures.

D. Perform all work necessary to carry out the proper removal and disposal of all lead-contaminated waste, in accordance with all applicable laws, codes, rules and regulations and in accordance with the requirements set forth in this section.

1.2 SCOPE OF LBP MANAGEMENT WORK

A. The Scope of the LBP Work shall include those activities necessary to assure compliance with applicable worker protection and waste disposal standards, and to prevent release of fugitive lead-containing debris and dust generated from the LBP to the surrounding properties. These Specifications delineate no specific activities, but rather the Contractor shall prepare and make available upon request by the Owner or authorized representative a plan sufficient to achieve these requirements.

PART 2 - PRODUCTS

2.1 JOB CONDITIONS

A. Provide investigation as necessary to properly plan LBP Management Work.

2.2 PHASING

A. Phase the LBP Work in accordance with the overall demolition Work phasing. The LBP Work is not meant to be an activity separate from the overall demolition process, but rather an essential element of the demolition Work to allow for the demolition and any other related Work to be undertaken with proper LBP management.

2.3 METHODS

A. Provide work methods pursuant to applicable standards and good industry practice. The Contractor's attention is particularly brought to OSHA requirements relative to torch cutting controls and use of HEPA-fitted cutting tool options under certain conditions.

PART 3 - EXECUTION

3.1 REGULATORY REQUIREMENTS, REFERENCE STANDARDS

A. Include provisions for the proper containment, removal, and disposal of lead-containing waste, as well as appropriate worker protection in accordance with all applicable laws, codes, rules and regulations pertaining to lead. Applicable guidelines and standards listed in this Scope of Work include, but are not necessarily limited to:

1. Code of Federal Regulations (CFR) Publications:

29 CFR, Part 1926.62	Lead Exposure in Construction; Interim Final Rule Vol. 58, No. 84
40 CFR 61, Subpart A	General Provisions (Hazardous Air Pollutants Listing)
40 CFR 61.152	Standards for Waste Manufacturing, Demolition, Renovation, Spraying and Fabricating Operations
40 CFR 241	Guidelines for the Land Disposal of Solid Wastes
40 CFR 257	Criteria for Classification of Solid Waste
40 CFR 261	Identification and Listing of Hazardous Wastes
40 CFR 262	Standards Applicable to Generators of Hazardous Waste

1. Current NJDEP requirements, N.J.A.C. 7:26-1 et.seq.

3.2 WORKER PROTECTION

A. Treat any surface coating and/or underlying substrate containing lead in any concentration that will be disturbed as a potential lead hazard to workers in accordance with 29 CFR 1926.62, Lead Exposure in Construction. This standard applies to all construction work in which lead in any concentration is present.

B. Maintain a program in accordance with 29 CFR 1926.62 at minimum and be responsible for protecting and training employees on worker safety, health hazards, etc. relating to lead. This program shall be incorporated into the Contractor's written health and safety plan. The Contractor should consult the following publications and/or competent environmental counsel:

OSHA - 3079 Respiratory Protection
OSHA - 3142 Lead in Construction

3.3 MANAGEMENT PROCEDURES

A. Work Plans

1. Prepare and make available upon request by the Owner or authorized representative task specific Work Plan prior to starting Work detailing how the Contractor shall accomplish each task of work

related to the disturbance of any LBP surface or contaminated material. Prepare the Work Plan with the needs, logistics and constraints of the individual job in mind, taking into account such factors as paint removal method, worker safety, proximity to other personnel and/or the public, protection of the environment including containment and air monitoring requirements, condition of the underlying substrate.

2. Prepare and make available upon request by the Owner or authorized representative the Plan to include methods of minimizing and containing the generation of all dust, including dust generated while cleaning up construction and demolition debris. These methods may include such techniques as wet mopping and/or wiping, HEPA vacuuming or the use of a negative pressure ventilation system where lead dust is generated. Once the Work has been completed and debris has been properly removed from the site, all surfaces shall be free and clear of visible dust. All work areas shall be cleaned on a daily basis at the end of each shift. Particular attention to be paid to fugitive dust which may arise from the sites and contaminate adjacent properties.
3. At no time perform any Work which may impact upon lead containing material until authorization from the Owner or its authorized representative is obtained.

3.4 PROTECTION OF ADJACENT AREAS AND THE ENVIRONMENT

A. Control of Contamination On-Site: If it’s determined by visual identification that the exterior of this property, or adjacent properties have been contaminated as a result of the Contractor's work, clean the affected premises at no charge to the Owner. The Contractor shall be responsible for all costs incurred by this clean-up activity.

B. Disposal Requirements

1. Perform sampling and analysis as may be required to assure the proper and legal handling of the waste. If any chemical analysis or sampling is performed by or on behalf of the Contractor, its Transporter, or its Treatment Storage and Disposal facility (TSD), a copy of such analysis must be provided to the Owner at no additional cost to the Owner. (Note: As prevailing law may allow, painted metal may be designated as recyclable and disposed of at a scrap metal facility for reuse or resale).
2. Ensure that waste disposal Transporter (be it the Contractor itself or a Subcontractor) warrants and represents possession of all permits and/or licenses required under the Resource Conservation and Recovery Act (RCRA) as well as any state or local permits or licenses required for removal, repackaging, transportation and disposal of hazardous waste.
3. Treat and dispose hazardous waste materials removed by the waste disposal Subcontractor at an Environmental Protection Agency (EPA) permitted Treatment, Storage and Disposal Facility.
4. Treat and dispose of all wastes, drums, and other items removed hereunder within sixty (60) days after removal from the site. Ensure that the waste disposal Subcontractor provides completed shipping documents for all hazardous wastes removed, which contain the information required under 40 CFR Part 262 Subpart B (hereinafter the "Manifest Form") and NJDEP requirements. Such Certificates shall include references to the Manifest Form for the shipment as well as address and EPA identification numbers for the generator facility.
5. Ensure that all TSD facilities or transporters which the waste disposal Transporter intends to use to treat and/or dispose of hazardous waste are approved for use by the Owner prior to any delivery of waste by the waste disposal Transporter to such TSD facility. The Owner reserves the right to inspect the waste disposal Transporter's equipment storage facility and TSD facility at any time prior to or subsequent to the award of this Contract.
6. Should any problems arise regarding the TSD facility chosen to accept the waste for treatment and disposal that would require the return of waste to the Owner, or should such TSD facility have violated any environmental regulation which would result in regulatory enforcement action, ensure that the waste disposal Subcontractor immediately notifies the Contractor in writing of such situation, identifies an alternate TSD and obtains written approval from the Owner for disposal at such TSD.
7. Ensure that the waste disposal Transporter provides completed shipping documents, hereinafter referred to as "Bills of Lading", for all non-hazardous waste removed from Owner property. A Bill

of Lading must accompany each waste shipment and must include information regarding the quantity and type of waste, the waste transporter name, and the date of removal from the property.

C. Transportation Requirements

1. Arrange that the waste disposal Transporter providing waste transportation services possesses a valid Waste Hauler's permit issued pursuant to the NJDEP regulations.
2. Package and transport all waste shall in accordance with the applicable sections of the Department of Transportation (DOT) regulations.

END OF SECTION 028313

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slabs.

B. Related Sections:

1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

F. Samples: For water-stops, vapor retarder

1.5 INFORMATION SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and testing agency.

B. Welding Certificates

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semi-rigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

G. Minutes of pre-installation conference

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Pre-installation Conference: Conduct conference at Project site or another pre-approved location.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.
e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.8 MEASUREMENTS

A. Field Measurements: Obtain all field measurements required for proper fabrication and installation of work. Submit prior to installation, all measurements indicating discrepancies from the drawings. Describe in writing, and where applicable, by sketches proposed methods of correcting the discrepancies. Measurements are the responsibility of the contractor.

B. Lay out each part of the work in strict accordance with the architectural, structural, mechanical, electrical, plumbing and all other drawings and be responsible for correct location of the same. Lay out from at least two pre-established benchmarks and axis lines, individually correct for length and bearing.

C. Templates: Furnish templates and layout drawings for exact locations of items to be embedded in concrete, with setting instructions required for installation of embedded items.

D. Contractor shall provide a certified survey showing the exact location of the centers of the columns at their top most level, exactly as installed. This information shall be incorporated into the “as built” drawings.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp-proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 35 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Regional Materials: Concrete materials shall be manufactured from aggregates and cement that have been extracted or recovered, as well as manufactured, within 500 miles of Project site.

B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F or C

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120

C. Silica Fume: ASTM C 1240, amorphous silica.

D. Norm0al-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

E. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Monofilament or fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Monofilament Micro-Fibers:

1) Axim Italcementi Group, Inc.; Fibrasol II P.
2) Euclid Chemical Company (The), an RPM company; Fiberstrand 100.
3) Grace Construction Products, W. R. Grace & Co.; Grace MicroFiber.
4) Sika Corporation; Sika Fiber PPM.

b. Fibrillated Micro-Fibers:

1) Axim Italcementi Group, Inc.; Fibrasol F.
2) Euclid Chemical Company (The), an RPM company; Fiberstrand F.
3) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
4) Sika Corporation; Sika Fiber PPF.

2.7 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BoMetals, Inc.
    b. Greenstreak.
    c. Paul Murphy Plastics Company.
    d. Vinylex Corp.

2. Profile: Ribbed with center bulb
3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick) non-tapered.

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
    b. CETCO; Volclay Waterstop-RX.
    c. Concrete Sealants Inc.; Conseal CS-231.
    d. Greenstreak; Swellstop.

2.8 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
    b. Meadows, W. R., Inc.; Perminator 15 mil.
    c. Raven Industries Inc.; Vapor Block 15.
    d. Reef Industries, Inc.; Griffolyn Type-65G.

2.9 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment (VOC Compliant): Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. ChemMasters; Chemisil Plus.

b. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
c. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
d. L&M Construction Chemicals, Inc.; Seal Hard.
e. Meadows, W. R., Inc.; LIQUI-HARD.
f. Metalcrete Industries; Floorsaver.
g. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

2. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for sealants applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

a. Primers, Sealers, and Undercoaters: 200 g/L.
b. Waterproofing Concrete/Masonry Sealers: 400 g/L.
c. Concrete-Curing Compounds: 100 g/L.
d. Floor Coatings: 100 g/L.

2.10 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound (VOC Compliant): ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.
g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
h. Kaufman Products, Inc.; Thinfilm 420.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Symons by Dayton Superior; Resi-Chem Clear.

2. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for sealants applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

a. Primers, Sealers, and Undercoaters: 200 g/L.
b. Waterproofing Concrete/Masonry Sealers: 400 g/L.
c. Concrete-Curing Compounds: 100 g/L.
d. Floor Coatings: 100 g/L.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Bonding agent in first paragraph below may be used directly from container or as an admixture in cement or sand-cement slurries and rubbing grout.

C. Epoxy Bonding Adhesive (VOC Compliant): ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
2. VOC Content: Epoxy Bonding Adhesive shall have a VOC content of 70 g/L or less.

D. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 4000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings & Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3.. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
3. Slump Limit: 4 inches (100 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

C. Suspended Slabs: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (34.5 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25mm)
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Do not chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 80 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES

A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Locoate vertical joints in walls beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete or as indicated.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated or to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17; for slabs-on-grade.
    b. Specified overall values of flatness, F(F) 30; and levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and levelness, F(L) 15; for suspended slabs.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall

within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.14 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 14 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least 6 month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 033500 – CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single application sealer-hardener for existing concrete floors.

B. Related Sections:

1. Division 03 Section “Cast-In-Place Concrete.”

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

C. Handling: Protect materials from dirt, corrosion, oil, grease and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for concrete finishing is Ashford Formula manufactured by Curecrete Distribution, Inc. Subject to compliance with requirements, provide concrete finishing products manufactured by the Basis of Design manufacturer or approved equal.

2.2 CONCRETE SEALER-HARDNER (SC1)

A. Cure-Seal-Hardener: Water-based, chemically reactive penetrating sealer and hardener allowing concrete to achieve full compressive strength and anti-dusting finish.

1. Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
2. Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.
3. Hardening: As follows when tested in accordance with ASTM C39:

   a. After 7 Days: An increase of at least 40% over untreated samples.
   b. After 28 Days: An increase of at least 38% over untreated samples.

4. Coefficient of Friction: 0.86 dry, 0.69 wet when tested in accordance with ASTM C1028.
5. Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
6. Light Exposure Degradation: No evidence of adverse effects on treated samples when tested in accordance with ASTM G23.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

B. Do not use frozen material. Thaw and agitate prior to use.

C. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

3.3 APPLICATION

A. New Concrete: Apply cure-seal hardener to new concrete as soon as the concrete is firm enough to work on after troweling; with colored concrete, wait a minimum of 30 days before application.

B. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Spray on at rate of 200 ft2/gal.
2. Keep surface wet with cure-seal-hardener for a minimum soak-in period of 30 minutes without allowing it to dry or become slippery.

a. If slipperiness occurs before the 30 minute time period has elapsed, apply additional cure-seal-hardener, as needed, to keep the entire surface in a non-slippery state for the first 15 minutes; for the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
b. In hot weather conditions, follow manufacturer's special application procedures.

3. When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
4. Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-seal-hardener residue.
5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
6. Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.

3.4 PROTECTION

A. Protect installed floors for at least 3 months until chemical reaction process is complete.

1. Do not allow traffic on floors for 3 hours after application.
2. Do not allow pipe cutting using pipe cutting machinery on concrete slab.
3. Do not allow temporary placement and storage of steel members on concrete slabs.
4. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
5. Clean floor regularly in accordance with manufacturer's recommendations.

END OF SECTION 033500

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Work Included:

1. Polish concrete floor slab finishing.

1.3 SYSTEM DESCRIPTION

A. Polished concrete finishing includes:

1. Grinding of the slab surface to receive clear reactive, penetrating liquid hardener/densifier.
2. Application of clear reactive, penetrating liquid hardener and concrete dye.
3. Progressively polishing and burnishing of the slab surface to achieve approved finish.
4. Application of stain resistant surface treatment.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Installer Certification: Certificates by manufacturer stating that installer is listed applicator of special concrete finishes.

C. Samples: Finished samples for color selection approval.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of concrete polishing products required for this Project.

B. Mock-up: Demonstrate the materials, equipment and application methods to be used for work specified herein in pre-approved location approximately 50 sq. ft. in area or as directed by the Owner's Representative or Architect.

1. Retain approved mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

B. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.

1. Store containers upright in a cool, dry, well-ventilated place, out of the sun with temperature between 40 and 100 degrees F.
2. Keep lights, fire, sparks and heat away from containers.
3. Keep containers tightly closed when not in use.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature and humidity, ventilation, and other conditions affecting underlayment and resurfacing performance.

1. Apply when surface and air temperature are between 40 degrees F and above 95 degrees F unless otherwise indicated by manufacturer's written instructions.
2. Apply when surface and air temperatures are expected to remain above 40 degrees F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
3. New concrete must cure a minimum of 28 days or as directed by the manufacturer before application of resurfacing materials.
4. Ventilation: Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for polished concrete floor finishing includes products manufactured by Procoso, Inc. Subject to compliance with requirements, provide polish concrete finishing products manufactured by the Basis of Design manufacturer or approved equal.

2.2 MATERIALS (PC1)

A. Pre-Densifier Concrete Cleaner: Cleaner to remove dirt, oil, grease, and other stains from existing slab surface; "Consolideck Cleaner/Degreaser' by Prosoco, Inc.

B. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier; "Consolideck LS" by Prosoco, Inc., with the following properties:

1. Abrasion Resistance: Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.
2. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
3. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.

4. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
5. Water Vapor Transmission: 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96 Method B (Water Method).
6. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

C. Translucent Concrete Dye: General Purpose water-carried, penetrating, translucent colored dye; "Consolideck GemTone Stain" by Proscoc, Inc.

D. Concrete Protective Treatments: Provide protective treatment offering gloss level as selected by Architect.

1. High Gloss: General Purpose high-gloss film forming premium sealer, lithium silicate hardener/densifier; "Consolideck LSGuard" by Proscoc, Inc., with the following properties:

   a. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
   b. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
   c. Adhesion: : Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
   d. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

2. MediumGloss: General Purpose medium gloss, film forming sealer, "Consolideck PolishGuard" by Prosoco, with the following properties:

   a. 'High Traction Range' readings when tested in accordance with ANSI B101.1.
   b. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
   c. Stain Resistance: Achieve limited or no adverse effects when tested in accordance with ASTM D1038
   d. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

2.3 EQUIPMENT

A. Scrubbing, Grinding and Polishing Equipment:

1. Auto Scrubber Machine: For cleaning operations.
2. Hand Grinder or stand-up edger for edge grinding/polishing.
3. Polishing Equipment: Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum

B. Diamond Segments: Use heads from the same manufacturers throughout the entirety of the project.

C. Diamond Heads Types:

1. Metal Diamonds: 60, 80 or 150.
2. Hybrid Style Diamonds: 50 or 100.
3. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1300 and 3000 (if necessary).

D. Burnishing Machine and Burnishing Pads: Provide the following to produce specified results.

1. Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.

2. Burnishing Pads: As recommended by protective treatment manufacturer.

    a. White Burnishing Pad, non-abrasive, “Consolideck Heat Pad” by Prosoco, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment and resurfacing.
2. Fill substrate voids to prevent underlayment and resurfacing from leaking.

B. Clean dirt, dust, oil, grease and other contaminants that interfere with penetration or performance of specified product from surfaces. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of product.

C. Variations in substrate texture and color will affect final appearance and should be corrected prior to application of sealer/hardener system and the polishing steps.

D. Protect surrounding areas prior to application. If product is accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.

E. Avoid contact in areas not to be treated. Avoid contact with metal, glass and painted surfaces.

F. Do not proceed until unsatisfactory conditions have been corrected.

3.3 CONCRETE POLISHING

A. Adhere to industry standard polishing procedures for dry and wet grinding/polishing is acceptable when industry standard polishing procedures are adhered to.

B. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final polishing passes.

C. Sequential progression of diamond polishing steps shall be required and limited to no more than double the grit value of the previous diamonds used.

D. Overlap adjacent polishing passes by 25 percent

E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.

F. Progressively grind and polish the slab surface utilizing approved diamond segments as necessary to produce Finishing requirements.

3.01 APPLICATION OF TRANSLUCENT DYE AND CONCRETE HARDENER/DENSIFIER

A. Dilute translucent dye with fresh water, or other approved solvent as recommended by manufacturer to create desired color. Apply within 24 hours of dilution.

1. Lightly wet a clean microfiber pad with diluted translucent concrete dye, leaving the pad damp.
2. Apply prepared diluted translucent dye to the clean, dry concrete with a low pressure sprayer with a conical spray pattern per manufacturer's recommendations. (Typically after 200 -grit).
3. Using pre-wet microfiber pad, immediately spread the spray-applied diluted translucent dye to ensure uniform wetting and color distribution.
4. Allow treated surface to dry for one hour minimum prior to walking on or auto scrubbing.
5. Remove excess stain residue by cleaning slab with auto scrubber or dry burnisher and allow treated surface to dry.

B. Dry polish floor with 400 grit resin diamonds.

C. Clean slab with auto scrubber and allow surface to dry.

D. Apply second coat of penetrating diluted translucent dye, if desired. Allow treated surface to dry for one hour minimum prior to auto scrubbing or burnishing.
1. As an alternative, both coats of dye may be applied at 400 grit, waiting one hour after each coat prior to auto-scrubbing or burnishing.

E. Remove excess stain residue by cleaning slab with auto scrubber or dry burnisher and allow treated surface to dry.

F. Apply a single coat of hardener/densifier with a low pressure sprayer fitted with a 0.5 gpm spray tip

1. Apply sufficient material to wet the surface without producing puddles. Use a clean soft-bristle push broom or microfiber pad to spread the hardener/densifier evenly to achieve uniform wetting. Avoid spreading once drying begins. Scrubbing is not necessary.
2. Allow treated surface to dry.

G. Continue progressively dry polishing floor with required resin diamonds to produce desired final finish.

3.4 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

A. Application of general purpose, high gloss protective treatment:

1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
2. Lightly wet a clean microfiber pad with concrete protective treatment and wring out excess, leaving the pad damp.
3. Working from one control joint to another, apply a light, fine spray of concrete protective treatment to a small section of the floor using a clean, pump-up sprayer fitted with a 0.5 gpm spray tip , at an estimated coverage rate of 2000 to 3000 square feet per gallon.

4. Using the damp microfiber pad and firm downward pressure, immediately spread the protective treatment to produce a thin, even coating. Spread the product as far as possible while maintaining a wet edge. Properly applied, protective treatment dries quickly. Stop spreading once drying begins. Avoid overlapping.
5. Allow to dry tack free, typically 20 to 60 minutes.
6. Once dry, high- speed burnish slab surface fitted with burnishing pad to increase gloss and to help the treatment fuse and bond with the concrete for increased durability and longevity. Surface temperatures immediately behind the burnisher must achieve 90.5 degrees Fahrenheit. (Burnish between coats if multiple applications are desired.)
7. Repeat above steps 1 through 6, as necessary for additional applications of protective treatment, to achieve desired final finish (Maximum 3 coats).

B. Application of general purpose, medium gloss protective treatment:

1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
2. Lightly wet a clean microfiber pad with "PolishGuard" and wring out excess, leaving the pad damp.
3. Spray-apply protective treatment using a clean, pump-up sprayer fitted with a 0.5 gpm conical or fan spray tip at an estimated coverage rate of 400 to 800 square feet per gallon. Work from one control joint to another.
4. Spread with the damp microfiber pad. Maintain a thin, even coating and wet edge. Stop spreading once drying begins. Do not overlap. Repeat steps 1 through 4. Two coats are recommended for maximum protection.
5. To increase gloss, wait at least 60 minutes after the final coat is applied, and then use a high- speed burnisher fitted with a white polishing pad. Burnish at a fast walking pace.

3.5 SLAB PROTECTION

A. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession. Clean spills immediately. Provide cleaning chemicals and absorptive materials.

B. Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.

C. Develop a concrete protection procedure which addresses the following procedures:

1. Communication of protection plan to subcontractors and vendors.
2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.

D. Provide a clean slab using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's recommendations.

3.6 FINISHING REQUIREMENTS

A. Appearance: Slab surface must meet the desired sheen and color, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.

END OF SECTION 033543

SECTION 035416 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hydraulic-cement-based underlayment for use below interior floor coverings.

B. Related Sections:

1. Division 09 Sections for patching and leveling compounds applied with floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

C. Manufacturer Certificates: Signed by manufacturers of both underlayment and floor covering system certifying that products are compatible.

D. Qualification Data: For Installer.

E. Minutes of pre-installation conference.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

B. Product Compatibility: Manufacturers of both underlayment and floor covering system certify in writing that products are compatible.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature and humidity, ventilation, and other conditions affecting underlayment performance.

1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg. F.

1.7 COORDINATION

A. Coordinate application of underlayment with requirements of floor covering products, including adhesives, specified in Division 09 Sections, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thicknesses of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Ardex; K-15 Self-Leveling Underlayment Concrete.
b. Bonsal, W. R. Company; Self-Leveling Underlayment.
c. ChemRex; MBT Mastertop 110 Plus Underlayment; Sonneborn Sonocrete Sonoflow; Thoro Underlayment, Self-Leveling.
d. MAPEI Corporation; Ultraplan 1.

3. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
5. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer formulated for use with underlayment when applied to substrate and conditions indicated.

B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg. F.

D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.

E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

F. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lbs. of water per 1000 sq. ft. in 24 hours.

2. Install underlayment reinforcement recommended in writing by manufacturer.

C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
2. Coordinate application of components to provide optimum underlayment-to-substrate and inter-coat adhesion.
3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply underlayment to produce uniform, level surface.

1. Apply a final layer without aggregate to produce surface.
2. Feather edges to match adjacent floor elevations.

D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035416

SECTION 044313 - ANCHORED STONE MASONRY VENEER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Stone masonry anchored to concrete backup.
2. Stone masonry anchored to cold-formed metal framing and sheathing.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing dovetail slots in concrete for anchoring stone.
2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.

1.3 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples for Verification:

1. For each stone type indicated. Include at least two Samples in each set and show the full range of color and other visual characteristics in completed Work.
2. For each color of mortar required.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for typical exterior wall in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.

a. Include stone coping at top of mockup.
b. Include through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit stone masonry above half of flashing).

2. Protect accepted mockups from the elements with weather-resistant membrane.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.

1. Protect base of walls from rain-splashed mud and mortar splatter using coverings spread on the ground and over the wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.7 COORDINATION

A. Advise installers of other work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain stone, from single quarry with resources to provide materials of consistent quality in appearance and physical properties.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

C. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with Section 044200 "Exterior Stone Cladding."

2.2 LIMESTONE

A. Material Standard: Comply with ASTM C 568.

1. Classification: II Medium Density.

B. Description: Dolomitic limestone.

C. Varieties and Sources: Subject to compliance with requirements, provide the following available stone varieties that may be incorporated into the Work include, but are not limited to, the following:

1. Limestone variety as selected by Architect manufactured by Halquist Stone.

D. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Water: Potable.

2.4 VENEER ANCHORS

A. Materials:

1. Stainless-Steel Wire: ASTM A 580, Type 304.
2. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304.

B. Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inchcover on exterior face.

C. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch-diameter, stainless-steel wire.

1. Ties are bent in the form of loops with legs not less than 15 inches in length and with last 2 inches bent at 90 degrees.

D. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Hohmann & Barnard, Inc.
b. Wire-Bond.

2. Structural Performance Characteristics: Capable of withstanding a 100-lbfload in both tension and compression without deforming or developing play in excess of 0.05 inch.
3. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes in top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
4. Fabricate sheet metal anchor sections and other sheet metal parts from 0.078-inch-thick stainless-steel sheet.
5. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch-diameter, stainless-steel wire.

2.5 STONE TRIM ANCHORS

A. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Heckmann Building Products, Inc.
b. Hohmann & Barnard, Inc.

B. Materials: Fabricate anchors from stainless steel, ASTM A 240 or ASTM A 666, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.

C. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593for bolts and ASTM F 594for nuts, Alloy Group 1.

D. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: Chemical anchors, torque-controlled expansion anchors, or undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or Type 316, for anchors.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim " and as follows:
   1. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

B. Application: Unless otherwise indicated, use the following:

   1. Where flashing is indicated to receive counterflashing, use metal flashing.
   2. Where flashing is indicated to be turned down at or beyond wall face, use metal flashing.
   3. Where flashing is partly exposed and is indicated to terminate at wall face, use metal flashing with a drip edge.
   4. Where flashing is fully concealed, use metal flashing.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Cementitious Dampproofing: Cementitious formulation recommended by ILI and nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

2.8 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.9 FABRICATION

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article.

   1. Shape stone specified to be laid in three-course, random range ashlar pattern with sawed beds.

B. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.

C. Cut and drill sinkages and holes in stone for anchors and supports.

D. Thickness of Stone: Provide thickness indicated, but not less than the following:

   1. Thickness: 4 inches plus or minus 1/4 inch.

E. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples and mockups.

2.10 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride.
2. Use portland cement-lime mortar unless otherwise indicated.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type S.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.

B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.

C. Examine wall framing, sheathing, and weather-resistant sheathing paper to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

B. Coat concrete and unit masonry backup with asphalt dampproofing.

C. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING STONE MASONRY

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones in range ashlar pattern with course heights as indicated, random lengths, and uniform joint widths, with offset between vertical joints as indicated.

D. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than1/2 inch at widest points.

E. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints is specified in Section 079200 "Joint Sealants."

F. Install embedded flashing at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

1. At concrete backing, extend flashing through stone masonry, turned up a minimum of 6 inches, and insert in reglet. Reglets are specified in Division 07 Section "Sheet Metal Flashing and Trim."
2. Extend sheet metal flashing 1/2 inch beyond masonry face at exterior, and turn flashing down to form a drip.

G. Coat limestone with cementitious dampproofing as follows:

1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
3. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

B. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.

E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLATION OF ANCHORED STONE MASONRY

A. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.

B. Anchor stone masonry to stud framing with screw-attached veneer anchors unless otherwise indicated.

C. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least a 5/8-inchcover on exterior face.

D. Space anchors to provide not less than one anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

E. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.

F. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.

G. Fill collar joint with mortar as stone is set.

H. Provide 1-inch cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.

1. Slope beds toward cavity to minimize mortar protrusions into cavity.
2. Do not attempt to trowel or remove mortar fins protruding into cavity.

I. Rake out joints for pointing with mortar to depth of not less than 1/2 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.6 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inchdeep. Compact each layer thoroughly and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: Concave.

3.7 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective joints.
3. Stone masonry not matching approved samples and mockups.
4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel un-cleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.

5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.

3.8 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in greatest dimension.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION 044313.13

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast stone trim including the following:

a. Copings and sills.
b. Column caps.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples for Verification:

1. For each color and texture of cast stone required, 10 inches square in size.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.

B. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.6 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE UNITS

A. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

C. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.

4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

D. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg. F for 12 hours or 70 deg. F for 16 hours.

E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

F. Colors and Textures: As selected by Architect from manufacturer's full range.

G. Color and Texture: Provide units with fine-grained texture and buff color resembling Indiana limestone.

2.2 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240, ASTM A 276, or ASTM A 666.

B. Dowels: 1/2-inch- diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240, ASTM A 276, or ASTM A 666.

2.3 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch.

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.4 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.

3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

END OF SECTION 047200

SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Structural steel.
2. Field-installed shear connectors.
3. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrication and other steel items not defined as structural steel.
3. Division 05 Section "Metal Stairs."
4. Division 09 painting sections and Division 09 Section "High-Performance Coatings" for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using general notes provided on the plans and AISC 360.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Moment frames.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Prepare shop drawings in conformance with the best standards of the construction industry and not less complete than indicated by the applicable procedures shown in "Structural Steel Detailing" latest edition published by the AISC. Prepare shop drawings under the supervision of competent engineering personnel, licensed by the state in which the construction is taking place. During preparation of shop drawing, and prior to submittal, coordinate and cross check all shop drawings, including those prepared by subcontractors, for compliance with the Contract Documents. Each shop drawing shall bear the signature of the engineer in charge of structural steelwork for the steelwork subcontractor, and the initials of the individual actually preparing the drawing.
7. Show clearly all work, including relationship of structural steel to the adjacent work of other trades and to significant lines of finishes of other trades.
8. Do not fabricate or deliver work to the site before drawings reviewed by the Architect have been returned.
9. Show explicitly the type of connection used in each location, the grade, size and number of bolts; the type, number, position, designation and orientation of each hole, and the size of each hole, whether slotted or round. Ensure than an adequate wrench clearance for correct bolt tightening is provided and note special bolt tightening sequences were necessary.
10. Prepare original shop drawings. The use of the engineer's or architect's drawings as a base for photographic or other reproduction for shop drawings or details will not be permitted. Show clearly the size and location of each member and the erection mark assigned to each member. Show each field connection with all data and details necessary for assembling the structure. Direct special attention to the possible need for special guying, bracing, or shoring to prevent deformation of existing or new structure due to stresses caused by erection procedures and equipment, by construction loadings, and by forces of natural phenomena.
11. Prepare, keep up-to-date, and submit a complete drawing index cross-referencing each assigned piece mark with the drawing number in which the piece is detailed. Detail drawings submitted without an up-to-date index and the applicable erection drawing(s) showing the location of each piece will be deemed an incomplete submission and will not be accepted as subject to and agreed shop drawing review schedule.
12. Prepare anchor bolt and baseplate erection drawings containing complete location and placing details, including details of all templates. Provide anchor bolt erection drawings to the concrete trade in advance of applicable concrete work and in coordination with the concrete construction sequence.
13. Direct the architect's attention in writing to any proposed deviations from the Contract Documents, prior to the submission of shop drawings showing the proposed deviation. Submit requests for deviations on the steelwork subcontractor's letterhead. Deviations not identified, or

identified only in letters of transmittal or in shop drawings or both, without the required written request, may not be accepted, and shall be sufficient cause for the architect to return each shop drawing containing such deviations without further action. Acceptance of shop drawings containing deviations not detected by the architect during shop drawing review shall not relieve the steelwork subcontractor from responsibility to conform strictly to the Contract Documents.

14. Prior to resubmission of shop drawings with additions or corrections, circle and identify all changes. Drawings submitted without each change being clearly identified are subject to return for resubmission.
15. Prior to making shop drawings for any portion of the work involving alterations to an existing structure, make all necessary field observations, measurements and surveys of existing conditions. If probes are required to accomplish such measurements, give timely notice where probes will be required.

C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer, fabricator, professional engineer, and testing agency.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Non-shrink grout.

E. Survey of existing conditions.

F. Source quality-control reports.

G. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified structural steel fabricator headquartered in the United States that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer, who to the satisfaction of the Architect and Owner, has successfully completed similar projects in size and complexity to the proposed project, and who can provide suitable documentation to confirm this experience and capabilities. Said documentation shall be data for recent project experience including, but not limited to; owner name and contact information, location, name and contact information for general contractor, gross area of building, use of building, contract amount, and any other information that is deemed appropriate to communicate the installer is appropriately qualified. Installer shall also provide a copy of their detailed written quality assurance

plan/program. Qualified installer shall participate in the AISC Quality Certification Program and be designated an AISC-Certified Erector, Category CSE or provide a similar quality program acceptable to the Architect.

1. Upon completion of job, the installer shall provide an affidavit indicating that the structural steel frame is plumb and level within the normal tolerances specified by code, or the more stringent tolerances specified herein.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.10 MEASUREMENTS

A. Field Measurements: Obtain all field measurements required for proper fabrication and installation of work. Submit prior to installation, all measurements indicating discrepancies from the drawings. Describe in writing, and where applicable, by sketches proposed methods of correcting the discrepancies. Measurements are the responsibility of the contractor.

B. Lay out each part of the work in strict accordance with the architectural, structural, mechanical, electrical, plumbing and all other drawings and be responsible for correct location of the same. Lay out from at least two pre-established benchmarks and axis lines, individually correct for length and bearing.

C. Templates: Furnish templates and layout drawings for exact locations of items to be embedded in concrete, with setting instructions required for installation of embedded items.

D. Contractor shall provide a certified survey showing the exact location of the centers of the columns at their top most level, exactly as installed. This information shall be incorporated into the “as built” drawings.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:

1. W-Shapes: 35 percent.
2. Channels, Angles, M-, S-Shapes: 35 percent.
3. Plate and Bar: 25 percent.
4. Cold-Formed Hollow Structural Sections: 35 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M-, S-Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

1. Weight Class: As indicated.
2. Finish: Black except where indicated to be galvanized.

G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

H. Steel Forgings: ASTM A 668/A 668M.

I. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 or ASTM A490; Cold forged with rolled threads. Do not use A325 and A490 bolts of the same diameter. Different grade bolts must vary in diameter by a minimum of ¼ inch.

B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.

4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
5. Finish: Plain except where indicated to be hot-dip zinc coating, ASTM A 153/A 153M, Class C.

E. Threaded Rods: ASTM A307 Grade A.

F. Torque Control Bolts: ASTM F1852 Type I:

1. LeJeune T.C. Bolts, LeJeune Bolt Company, Burnsville, Mineesota.
2. Tru-Tension Bolts, Nucor Corporation, St. Joe, Indiana.

G. Direct Tension Indicators, ASTM F959:

1. “Coronet Load Indicators” by TurnaSure, LLC, Langhorne, PA.

H. Expansion Anchors – Install in accordance with Manufacturer’s printed instructions. Use only with prior review and acceptance by Architect/Engineer for the specified applications indicated.

I. Adhesive Anchors: Install in accordance with manufacturers printed instructions. Use only with prior review and acceptance by Architect/Engineer for specific applications indicated. Subject to compliance with requirements, provide one of the following:

1. HIT HY-200 SafeSet by HILTI.
2. An Approved equal.

2.3 PRIMER

A. Primer: (Steel not exposed to the elements) Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Primer (exposed exterior structural steel): Primer compatible with Division 09 “High-Performance Coatings”.

C. Finish Paint: Provide first finish coat of paint in shop. Refer to Painting Specification.

D. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Slip critical.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. Clean steel not exposed to the elements that is specified to be painted in accordance with SSPC-SP3. Steel not exposed to the elements is contained within the building envelope.

2. Clean steel exposed to the elements that is to be painted in accordance with SSPC-SP6. Connections are to be included.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 2 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: provide first finish coat of paint in shop facility. Steel will receive top coats per Division 09.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, shelf angles and members which are permanently exposed to weather.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200

SECTION 053100 – STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Long-span (LH-series) steel joists.
2. Joist accessories.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for installing bearing plates in concrete
2. Division 04 Section "Unit Masonry" for installing bearing plates in unit masonry.

1.3 DEFINITIONS

A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and professional engineer.

B. Welding certificates.

C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparationroduct Certificates: For each type of steel deck, signed by product manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Deliver steel bearing plates to be built into cast-in-place concrete construction.

1.9 MEASUREMENTS

A. Field Measurements: Obtain all field measurements required for proper fabrication and installation of work. Submit prior to installation, all measurements indicating discrepancies from the drawings. Describe in writing, and where applicable, by sketches proposed methods of correcting the discrepancies. Measurements are the responsibility of the contractor.

B. Lay out each part of the work in strict accordance with the architectural, structural, mechanical, electrical, plumbing and all other drawings and be responsible for correct location of the same. Lay out from at least two pre-established benchmarks and axis lines, individually correct for length and bearing.

C. Templates: Furnish templates and layout drawings for exact locations of items to be embedded in concrete, with setting instructions required for installation of embedded items.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level.

2. Design special joists to withstand design loads with live-load deflections no greater than the following:

a. Roof Joists: Vertical deflection of 1/360 of the span.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

2.2 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

1. Joist Type: LH-series steel joists.
2. End Arrangement: Square, bottom chord bearing as indicated on plans
3. Top-Chord Arrangement: Double Pitched, with extended ends as indicated on plans.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Camber long-span steel joists according to SJI's "Specifications.

E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.3 PRIMERS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.4 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal and/or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated.

C. Steel bearing plates with integral anchorages are specified in Division 05 Section "Metal Fabrications."

D. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.

E. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect[field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Field welds will be visually inspected according to AWS D1.1/D1.1M.

C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:

1. Radiographic Testing: ASTM E 94.
2. Magnetic Particle Inspection: ASTM E 709.
3. Ultrasonic Testing: ASTM E 164.
4. Liquid Penetrant Inspection: ASTM E 165.

D. Bolted connections will be visually inspected.

E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."

F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel and accessories.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

SECTION 053100 – STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Composite floor deck.

B. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck accessory, and product indicated.

B. Shop Drawings: layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of steel deck, signed by product manufacturer.

B. Welding certificates.

C. Field quality-control test and inspection reports

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

E. Research/Evaluation Reports: For steel deck.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

E. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.7 MEASUREMENTS

A. Field Measurements: Obtain all field measurements required for proper fabrication and installation of work. Submit prior to installation, all measurements indicating discrepancies from the drawings. Describe in writing, and where applicable, by sketches proposed methods of correcting the discrepancies. Measurements are the responsibility of the contractor.

B. Lay out each part of the work in strict accordance with the architectural, structural, mechanical, electrical, plumbing and all other drawings and be responsible for correct location of the same. Lay out from at least two pre-established benchmarks and axis lines, individually correct for length and bearing.

C. Templates: Furnish templates and layout drawings for exact locations of items to be embedded in concrete, with setting instructions required for installation of embedded items.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 35 percent.

2.2 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Canam United States; Canam Group Inc.
2. CMC Joist & Deck.
3. Consolidated Systems, Inc.; Metal Dek Group.
4. Epic Metals Corporation.
5. Marlyn Steel Decks, Inc.
6. New Millennium Building Systems, LLC.
7. Nucor Corp.; Vulcraft Group
8. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
2. Profile Depth: As indicated on the drawings.
3. Design Uncoated-Steel Thickness: As indicated on the drawings; 0.0474 inch (1.20 mm).
4. Span Condition: Triple span or more.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

H. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: ASTM A 780.

J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 FLOOR DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch (16 mm), nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped or butted at Contractor's option.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.

B. Related Requirements:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

B. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg. F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1/2 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

1. Wall Studs: AISI S211.
2. Lateral Design: AISI S213.

D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Bracing, bridging, and solid blocking.
2. Anchor clips.
3. Gusset plates.
4. Stud kickers and knee braces.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

B. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Connect vertical deflection clips to bypassing studs and anchor to building structure.
2. Connect drift clips to cold-formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for overhead doors and grilles.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections, including concealed steel handrail supports.
5. Metal ladders.
6. Metal floor plate.
7. Bollards.
8. Structural-steel door frames.
9. Miscellaneous steel trim including steel angle corner guards steel edgings.
10. Abrasive metal nosings.
11. Metal downspout boots.
12. Steel wall base.
13. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Sections:

1. Division 03 Section "Pre-Cast Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Division 05 Section "Structural Steel Framing."
3. Division 05 Sections “Metal Stairs” and "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders and alternating tread devices, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Qualification Data: For qualified professional engineer.

D. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240or ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36or ASTM A 283, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53, standard weight (Schedule 40) unless otherwise indicated.

H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches, or as indicated.
2. Material: Galvanized steel, ASTM A 653, commercial steel, Type B, with G90 coating; 0.079-inch nominal thickness.

I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47, unless otherwise indicated.

2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, Alloy 6061-T6.

D. Aluminum Castings: ASTM B 26, Alloy 443.0-F.

E. Nickel Silver Extrusions: ASTM B 151, Alloy UNS No. C74500.

F. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Screws: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47malleable iron or ASTM A 27cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

L. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

M. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.

B. Steel Ladders:

1. Space siderails 16 inches apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

6. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
8. Galvanize exterior ladders, including brackets and fasteners.

2.9 STEEL WALL BASE (SB1)

A. Wall Base: Provide 16 gauge stainless steel wall base, #4 finish.

2.10 METAL FLOOR PLATE

A. Fabricate from rolled-steel floor plate of thickness indicated below:

1. Thickness: 1/8 inch or as indicated.

B. Provide grating sections where indicated fabricated from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.

C. Provide steel angle supports as indicated.

D. Include steel angle stiffeners, and fixed and removable sections as indicated.

E. Provide flush steel bar drop handles for lifting removable sections, one at each end of each section.

2.11 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

C. Galvanize exterior steel frames.

D. Prime steel frames with zinc-rich primer.

2.12 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

D. Prime miscellaneous steel trim with zinc-rich primer.

2.13 ABRASIVE METAL NOSINGS

A. Cast-Metal Units: Cast iron, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Safety Tread Co., Inc.
b. Balco Inc.
c. Barry Pattern & Foundry Co., Inc.
d. Granite State Casting Co.
e. Safe-T-Metal Company, Inc.
f. Wooster Products Inc.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.

1. Provide two rows of holes for units more than 5 inches wide, with two holes aligned at ends and intermediate holes staggered.

D. Apply bituminous paint to concealed surfaces of cast-metal units.

E. Apply clear lacquer to concealed surfaces of extruded units.

2.14 METAL DOWNSPOUT BOOTS

A. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.

1. Outlet: Vertical, to discharge into pipe.

B. Prime cast-iron downspout boots with zinc-rich primer.

2.15 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.16 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

C. Prime plates with zinc-rich primer.

2.17 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.18 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe. Fill with concrete as shown, refer to Division 03 section for Cast-In-Place Concrete.

B. Where anchored to concrete slabs, fabricate bollards with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

2.19 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.20 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.21 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING PIPE GUARDS

A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard. Mount pipe guards with top edge 26 inches above driving surface.

3.4 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

A. Center nosings on tread widths unless otherwise indicated.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 07 Section "Joint Sealants" to provide a watertight installation.

3.5 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Sections:

1. Division Section 03 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.
3. Division Section 09 "Non-Structural Metal Framing" for metal backing for anchoring railings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor is 1.5.

1.4 ACTION SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Prefilled metal-pan stair treads.
2. Abrasive nosings.
3. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Wire Rod for Grating Crossbars: ASTM A 510.

D. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.

E. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008, structural steel, Grade 25, unless another grade is required by design loads; exposed.

F. Galvanized-Steel Sheet: ASTM A 653, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum Castings: ASTM B 26, Alloy 443.0-F.

C. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 ABRASIVE NOSINGS

A. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

2.5 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be shop primed with zinc-rich primer.

D. Machine Screws: ASME B18.6.3.

E. Lag Screws: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 Section "High-Performance Coatings."

C. Concrete Materials and Properties: Comply with requirements in Section Division 03 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

2.7 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.8 STEEL-FRAMED STAIRS

A. Stair Framing:

1. Fabricate stringers of steel plates or channels.

    a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.

1. Steel Sheet: Uncoated cold-rolled steel sheet unless otherwise indicated.
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
3. Shape metal pans to include nosing integral with riser.
4. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.
5. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

    a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.9 STAIR RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Rails and Posts: 1-5/8-inch-diameter top and bottom rails and 1-1/2-inch-square posts.
2. Picket Infill: 1/2-inch-square pickets spaced less than 4 inches clear.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay.

C. Form changes in direction of railings as follows:

1. By bending.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

E. Close exposed ends of railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. For non-galvanized railings, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.10 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.2 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil. dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "High-Performance Coatings."

END OF SECTION 055100

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Requirements:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 05 Section "Pipe and Tube Railings" for pipe and tube railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Steel Tubing: ASTM A 500 (cold formed).

D. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.

E. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008, structural steel, Grade 25, unless another grade is required by design loads; exposed.

F. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

G. Aluminum Castings: ASTM B 26, Alloy 443.0-F.

H. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

I. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

J. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast iron, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Configuration: Cross-hatched units, 3 inches wide without lip.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

D. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be galvanized.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

A. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

B. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel plates or channels.

    a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Directly weld metal pans to stringers; locate welds on top of subtreads where they are concealed by concrete fill. Do not weld risers to stringers.
2. Attach abrasive nosings to risers.
3. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.8 STAIR RAILINGS

A. Comply with applicable requirements in Division 05 Section "Pipe and Tube Railings."

1. Fabricate newels of square steel tubing and provide newel caps of pressed steel, as shown.
2. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
3. Connect posts to stair framing by direct welding unless otherwise indicated.

2.9 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055113

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Related Requirements:

1. Division 05 Section "Metal Pan Stairs" for steel tube railings associated with metal pan stairs.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design railings, including attachment to building construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inchclearance from inside face of handrail to finished wall surface.

2.3 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Form Changes in Direction as Follows:

1. By bending.

I. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
3. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.4 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

2. For hollow masonry anchorage, use toggle bolts.

3.5 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 057500 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal base.
2. Metal cladding.
3. Decorative metal mesh.
4. Metal foot rest.
5. Metal coat hook

B. Related Requirements:

1. Division 06 Section “Architectural Cabinets” and Division 14 Section “Hydraulic Elevator“ for metal base.

1.3 COORDINATION

A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes of deterioration.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same thickness and material indicated for the Work.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated for this Project and with a record of successful in-service performance as well as sufficient production capacity to produce required units.

B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

B. Store products on elevated platforms in a dry location.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturers: The Basis of Design for decorative formed metal work includes products manufactured by the following. Subject to compliance with requirements, provide the Basis of Design manufacturer or approved equal.

1. Decorative Metal Mesh: Mc Nichols Co., refer to Finish Schedule.
2. Coat Hook (Bar): Brass with chrome finish, “SSF” by Sugatsune Co.

2.2 STAINLESS STEEL

A. General: Fabricate foot rest from pipe or tube material. Fabricate products from sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

B. Tubing: ASTM A 554, Grade MT 304.

C. Pipe: ASTM A 312/A 312M, Grade TP 304.

D. Stainless-Steel Sheet: ASTM A 240or ASTM A 666, Type 304, stretcher-leveled standard of flatness.

2.3 METAL MESH (M2)

A. Decorative wire mesh with the following characteristics:

1. Material: Stainless steel
2. Weight: 1.04 lbs per square foot
3. Open Area: 77%
4. Size: 48 inches by 96 inches

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

C. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

E. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

F. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.

1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

G. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.

H. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.

I. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

2.5 METAL BASE (SB1)

A. Form metal base from metal of type and thickness indicated below:

1. Stainless-Steel Sheet: 0.050 inch.

a. Finish: No. 2B.

2.6 METAL WALL PANEL (WP2)

A. Form metal wall panel from metal of type and thickness indicated below:

1. Stainless-Steel Sheet: 0.050 inch or if laminated to wood substrate 0.038 inch.

a. Directional Satin Finish: No. 4.

2.7 GENERAL FINISH REQUIREMENTS

A. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish items indicated on Drawings after assembly.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."

B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating.

2.9 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Bright, Cold-Rolled, Unpolished Finish (SB1): No. 2B.

C. Directional Satin Finish (WP2): No. 4.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Install concealed gaskets, joint fillers, insulation, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.

E. Install concealed gaskets, joint fillers, sealants, and insulation, as the Work progresses, to make interior decorative formed metal items soundproof or lightproof as applicable to type of fabrication indicated.

F. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 ADJUSTING AND CLEANING

A. Unless otherwise indicated, clean metals by washing thoroughly with water and soap, rinsing with clean water, and drying with soft cloths.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 057500

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered joist framing.
3. Rooftop equipment bases and support curbs.
4. Wood blocking,sleepers,cants, and nailers.
5. Plywood backing panels.

B. Related Sections:

1. Division 06 Section "Sheathing."

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

A. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking and similar concealed members in contact with masonry or concrete.
3. Wood framing attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use treatment that does not promote corrosion of metal fasteners.

2. Use Exterior type for exterior locations and where indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat all miscellaneous carpentry, unless otherwise indicated.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 15 percent.

B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.

C. Other Framing: No. 2 grade and the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWPA.

2.5 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Boise Cascade Corporation.
b. Georgia-Pacific Building Products.
c. Louisiana-Pacific Corporation.
d. Weyerhaeuser Company.

2. Web Material: Either OSB or plywood, complying with DOC PS 1 of DOC PS 2, Exposure 1.
3. Structural Properties: Depths and design values not less than those indicated.
4. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.

D. Insulated Rim Boards: Insulated product designed to be used as a load bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.

1. Manufacturer: Provide products by the same manufacturer as I-joists.
2. Rim Board Material: Product made from any combination of solid lumber, wood strands, and veneers.

3. Rim Board Thickness: 1-1/4 inches (32mm).
4. Insulation: 1-1/2-inch (38mm) thick polyisocyanurate foam complying with ASTM C 1289.
5. Inside Facing: 7-16-inch (11mm) thick OSB.
6. Comply with APA PRR-401, rim board plus grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

2.6 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.7 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.9 METAL FRAMING ANCHORS

A. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.

1. Use for interior locations where stainless steel is not indicated.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

D. Do not splice structural members between supports, unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Provide fire blocking in stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.

J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 ROOF JOIST FRAMING INSTALLATION

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or by using metal framing anchors.
2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).

C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than 2 inches (50 mm) from top or bottom.

D. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.

E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.

F. Provide solid blocking between joists under jamb studs for openings.

G. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.

1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

H. Provide bridging of type indicated below, at intervals of 96 inches (2438 mm) on-center, between joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal-(19-by-64-mm actual-)size lumber, double-crossed and nailed at both ends to joists.
2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.4 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061323 – HEAVY TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Beams, girders, and purlins.
2. Prefabricated trusses with chords/members comprised of heavy timber sections.

B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Division 06 Section “Rough Carpentry” for dimension lumber items associated with heavy timber construction.

1.3 DEFINITIONS

A. Timbers: Lumber of 5 inches nominal or greater in least dimension.

B. Inspection Agencies, and the abbreviations used to reference them, include the following:

1. NHLA - National Hardwood Lumber Association
2. NLGA - National Lumber Grades Authority.
3. SPIB - Southern Pine Inspection Bureau.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance of Heavy Timber: Engineer, fabricate, and install structural glulam timber to withstand structural loads shown on Drawings without exceeding the allowable design working stresses according to AITC 117--DESIGN.

1.5 SUBMITTALS

A. Product Data: For preservative-treated wood products and timber connectors.

1. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. For timber connectors, include installation instructions.

B. Shop Drawings: For heavy timber construction. Show layout, dimensions of each member, and details of connections. Shop drawings shall be prepared and stamped by a registered professional engineer in the state in which the project occurs. Truss geometry (slope, heel height, etc.) shall be coordinated with Architectural and Structural Drawings.

1. Include large-scale details of connections.
2. For installed heavy timber indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples: Not less than 7 inches wide by 24 inches long, showing the range of variation to be expected in appearance, including surface texture, of wood products. Apply a coat of penetrating sealer to Samples.

D. Material Certificates:

1. For heavy timber construction specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed structural glulam timber construction similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of structural glulam timber similar to that indicated for this Project in design and extent.

C. Timber Standard: Comply with AITC 108, "Standard for Heavy Timber Construction."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of heavy timber construction to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings

1.8 MEASUREMENTS

A. Field Measurements: Obtain all field measurements required for proper fabrication and installation of work. Submit prior to installation, all measurements indicating discrepancies from the drawings. Describe in writing, and where applicable, by sketches proposed methods of correcting the discrepancies. Measurements are the responsibility of the contractor.

B. Lay out each part of the work in strict accordance with the architectural, structural, mechanical, electrical, plumbing and all other drawings and be responsible for correct location of the same. Lay out from at least two pre-established benchmarks and axis lines, individually correct for length and bearing.

C. Templates: Furnish templates and layout drawings for exact locations of items to be embedded in concrete, with setting instructions required for installation of embedded items.

PART 2 - PRODUCTS

2.1 TIMBER

A. General: Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable.

1. Factory mark each item of timber with grade stamp of grading agency.
2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that will not be exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.

B. Timber Species and Grade: Southern pine; Select Structural, SPIB.

C. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing.

D. Dressing: Provide dressed timber (S4S) unless otherwise indicated.

E. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

F. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.2 PRESERVATIVE TREATMENT

A. Pressure treat materials with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Framing in Contact with Salt or Brackish Water: UC5C Marine Use Southern Waters.

B. Preservative Chemicals: Acceptable to authorities having jurisdiction. 1. Do not use chemicals containing arsenic or chromium.

C. Use process that includes water-repellent treatment.

D. Use process that does not include water repellents or other substances that might interfere with application of indicated finishes.

E. After treatment, re-dry timber to 19 percent maximum moisture content.

F. Mark treated timber with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

1. For exposed items indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

G. Application: Treat items indicated on Drawings and the following:

1. Timber members in contact with masonry or concrete.
2. Timber framing members less than 18 inches above grade.

2.3 TIMBER CONNECTORS

A. General: Unless otherwise indicated, fabricate from the following materials:

1. Stainless-steel plate and flat bars complying with ASTM A 666, Type 316.
2. Stainless-steel bars and shapes complying with ASTM A 276, Type 316.
3. Stainless-steel sheet complying with ASTM A 666, Type 316.

B. Provide bolts, 3/4 inch unless otherwise indicated, complying with ASTM A 307, Grade A; provide nuts complying with ASTM A 563; and, where indicated, provide flat washers.

2.4 FABRICATION

A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.

B. Predrill for fasteners and assembly of units.

C. Coat crosscuts with end sealer.

D. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Install heavy timber construction to comply with Shop Drawings.

2. Install horizontal and sloping members with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports if not continuous.
3. Handle and temporarily support heavy timber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

C. Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.

1. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
2. Coat crosscuts with end sealer.
3. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.

    a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
    b. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

D. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.2 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Architect.

END OF SECTION 061323

SECTION 061516 – WOOD ROOF DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

B. This Section includes the following:

1. Glued-laminated wood roof decking.

1.3 SUBMITTALS

A. Product Data: For glued-laminated wood decking. Include installation instructions and data on fabrication.

B. Samples: 24 inches (600 mm) long, showing the range of variation to be expected in appearance of wood decking.

C. Wood-Treatment Certificates: Signed by wood treater certifying that treatment processes comply with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed wood decking installation similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Decking Standard: Comply with AITC 112, "Standard for Tongue-and-Groove Heavy Timber Roof Decking."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work.

B. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. General: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority (Canada).
3. RIS - Redwood Inspection Service.
4. SPIB - Southern Pine Inspection Bureau.
5. WCLIB - West Coast Lumber Inspection Bureau.
6. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide wood decking with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, species, grade, moisture content at time of surfacing, and mill. Apply grade stamp to surfaces that will not be exposed to view.

D. Preservative Treatment: Pressure treated solid wood decking with waterborne solution to comply with AWPA C2 for aboveground use.

E. Preservative Treatment: Where preservative treatment is indicated, pressure treat lumber with waterborne solution to comply with AWPA C2 for aboveground use before laminating.

1. After treatment, re-dry wood to 15 percent maximum moisture content.
2. Use preservative solution with water-repellent additive.
3. Use preservative solution without water repellents or other substances that might interfere with application of indicated finishes.
4. Do not use chemicals containing arsenic or chromium.

2.2 GLUED-LAMINATED WOOD DECKING

A. Face Species: Southern pine.

B. Face Grade: Decorative.

C. Face Surface: Smooth sanded.

D. Edge Pattern: Standard vee.

2.3 FABRICATION

A. Shop Fabrication: Where pressure treatment of decking is indicated, complete cutting, trimming, surfacing, and sanding before treatment.

B. Fabricate decking in lengths for 2-span continuous lay-up.

C. Fabricate decking in lengths for combination simple and 2-span continuous lay-up.

D. Fabricate decking in lengths for controlled random lay-up.

E. Predrill decking for lateral spiking to adjacent units to comply with referenced decking standard.

F. Seal Coat: After fabricating and surfacing decking, apply a saturation coat of penetrating sealer.

2.4 FACTORY FINISHING

A. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer, oven dried and resistant to mildew and fungus.

1. Provide color selected by Architect from manufacturer's full range of col

2. Provide color matching Architect's sample.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install laminated wood decking to comply with manufacturer's written instructions and with end joints located according to lay-up indicated. Apply joint sealant between decking and supports and between tongues and grooves at outside wall supports.

1. Nail each course of decking at each support with one nail slant nailed above the tongue and one straight nailed through the face.

a. Use 16d nails for 2-inch nominal (37-mm actual) decking.
b. Use 20d nails for 3-inch nominal (56-mm actual) decking.
c. Use 30d nails for 4-inch nominal (75-mm actual) decking.

2. Slant nail each course to the tongue of the adjacent course at 30 inches (750 mm) on-center and within 12 inches (300 mm) of the end of each unit. Stagger nailing in adjacent courses 15 inches (380 mm).

a. Use 6d nails for 2-inch nominal (37-mm actual) decking.
b. Use 8d nails for 3-inch nominal (56-mm actual) decking.
c. Use 16d nails for 4-inch nominal (75-mm actual) decking.

3.2 ADJUSTING AND CLEANING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

3.3 PROTECTION

A. Provide temporary waterproof covering to protect exposed decking before applying roofing.

END OF SECTION 061516

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I Exterior Exposure 1, Structural I Exposure 1 sheathing.

1. Span Rating: Not less than 16/0.
2. Nominal Thickness: Not less than 11/32 inch.

B. Glass-Mat Gypsum Wall Sheathing: ASTM C 117.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. LaFarge Gypsum (Continental Building); Exterior Gypsum Sheathing.
b. G-P Gypsum Corporation; Dens-Glass Gold.
c. National Gypsum Company; Gold Bond e(2)XP.

2. Type and Thickness: Regular, 1/2 inch, Type X, 5/8 inch thick.
3. Size: 48 by 96 inches for vertical installation.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.

B. Power-Driven Fasteners: NES NER-272.

1. For wall sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

C. Wood Screws: ASME B18.6.1.

D. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

E. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with nails.
2. Fasten gypsum sheathing to cold-formed metal framing with screws.
3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

E. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lumber siding.
2. Plywood soffits.

B. Related Requirements:

1. Division 01 Section "Alternates" for administrative and procedural requirements for alternates. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.6 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.7 WARRANTY

A. Manufacturer's Warranty for Columns: Manufacturer agrees to repair or replace columns that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
2. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
3. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
4. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

C. Hardboard: ANSI A135.4.

2.2 LUMBER SIDING

A. Provide kiln-dried lumber siding complying with DOC PS 20, factory coated with exterior primer compatible with topcoats specified.

B. Species and Grade: 1 Common spruce-pine-fir; NeLMA, NLGA, WCLIB, or WWPA.

C. Species and Grade: D Select (Quality) eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; NeLMA, NLGA, WCLIB, or WWPA.

D. Pattern: Bevel siding, S1S2E, actual overall dimensions of7-1/4 by 3/4 inch, measured on the face and thick edge at 19 percent moisture content.

2.3 PLYWOOD SOFFITS

A. Plywood Type: Exterior, Grade C-C, plugged and touch sanded or APA-rated siding.

1. Face Grade: 303-NR.

B. Thickness: 15/32 inch.

C. Face Species: Douglas fir.

D. Pattern: Plain.

E. Surface: Smooth.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
2. For applications not otherwise indicated, provide, hot-dip galvanized-steel, fasteners.

B. Flashing and Soffit Cladding: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

C. Insect Screening for Soffit Vents: PVC-coated glass-fiber fabric, 18-by-14-inch or 18-by-16-inch mesh.

D. Continuous Soffit Vents: Aluminum hat channel shape with stamped louvers or perforations, 2 inches wide and in lengths not less than 96 inches.

1. Net Free Area: 4 sq. in./linear ft..
2. Finish: To match roofing.

E. Round Soffit Vents: Molded plastic louvered vents, 2 inches in diameter, made to be inserted into round holes cut into soffit.

F. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and with applicable requirements in Division 07 Section "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

2.5 FABRICATION

A. Factory paint wood siding.

B. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.

C. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Division 09 Section "Painting."

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inchmaximum offset for flush installation and 1/16-inchmaximum offset for reveal installation.
3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 SIDING INSTALLATION

A. Install siding to comply with manufacturer's written instructions.

B. Horizontal Lumber Siding: Apply starter strip along bottom edge of sheathing or sill. Install first course of siding with lower edge at least 1/8 inch below starter strip and subsequent courses lapped 1 inch over course below. Nail at each stud. Do not allow nails to penetrate more than one thickness of siding.

1. Leave 1/8-inchgap at trim and corners unless otherwise recommended by manufacturer, and apply sealant.
2. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.

C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.

D. Finish: Apply additional finish within two weeks of installation.

3.5 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062013

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior trim.
2. Interior hardboard paneling.
3. Shelving.

B. Related Requirements:

1. Division 06 Section "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

1.4 ACTION SUBMITTALS

A. Samples for Verification:

1. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
4. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
5. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece.

C. Hardboard: AHA A135.4.

D. MDF: ANSI A208.2, Grade 130.

2.2 INTERIOR TRIM

A. Hardwood Lumber Trim for Shop Applied Transparent Finish (Stain or Clear Finish): Column covering and elsewhere shown. Refer to Division 06 Section “Wood-Veneer-Faced Architectural Cabinets” for finishing requirements.
1. Species and Grade: Cherry to match species as specified in Division 06 Section “Wood-Veneer-Faced Architectural Cabinets.”
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Use for lumber trim wider than 6 inches.
5. Veneered Material: Allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

2.3 T&G CEILING

A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.

1. Species and Grade: Western red cedar, Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 19 percent.
3. Face Surface: Surfaced (smooth).
4. Thickness and Face Width: Refer to Finish Schedule.
5. Lengths: Manufacturer's standard.
6. Finish: UV urethane, as selected by Architect.

2.4 SHELVING AND CLOTHES RODS

A. Closet Shelving: Made from the following material, 3/4 inch thick.

1. MDF with radiused or solid-wood front edge.

B. Shelf Cleats: 3/4-by-3-1/2-inch boards, as specified above for shelving lumber trim for opaque finish.

C. Clothes Rods: 1-5/16-inch-diameter, stainless-steel tubes.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.

C. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.6 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inchradius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inchmaximum offset for flush installation and 1/16-inchmaximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
2. Install trim after gypsum-board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 T&G CEILING INSTALLATION AND FINISHING

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."

B. Wood Sleepers: Install according to requirements in Division 06 Section "Miscellaneous Rough Carpentry".

C. Provide expansion space at walls and other obstructions and terminations of ceiling

D. Solid-Wood Ceiling: Blind nail or staple to substrate.

E. Finishing: Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

3.6 SHELVING AND CLOTHES ROD INSTALLATION

A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.

B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c. Use 2 fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.

1. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing. Remove adhesive that is squeezed out after fastening shelf cleats in place.

C. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

3.7 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.8 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

3.9 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

SECTION 064113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Architectural wood cabinets.
2. Shop finishing of architectural wood cabinets.

B. Related Requirements:

1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of cutouts and holes for electrical switches and outlets installed in architectural wood cabinets.
2. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
3. Apply AWI Quality Certification Program label to Shop Drawings.

B. Samples for Initial Selection:

1. Shop-applied transparent finishes.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOOD CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

2.2 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Type of Construction: Face frame.

C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.

D. Wood for Exposed Surfaces (WD2): Refer to Finish Schedule.

1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
2. Matching of Veneer Leaves: Book match.

E. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

F. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1.
2. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.5 CABINET HARDWARE AND ACCESSORIES

A. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:

1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.

B. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

C. Shelf Rests: BHMA A156.9, B04013; metal.

D. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
2. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.

E. Door Locks: BHMA A156.11, E07121.

F. Drawer Locks: BHMA A156.11, E07041.

G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Bright Brass, Vacuum Coated: BHMA 723 for brass base; BHMA 729 for zinc-coated-steel base.
4. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
5. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
6. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
7. Satin Stainless Steel: BHMA 630.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.6 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets: 1/16 inch unless otherwise indicated.

C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: System - 2, precatalyzed lacquer.
3. Staining: Match Architect's sample.
4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
5. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. For shop finished items use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inchsag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inchpenetration into wood framing, blocking, or hanging strips.

G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064113

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Sections:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
2. Division 12 Section "Quartz Agglomerate Countertops" and “Plastic-Laminate-Clad Countertops.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including, panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate,, and cabinet hardware and accessories.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for electrical switches and outlets installed in architectural plastic-laminate cabinets.
4. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
2. Corner pieces as follows:

a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.

b. Miter joints for standing trim.

3. Exposed cabinet hardware and accessories, one unit for each type.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Forfabricator.

B. Product Certificates: Forthe following:

1. Composite wood and agrifiber products.
2. Thermoset decorative panels.
3. High-pressure decorative laminate.
4. Adhesives.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Fabricator of products or approved by fabricator.

C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Premium.

C. Regional Materials: Plastic-laminate cabinets shall be manufactured within 500 miles of Project site.

D. Type of Construction: Frameless.

E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

G. Laminate Cladding for Exposed Surfaces (PL1, PL2, PL3)

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC T-mold matching laminate in color, pattern, and finish or PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

H. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Hardwood plywood.

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.4 CABINET HARDWARE AND ACCESSORIES

A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.

B. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

C. Shelf Rests: BHMA A156.9, B04013; metal.

D. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.

E. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
2. Satin Stainless Steel: BHMA 630.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Adhesives: Do not use adhesives that contain urea formaldehyde.

C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semi-exposed surfaces.

END OF SECTION 064116

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

B. Related Sections:

1. Division 06 Section "Rough Carpentry" for wood furring for installing plastic paneling.
2. Division 10 Section "Wall and Door Protection" for corner guards installed over plastic paneling.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For plastic paneling.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.
3. Testing Agency: UL.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for plastic paneling is manufactured by Crane Composites; refer to Finish Schedule. Subject to compliance with requirements, provide flush wood doors manufactured by the Basis of Design manufacturer or approved equal.

2.2 PLASTIC SHEET PANELING (FP1)

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

1. Nominal Thickness: Not less than 0.075 inch.
2. Surface Finish and Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: Match panels.

B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

D. Adhesive: As recommended by plastic paneling manufacturer.

E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels, unless otherwise indicated.

3.3 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.

1. Drill oversized fastener holes in panels and center fasteners in holes.
2. Apply sealant to fastener holes before installing fasteners.

D. Install factory-laminated panels using concealed mounting splines in panel joints.

E. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

F. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

G. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

H. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

I. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cold-applied, cut-back-asphalt dampproofing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

A. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
2. Euclid Chemical Company (The); an RPM company.
3. Henry Company.
4. Karnak Corporation.
5. Koppers Inc.
6. Meadows, W. R., Inc.

B. Trowel Coats: ASTM D 4586, Type I, Class 1, fibered.

C. Brush and Spray Coats: ASTM D 4479, Type I, fibered.

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Cut-Back-Asphalt Primer: ASTM D 41.

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

E. Protection Course: ASTM D 6506, 1/8-inch- thick, semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.

C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.25 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat.

B. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..

3.5 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.

1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
2. Install protection course on same day of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 CLEANING

A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071113

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Modified bituminous sheet waterproofing, fabric reinforced.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet, Fabric Reinforced: Minimum 60-mil nominal thickness, self-adhering sheet consisting of rubberized-asphalt membrane with embedded fabric reinforcement, and with release liner on adhesive side.
   1. Physical Properties:
      a. Pliability: No cracks when bent 180 degrees over a 1-inch mandrel at minus 25 deg F; ASTM D 146.
      b. Puncture Resistance: 40 lbf minimum; ASTM E 154.
      c. Water Vapor Permeance: 0.05 perm maximum; ASTM E 96, Water Method.
   2. Sheet Strips: Self-adhering, reinforced, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

D. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.
   1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
   2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Bridge and cover isolation joints and expansion joints discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inchfillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.

E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

F. Seal edges of sheet-waterproofing terminations with mastic.

G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

H. Immediately install protection course with butted joints over waterproofing membrane.

3.4 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071326

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation.
3. Foam-plastic board insulation.
4. Spray polyurethane foam insulation.

B. Related Sections:

1. Division 07 Section "Fluid-Applied Membrane Air Barriers" for vapor retarders.
2. Division 07 Section "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.

2. Type IV, 25 psi.
3. Type VII, 60 psi.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 GLASS-FIBER BLANKET INSULATION

A. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 MINERAL-WOOL BLANKET INSULATION

A. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.4 SPRAY POLYURETHANE FOAM INSULATION

A. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. BASF Corporation.
b. Dow Chemical Company (The).
c. Gaco Western LLC.
d. Henry Company.

2. Minimum density of 0.4 lb/cu. ft., thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Ceiling plenums.
b. Attic spaces.
c. Where indicated.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

B. Cellular-Glass Board Insulation: Install with closely fitting joints using attachment method according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.7 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.8 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.9 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Open-cell spray polyurethane foam.

B. Related Requirements:

1. Division 07 Section "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.4 lb/cu. ft. and minimum aged R-value at 1-inchthickness of 3.4 deg F x h x sq. ft./Btu at 75 deg F.

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fluid-applied, vapor-permeable membrane air barriers.

B. Related Requirements:

1. Division 06 Section "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 283 or ASTM E 2357.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Synthetic polymer membrane.

1. Synthetic Polymer Membrane: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Carlisle Coatings & Waterproofing Inc.; Barritech VP.
   b. Grace, W. R., & Co. - Conn.; Perm-A-Barrier VP.
   c. Henry Company; Air-Bloc 31.
   d. Tremco Incorporated, an RPM company; ExoAir 230.

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Vapor Permeance: Minimum 10 perms; ASTM E 96.
   c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.

D. Butyl Strip: Vapor retarding, 30 to 40 mils thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.

E. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

F. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

I. Elastomeric Flashing Sheet: ASTM D 2000, minimum 50- to 65-mil- thick, cured sheet neoprene with manufacturer-recommended contact adhesives and lap sealant with stainless-steel termination bars and fasteners.

J. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

K. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install butyl strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Re-prime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.
2. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
3. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
4. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, counterflashing strip.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

1. Apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Re-prime areas exposed for more than 24 hours.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil dry film thickness, applied in one or more equal coats.

C. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.

9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests: As determined by Owner's testing agency from among the following tests:

1. Qualitative Air-Leakage Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, smoke pencil with pressurization or depressurization.
2. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 783.
3. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Underlayment.
3. Ridge vents.

B. Related Requirements:

1. Division 01 Section "Alternates" for administrative and procedural requirements for alternates
2. Division 07 Section "Roof Accessories" for ridge vents.

1.3 DEFINITION

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of asphalt shingle indicated.

1. Include similar Samples of accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's warranty.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft. of each type, in unbroken bundles.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.

B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.

C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Manufacturing defects.

2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first three years nonprorated.
3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 80 mph for15 years from date of Substantial Completion.
4. Workmanship Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class 4.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Atlas EPS; a Division of Atlas Roofing Corporation.

b. GAF.
c. CertainTeed Corporation.
d. Johns Manville; a Berkshire Hathaway company.

2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules resist algae discoloration.
5. Color and Blends: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970/D 1970M, minimum of 40-mil-thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release backing; cold applied.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atlas EPS; a Division of Atlas Roofing Corporation.
b. CertainTeed Roofing Corporation.
c. GAF.
d. Johns Manville; a Berkshire Hathaway company.
e. Owens Corning.

2.4 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent for use under ridge shingles.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Air Vent, Inc.; a Gibraltar Industries company.
b. GAF.
c. Owens Corning.

2. Minimum Net Free Area: As recommended by architect or engineer.
3. Width: As shown.
4. Features:

a. Nonwoven geotextile filter strips.

2.5 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a minimum 3/8-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.

1. Shank: Barbed.
2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Synthetic-Underlayment Fasteners: As recommended in writing by synthetic-underlayment manufacturer for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Synthetic Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides and ends and treat laps as recommended in writing by manufacturer. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer. Fasten according to manufacturer's written instructions. Cover underlayment within period recommended in writing by manufacturer.

1. Install in single layer on roofs sloped at 4:12 and greater.

C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

1. Eaves: Extend from edges of eaves36 inches beyond interior face of exterior wall.
2. Rakes: Extend from edges of rake 36 inches beyond interior face of exterior wall.
3. Hips: Extend 18 inches on each side.
4. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
5. Sidewalls: Extend beyond sidewall 18 inches, and return vertically against sidewall not less than 4 inches.
6. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches, and return vertically against penetrating element not less than 4 inches.
7. Roof Slope Transitions: Extend 18 inches on each roof slope.

3.3 ASPHALT-SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.

E. Fasten asphalt-shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.

1. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

F. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

END OF SECTION 073113

SECTION 074113 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes standing-seam metal roof panels.

B. Related Sections:

1. Division 01 Section "Alternates" for administrative and procedural requirements for alternates.
2. Division 07 Section "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.6 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft..

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft..

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports

using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Architectural Metal Systems.
    b. Fabral.
    c. MBCI; a division of NCI Group, Inc.
    d. McElroy Metal, Inc.
    e. Merchant & Evans Inc.
    f. Metal Sales Manufacturing Corporation.
    g. Petersen Aluminum Corporation.

2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

    a. Thickness: 0.040 inch.
    b. Surface: Smooth, flat finish.
    c. Exterior Finish: Three-coat fluoropolymer.
    d. Color: Match Architect's samples.

3. Clips: One-piece fixed to accommodate thermal movement.

    a. Material: 0.025-inch-thick, stainless-steel sheet.

4. Panel Coverage: 12 inches.
5. Panel Height: 1.75 inches.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.

B. Panel Fasteners: Self-tapping screws designed to withstand design loads.

C. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types

indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 074643 – COMPOSITE SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Composite siding
2. Metal sub-framing, siding attachment clips and accessories.

B. Related Sections:

1. Division 01 Section "Alternates" for administrative and procedural requirements for alternates Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, grounds, nailers, and blocking.
2. Division 06 Section "Sheathing" for wall sheathing.
3. Division 06 Section "Weather Barriers" for weather-resistive barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: For composite siding including related accessories.

C. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- long-by-actual-width Sample of composite siding.
2. 24-inch- wide-by-36-inch- high Sample panel of composite siding assembled on plywood backing.
3. 12-inch- long-by-actual-width Samples of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified vinyl siding Installer.

B. Product Certificates: For each type of composite siding, from manufacturer.

C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of composite siding and related accessories to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of composite siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain each type, color, texture, and pattern of composite siding, including related accessories, from single source from single manufacturer.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockups for composite siding including accessories.

a. Size: 48 inches long by 60 inches high.
b. Include outside corner on one end of mockup and inside corner on other end.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.9 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.10 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace composite siding that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the structural failures (including cracking)
2. Warranty Period: 10 years from date of receipt by the customer that the goods are ready.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Product: Subject to compliance with requirements, provide “Modulatus Q20410” manufactured by WoodN Industries. Subject to compliance with requirements, provide a comparable approved product.

2.2 COMPOSITE SIDING

A. Exterior Grade Wood Composite Panels: Exterior grade, UV and weather resistant composite plank cladding for exterior use with no painting, staining or maintenance required. Made from natural recycled plant materials, joined with thermoplastic polymer (PVC) in homogeneous extruded compound without the use of volatile substances.

1. Color: #10 Bogota Coffee.
2. Finish: Rough.
3. Panel Profiles/System Options: Q20410.
4. Panel Dimensions: Q20410, 8.03 inches by 6 feet, 7 inches by 3/8 inch.
5. Dimensional Tolerances: Length ± 2 mm. Thickness ±0.55 mm (10 mm tick panel).
6. Weight: Q20410 (1.3 lbs/ft).
7. Surface Burning Characteristics: Q20410 ASTM E84 Class A. Report on surface burning characteristics determined by ASTM E84 (twenty-five foot tunnel furnace test method) Fire Rated (F) panel meets class A, flame spread index 0 - 25 and a smoke developed index of 0 – 450.
8. Resistance to accelerated aging according to UNI norms EN ISO 4892-2:2009 and EN 20105-A02:1996. 3,600 hours of exposure. Grey Scale results (comparing to samples aged for 1200 hours) = 4/5 rating (4 rating for colors 10 and 13)

2.3 ACCESSORIES

A. Provide Trim, gaskets, fasteners and other related accessories recommended by the manufacturer to provide a complete system.

B. Sub-Framing and Fasteners: Provide sub-framing component and fasteners by manufacture or approved by manufacture.

2.4 FABRICATION

A. Fabricate composite panels and accessory items in accordance with manufacturer’s recommendations and approved submittals.

B. Fabricate panels to sizes indicated.

C. Flashing: Provide aluminum flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Siliconized polyester coating.

D. Fasteners: As recommended by manufacturer; stainless-steel

1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Examine alignment of backup structure prior to installing sub-frame. Do not proceed until all defects are corrected.

3.3 INSTALLATION

A. General: Comply with composite siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.
2. Install fasteners for horizontal composite siding no more than 24 inches o.c.

B. Attachment system: Hidden fastening system with hanger system as per manufacturer’s system details.

C. Fasten solid exterior wall panels to supporting substrate with fasteners approved for use with adjoining construction.

D. Accessory Items: Install corner profiles, gaskets and trim with fasteners and adhesive appropriate for use with adjoining constructions as indicated on drawings and as recommended by manufacturer.

3.4 PROTECTION

A. Protect installed product and finish surfaces from damage and stains (such as varnishing, dirty water or any kind of liquid) during construction. Do not use transparent films for protection.

3.5 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074643

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered, ethylene-propylene-diene-monomer (EPDM) roofing system.
2. Roof insulation.

B. Related Requirements:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
3. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
4. Division 22 Section for storm roof drains.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.

9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacings and patterns for mechanically fastened roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color required.
2. Walkway pads or rolls, of color required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of complying with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
3. Dynamic Puncture Resistance: Tested in accordance with ASTM D5635 of 20 joules.
4. Static Puncture Resistance: Tested in accordance with ASTM D120 of 19 lbf.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Tested by a qualified testing agency to resist uplift pressures as shown on structural drawings:

2.3 EPDM ROOFING

A. Fabric-Backed EPDM: ASTM D 4637, Type III, uniform, flexible EPDM sheet, laminated to a nonwoven polyester fabric backing except at selvages.

B. Basis-of-Design Product: Subject to compliance with requirements, provide “Sure-White Fleece Back EPDM Roofing” (nonreinforced) by Carlisle SynTec Incorporated or approved equal.

1. Composite Thickness: 115 mils, nominal.
2. Exposed Face Color: White on black.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55- to 60-mil- thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.

D. Bonding Adhesive: Manufacturer's standard cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.

E. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 3-inch- wide minimum, butyl splice tape with release film.

F. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

G. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

H. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

I. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

J. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.

K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

1. Provide white flashing accessories for white EPDM membrane roofing.

2.5 SUBSTRATE BOARDS

A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch thick.

1. Acceptable Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corporation; GlasRoc Sheathing.
b. Georgia-Pacific Corporation; Dens Deck.
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
d. USG Corporation; Securock Glass Mat Roof Board.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate panel to roof deck.

2.6 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. minimum density, square edged.

1. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Corporation.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.
2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
3. Full-spread spray-applied, low-rise, two-component urethane adhesive.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Global's "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
3. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
4. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
2. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere fabric-backed roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. Fabric-Backed Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

1. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

H. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

I. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

J. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

K. Adhere protection sheet over membrane roofing at locations indicated.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
2. Flood each area for 48 hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 075323

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge drainage systems.

B. Related Sections:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Submittals: Product Data, Shop Drawings, and color Samples.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: Smooth, flat finish.
2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
    b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 COPINGS

A. Copings: Manufactured coping system consisting of straight formed-metal coping caps. Provide concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

1. Basis-of-Design Product: Subject to compliance with requirements, provide coping covers by Hickman Company, W.P. or comparable product by one of the following:

    a. ATAS International, Inc.
    b. Cheney Flashing Company.
    c. Petersen Aluminum Corporation.

2. Coping-Cap Material: Formed aluminum as follows:

   a. Back, Front and Tops at Straight Sections: 0.063 inch thick.
   b. Finish: Fluoropolymer (2 coat) finish matching metal panels at fascia.

3. Fabrication: Factory mitered and continuously welded.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
5. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
6. Face Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.6 ROOF-EDGE DRAINAGE SYSTEMS

A. Gutters: Manufactured in uniform section lengths, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish expansion joints, and expansion-joint covers.

1. Gutter Style: Rectangular.
2. Aluminum: 0.040 inch thick.

   a. Gutter Supports: Gutter brackets with finish matching the gutters.

B. Downspouts: Plain rectangular with smooth curved elbows. Furnish wall brackets of same material and finish as downspouts, with anchors.

1. Formed Aluminum: 0.040 inch thick.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Formed Aluminum: 0.032 inch thick.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim.

1. Formed Aluminum: 0.032 inch thick.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Aluminum Sheet and Extrusion Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with elastomeric sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.4 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.5 ROOF-EDGE DRAINAGE SYSTEM INSTALLATION

A. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 12 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

B. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

C. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal or solder exterior wall scupper flanges into back of conductor head.

D. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.6 CLEANING AND PROTECTION

A. Clean and neutralize flux materials. Clean off excess solder and sealants.

B. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

C. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Roof hatches.
3. Preformed flashing sleeves.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
3. Division 07 Section "Roof Specialties" for manufactured fasciae, copings, gutters and downspouts, and counterflashing.
4. Division 23 Section "HVAC Power Ventilators" for power roof-mounted ventilators.
5. Division 23 Section "Packaged, Outdoor, Central-Station Air-Handling Units" for standard curbs specified with rooftop units.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, 0.064 inch thick.

1. Finish: Two-coat fluoropolymer.
2. Color: As selected by Architect from manufacturer's full range.

D. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
3. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange.
4. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
5. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Babcock-Davis.
b. Bilco Company (The).
c. JL Industries, Inc.; a division of the Activar Construction Products Group.
d. Milcor; Commercial Products Group of Hart & Cooley, Inc.
e. O'Keeffe's Inc.

B. Type and Size: Single-leaf lid, 30 by 36 inches.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Zinc-coated (galvanized) steel sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated.

2. Finish: Two-coat fluoropolymer.
3. Color: As selected by Architect from manufacturer's full range.

E. Construction:

1. Insulation: Cellulosic-fiber board.

a. R-Value: 12.0 according to ASTM C 1363.

2. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.

F. Hardware: Spring operators, hold-open arm, galvanized-steel spring latch with turn handles, galvanized-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

2.4 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and slotted metal collar.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Custom Solution Roof and Metal Products.
b. Menzies Metal Products.
c. Thaler Metal Industries Ltd.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Diameter: As indicated on Drawings.
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Custom Solution Roof and Metal Products.
b. Menzies Metal Products.
c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
d. Thaler Metal Industries Ltd.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Height: 7 inches.
4. Diameter: As indicated on Drawings.
5. Finish: Manufacturer's standard.

2.5 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation.

1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

B. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.

a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

C. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

D. Stainless-Steel Sheet and Shapes: ASTM A 240or ASTM A 666, Type 304.

E. Steel Shapes: ASTM A 36, hot-dip galvanized according to ASTM A 123unless otherwise indicated.

F. Steel Tube: ASTM A 500, round tube.

G. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123.

H. Steel Pipe: ASTM A 53, galvanized.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.

C. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Underlayment:

1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with

release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
6. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 or ASTM F 2329.
7. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
8. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

E. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.

F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Clean exposed surfaces according to manufacturer's written instructions.

C. Clean off excess sealants.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077253 - SNOW GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMAWRY

A. Section Includes:

1. Rail-type, seam-mounted snow guards.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for snow guards.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Structural Performance:

1. Snow Loads: As indicated on Drawings.

2.2 RAIL-TYPE SNOW GUARDS

A. Seam-Mounted, Rail-Type Snow Guards:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. S-5! Attachment Solutions; Metal Roof Innovations, Ltd.
    b. Sno-Gem, Inc.
    c. Snow Management Systems.
    d. Tra Snow and Sun, Inc.
2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with one rail.
3. Material and Finish: Aluminum; clear anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare substrates for bonding snow guards.

B. Prime substrates according to snow guard manufacturer's written instructions.

3.3 INSTALLATION

A. Install snow guards according to manufacturer's written instructions.

B. Attachment for Standing-Seam Metal Roofing:

1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.
2. Seam-Mounted, Rail-Type Snow Guards: Stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.

END OF SECTION 077253

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Sections:

1. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction and in smoke barriers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. 3M Fire Protection Products.
6. Tremco, Inc.; Tremco Fire Protection Systems Group.
7. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls fire-barrier walls smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration

firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-wool-fiber or rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Sections:

1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

B. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:

a. Fire-resistive joint system products bear classification marking of qualified testing agency.
b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

1) UL in its "Fire Resistance Directory."

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-

resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
3. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. A/D Fire Protection Systems Inc.
    b. CEMCO.
    c. Grace Construction Products.
    d. Hilti, Inc.
    e. Johns Manville.
    f. Nelson Firestop Products.
    g. NUCO Inc.
    h. Specified Technologies Inc.
    i. 3M Fire Protection Products.
    j. Tremco, Inc.; Tremco Fire Protection Systems Group.
    k. USG Corporation.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
2. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. A/D Fire Protection Systems Inc.
    b. Grace Construction Products.
    c. Hilti, Inc.
    d. Johns Manville.
    e. Nelson Firestop Products.
    f. 3M Fire Protection Products.
    g. Tremco, Inc.; Tremco Fire Protection Systems Group.
    h. USG Corporation.

D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Acoustical joint sealants.

B. Related Sections:

1. Division 07 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
2. Division 08 Section "Glazing" for glazing sealants.
3. Division 09 Section "Gypsum Board" for sealing perimeter joints.
4. Division 09 Section "Tiling" for sealing tile joints.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

F. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

G. Field-Adhesion Test Reports: For each sealant application tested.

H. Warranties: Sample of special warranties.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

    a. Dow Corning Corporation; 799.
    b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
    c. Polymeric Systems, Inc.; PSI-631.
    d. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.

B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

2.3 URETHANE JOINT SEALANTS

A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems; Sonolastic NP1.
    b. Bostik, Inc.; Chem-Calk 900.
    c. Pecora Corporation; Dynatrol I-XL.
    d. Sika Corporation, Construction Products Division; Sikaflex - 1a.
    e. Tremco Incorporated; Dymonic, Vulkem 116.

B. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 25, for Use T.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems; Sonolastic NP1.
    b. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II.
    c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
    d. Tremco Incorporated; Vulkem 116.

C. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.

2.4 POLYSULFIDE JOINT SEALANTS

A. Single-Component, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

2.5 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems; Sonolac.
    b. Bostik, Inc.; Chem-Calk 600.
    c. Pecora Corporation; AC-20+.
    d. Tremco Incorporated; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.7 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Masonry.
c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads

of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

    a. Construction joints in and joints between existing stucco and EIFS panels.
    b. Joints between different materials listed above.
    c. Perimeter joints between materials listed above and frames of doors windows and louvers.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 25**.**
3. Urethane Joint Sealant: Single component, nonsag, Class 50.
4. Polysulfide Joint Sealant: Single component, nonsag.
5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Perimeter joints of exterior openings where indicated.
b. Tile control and expansion joints.
c. Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.

2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

a. Acoustical joints where indicated.
b. Other joints as indicated.

2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections:

1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
2. Division 09 Sections "Interior Painting" for field painting hollow metal doors and frames.
3. Division 16 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.

E. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Frame Anchors: ASTM A 591/, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Glazing: Comply with requirements in Division 08 Section "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.2 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg. F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Vertical Edges for Single-Acting Doors: Beveled edge.

a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.3 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.
5. Frames for Borrowed Lights: 0.042-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.6 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

    c. Compression Type: Not less than two anchors in each jamb.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

2.9 Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames" for door frames.
2. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
    a. Provide samples for each species of veneer and solid lumber required.
    b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

E. Warranty: Sample of special warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for factory finished flush wood doors includes "Graham" wood doors distributed by Assa Abloy. Subject to compliance with requirements, provide flush wood doors manufactured by the Basis of Design manufacturer or approved equal.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

B. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, made with binder containing no urea-formaldehyde resin.
2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

3. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

C. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH (WD1)

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.
2. Species and Cut: Cherry (Basis of Design #850); plain sliced (flat sliced).
3. Match between Veneer Leaves: Book match.
4. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
5. Exposed Vertical Edges: Same species as faces or a compatible species.
6. Core: Particleboard.
7. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
8. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

C. Transparent Finish: WD-1 refer to Finish Schedule.

1. Grade: Premium.
2. Finish: AWI conversion varnish system.
3. Staining: Refer to Finish Schedule.
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.

2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Insulated service doors.
2. Counter doors.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Curtain Slats: 12 inches long.
2. Hood: 6 inches square.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Door Curtain Material: Galvanized steel sheet thickness of 0.025 inch and as required to meet requirements.
2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Endlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

D. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

E. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

F. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that project beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Hood: Match curtain material and finish
2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.3 COUNTER DOORS

A. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:

1. Stainless Steel: 0.062-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Metal Sill for Counter Door: Fabricate sills as integral part of frame assembly of Type 304 stainless steel in manufacturer's standard thickness with No. 4 finish.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Provide Three for each cylinder.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

1. At door head, use 1/8-inch- thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.

2.6 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics: Manufacturer’s standard assembly; ¾ horse power.
2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

H. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.8 DOOR ASSEMBLY

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide “Wind-Tite” Weather Sealed Rolling Service Door by Alpine Overhead Doors, Inc. or approved equal.

B. Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

C. Operation Cycles: Not less than 10,000.

1. Include tamperproof cycle counter.

D. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu.

E. Door Curtain Material: Stainless steel.

F. Door Curtain Slats: Flat profile slats of 1-1/4-inch (counter doors) 2-3/4-inch (service doors) center-to-center height.

G. Curtain Jamb Guides: with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

H. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

I. Integral Frame, Hood, and Fascia for Counter Door: Stainless steel.

1. Mounting: As shown on Drawings.

J. Sill Configuration for Counter Door: No sill.

K. Locking Devices: Equip door with locking device assembly and chain lock keeper.

1. Locking Device Assembly: Single-jamb side locking bars, operable from inside and outside with cylinders.

L. Electric Door Operator:

1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Location: Top of hood or front of hood as shown on Drawings.
3. Motor Exposure: Interior.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic photoelectric sensor.

    a. Sensor Edge Bulb Color: Black.

6. Remote-Control Station: As directed or where shown on Drawings.

M. Door Finish:
1. Powder-Coated Finish: Color as selected by Architect from manufacturer's full range
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Fire-Rated Doors: Install according to NFPA 80.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 083326 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Open-curtain overhead coiling grilles.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Open-Curtain Grille: 18-inch- square assembly with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
2. Hood: 6 inches square.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

1. Stainless-Steel Grille Curtain: ASTM A 666, Type 300 series.

B. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

C. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.

1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
2. Provide motor-operated grilles with combination bottom astragal and sensor edge.

D. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.2 HOODS AND ACCESSORIES

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Stainless Steel: 0.025-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

2.3 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 ELECTRIC GRILLE OPERATORS

A. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.

C. Grille Operator Location(s): Operator location indicated for each grille.

1. Top-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on top of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
2. Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics: Manufacturer's standard.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized grille with indicated external automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

G. Emergency Manual Operation: Equip each electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed 25 lbf.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for ADA-ABA-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive upon return of handle to original position.

J. Self-Opening Mechanism: Automatic release mechanism triggered by smoke detector, fire alarm or power failure. When activated, the grille self opens by means of a fail-safe operator to the fully open position without the need of power operation or battery backup systems. When the alarm is cleared and power is restored, the grille will operate normally.

2.6 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.

B. Operation Cycles: Not less than 10,000.

1. Include tamperproof cycle counter.

C. Grille Curtain Material: Stainless steel.

1. Space rods at approximately 1-1/2 inches o.c.
2. Space links approximately 3 inches apart in a straight in-line pattern.
3. Spacers: Metal tubes matching curtain material.

D. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

E. Hood: Match curtain material and finish.

1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

F. Locking Devices: Equip grille with locking device assembly and chain lock keeper.

G. Electric Grille Operator:

1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Location: Top of hood or front of hood as shown on Drawings.
3. Motor Exposure: Interior.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic photoelectric sensor or manufacturer's standard**.**

a. Sensor Edge Bulb Color: Black.

6. Remote-Control Station: Where shown on Drawings.
7. Other Equipment: Emergency-egress release.

H. Grille Finish:

1. Stainless-Steel Finish: No. 2B (bright, cold rolled).

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.

C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 083326

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Exterior and interior manual-swing entrance doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Water penetration through fixed glazing and framing areas.
d. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.

c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

a. Operable Units: Provide a minimum 1/16-inchclearance between framing members and operable units.

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 Insert number percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

2. Entrance Doors:

a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than0.40 as determined according to NFRC 200.

3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for aluminum framed entrances and storefronts is the "451" and "451T" system manufactured by Kwaneer. Subject to compliance with requirements, provide the Basis of Design or approved equal.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken and Nonthermal.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front (thermally broken), center (nonthermal).
4. Finish: High-performance organic finish.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429.
d. Structural Profiles: ASTM B 308.

2.4 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Medium stile; 3-1/2-inch nominal width.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

2.6 GLAZING

A. Glazing: Comply with Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. Color: Match structural sealant.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-milthickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. System Installation: Comply with the following and Division 08 Section ‘Glazing.”

1. Thermally Broken: Install at exterior locations with GL1.
2. Nonthermal: Install at interior locations with GL2.

C. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades.

F. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

G. Install glazing as specified in Division 08 Section "Glazing."

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION 084113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes aluminum windows for exterior locations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

B. Field quality-control reports.

C. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Deterioration of materials and finishes beyond normal weathering.
d. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.
c. Aluminum Finish: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Series 1200 Fixed Window by Oldcastle Building Envelope or comparable product by one of the following:

1. EFCO Corporation; a Pella company.
2. Graham Architectural Products Corp.
3. Kawneer North America; an Alcoa company.
4. Mannix Exterior Wall Systems, Inc.
5. TRACO.
6. Wausau Window and Wall Systems.
7. YKK AP America Inc.

B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: AW.
2. Minimum Performance Grade: 50.

2.3 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Fixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

C. Insulating-Glass Units: ASTM E 2190, certified through IGCC as complying with requirements of IGCC.

1. Glass: ASTM C 1036, Type 1, Class 1, q3.

a. Tint: Blue.

2. Lites: Two.
3. Low-E Coating: Pyrolytic on second surface.

D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Fasteners: Noncorrosive and compatible with window members, trim, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from full range of industry colors and color densities, to match other exterior metal framing finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
2. Air-Infiltration Testing:

    a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
    b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

    a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
    b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Remove and replace noncomplying windows and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.

B. Related Sections:

1. Division 6: Rough Carpentry.
2. Division 8: Aluminum Doors and Frames
3. Division 8: Hollow Metal Doors and Frames.
4. Division 8: Wood Doors.
5. Division 26 Electrical
6. Division 28: Electronic Security

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 -Fire Doors and Windows
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
8. ICC – International Building Code

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

1.2 SUBSTITUTIONS:

A. Comply with Division 1.

1.3 SUBMITTALS:

A. Comply with Division 1.

B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.

C. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.
3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
4. Submit 6 copies of catalog cuts with hardware schedule.

D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.

1. List groups and suffixes in proper sequence.
2. Completely describe door and list architectural door number.
3. Manufacturer, product name, and catalog number.
4. Function, type, and style.
5. Size and finish of each item.
6. Mounting heights.
7. Explanation of abbreviations and symbols used within schedule.
8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.

E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

F. Samples: (If requested by the Architect)

1. 1 sample of Lever and Rose/Escutcheon design, (pair).
2. 3 samples of metal finishes

G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.

1. Operating and maintenance manuals: Submit 3 sets containing the following.

    a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Name, address, and phone number of local representative for each manufacturer.
    d. Parts list for each product.

2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed “Wiring Diagrams” for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years' experience in the distribution of commercial hardware.

a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
b. Hardware Schedule shall be prepared and signed by an AHC.

4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.

a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

A. Refer to Conditions of the Contract

B. Special Manufacturer's Warranty:

1. Closers: Thirty years
2. Exit Devices: Five Years
3. Locksets & Cylinders: Ten years
4. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.

1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.

B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

Item:	Manufacturer:
Hinges	Ives
Continuous Hinges, Overhead Stops	ABH
Power Transfers	ABH
Grade 1Locksets	Schlage
Cylinders	Schlage
Exit Devices	Von Duprin
Card Readers	AptiQ
Credentials	AptiQ
Aluminum Door Hardware	Adams Rite
Closers & Automatic Operators	LCN
Custom Pulls	Elmes
Power Supplies	Von Duprin
Push Pull Plates	Ives & Elmes
Push/Pull Bars	Ives
Protection Plates	Ives & Elmes
Door Stops, Flush Bolts	Ives & Elmes
Threshold & Gasketing	Reese
Key Cabinet	Telkee

2.2 MATERIALS:

A. Hinges: Shall be Concealed Bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Equip with easily seated, non-rising pins.
5. Non Removable Pin screws shall be slotted stainless steel screws.
6. Bearing assembly is to be installed after plating.
7. Sufficient size to allow 180-degree swing of door
8. Provide hinge type as listed in schedule.
9. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
10. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
11. UL10C listed for Fire rated doors.

B. Continuous Hinges:

1. Certified by BHMA for ANSI A156.26, Grade 1
2. UL and ULC listed for fire-rated 4’ x 8’ single doors and 8’ x 8’ pairs up to 3 hour.
3. 32 bearings located 3” on center. (For 83” hinge)
4. Limited Lifetime warranty

C. Cylindrical Type Locks and Latch sets:

1. Tested and approved by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty, and be UL10C listed.
2. Fit modified ANSI A115.2 door preparation.
3. Locksets to have anti-rotational studs that are thru-bolted
4. Keyed lever shall not have exposed “keeper” hole
5. Each lever to have independent spring mechanism controlling it
6. 2-3/4 inch (70 mm) backset
7. 1/2 inch throw latch bolt
8. Provide sufficient curved strike lip to protect door trim
9. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy
10. Threaded inside and outside rose assembly adjustable for door thickness without removing keyed lever.
11. Locksets outside locked lever must withstand minimum 1000 inch pounds of torque.
12. Functions and design as indicated in the hardware groups.
13. Tested and approved by ANSI A156.5, Operational Grade 1,
14. Fit modified ANSI A115.3 door preparation
15. 2-3/4 inch (70mm) backset, or 2 3/8 inch backset as needed
16. 1 inch throw deadbolt

D. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.

E. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Conform to ANSI 156.4
4. non-ferrous cover
5. Separate adjusting valves for closing and latching speed, and back check
6. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
7. Full rack and pinion type closer
8. Mount closers **on non-public side of door**, unless otherwise noted in specification
9. Closers shall be non-handed, non-sized and multi-sized.

F. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.

1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
2. Provide fastener suitable for wall construction.
3. Coordinate reinforcement of walls where wall stop is specified.
4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered

G. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.
1. Surface overhead stops shall be heavy duty bronze or stainless steel.

H. Push Plates: Provide with four beveled edges ANSI J301, .050 thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.

I. Pulls with plates: Provide with four beveled edges ANSI J301, .050 thickness Plate s with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.

J. Push Pull Bars: Provide ANSI J504, .1” Dia. Pull and push bar model and series as listed in hardware set. Provide proper fasteners for door construction.

K. Kick plates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

L. Door Bolts: Flush bolts for wood or metal doors.

1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

M. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

N. Weather stripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weather strip is used with parallel arm mounted closers install weather strip first.

1. Weather strip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
2. UL10C Positive Pressure rated seal set when required.

O. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.

1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
2. UL10C Positive Pressure rated seal set when required.

P. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

Q. Provide one wall mounted Telkee, series key cabinet complete with hooks, index and tags to accommodate 50% expansion. Coordinate mounting location with architect.

R. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.

2.3 FINISH:

A. Designations used in Schedule of Finish Hardware - 3.5, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products. ***Please note some of the hardware on the Main Level is to be provided in Black as noted in the Hardware Sets.***

B. Powder coat door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING:

A. Provide construction keying with all Brass Cores during the construction period. Permanent keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

B. Cylinders: Schlage FSIC Primus XP 6-pin.

C. Transmit Master keys and other Security keys to hardware supplier.

D. Furnish keys in the following quantities:

1. 3 each Master keys
2. 3 each Change keys each keyed core
3. 3 each Construction master keys

E. Keying Schedule: Arrange for a keying meeting, with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements. Furnish 3 typed copies of keying schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).

2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION:

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Conform to local governing agency security ordinance.

C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.

1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.

1. Check and adjust closers to ensure proper operation.

2. Check latch set, lockset, and exit devices are properly installed and adjusted to ensure proper operation.

a. Verify levers are free from binding.
b. Ensure latch bolts and dead bolts are engaged into strike and hardware is functioning.

3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

Code	**Name**
AB	ABH Manufacturing

AR	Adams Rite
BY	By Others
EL	Elmes
IV	Ives
LC	LCN
RS	Reese Enterprises Inc.
SC	Schlage
SE	Schlage Electronics
TE	Telkee
VD	Von Duprin
AP	AptiQ
VB	Vanderbilt

Finish List

Code	Description
622	Black
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
652	Satin Chromium Plated
711	Black
GR	Grey
PCBMF	Powder Coat Black Matte Finish
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

Option List

Code	Description
B4E	Beveled 4 Edges
NRP	NON Removable Pin Hinge
CSK	Counter Sunk Screws

Hardware Sets

SET # 1 Door # LO1

3 Hinges	3-CB-1HW-4.5x4.5-NRP	652	IV
1 Classroom Lock	ND70-TD RHO	626	SC
1 Core	20-740-XP	626	SC
1 Closer	4040XP	689	LC
1 Floor Stop	FS438	626	IV
3 Silencers	SR64	GR	IV

SET # 2 Door # LO2, L10,

3 Hinges	3-CB-1HW-4.5x4.5-NRP	652	IV
1 Electrified Lock	ND96-DEL-TD RHO-RX	626	SC
1 Core	20-740-XP	626	SC
1 Closer	4040XP-Cush	689	LC
1 Door position switch	679-05HM		SE

1	Card Reader	MT-15	BLK	AP
1	Power Transfer	PT1000	628	AB
1	Power Supply	PS902		VD
1	Kick Plate	8400-10”-B4E-CSK-2” LDW	630	IV
3	Silencers	SR64	GR	IV

SET # 3 Door # LO4, L05

3	Hinges	3-CB-1HW-4.5x4.5	652	IV
1	Push Plate	8200 4x16	630	IV
1	Pull Plate	8305 4x16 10” CTC	630	IV
1	Closer	4040XPx62PA	AL	LC
1	Wall Stop	WS407CVX	626	IV
1	Kick Plate	8400-10”-B4E-CSK-1” LDW	630	IV
3	Silencers	SR64	GR	IV

SET # 4 Door # LO6A, LO8, LO9, 110

3	Hinges	3-CB-1HW-4.5x4.5	652	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Wall Stop	WS407CVX	626	IV
3	Silencers	SR64	GR	IV

SET # 5 Door # LO6B, LO7B, LO7C, 107A, 119B

1	Cylinder	To Suit	626	SC

Note: Balance of hardware is to be provided by roll up door or grille manufacturer. BY

SET # 6 Door # LO7A, LO7D

1	Continuous Hinge	A110HD	628	AB
1	Exit Device	RX-QEL98NL	630	VD
1	Rim Cylinder	20-079	626	SC
1	Mortise Cylinder	20-763 (For Cylinder dogging)	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-S Cush	689	LC
1	Door position switch	679-05HM		SE
1	Card Reader	MT-15	BLK	AP
1	Power Transfer	PT1000	628	AB
1	Power Supply	PS902FA-2RS		VD

1	Extended Rain Drip	R201A	AL	RS
1	Set Weather Strip	775A Head & Jambs	AL	RS
1	Rain Drip/Sweep	354A	AL	RS
1	Threshold	S483A	AL	RS

SET # 7 Door # L11, 111

3	Hinges	3-CB-1HW-4.5x4.5-NRP	652	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Wall Stop	WS407CVX	626	IV
3	Silencers	SR64	GR	IV

SET # 8 (Fire Rated) Door # L12, L13A

3	Hinges	3-CB-1HW-4.5x4.5-NRP	652	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-S Cush	689	LC
1	Set Seals	F797 Head & Jambs	BLK	RS

SET # 9 (Fire Rated) Door # L13B

6	Hinges	3-CB-1HW-4.5 x 4.5-NRP	652	IV
1	Pair Flush Bolts	FB458	626	IV
1	Dust Proof Strike	DP2	626	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-Cush	689	LC
1	Set Seals	F797 Head & Jambs	BLK	RS
1	Astragal	183Cx797B	SP	RS

SET # 10 Door # L14, L17

6	Hinges	3-CB-1HW-4.5 x 4.5-NRP	652	IV
1	Pair Flush Bolts	FB458	626	IV
1	Dust Proof Strike	DP2	626	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
2	Overhead Stops	4424630	AB	

2	Silencers	SR64	GR	IV

SET # 11 Door # L15A, L15B

6	Hinges	3-CB-1HW-4.5 x 4.5	652	IV
1	Pair Flush Bolts	FB458	626	IV
1	Dust Proof Strike	DP2	626	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
2	Overhead Stops	4424-AJB	630	AB
2	Silencers	SR64	GR	IV

SET # 12 Door # L16

1	Continuous Hinge	A110HDPT (Active Leaf)	628	AB
1	Continuous Hinge	A110HDPT	628	AB
1	Exit Device	RX-QEL9849NL (Active Leaf)	630	VD
1	Exit Device	RX-9849EO	630	VD
1	Rim Cylinder	20-079	626	SC
1	Core	20-740-XP	626	SC
2	Closer	4040XP-H-Cush	689	LC
2	Door position switch	679-05HM		SE
1	Card Reader	MT15	BLK	AP
1	Power Transfer	PT1000	628	AB
1	Power Supply	PS902FA-RS2		VD
1	Extended Rain Drip	R201A	AL	RS
1	Set Weather Strip	775A Head & Jambs	AL	RS
2	Rain Drip/Sweep	354A	AL	RS
1	Threshold	S483A	AL	RS

SET # 13 Door # L18

3	Hinges	3-CB-1HW-4.5 x 4.5	652	IV
1	Exit Device	98L-06	630	VD
1	Rim Cylinder	20-079	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-62PA	689	LC
1	Wall Stop	WS407CVX	626	IV
3	Silencers	SR64	GR	IV

SET # 14 Door # L19, 109

3	Hinges	3-CB-1HW-4.5x4.5	652	IV
1	Office Lock	ND50-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Wall Stop	WS407CCV	626	IV
3	Silencers	SR64	GR	IV

SET # 15 (Fire Rated) Door # L20

3	Hinges	3-CB-1HW-4.5x4.5	652	IV
1	Exit Device	98LF-BE-06	630	VD
1	Closer	4040XP	689	LC
1	Wall Stop	WS407CVX	626	IV
1	Set Seals	F797 Head & Jambs	BLK	RS

SET # 16 Door # L21

3	Hinges	3-CB-1-4.5x4.5	652	IV
1	Privacy Latch	ND40S RHO	626	SC
1	Wall Stop	WS407CCV	626	IV
1	Mop Plate	8400-4”-B4E-CSK-1” LDW	630	IV
3	Silencers	SR64	GR	IV

SET # 17 Door # L22, L23

3	Hinges	3-CB-1-4.5x4.5	652	IV
1	Passage Latch	ND10S RHO	626	SC
1	Wall Stop	WS407CCV	626	IV
3	Silencers	SR64	GR	IV

SET # 18 Door # 116A

2	Pivot Sets	0117PCBMF	AB	
4	Intermediate pivots	019	PCBMF	AB
1	Exit Device	CD3549A-NL Less Pull (Active Leaf)	315	VD
1	Exit Device	CD3549-EO	315	VD
2	Pulls	T3004-01-061-L94” Single Mounted	BLK	EL
1	Rim Cylinder	20-079	622	SC
2	Mortise Cylinders	20-763	BLK	SC

3 Cores	20-740-XP	BLK	SC
2 Concealed Closers	5032-ST2714	693	LC
2 Overhead Stops	1023PCBMF	AB	
1 Threshold	S483D	DB	RS

Note: Minimum stile width required is 2 1/8” wide to accommodate the exit device.

Balance of hardware by Door manufacturer

SET # 18A Door # 100, 101B, 112B, 116F

2 Pivot Sets	0117PCBMF	AB	
4 Intermediate pivots	019	PCBMF	AB
1 Exit Device	RX-QEL3549A-NL Less Pull (Active Leaf)	315	VD
1 Exit Device	RX-3549-EO	315	VD
2 Pulls	T3004-01-061-L94” Single Mounted	BLK	EL
1 Rim Cylinder	20-079	622	SC
1 Core	20-740-XP	BLK	SC
2 Concealed Closers	5032-ST2714	693	LC
2 Overhead Stops	1023PCBMF	AB	
1 Card Reader	MT11	BLK	AP
2 Door position switch	679-05HM		SE
2 Power Transfer	PT1000	PCBMF	AB
1 Power Supply	PS902FA-RS2		VD
1 Threshold	S483D	DB	RS

Note: Minimum stile width required is 2 1/8” wide to accommodate the exit device.

Balance of hardware by Door manufacturer

SET # 19 Door # 101A

2 Pivot Sets	0117PCBMF	AB	
4 Intermediate pivots	019	PCBMF	AB
4 Pulls	T3004-01-061-L94” Back to Back Mounted	BLK	EL
2 Concealed Closers	5032-ST2714	693	LC
2 Overhead Stops	1023PCBMF	AB	

Balance of hardware by Door manufacturer

SET # 20 Door # 102

4 Hinges	3-CB-1HW-4.5x4.5	693	IV
1 Store front Latch Lock	4710 1 1/8”	BLK	AR

2	Handles	4569335	AR	
1	Mortise Cylinder	20-060	622	SC
1	Core	20-740-XP	622	SC
1	Floor Stop	UT263-62-ALS	BLK	EL
3	Silencers	SR64	GR	IV

SET # 21 Door # 103

4	Hinges	3-CB-1-4.5x4.5	693	IV
1	Passage Latch	ND10S RHO	622	SC
1	Floor Stop	UT263-62-ALS	BLK	EL
3	Silencers	SR64	GR	IV

SET # 22 Door # 104

4	Hinges	3-CB-1HW-4.5x4.5	693	IV
1	Office Lock	ND50-TD RHO	622	SC
1	Core	20-740-XP	622	SC
1	Floor Stop	UT263-62-ALS	BLK	EL
3	Silencers	SR64	GR	IV

SET # 23 Door # 105, 106, 113, 115

3	Hinges	3-CB-1HW-4.5x4.5	693	IV
1	Push/Pull	T726-56-108	BLK	EL
1	Closer	4040XPx62PA	693	LC
1	Floor Stop	UT263-62-ALS	BLK	EL
1	Kick Plate	8400-10”-B4E-CSK-2” LDW (Plastic)	BLK	IV
1	Mop Plate	8400-4”-B4E-CSK-1” LDW (Plastic)	BLK	IV
3	Silencers	SR64	GR	IV

SET # 24 Door # 107B

1	Pivot Set	0117PCBMF	AB	
2	Intermediate pivots	019	PCBMF	AB
1	Exit Device	RX-QEL35A-NL-OP Less Pull	315	VD
1	Pull	T3004-01-061-L94” Single Mounted	BLK	EL
1	Rim Cylinder	20-079	622	SC

1	Mortise Cylinder	20-763	BLK	SC
1	Core	20-740-XP	BLK	SC
1	Automatic Operator	4642693	LC	
1	Actuator	8310-853 (Exterior)	630	LC
1	Actuator	8310-818 (Interior)	630	LC
1	Overhead Stop	1023PCBMF	AB	
1	Door position switch	679-05HM		SE
1	Card Reader	MT11	BLK	AP
1	Power Transfer	PT1000	PCBMF	AB
1	Power Supply	PS902FA-2RS		VD
1	Extended Rain Drip	R201D	DB	RS
1	Set Weather Strip	775D Head & Jambs	DB	RS
1	Rain Drip/Sweep	354D	DB	RS
1	Threshold	S483D	DB	RS

Note: Minimum stile width required is 1 ¾" wide to accommodate the exit device.

Balance of hardware by Door manufacturer

SET # 25 Door # 108

3	Hinges	3-CB-1HW-4.5x4.5-NRP	693	IV
1	Classroom Lock	ND70-TD RHO	622	SC
1	Core	20-740-XP	622	SC
1	Overhead Stop	4424PCBMF	AB	
3	Silencers	SR64	GR	IV

SET # 26 Door # 112A

1	Pivot Set	0117PCBMF	AB	
2	Intermediate pivots	019	PCBMF	AB
1	Deadlock	MS1850S 1 1/8"	BLK	AR
1	Mortise Cylinder	20-060	622	SC
1	Core	20-740-XP	622	SC
2	Pulls	T3004-01-061-L94" Back to Back Mounted	BLK	EL
1	Concealed Closer	5032-ST2714	693	LC
1	Overhead Stop	1023PCFB	AB	

SET # 27 Door # 114

3	Hinges	3-CB-1HW-4.5x4.5	693	IV
1	Storeroom Lock	ND80-TD RHO	622	SC

1	Core	20-740-XP	622	SC
1	Overhead Stop	4424PCBMF	AB	
3	Silencers	SR64	GR	IV

SET # 28 Door # 117A, 117B

1	Pivot Set	0128PCBMF	AB	
1	Concealed Closer	5032	693	LC
2	Push Plates	SP8-53-101	BLK	EL
2	Kick Plates	8400-16”-B4E-CSK-1” LDW (Plastic)	BLK	IV

Note: Double acting doors.

SET # 29 (Fire Rated) Door # 118

4	Hinges	3-CB-1 HW-4.5 x 4.5	652	IV
1	Exit Device	98L-F-BE-06	630	VD
1	Rim Cylinder	20-079	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP	689	LC
1	Wall Stop	WS407CVX	626	IV
1	Kick Plate	8400-10”-B4E-CSK-2” LDW	630	IV
1	Set Seals	F797B	BL	RS

T # 30 Door # 119A

3	Hinges	3-CB-1HW-4.5 x 4.5	630	IV
1	Exit Device	RX-QEL98NL	630	VD
1	Rim Cylinder	20-079	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-SCush	689	LC
1	Door position switch	679-05HM		SE
1	Card Reader	MT11	BLK	AP
1	Power Transfer	PT1000	628	AB
1	Power Supply	PS902FA-2RS		VD
1	Extended Rain Drip	R201A	AL	RS
1	Set Weather Strip	775A Head & Jambs	AL	RS
1	Rain Drip/Sweep	354A	AL	RS
1	Threshold	S483A	AL	RS

SET # 31 Door # 119C

3	Hinges	3-CB-1HW-5x4.5-NRP	630	IV
1	Storeroom Lock	ND80-TD RHO	626	SC
1	Core	20-740-XP	626	SC
1	Closer	4040XP-S Cush	689	LC
1	Lock Guard	LG12	630	IV
1	Extended Rain Drip	R201A	AL	RS
1	Set Weather Strip	775A Head & Jambs	AL	RS
1	Rain Drip/Sweep	354A	AL	RS
1	Threshold	S483A	AL	RS

SET # 32

1	Access control unit	VBB-Bright Blue	VB
9	Reader Interface	VBB-RI	VB
1	Power Supply	PS904-8P-FA	VD
200	Access Cards	9520 Mifare cards	AP

SET # 33

1	Key Cabinet	Telcore TCR-123S Complete System	TE

END OF SECTION

Specification texts

Credentials
9520 2.5k bit ISO MIFARE Smart Card

a. Access cards shall be used with access readers to gain entry to access control portals (e.g. doors, gates, turnstiles) and to hold information specific to the user.
b. The card shall function at 13.56 MHz.
c. Presentation to the access control reader at any angle within a minimum distance of one half (1/2) inch shall result in an accurate reading of the card.
d. The card shall have a read range of up to 4 inches.
e. The card shall be compatible with aptiQ, XceedID, and Schlage smart card readers.
f. The card shall be made of a composite material for added durability.
g. The card shall have open memory architecture.
h. The card shall be GSC-IS® certified.
i. The card shall have an ISO MIFARE microprocessor.
j. The card shall have a passive design, requiring no batteries.
k. The card shall have 2.5k bits of memory.
l. The card shall be ISO14443 compliant.

Refer to Division 28 Section, “Electronic Access Control” for access control system

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior glazed wall panels.
4. Storefront framing.
5. Glazed entrances.
6. Interior borrowed lites.

B. Related Sections:
1. Division 08 Sections "Hollow Metal Doors and Frames" for glass panels in metal doors.
2. Division 08 Section "Aluminum-Framed Entrances and Storefronts" and “Interior Frames” for exterior and interior glazed frames.
3. Division 08 Sections "Aluminum Windows".

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As indicated on Structural Drawings.

2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Structural Drawings.
    b. Basic Wind Speed: 100 mph.
    c. Importance Factor: As indicated on Structural Drawings.
    d. Exposure Category: B.

3. Design Snow Loads: As indicated on Drawings.
4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass the following products; 12 inches square.

1. Coated glass.
2. Insulating glass.
3. Wall panel glass.

C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturers of insulating-glass units with sputter-coated, low-e coatings glass testing agency and sealant testing agency.

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain tinted float glass coated float glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE SYSTEM FABRICATORS

A. Basis-of-Design Fabricators: The contract documents include following Basis-of-Design fabricators. Subject to compliance with requirements, provide the named manufacturer or an approved comparable manufacturer.

1. Glazed Exterior Storefronts and Windows: The glass for glazed exterior storefronts and windows is based on “Solarban 70XL” by PPG Industries, Inc.
2. Interior Glazed Wall Panels: Interior wall panel glass is based on “Infinite Glass” by 3 Form

2.2 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated

float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.4 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.

4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Pecora Corporation; 890.
d. Sika Corporation, Construction Products Division; SikaSil-C990.
e. Tremco Incorporated; Spectrem 1.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 791.
c. GE Advanced Materials - Silicones; SilPruf SCS2000.
d. Pecora Corporation; 864.
e. Sika Corporation, Construction Products Division; SikaSil-C995.
f. Tremco Incorporated; Spectrem 2.

D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Acceptable Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 799.
b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
c. Tremco Incorporated; Proglaze SSG.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that

have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.9 SCHEDULE OF GLAZING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

1. (GL-1): 1-inch thick insulated glass assembly.
2. (GL-2): 1/4-inch thick fully tempered glass.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.
2. Decorative mirrored panels.

B. Related Sections:

1. Division 10 Section "Toilet Accessories" for metal-framed mirrors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Samples: For each type of the following products:

1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
2. Mirror Trim: 12 inches long.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mirrors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

D. Glazing Publications: Comply with the following published recommendations:

1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: The Basis of Design for decorative mirrored panel is products manufactured by 3Form; refer to Finish Schedule. Subject to compliance with requirements provide the basis of design product or approved comparable product.

2.2 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

A. Clear Glass: Mirror Select Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission.

1. Nominal Thickness: 3.0 mm.

B. Etched Glass (WP1): Mirror Select Quality; ultraclear (low-iron) float glass with a decorative etched front .

1. Nominal Thickness: Refer to Finish Schedule.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

2.4 MIRROR HARDWARE

A. Top Channel/Cleat and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 5/16 and 3/4 inch in height, respectively.

a. Product: Subject to compliance with requirements, provide D638 FHA Type "J" Channel by Laurence, C. R. Co., Inc.

2. Top Trim: Formed with front leg with a height of 5/16 inch and back leg designed to fit into the pocket created by wall-mounted aluminum cleat.

a. Product: Subject to compliance with requirements, provide D 1638 Top Channel and D 1637M Mirror Mount System Cleat by Laurence, C. R. Co., Inc.

3. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.

3.3 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Include:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior non-load-bearing wall studs.
2. Division 07 Section "Thermal Insulation" for insulation installed with Z-shaped furring members.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: The design of wall studs over nine feet high, including comprehensive engineering analysis shall be completed by a qualified professional engineer. The performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For qualified professional engineer.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653, G40, hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Cast-in-place anchor, designed for attachment to concrete forms.

C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings or 2-1/2 inches.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Steel Studs: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.0179 inch.
b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base Metal Thickness: As indicated on Drawings or 0.0179 inch.

4. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical or hat shaped.

G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    b. Chicago Metallic Corporation; 640-C Fire Front 650-C Drywall Furring System.
    c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.0179 inch or to suite size per manufacturer standard.
2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.0179 inch.

E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: As indicated on Drawings.

G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped.

H. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.

3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.

D. Z-Furring Members:

1. Erect insulation (specified in Division 07 Section "Thermal Insulation") vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092500 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for load-bearing steel framing that supports gypsum board.
2. Division 06 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.
3. Division 06 Section "Sheathing" for gypsum sheathing.
4. Division 07 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
5. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
6. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.
7. Division 09 Section “Interior Painting” for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. American Gypsum.
3. CertainTeed Corp.
4. Georgia-Pacific Gypsum LLC.
5. Lafarge North America Inc.
6. National Gypsum Company.
7. USG Corporation.

B. Gypsum Wallboard: ASTM C 1396.

1. Thickness: As shown on drawings, but no less than 1/2 inch.
2. Long Edges: Tapered.

C. Gypsum Board, Type X: ASTM C 1396.

1. Thickness: As shown on drawings, but no less than 5/8 inch.
2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396.

1. Thickness: As shown on drawings, but no less than 1/2 inch.
2. Long Edges: Tapered.

E. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

F. Abuse-Resistant Type: ASTM C 1629, Level 2. Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.

1. Core: As indicated on Drawings.
2. Long Edges: Tapered.

1. Core: As indicated on Drawings.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

G. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.

1. Core: As indicated.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396. Manufactured to have increased fire-resistive capability.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum; Firebloc Type C.
b. CertainTeed Corp.; ProRoc Type C.
c. Georgia-Pacific Gypsum LLC; Fireguard C.
d. Lafarge North America Inc.; Firecheck Type C.
e. National Gypsum Company; Gold Bond Fire-Shield C.
f. USG Corporation; Firecode C Core.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C 931or ASTM C 1396, with manufacturer's standard edges.

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.
d. Lafarge North America Inc.
e. National Gypsum Company.
f. USG Corporation.

2. Core: As indicated.

B. Glass-Mat Gypsum Sheathing Board: Refer to Division 06 Section ”Sheathing.”

2.5 TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board: ASTM C 630or ASTM C 1396.

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.
d. Lafarge North America Inc.
e. National Gypsum Company.
f. USG Corporation.

2. Core: As indicated on Drawings.

B. Glass-Mat, Water-Resistant Backing Board:

1. Complying with ASTM C 1178.

a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum, “GlasRoc” by CertainTeed or “e^{2}XP” by National Gypsum, or equal.

2. Core: As indicated on Drawings.

C. Cementitious Backer Units: ANSI A118.9.

1. Acceptable Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Custom Building Products; Wonderboard.
b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
c. USG Corporation; DUROCK Cement Board.

2. Thickness: As indicated on Drawings.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

    a. Cornerbead.
    b. Bullnose bead.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    f. Expansion (control) joint.
    g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Fry Reglet Corp.
    b. Gordon, Inc.
    c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
3. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Regular Type: As indicated on Drawings.
2. Type X: As indicated on Drawings.
3. Type C: As indicated on Drawings.
4. Flexible Type: Apply in double layer at curved assemblies.
5. Abuse-Resistant Type: As indicated on Drawings.
6. High-Impact Type: As indicated on Drawings.
7. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11.

C. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. Curved-Edge Cornerbead: Use at curved openings.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

4. Level 5: Where indicated on Drawings surfaces receiving gloss and semigloss enamels and other surfaces subject to severe lighting.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092500

SECTION 092650 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Shaft-wall enclosures.
2. Chase enclosures.

B. Related Sections:

1. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board shaft-wall assemblies.

1.3 SUBMITTALS

A. Product Data: For each gypsum board shaft-wall assembly indicated.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.

1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

2.2 PANEL PRODUCTS

A. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.

1. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.

a. Core: 1 inch thick.
b. Long Edges: Double bevel.

2. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.

a. Core: 1 inch thick.
b. Long Edges: Double bevel.

B. Gypsum Base for Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering."

C. Gypsum Board: As specified in Division 09 Section "Gypsum Board."

D. Water-Resistant Gypsum Backing Board: As specified in Division 09 Section "Gypsum Board."

E. Cementitious Backer Units: As specified in Division 09 Section "Tiling."

2.3 NON-LOAD-BEARING STEEL FRAMING

A. Framing Members: Comply with ASTM C 754 for conditions indicated.

B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
1. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

C. Gypsum Base Joint-Reinforcing Materials: As specified in Division 09 Section "Gypsum Veneer Plastering."

D. Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering."

E. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board."

F. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum face-layer panels and gypsum-base face-layer panels to backing-layer panels in multilayer construction.

G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

H. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

I. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

J. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

2.5 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated.

B. STC Rating: As indicated.

C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.

1. Depth: As indicated.

D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.

E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

F. Room-Side Finish: As indicated.

G. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

H. Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Division 7 Section "Applied Fireproofing."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturers written installation instructions, and ASTM C 754 other than stud-spacing requirements.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Cant Panels: At projections into shaft exceeding 4 inches or where indicated, install 1/2- or 5/8-inch- thick gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft wall framing.

I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092650

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Porcelain tile.
3. Stone thresholds.
4. Waterproof membrane.
5. Crack isolation membrane.
6. Tile backing panels.
7. Metal edge strips.

B. Related Sections:

1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 09 Section “Gypsum Board” for cementitious backer units.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. Module Size: Actual tile size plus joint width indicated.

C. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.60.
2. Step Treads: Minimum 0.60.
3. Ramp Surfaces: Minimum 0.80.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory.
4. Stone thresholds in 6-inch lengths.
5. Metal edge strips in 6-inch lengths.

D. Qualification Data: For qualified Installer.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Joint sealants.
5. Cementitious backer units.
6. Metal edge strips.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

A. Tile Type (WT1, WT2): Glazed ceramic wall tile.

1. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.
2. Module Size: As shown.
3. Thickness: 1/4 inch,unless otherwise indicated.
4. Face: Plain with modified square edges or cushion edges.
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Mounting: Factory, back mounted.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

B. Ceramic Tile Type (WT3): Glazed wall tile.

1. Module Size: 6 by 6 inches.
2. Thickness: 5/16 inch.
3. Face: Plain with modified square edges or cushion edges.
4. Finish: Bright, opaque glaze.
5. Tile Color and Pattern: As indicated by manufacturer's designations.

C. Ceramic Tile Type (WT4, WT5): Factory-mounted glazed ceramic mosaic tile.

1. Composition: Porcelain.
2. Module Size and Thickness: As shown on Finish Schedule.
3. Face: Pattern of design indicated, with cushion edges.

D. Tile Type (FT1, FT1E, FT2): Unglazed porcelain ceramic tile.

1. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.
2. Face Size: Refer to Finish Schedule.
3. Thickness: 3/8 inch, unless otherwise indicated.
4. Face: Plain with square or cushion edges.
5. Finish: Refer to Finish Schedule.
6. Dynamic Coefficient of Friction: Not less than 0.60 where shown (FT1E).
7. Tile Color and Pattern: As indicated by manufacturer's designations.
8. Grout Color: Match Architect's sample or as selected by Architect from manufacturer's full range.

E. Ceramic Tile Type (FT3): Unglazed square-edged quarry tile.

1. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.
2. Face Size: Refer to Finish Schedule.
3. Thickness: 1/2 inch, unless otherwise indicated.
4. Wearing Surface: Nonabrasive, smooth.
5. Dynamic Coefficient of Friction: Not less than 0.42.
6. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base (B3): Coved, face size as shown on Finish Schedule.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.
2. Description: Match Architect's sample.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints; 1/2 inch thick,unless otherwise indicated.

B. Manufacturers / Products: Refer to Division 9 Section“Gypsum Board” for manufacturers and product requirements.

2.5 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Basis of Design Manufacturer: Subject to compliance with requirements, provide products specified herein manufactured by MAPEI Corporation or approved comparable product.

C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

1. Basis of Design Product: Mapelastic L - PRP M19 (MAPEI Corp)

D. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

1. Basis of Design Product: Mapelastic - PRP 315 (MAPEI Corp)

2.6 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.

2.7 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

B. Basis of Design Manufacturer: Subject to compliance with requirements, provide products specified herein manufactured by MAPEI Corporation or approved comparable product.

C. Organic Adhesive: ANSI A136.1, Type I, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

C. Polymer-Modified Tile Grout: ANSI A118.7.

A. Basis of Design Manufacturer: Subject to compliance with requirements, provide products specified herein manufactured by MAPEI Corporation or approved comparable product.

2.9 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

2.10 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.11 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Paver Tile: 1/4 inch.
2. Glazed Wall Tile: 1/16 inch.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
2. Do not extend waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.

I. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.7 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCA F113.

a. Tile Type: Floor Tile as Scheduled or approved.

b. Thin-Set Mortar: Latex- portland cement mortar.
c. Grout: As recommended by manufacturer, sand-portland cement or standard sanded cement grout.

2. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.

a. Tile Type: Floor Tile as Scheduled or approved.
b. Thin-Set Mortar: Latex- portland cement mortar.
c. Grout: As recommended by manufacturer, polymer-modified sanded or unsanded grout.

B. Interior Wall Installations, Masonry or Concrete:

1. Tile Installation W202: Thin-set mortar; TCA W202.

a. Tile Type: Wall Tile as Scheduled or approved.
b. Thin-Set Mortar: Latex- portland cement mortar.
c. Grout: As recommended by manufacturer.

2. Tile Installation W223: Organic adhesive; TCA W223.

a. Tile Type: Wall Tile as Scheduled or approved.
b. Grout: As recommended by manufacturer.

C. Interior Wall Installations, Metal Studs or Furring:

1. Tile Installation W242: Organic adhesive on gypsum board; TCA W242.

a. Tile Type: Wall Tile as Scheduled or approved.
b. Grout: Polymer-modified grout as recommended by manufacturer.

2. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA W244.

a. Tile Type: Wall Tile as Scheduled or approved.
b. Thin-Set Mortar: Latex- portland cement mortar.
c. Grout: As recommended by manufacturer.

3. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.

a. Tile Type: Wall Tile as Scheduled or approved.
b. Thin-Set Mortar: Latex- portland cement mortar.
c. Grout: As recommended by manufacturer.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of full-size samples of each type, color, pattern, and texture.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
3. Acoustical Plaster: 12 inch square samples of each type, color, pattern, and texture.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for acoustical ceiling panels and suspension systems are manufactured by Armstrong Ceilings; refer to Finish Schedule. Subject to compliance with requirements, provide acoustical ceiling panels and suspension systems manufactured by the Basis of Design manufacturer or approved equal.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
2. Suspension System: Obtain each type from single source from single manufacturer.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

E. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS (ACT 1, ACT2)

A. Manufacturers: Subject to compliance with requirements, provide products as shown on Finish Schedule or approved equal.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face.

a. Provide washable and scrubbable face where indicated (ACT2).

C. Edge Design:

1. ACT1: Tegular
2. ACT2: Square

D. Color, Size and Thickness: As indicated on Drawings.

2.4 METAL SUSPENSION SYSTEMS, GENERAL (SS1, SS2)

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

1. High-Humidity Finish: Comply with ASTM C 635requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to

five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled expansion anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

D. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

E. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.5 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products as shown on Finish Schedule or approved equal.

B. Wide-Face, Capped, Double-Web,Steel Suspension System (SS2): Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted white.

C. Narrow-Face, Uncapped, Double-Web, Steel Suspension System (SS1): Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, to produce structural members with 9/16-inch- wide faces.

1. Structural Classification: Heavy-duty system.
2. Face Design: With 1/8-inch- wide, slotted, box-shaped flange.
3. Face Finish: Painted white.
4. Reveal Finish: Painted to match flange color.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements provide edge moldings from same manufacturer as suspension system.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C 635and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.7 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints: Provide the following or approved equal:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corporation; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 ACOUSTICAL PANEL INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to steel deck tabs.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 095423 - LINEAR METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes strip linear metal pans and suspension systems for ceilings.

B. Related Sections:

1. Division 09 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 DEFINITIONS

A. LR: Light Reflectance coefficient.

B. NRC: Noise Reduction Coefficient.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Exterior linear metal ceilings shall withstand exterior exposure and the effects of gravity loads and the following loads and stresses without showing permanent deformation of ceiling system components including pans and suspension system; noise or metal fatigue caused by vibration, deflection, and displacement of ceiling units; or permanent damage to fasteners and anchors.

1. Wind Load: Uniform pressure of 20 lbf/sq. ft. ors indicated on Drawings, acting inward or outward.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F ambient; 180 deg F material surfaces.

1.5 ACTION SUBMITTALS

A. Samples for Initial Selection: For components with factory-applied color and other decorative finishes.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each set of linear metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.

B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver linear metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle linear metal pans, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install linear metal ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.9 COORDINATION

A. Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for linerar metal ceilings includes products manufactured by Armstrong Ceilings; refer to Finish Schedule. Subject to compliance with requirements, provide the Basis of Design manufacturer or approved equal.

2.2 LINEAR METAL CEILING PANS

A. Acoustical Metal Pan Standard: Provide manufacturer's standard linear metal pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, acoustical ratings, and light reflectances unless otherwise indicated.

B. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated to snap on and be securely retained on carriers without separate fasteners, and finished to comply with requirements indicated.

D. Pan Splices: Construction same as pans, in lengths 8 to 12 inches with manufacturer's standard finish.

E. End Caps: Metal matching pans; fabricated to fit and conceal exposed ends of pans.

F. Moldings and Trim: Provide manufacturer's standard moldings and trim for exposed members, and as indicated or required, for edges and penetrations of ceiling, around fixtures, at changes in ceiling height, and for other conditions; of same metal and finish as linear metal ceiling pans.

G. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.

1. Bond fabric layer to pan in the factory with manufacturer's standard nonflammable adhesive.

2.3 METAL SUSPENSION SYSTEMS

A. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Suspension Systems: Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung will be less than yield stress of wire, but provide not less than 0.106-inchdiameter wire.

E. Carriers: Factory finished with matte-black baked finish.

1. Main Carriers: Aluminum, not less than 0.240-incholled sheet, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, complying with ASTM B 209

2. Main Carriers: Steel, not less than 0.0209-inchominal thickness, cold-rolled sheet, with factory-applied protective coating, complying with ASTM C 635.

F. Carrier Splices: Same metal, profile, and finish as indicated for carriers.

G. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.

H. Exterior Bracing Channels and Angles: Cold-rolled steel, hot-dip galvanized to comply with ASTM A 653/A 653M, G60oating designation; size and profile as required to withstand wind load.

2.4 ALUMINUM PANS FOR LINEAR METAL CEILING (MTL1)

A. Basis-of-Design Manufacturer / Product: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

B. Linear Aluminum Pans:

C. Classification: Units complying with ASTM E 1264 for Type XX, aluminum strips with mineral- or glass-fiber-base backing; Form 1, perforated.

1. Pattern: Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, and percent open area.

D. Pan Thickness: As required based on panel size, but not less than 0.022 inch

E. Pan Edge Detail: Square.

F. Linear Module Width and Pan Face Width: Refer to Finish Schedule on Drawings

G. Pan Depth: Not less than 1/2 inches deep.

H. Pan Face Finish: As selected from manufacturer’s standard finishes.

I. End Cap, Finish of Exposed Portions: Manufacturer's standard finish.

J. LR: 0.60.

K. NRC: Not less than 0.70.

2.5 SUSPENSION SYSTEM FOR LINEAR METAL CEILING (SS3)

A. Basis-of-Design Manufacturer / Product: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation, with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.

2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted to match color indicated by manufacturer's designation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which linear metal ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear metal ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of linear metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width or -length pans at borders, and comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.3 INSTALLATION

A. Comply with ASTM C 636 and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c., along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

D. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

F. Install linear metal pans in coordination with suspension system and exposed moldings and trim.

1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Install pans with butt joints using internal pan splices and in the following joint configuration:

    a. Aligned.
    b. Aligned, every other pan length.
    c. Staggered a minimum of 12 inches
    d. Random.
    e. As indicated.

4. Where metal pan ends are visible, install end caps unless trim is indicated.
5. Install sound-absorbent fabric layers in perforated metal pans.

3.4 CLEANING

A. Clean exposed surfaces of linear metal ceilings, including trim and edge moldings after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 095423

SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Factory-finished wood flooring.

B. Related Sections:

1. Division 03 Section "Hydraulic Cement Underlayment" for patching and leveling concrete floors substrate.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 QUALITY ASSURANCE

A. Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.

1. Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.

B. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.6 PROJECT CONDITIONS

A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

    a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
    b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for factory finished wood flooring includes products manufactured by Armstrong Flooring; refer to Finish Schedule. Subject to compliance with requirements, provide the Basis of Design manufacturer or approved equal.

2.2 FACTORY-FINISHED WOOD FLOORING (WF1)

A. Engineered-Wood Flooring: HPVA EF.

1. Species: Walnut.
2. Grade: Best.
3. Thickness: 3/8 inch.
4. Construction: Five ply.
5. Face Width: 5 inches.
6. Length: Manufacturer's standard.
7. Edge Style: Micro Beveled (eased).
8. Finish: UV urethane.

    a. Color: Fiery Bronze.

2.3 ACCESSORY MATERIALS

A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6.0 mils thick.

B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.

a. Perform anhydrous calcium chloride test per ASTM F 1869, as follows:

1) Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

A. Concrete Slabs: Grind high spots and fill low spots to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.

B. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

C. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring.".

B. Provide expansion space at walls and other obstructions and terminations of flooringof not less than 3/4 inch.

C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:

1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.
2. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.

D. Engineered-Wood Flooring: Set in adhesive.

3.4 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient stair accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F .

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 THERMOPLASTIC-RUBBER BASE (B1, B2)

A. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).

C. Thickness: 0.125 inch 0r 0.375 inch.

D. Height: As indicated on Drawings.

E. Lengths: Cut lengths 48 inches long.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Colors: Refer to Finish Schedule on Drawings.

2.3 RUBBER STAIR ACCESSORIES (RS1)

A. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

B. Stair Treads: ASTM F 2169.

1. Type: TS (rubber, vulcanized thermoset).
2. Class: 2 (pattern; embossed, grooved, or ribbed).
3. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
4. Nosing Height: 45mm.
5. Thickness: 3mm.

6. Size: Lengths and depths to fit each stair tread in one piece.

C. Locations: Provide rubber stair accessories in areas indicated.

D. Colors and Patterns: Refer to Finish Schedule on Drawings.

2.4 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Miter corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Tightly adhere to substrates throughout length of each piece.
2. For treads installed as separate, equal-length units, install to produce a flush joint between units.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Rubber floor tile.

B. Related Sections:

1. Division 09 Section "Resilient Base and Accessories" for resilient wall base, stair tread and riser.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor tile required.

D. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RUBBER FLOOR TILE (R1)

A. Products: Subject to compliance with requirements, provide products as shown on Finish Schedule or approved equal.

B. Tile Standard: ASTM F 1344, Class I-A, homogeneous rubber tile, solid color.

C. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.

D. Wearing Surface: Refer to Finish Schedule.

E. Thickness: Refer to Finish Schedule.

F. Size: Refer to Finish Schedule.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

E. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.

1. Sealer: Apply two base coats of liquid sealer.
2. Finish: Apply two coats of liquid floor finish.

F. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular, tufted carpet tile.

B. Related Requirements:

1. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.7 QUALITY ASSURANCE

A. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.9 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

PART 2 - PRODUCTS

2.1 CARPET TILE (CT1)

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

B. Color and Pattern: Refer to Finish Schedule on Drawings.

C. Fiber Content: 100 percent nylon 6, 6.

D. Pile Characteristic: Tufted textured loop.

E. Tufted Face Weight: 15 oz./sq. yd. .

F. Primary Backing/Backcoating: Manufacturer's standard composite materials; PVC free.

G. Size: Refer to Finish Schedule on Drawings.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Methods

1. Concrete Substrate: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
2. Access Flooring Substrate: Free lay; install carpet tiles without adhesive.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097723 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes shop-fabricated, acoustical fabric-wrapped wall panels.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fabric-wrapped wall panels to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.

B. Fire-Test-Response Characteristics: Provide fabric-wrapped wall panels meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.

    a. Flame-Spread Index: 25 or less.

2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and fabric-wrapped, wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fabric-wrapped wall panels until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Air-Quality Limitations: Protect fabric-wrapped wall panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.

C. Field Measurements: Verify locations of fabric-wrapped wall panels and actual dimensions of openings and penetrations by field measurements before fabrication.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fabric-wrapped wall panels that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Fabric sagging, distorting, or releasing from panel edge.
b. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FABRIC-WRAPPED WALL PANELS (ACP1)

A. Basis of Design: The Basis of design of acoustical fabric-wrapped wall panels is manufactured by 3From; refer to Finish Schedule. Subject to compliance with requirements, provide the Basis of Design product or comparable approved equal.

B. Fabric-Wrapped Wall Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.

1. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
2. Core: Medium-density fiberboard.

3. Edge Construction: Manufacturer's standard.
4. Edge Profile: Long edges kerfed and rabbeted to receive splines.
5. Corner Detail in Elevation: Square with continuous edge profile indicated.
6. Facing Material: As indicated on Drawings; refer to Finish Schedule.
7. Nominal Overall Panel Thickness: up to 3/4 inch.
8. Panel Width: 48 inches.
9. Panel Height: 96 inches.

2.2 MATERIALS

A. Core Materials:

1. Medium-Density Fiberboard: Panels complying with ANSI A208.2, Grade M-2.

    a. Fire-retardant panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

B. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:

1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of panel and the other part to substrate, designed to permit unit removal.

2.3 FABRICATION

A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Facing Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

1. Square Corners: Tailor corners.
2. Radius and Other Nonsquare Corners: Attach material so there are no seams or gathering of material.
3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.

C. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fabric, fabricated panels, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of fabric-wrapped wall panels.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fabric-wrapped wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with fabric-wrapped, wall panel manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

C. Align and level fabric pattern and grain among adjacent panels.

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb and Level: Plus or minus 1/16 inch.

B. Variation of Panel Joints from Hairline: Not more than 1/16 inch wide.

3.4 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 097723

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel.
2. Wood.
3. Gypsum board.

B. Related Sections:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 08 Sections for factory priming doors with primers specified in this Section.
3. Division 09 Section “High Performance Coatings” for polyurethane based coatings.

1.3 DEFINITIONS

A. Gloss Level 1 (Flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2 (High Side Sheen Flat): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3 (Eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide product indicated on Finish Schedule on Drawings or approved comparable product.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.3 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

B. Primer Sealer, Latex, Interior, Wood: MPI #39.

1. VOC Content: E Range of E3
2. Environmental Performance Rating: EPR 3.

C. Primer Sealer, Rust-Inhibitive, Water Based, Metal: MPI #107.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

D. Primer Sealer, Galvanized, Water Based, Metal: MPI #134.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

2.4 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

B. Latex, Interior, Low Sheen, (Gloss Level 2): MPI #44.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

C. Latex, Interior, Eggshell (Gloss Level 3): MPI #52.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

D. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Wood: 15 percent.
2. Gypsum Board: 12 percent.
3. Concrete: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Wood Substrates:

1. Sand surfaces that will be exposed to view, and dust off.
2. Prime edges, ends, faces, undersides, and backsides of wood.
3. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Pipe hangers and supports.
d. Metal conduit.

2. Paint the following work where exposed in occupied spaces:

a. Uninsulated metal piping.
b. Pipe hangers and supports.
c. Metal conduit.
d. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates (DP1, SP1):

1. Institutional Low-Odor/VOC Latex System

    a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145.
    d. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

B. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

    a. Prime Coat: Primer, galvanized, water based, MPI #134.
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
    d. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
    e. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
    f. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

C. Gypsum Board Substrates (P1 – P4 and CP1 – CP2): MPI INT 9.2M.

1. Latex System:

    a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53 (ceilings).
    d. Topcoat: Latex, interior, (Gloss Level 3), MPI #52 (walls).

D. Pipe and Duct Coverings.

1. Latex System:

    a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
    d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

END OF SECTION 099123

SECTION 099600 - HIGH PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Polyurethane - acrylic textured coating for steel substrates.

B. Related Sections:

1. Division 08 Sections for factory priming doors with primers specified in this Section.
2. Division 09 Section “Interior Painting.”

1.3 QUALIFICATIONS

A. Installer: A firm with a minimum of 3 years successful experience in the installation of the specified materials and which is approved by the acrylic coating manufacturer. Employ only tradesmen experienced with the installation of the materials specified.

1.4 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's specifications, installation instructions and other data as may be required to show compliance with the Contract Documents.

B. Samples: Submit samples of each type of acrylic coating specified in colors as selected. Samples shall be 12 inches square on plywood and shall show the various stages of installation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg. F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg. F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg. F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Products: The Basis of Design of high performance coating is manufactured by Sherwin Williams. Subject to compliance with requirements, provide the Basis of Design product as indicated on Finish Schedule on Drawings or approved comparable product.

2.2 POLYURETHANE - ACRYLIC COATINGS (DP1)

A. General: Provide spray or roll-applied, water-based polyurethane / acrylic textured coating. System components include the following:

1. Primer: Manufacturer recommended primer / sealer.
2. Finish: Manufacturer’ base and textured finish coats.

B. Miscellaneous Products: Provide miscellaneous products as specified and as required to fulfill the requirements of the systems to be used on the Project. Provide materials and products best suited for intended use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

C. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 099600

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast dimensional characters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Exposed Accessories: Full-size Sample of each accessory type.

E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 DIMENSIONAL CHARACTERS

A. Cutout Characters: Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows:

1. Character Material: Sheet or plate aluminum.
2. Character Height: As indicated.
3. Thickness: As indicated or manufacturer's standard for size of character.
4. Finishes:

a. Integral Aluminum Finish: Clear anodized.
b. Overcoat: Clear organic coating.

5. Mounting: Projecting studs.

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Sign Mounting Fasteners:

a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101419

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior surface mounted panel signs.
2. Exterior site signs.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size Insert scale.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Panel Signs: Full-size Sample.
2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.2 SIGNS

A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Engraved Plastic-Laminate Sign: Plastic-laminate face laminated to contrasting phenolic core to produce composite sheet.

a. Composite-Sheet Thickness: Manufacturer's standard for size of sign (0.125 inch or 0.25 inch).
b. Engraved Graphics: Characters engraved through plastic-laminate face sheet to expose contrasting phenolic core.
c. Plastic-Laminate Color and Pattern: As selected by Architect from manufacturer's full range.
d. Core Color: Manufacturer's standard dark color.

2. Surface Finish and Applied Graphics:

3. Text and Typeface: Accessible raised characters and Braille typeface as indicated by manufacturer's designation and variable content as scheduled. Finish raised characters to contrast with background color, and finish Braille to match background color.
4. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.3 PANEL-SIGN MATERIALS

A. Plastic-Laminate Sheet: NEMA LD 3, general-purpose HGS grade, 0.048-inch nominal thickness.

B. Aluminum Sheet: Provide aluminum sheet of alloy and temper recommended by the sign manufacturer for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15.

2.4 ACCESSORIES

1. Mounting: Surface mounted to wall with two-face tape.
2. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.

1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
2. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.
3. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

2.6 EXTERIOR SIGNS

A. Handicapped parking signs, and traffic control signs as shown with silk screened copy, on baked enamel aluminum, colors as indicated or as otherwise required by authorities having jurisdiction, (Manual on Uniform Traffic Control Devices latest edition) with aluminum post embedded in concrete.

B. Barrier Free Accessibility Sign: Provide 8" x 8" aluminum signs at accessible entrances, displaying international symbol of accessibility.

2.7 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:

1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 101453 – TRAFFIC SIGNS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Traffic Sign shall include furnishing and installing the Traffic Control Signage as shown on the plans.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Construction Materials: Comply with the applicable requirements of Subsection 619.02 of the NJDOT Standard Specifications.

B. Posts: Galvanized steel.

C. All signage shall comply with applicable requirements from the Manual on Uniform Traffic Control Devices (MUTCD).

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Erect signs in their designated locations, as indicated and in accordance with the approved shop drawings and the applicable requirements of Section 619 of the NJDOT Standard Specifications.

B. Protect surfaces and finishes from abrasion and other damage during handling and installation.

C. Replace damaged or faulty signs.

END OF SECTION 101453

SECTION 102113 - PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking.
2. Division 10 Section "Toilet Accessories" for toilet tissue dispensers, grab bars, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARMENTS (TP1)

A. Basis-of-Design Product: Basis of design for toilet compartments is manufactured by Global Partitions; refer to Finish Schedule. Subject to compliance with requirements, provide basis of design manufacturer and product or comparable product.

B. Toilet-Enclosure Style: Overhead braced and floor anchored.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel and Pilaster Construction: Solid phenolic-core panel material with plastic laminate facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch-thick doors and pilasters and minimum 1/2-inch-thick panels.

E. Pilaster Shoes: Formed from stainless-steel sheet, not less than 0.031-inchnominal thickness and 3 inches high, finished to match hardware.

F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, chrome-plated zamac.

G. Phenolic-Panel Finish:

1. Plastic Laminate Facing Sheet Finish: Refer to Finish Schedule for manufacturer and model.
2. Color and Pattern: As indicated by manufacturer's designations; refer to Finish Schedule.
3. Edge Color: Manufacturer's standard.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.

1. Material: Chrome-plated zamac.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt

applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Castings: ASTM B 26.

B. Aluminum Extrusions: ASTM B 221.

C. Brass Castings: ASTM B 584.

D. Brass Extrusions: ASTM B 455.

E. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch.
b. Panels and Walls: 1 inch.

2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.

a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102239 - FOLDING GLASS-PANEL PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes manually operated, glass-panel partitions.

B. Related Requirements:

1. Division 05 Section "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.

1.3 DEFINITIONS

A. STC: Sound Transmission Class.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable glass-panel partitions.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable glass-panel partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of operable glass-panel partitions.

b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide “NanaWall SL70” manufactured by Nana Wall Systems, Inc. Subject to compliance with requirements provide the Basis of Design or comparable approved product.

2.2 OPERABLE GLASS PANELS

A. Operable Glass Panels: Aluminum-framed glass-panel partition system, including panels, seals, suspension system, operators, and accessories.

B. Panel Operation: Manually operated, paired panels.

C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

1. Factory-Glazed Fabrication: Glaze operable glass panels in the factory where practical and possible for applications indicated. Comply with manufacturer's written instructions and with requirements in Division 08 Section "Glazing."

D. Glass and Glazing: As follows:

1. Safety Glass Standard for Partition Panels: Provide glass products complying with testing requirements in 16 CFR 1201, Category II, or ANSI Z97.1, Class A.
2. Glass: Manufacturer's standard safety glass and glass assemblies as indicated and complying with the following:

a. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Type I (transparent flat glass), Class 1 (clear), Quality-Q3.
b. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass as indicated, separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1) Spacer: Manufacturer's standard spacer construction and material.

c. Glass Thickness: Manufacturer's standard thickness for indicated requirements.

3. Glazing System: Manufacturer's standard factory-glazing system.

E. Dimensions: Fabricate operable glass-panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

1. Panel Width: Equal widths as indicated.

F. Panel Weight: 8 lb/sq. ft. maximum.

G. Panel Frame Thickness: Maximum 3 inches.

H. Panel Frame Materials:

1. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B 221for extrusions; manufacturer's standard strengths and thicknesses for type of use.

a. Frame Reinforcement: Manufacturer's standard steel or aluminum.

I. Panel Closure: Manufacturer's standard unless otherwise indicated.

J. Hardware: Manufacturer's standard as required to operate operable glass-panel partition and accessories; with decorative, protective finish.

1. Hinges: Manufacturer's standard.
2. Floor Lock: Lever handle-turn and key actuated.

K. Panel Frame Finishes:

1. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss: As selected by Architect from manufacturer's full range.

2.3 SEALS

A. General: Provide seals that produce operable glass-panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.

2.4 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum mounted directly to overhead structural support, designed for operation, size, and weight of operable glass-panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable glass-panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable glass-panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.

D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable glass-panel partitions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable glass-panel partition manufacturer's written installation instructions.

B. Install operable glass-panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals.

3.3 ADJUSTING

A. Adjust operable glass-panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust pass doors to operate smoothly and easily, without binding or warping.

C. Verify that safety devices are properly functioning.

END OF SECTION 102239.13

SECTION 102800 - TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Toilet accessories as shown and scheduled.
2. Miscellaneous accessories.

B. Related Sections:

1. Division 08 Section "Mirrors" for frameless mirrors.

1.3 QUALITY ASSURANCE

A. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper anchorage, operation and servicing or accessory units.

B. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in other work and coordinate their delivery to avoid delay.

C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas.

D. Code Requirements: Provide grab bars of types, capable of sustaining loads, as required by authorities having jurisdiction.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, catalogue cuts and installation instructions for each toilet accessory.

B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices in other work.

C. Samples: Submit samples of toilet accessories as requested by Architect.

1.5 SYSTEM PERFORMANCE

A. Grab bars in handicap toilets shall be capable of supporting 250 pounds for 5 minutes. Reinforce support system to achieve great rigidity so that glass wall panels do not break.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver accessories to the site, ready for use, in the manufacturer’s original and unopened containers and packaging, bearing labels as to type or material, manufacturer’s name and brand name.

B. Store and handle accessories in accordance with manufacturer's instructions.

C. Remove materials which are disfigured, scratched or not suitable and replace with new materials.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum, unless otherwise indicated.

B. Brass: Leaded and unleaded, flat products, rods, shapes, forgings, and flat products with finished edges.

C. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B456, Type SC 2.

D. Galvanized Steel Sheet: ASTM A527, G60.

E. Fasteners, General: No exposed fastening devices permitted on exposed frames.

1. Exposed Fasteners: Match finishes on which they are being used.
2. Concealed Fasteners: Galvanized or cadmium plated.

2.2 TOILET ACCESSORIES

A. Basis of Design Manufacturers and Products: Subject to compliance with requirements, provide products indicated on the Finish Schedule or approved comparable products.

2.3 FABRICATION

A. Stamped names or labels on exposed faces of toilet accessory units are not permitted. Unobtrusive labels on surfaces not exposed to view are acceptable.

B. Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher cabinets.

B. Related Requirements:

1. Division 10 Section "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. J. L. Industries, Inc., a division of Activar Construction Products Group.
    b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
    c. Larsen's Manufacturing Company.
    d. Potter Roemer LLC.
    e. Watrous Division, American Specialties, Inc.

B. Cabinet Construction: Non-rated.

C. Cabinet Material: Cold-rolled steel sheet.

D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

E. Door Material: Steel sheet.

F. Door Style: Fully glazed panel with frame.

G. Door Glazing: Tempered float glass (clear).

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting lever handle with cam-action latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

J. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

    a. Finish: Baked enamel or powder coat.
    b. Color: As selected by Architect from full range of industry colors and color densities.

2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.

4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.3 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:

1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

B. Related Requirements:

1. Division 10 Section "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

1.4 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Multipurpose Dry-Chemical Type: UL-rated 20 pounds nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container with red glossy polyester coating complete with bracket, pressure gauge, and hose. Pressure: 195 psi. For Class A, B, and C fires.

1. UL Rating -20A: 120B:C.

C. Regular Dry-Chemical Type BC in Steel Container: Sodium bicarbonate-based dry chemical in enameled-steel container stored under pressure at approximately 195 p.s.i..

1. UL Rating -120-B:C.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Knocked-down corridor lockers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of metal locker.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.6 COORDINATION

A. Coordinate sizes and locations of bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.

3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: The Basis of Design for metal lockers are manufactured by ASI Storage solutions; refer to Finish Schedule. Subject to compliance with requirements provide the basis of design or approved comparable manufacturer and product.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in ICC A117.1.

2.3 KNOCKED-DOWN CORRIDOR LOCKERS (L1)

A. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Doors less than 12 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
2. Doors for box lockers less than 15 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inchnominal-thickness steel sheet; welded to inner face of doors.
5. Door Style: Vented panel as follows:

    a. Louvered Vents: No fewer thanthree louver openings at top and bottom for double-tier lockers.

B. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.

C. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

D. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.

E. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.

a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inchnominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

F. Locks: Combination padlocks.

G. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

H. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.

I. Coat Rods: chrome finished.

J. Legs: 6 inches high; formed by extending vertical frame members, or fabricated from 0.075-inch nominal-thickness steel sheet; welded to bottom of locker.

1. Closed Front and End Bases: Fabricated from 0.036-inchnominal-thickness steel sheet.

K. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.

1. Closures: Vertical or hipped-end type.
2. Sloping-top corner fillers, mitered.

L. Materials:

1. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B, suitable for exposed applications.

M. Finish: Baked enamel or powder coat.

1. Color: As selected by Architect from manufacturer's full range.

2.4 LOCKS

A. Combination Padlocks: Provided by Owner.

2.5 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.

2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.

D. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for preassembly at plant prior to shipping.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

2.6 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
3. Anchor back-to-back metal lockers to floor.

B. Knocked-Down Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment:

1. Attach hooks with at least two fasteners.
2. Identification Plates: Identify metal lockers with identification indicated on Drawings.

a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.
4. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.

3.3 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.4 PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

SECTION 107500 – FLAGPOLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Under this item the Contractor shall furnish and erect, where shown on the Plans, three (3) flagpoles consisting of cone tapered fiberglass flag poles, complete with all standard fittings, manufactured by Baartol Company Inc., Kenton, Ohio, or approved equivalent. Flag Poles to be ground set as follows:

1. Center Flagpole: 40 feet high
2. Right Flagpole: 35 feet high
3. Left Flagpole: 35 feet high

B. Contractor shall furnish three flags to be installed on the flag poles as follows:

1. United States of America Flag: Size 6’ x 10’
2. State of NJ Flag: Size 6’ x 10’
3. Ash Brook Golf Course Logo Sign: Size 6’ x 10’

Note: Flags to be approved by County of Union prior to construction.

1.2 REALTED SECTIONS

A. Refer section 265619 – Flagpole Lighting

PART 2 – PRODUCTS

2.1 MATERIALS

A. Exterior of fiberglass shall be given a LUSTRATEX finish or approved equal and then a 0.0010 coating of Permacote 62 wax or approved equal. Portion of pole below grade shall be given a heavy coat of black asphalt on inside and outside.

Ball:	Shall be gold anodized (sized to match pole butt diameter)
Butt Diameter:	7” for 35’ pole and 8” for 40’ pole
Ground Tube I.D:	10” for 35’ pole and 12” for 40’ pole
Ground Tube Length:	3’-6” for 35 pole and 4’-0” for 40’ pole
Max Wind Speed Rating Flagged:	107 mph for 35’ pole and 104 mph for 40’ pole

Max Wind Speed Rating Un-Flagged:	151 mph for 35’ pole and 145 mph for 40’ pole
Halyard:	Shall be internal halyard.
Truck:	Shall be standard size all aluminum truck stainless steel ball bearings, with double 2 1/8" diameter celcon sheaves.
Cleats:	Shall be two (2) 9" aluminum attached to pole with 3/8" flat head aluminum machine screws.

PART 3 – EXECUTION

3.1 METHOD OF CONSTRUCTION

A. Flag poles to be installed and spaced as shown on the construction drawings or as directed by the Engineer.

B. Foundation tube fabricated from 16 ga galvanized steel, with steel plate whose square dimension is at least the internal diameter of shaft foundation sleeve plus 4”. A setting plate 6” square shall be securely welded to ground spike at least 6” below the base plate. Lightning rod ground spike shall be ¾” diameter, not less than 18” long.

C. Shaft foundation sleeve diameter shall be 10” for the 35’ pole and 12” for the 40’ pole. The concrete pole foundation shall be 42” diameter at the top and 36” diameter at the base. The depth of the footing shall be 54” minimum. 3000 psi concrete shall be used for the pole foundation.

END OF SECTION 107500

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Refrigeration appliances.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Obtain residential appliances from single source.

C. Regulatory Requirements: Comply with the following:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 MICROWAVE OVENS

A. Microwave Oven: Basis of Design of microwave oven is “Profile Series” Model# PEB7226SFSS by GE

1. Mounting: Countertop.
2. Type: Conventional.
3. Dimensions:

    a. Width: 24 inches.
    b. Depth: 19-1/2 inches.
    c. Height: 14 inches.

4. Capacity: 2.2 cu. ft..
5. Oven Door: Door with observation window and push-button latch release.
6. Microwave Power Rating: 1100 W.

7. Electric Power Supply: 120 V, 60 Hz, 1 phase, 15 A.
8. Controls: Digital panel controls and timer display.
9. Other Features: Turntable
10. Material: Stainless steel.

2.2 REFRIGERATOR/FREEZERS

A. Refrigerator/Freezer: Basis of Design of Refrigerator/Freezer is Model# GTE21GSHSS by GE

B. Refrigerator/Freezer: Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1. ADA Compliant; Energy Star

1. Type: Freestanding.
2. Dimensions:

    a. Width: 32 inches.
    b. Depth: 33-1/4 inches.
    c. Height: 66 inches.

3. Storage Capacity:

    a. Refrigeration Compartment Volume: 15.1 cu. ft..
    b. Freezer Volume: 6.1 cu. ft..
    c. Shelf Area: Three adjustable glass shelves.

4. General Features:

    a. Door Configuration: Overlay.

5. Refrigerator Features:

    a. Interior light in refrigeration compartment.
    b. Compartment Storage: Insert requirement.

6. Freezer Features: One freezer compartment with door.

    a. Automatic defrost.
    b. Interior light in freezer compartment.

7. Front Panel(s): Stainless steel.

8. Appliance Color/Finish: Stainless steel.

2.3 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Utilities: Comply with plumbing and electrical requirements.

END OF SECTION 113100

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.

B. Related Sections:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: The Basis of Design of window treatment is manufactured by Draper Inc.; refer to Finish Schedule. Subject to compliance with requirements provide product by basis of design manufacturer are approved comparable product.

B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS (W1)

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Chain tensioner, jamb mounted.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade.
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Shadebands:

1. Shadeband Material: Light-filtering fabric or light blocking as selected.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material.
b. Color and Finish: As selected by Architect from manufacturer's full range.

E. Installation Accessories:

1. Endcap Covers: To cover exposed endcaps.
2. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 6 inches.
b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant. Refer to finish Schedule.

1. Source: Roller-shade manufacturer.
2. Type: Per manufacturer’s product designation.
3. Weave: Mesh.
4. Thickness and Weight: Manufacturer’s standard.
5. Roll Width: As shown.
6. Openness Factor and Color: Refer to Finish Schedule.

2.4 ROLLER-SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER-SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

SECTION 123623 - CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate clad countertops.
2. Plastic-laminate flip-top countertop door.

B. Related Sections:

1. Division 06 Section ”Plastic-Laminate-Faced Architectural Cabinets” for plastic laminate.
2. Division 12 Section ”Simulated Stone Countertops” for solid-surface-material countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including, panel products, high-pressure decorative laminate, and adhesive for bonding plastic laminate.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in plastic-laminate countertops.
2. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Initial Selection and Verification: For each type of exposed finish required, prepared 6-inch square samples of the following:

1. Plastic laminates.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For the following:

1. High-pressure decorative laminate.
2. Adhesives.

B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Fabricator of products.

C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. General: Refer to Division 06 Section ”Plastic-Laminate-Faced Architectural Cabinets” for plastic laminate.

B. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels from AWI certification program indicating that countertops comply with requirements of grades specified.

2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

C. Grade: Premium.

D. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in the following categories:

a. Solid colors, matte finish, unless otherwise indicated or directed.
b. Solid colors with core same color as surface, matte finish, unless otherwise indicated or directed.

F. Edge Treatment: Same as laminate cladding on horizontal surfaces.

G. Core Material: Particleboard or medium-density fiberboard.

H. Core Material at Sinks: Particleboard made with exterior glue.

I. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

J. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

B. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.4 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 123623

SECTION 123661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-surface-material countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Samples for Initial Selection: For each type of material exposed to view.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.5 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturers: The Basis of Design for simulated stone countertops includes the following manufacturers. Subject to compliance with requirements, provide the Basis of Design manufacturers or approved equal:

1. Cesarstone International
2. Cambria Co.

2.2 QUARTZ AGGLOMERATE COUNTERTOPS (S1, S2 and S3)

A. Basis of Design Product: Subject to compliance with requirements, provide Basis of Design product as shown on Finish Schedule or approved comparable product.

B. Configuration: Provide countertops with the following front and backsplash style:

1. Front: Straight, slightly eased at top.
2. Endsplash: None.

C. Countertop Materials: 1 cm- thick, 90 percent quartz with polyester resin agglomerate complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

D. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661

SECTION 124813 - ENTRANCE FLOOR MATS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient entrance mats.

B. Related Sections:

1. Division 03 Section "Hydraulic Cement Underlayment" for floor preparation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats.

B. Shop Drawings:

1. Items penetrating floor mats, including door control devices.
2. Divisions between mat sections.
3. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Mat: Assembled sections of floor mat.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor mats to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: The Basis of Design for entrance floor mats is Milliken Co.. Subject to compliance with requirements, provide entrance floor mats manufactured by the Basis of Design manufacturer or approved equal.

2.2 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Regulatory Requirements: Comply with applicable provisions in ICC A117.1.

2.3 RESILIENT ENTRANCE MATS (FM1)

A. Carpet-Type Mats: 100% Polyamide carpet bonded to 1/8- to 1/4-inch- thick, flexible polyester backing to form mats 3/8 or 7/16 inch thick with non-raveling edges.

1. Colors, Textures, and Patterns: As indicated by manufacturer's designations.
2. Mat Size: As indicated.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed floor mat and is recommended by floor mat manufacturer for installation.

2.5 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

3.3 PROTECTION

A. After completing frame installation provide temporary protections. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

SECTION 131213 – POND AERATOR AND CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Under this section, the Contractor shall provide all labor, materials, and equipment necessary to furnish and install an aerator unit complete, including aerator unit, anchor system, electrical connection, Testing and Adjustment, and all other accessories required to complete the work, as shown and specified herein and as directed by the Engineer.

1.2 SUBMITTALS

A. Complete materials list of items proposed to be furnished under this Section

B. Sufficient data to demonstrate compliance with the specified requirements.

C. Manufacturers printed installation and application instructions.

PART 2 – PRODUCTS

2.1 MODEL

A. The pond aerator shall be the ½ horsepower, 60 Hz Fractional Series Aerating Fountain & Mixing Series, with “Gemini” spray pattern, manufactured by Otterbine Barebo, Inc., or approved equivalent.

B. The aerator shall be a floating, surface spray aerator with a “Gemini” spray pattern. Spray dimensions are: 4 feet in height, and 4.5 feet in diameter.

C. The aerator shall be equipped with a 2-light LED set, 6.5-watt, low voltage.

2.2 PUMPING CAPACITIES

A. The primary pumping rate of the unit is 506 gallons per minute (gpm).

B. The oxygen transfer rate shall be 2.2 pounds per horsepower per hour (lb/HP/hr).

2.3 FLOAT

A. The float shall be made of seamless, one-piece high-density polyethylene plastic, filled with high density closed cell polyurethane foam. The float shall be capable of providing full floatation if the shell is punctured or cracked. The float shall have protective pockets for lights and handles molded into the bottom for easy handling. Metal floats or those with an internal void for additional ballast are not acceptable.

B. Anchoring shall be in accordance with the contract documents, or per manufacturer’s specifications, whichever is more stringent.

2.4 IMPELLER

A. The impeller shall be dynamically balanced and die cast from type 304 stainless steel. A type 304 stainless steel bolt and set-screw shall secure the impeller to the motor shaft. Flexible shaft couplings are not acceptable.

2.5 MOTOR

A. The motor shall be a 0.5 HP, 115 Volt, 1 phase, 60 HZ oil-cooled, submersible motor operating at 3450 RPM. The service factor shall be 1.15. The motor shall operate in a reservoir of Otterbine oil for continuous lubrication of bearings and for efficient transfer of heat through the motor housing wall. Top mounted motors and water-lubricated motors are not acceptable. The rotor shall be dynamically balanced. The winding (stator) wires shall be covered with class F rated insulation designed for complete immersion in oil. The motor shall be attached to a thermoplastic motor base plate. The motor shall be protected against oil and water leakage by a combination of rotary seals, stationary seals, and molded rubber “O” rings. The rotary seal shall be accessible without removing the motor base plate. Motor shall be serviceable.

2.6 MOTOR HOUSING

A. The external motor housing shall be a canister formed from deep drawn 316 stainless steel.

B. The motor base plate shall be constructed of 420 Valox thermoplastic. A Valox boss will provide support and protection for the male electrical connector.

2.7 FASTENER

A. All fasteners are to be metric and type 304 or 316 stainless steel.

2.8 ELECTRICAL CONNECTORS

A. The electrical connectors shall consist of a receptacle and a plug constructed of nonconductive polymers. The system shall create a vacuum seal when connected and have a threaded nut system as a backup. The plug shall have a keyway and be threaded into the motor base plate. The connector system shall be ETL and UL approved.

2.9 UNDERWATER POWER CABLE

A. The power cables shall be type SOOW specifically designed for underwater use. The conductors shall be flexible, stranded bare copper 12, 10 or 8 gauge, triple insulated to resist moisture, cracking, and softening. The outer jacket of the cable shall be a black CPE material. All underwater connections shall be vulcanized. Power cable shall be able to be furnished in unspliced lengths up to two hundred if necessary.

2.10 POWER CONTROL CENTER

A. The electrical components shall be mounted in a NEMA 4X rated enclosure with an externally mounted disconnect switch, and a MANUAL - OFF - AUTO selector switch. The electrical system for all units (115, 208-230, 380-415 & 460V) shall include a non-reversing 600V rated Manual Motor Controller (MMC)

with thermal overload and short circuit trip and 24hr timer. 115, 208-230 volt, single and three phase units shall include GFCI (Ground Fault Circuit Interrupter) protection. To operate the GFCI and control circuit on 208-230 volt systems a neutral must be present or an optional control transformer may be supplied. The electrical system shall include a lightning arrester, rated for a maximum of 60,000 amperes discharge.

B. Controller shall be installed in the mechanical room. Contractor shall coordinate with MEP Engineer for specific placement inside the building.

2.11 TESTING

A. Safety - The aerator system shall be tested and approved as a unit. Separate component testing not allowed. Unit must be tested by ETL, ETL-C, CE, UL or other accredited testing facilities.

B. Performance - Unit must have independent performance testing provided by the University of Minnesota.

2.12 WARRANTY

A. The warranty shall be a minimum of two years.

2.13 ACCEPTABLE MANUFACTURER

A. This unit shall be an OTTERBINE Gemini Aerating Fountain manufactured by

Otterbine Barebo,Inc.
3840 Main Road East
Emmaus, PA 18049
Telephone: (610) 965-6018.
www.otterbine.com
or approved equal

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. All construction and installation shall be in accordance with manufacturer's specifications and all applicable codes. The Contractor shall complete all installation, startup, testing, and any necessary adjustments to the satisfaction with the Engineer. Unit must be tested by ETL, UL or other accredited testing facilities. The unit shall be properly anchored to the bottom of the pond as shown on plans.

END OF SECTION 131213

SECTION 142143 - VERTICAL RECIPROCATING CONVEYORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Electric traction vertical reciprocating conveyors.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for the following:

a. Attachment plates and angle brackets for supporting guide-rail brackets.
b. Hoist beams.
c. Structural-steel shapes for subsills.
d. Pit ladders.
e. Cants in hoistways made from steel sheet.

1.3 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
2. Include large-scale layout of car-control station.
3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Manufacturer Certificates: Signed by conveyor manufacturer certifying that hoistway, pit, as shown on Drawings, and electrical service, as shown and specified, are adequate for conveyor system being provided.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For conveyor to include in emergency, operation, and maintenance manuals.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted conveyor use.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer must have a minimum of five (5) years' experience in the manufacturing of vertical reciprocating conveyors

B. Installer Qualifications: Conveyor manufacturer or an authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

A. Coordinate installation of sleeves, block outs, conveyor equipment with integral anchors, and other items that are embedded in concrete or masonry for conveyor equipment. Furnish templates, sleeves, conveyor equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of other work relating to conveyors including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits.

1.9 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace conveyor work that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty Period: 1 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Subject to compliance with requirements, provide “S Series” vertical reciprocating conveyors manufactured by Custom Industrial Products or approved equal

B. Source Limitations: Obtain conveyor and major conveyor components, including pump-and-tank units, guide assemblies, controllers, signal fixtures, operators, frames and entrances from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ANSI/ASME B20.1 Safety Standards for Conveyors and Related Equipment.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

2.3 VERTICAL RECIPROCATING CONVEYORS

A. Conveyor System, General: Manufacturer's standard conveyor system. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard conveyor systems and as required for complete system.

B. Conveyor Description:

1. Load Capacity: The vertical reciprocating conveyor shall be rated at a live load capacity of 6,000 lbs.
2. Operating Speed: The vertical reciprocating conveyor shall have a vertical lifting speed of 20 - 25 feet per minute when loaded to maximum capacity.
3. Vertical Travel Height: The vertical reciprocating conveyor shall have a vertical lifting height (lowest finished floor to uppermost finished floor) of up to 40 feet with a total of two landings (including lowest level).
4. Lift Carriage: The vertical reciprocating conveyor carriage shall be a minimum size as indicated on Drawings with a steel deck plate and Full Load Height platform side panels on all non-operating ends and safety chains with snap hooks on all operating ends.
5. Soft-Start / Soft-Stop: The vertical reciprocating conveyor shall be equipped with a Variable Frequency Drive which provides smooth acceleration and deceleration.
6. Mounting: The vertical reciprocating conveyor shall be pit mounted as shown.
7. Vertical Masts: The vertical reciprocating conveyor shall have two structural grade steel H-beams.

A. Deflection Under Load: No portion of the vertical reciprocating conveyor shall exhibit permanent deflection when loaded to full capacity.

B. Lifting Means: The drive system shall be comprised of two cable drums transmitting lifting forces through two wire rope cables to the upper cross member of the carriage with leveling adjustments. The electrical drive motor shall be 100% duty cycle coupled with a Cyclo-Drive gear reducer with a shock load rating of 500%. Planetary or helical gear reducers are not allowed.

C. Safety Brakes and Devices: The Carriage shall be equipped with two broken/slack cable brakes that prevent the carriage from descending if tension is lost on either cable. Slack cable switches are required to disable motor power in the event a cable becomes slack.

D. Security Enclosures

1. Guards are required on all non-operating sides of the vertical reciprocating conveyor to meet ASME B20.1 Safety Standards.
2. Gates are required on all operating sides of the vertical reciprocating conveyor at each level of operation. Each gate must be equipped with an electrical and mechanical locking device to prevent opening of the gate unless the carriage is present and to prevent operation unless all gates are closed.
3. Enclosures shall extend 96 inches high at each level which consists of expanded metal panels which will reject a 2" diameter ball.
4. Landing Gates, equipped with electrical and mechanical locking devices, to be supplied on all operating sides of the vertical reciprocating conveyor at each level of operation. Security enclosures shall tie directly into the vertical mast.
   a. Type: Manufacturer's standard roll-up.
   b. Finish, Color: Manufacturer's standard powder-coat finish, gray.
5. Security Signage: Signs dictating "NO RIDERS" and maximum weight capacity shall be placed at every access point and visible from all operating ends of the carriage.

E. Load Pattern: The pattern for loading and unloading the carriage at different levels must be a "Z" configuration (loading /unloading from opposite sides).

2.4 SYSTEMS AND COMPONENTS

A. Power Requirements: The conveyor shall be manufactured to operate on 230 or 460 volts with 3 or 1 phase at 60 hertz.

B. Electric Motor

1. The motor shall have a minimum duty cycle of 100%.
2. The motor and Cyclo-Drive gear reducer must be able to withstand a shock load of at least 500%.
3. Motor horsepower shall be sized to handle the carriage weight in addition to the rated live load and specified speed.
4. Motor shall be designed for continuous duty at ambient temperatures of 32° to 102° Fahrenheit.
5. The motor shall not automatically restart when the overload device is reset.
6. The motor shall be equipped with a heavy-duty, long life, fast-acting fail-safe disc brake to ensure the brake will hold in case of power failure.

C. Controls:

1. Each operating floor shall be equipped with a light-present momentary contact push-button control station with full call, send and mushroom style E-stop switches for manual control of lift operation.
2. An internally pre-wired, NEMA 12 rated Intelitroll control panel shall be provided with appropriate transformer, overload relay, field wiring terminal block and breakers.
3. Limit Switches: The conveyor shall be equipped with a floor level switch at each level, upper level, and over travel limit switch to provide precise positioning of the carriage.
4. Slack Cable Safety Switches: Switches shall be provided to monitor slack cable situations and disable power to the motor while engaging carriage safety brakes in the event of a slack or broken cable.
5. The control voltage shall not exceed 24 volts.

D. Power Source: Owner shall terminate high voltage operating power within 10 feet of the location designated for the conveyor installation.

2.5 FINISHES

A. All carbon steel surfaces shall be finished with manufacturer's standard powder coat system or equivalent.

B. Prior to applying finish, all dirt, mill scale, oil and grease shall be removed from carbon steel surfaces by a combination of brushing, wiping and use of solvents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conveyor areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which conveyor work is to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Welded Construction: Provide welded connections for installing conveyor work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.

B. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to conveyor system.

C. Lubricate operating parts of systems as recommended by manufacturers.

D. Alignment: Coordinate installation of hoistway entrances with installation of conveyor guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

E. Leveling Tolerance: 1/4 inch, up or down, regardless of load and travel direction.

F. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

G. Locate signal equipment for conveyor as directed.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of conveyor installation and before permitting conveyor use (either temporary or permanent), provide and or perform acceptance tests as required and recommended by ANSI/ASME B20.1 and by governing regulations and agencies. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on conveyors.

1. Operating Load Test: Peform a 4,000 pound test load and load the conveyor at the lowest level. The loaded conveyor carriage shall be conveyed to an upper floor level and returned to the lowest level to assure proper operation.

    a. If the conveyor cannot lift or lower the load, the conveyor shall fail the test.

2. Performance Test: This test is to be performed in conjunction with Test 1 above. During the demonstration of the lifting and lowering test, measure the time required to lift and lower the capacity load. Average times for lifting and lowering the load and calculate the average feet per minute travel speed.

    a. If the conveyor does not lift the load within 10% of the specified speed, or if the lowering speed exceeds the lifting speed by more than 10%, the conveyor shall fail the test.

3. Stationary Load Test: This test is to be performed in conjunction with Test 1 above. The loaded conveyor carriage shall remain stationary at an upper level for a minimum of one (1) hour. After the one (1) hour period, the conveyor will be inspected for deflection of the components or drift of the platform.

    a. If deformation or downward drift is evident, the conveyor shall fail the test.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain conveyor(s).

B. Check operation of each conveyor with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142143

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal fittings.
3. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

C. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

B. Retain option in first paragraph below if manufacturer's name and model number are indicated in schedules or plans on Drawings; delete option and insert manufacturer's name and model number if not included on Drawings.

C. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Presealed Systems.

D. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.

3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6 (DN 150) Cast-iron wall sleeves
b. Piping NPS 6 (DN 150 and Larger: Cast-iron wall sleeves

2. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6 (DN 150) Cast-iron wall sleeves with sleeve-seal system
b. Retain first subparagraph below if using sleeve-seal systems; delete if using sleeve-seal fittings.

1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

c. Piping NPS 6 (DN 150 Cast-iron wall sleeves with sleeve-seal system
d. Retain first subparagraph below if using sleeve-seal systems; delete if using only galvanized-steel-pipe sleeves.

1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

3. Interior Partitions:

a. Piping Smaller Than NPS 6 (DN 150) Galvanized-steel-pipe sleeves
b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-sheet sleeves

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With rough-brass finish and setscrew fastener.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type
d. Retain one of first two subparagraphs below.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 210518

SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Two-piece ball valves with indicators.
2. Bronze butterfly valves with indicators.
3. Iron butterfly valves with indicators.
4. Check valves.
5. Iron OS&Y gate valves.
6. Trim and drain valves.

1.3 DEFINITIONS

A. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

B. NRS: Nonrising stem.

C. OS&Y: Outside screw and yoke.

D. SBR: Styrene-butadiene rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

D. Protect flanges and specialties from moisture and dirt.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:

1. Main Level: HAMV - Fire Main Equipment.

    a. Level 1: HCBZ - Gate Valve.
    b. Level 1: HLOT - Valves.

        1) Level 3: HLUG - Ball Valves, System Control.
        2) Level 3: HLXS - Butterfly Valves.
        3) Level 3: HMER - Check Valves.
        4) Level 3: HMRZ - Gate Valves.

2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.

    a. Level 1: VQGU - Valves, Trim and Drain.

B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:

1. Automated Sprinkler Systems:

    a. Valves.

        1) Gate valves.
        2) Check valves.

            a) Single check valves.

        3) Miscellaneous valves.

C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.

D. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B1.20.1 for threads for threaded-end valves.
3. ASME B31.9 for building services piping valves.

E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

F. NFPA Compliance: Comply with NFPA 24 for valves.

G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.

H. Valve Sizes: Same as upstream piping unless otherwise indicated.

I. Valve Actuator Types:

1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Handlever: For quarter-turn trim and drain valves NPS 2 (DN 50) and smaller.

2.2 TWO-PIECE BALL VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following

B. Retain "Basis-of-Design Product" Paragraph and list of manufacturers below to identify a specific product or a comparable product from manufacturers listed. Retain option and delete insert note if manufacturer's name and model number are indicated on Drawings.

1. NIBCO INC.
2. Victaulic Company.

C. Description:

1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Chrome-plated brass.
9. Actuator: Worm gear or traveling nut.
10. Supervisory Switch: Internal or external.
11. End Connections for Valves NPS 1 (DN 25) through NPS 2 (DN 50): Threaded ends.
12. End Connections for Valves NPS 2-1/2 (DN 65): Grooved ends.

2.3 IRON BUTTERFLY VALVES WITH INDICATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Anvil International, Inc.
2. Fivalco Inc.
3. Globe Fire Sprinkler Corporation.
4. Kennedy Valve; a division of McWane, Inc.
5. NIBCO INC.
6. Tyco Fire & Building Products LP.
7. Victaulic Company.

B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body Material: Cast or ductile iron epoxy coating
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, nickel plated
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: Grooved-end connections

2.4 CHECK VALVES

A. Subject to compliance with requirements, provide or comparable product by one of the following:

1. Anvil International, Inc.
2. Fire Protection Products, Inc.
3. Fivalco Inc.
4. Globe Fire Sprinkler Corporation.
5. Kennedy Valve; a division of McWane, Inc.
6. Matco-Norca.
7. Mueller Co.; Water Products Division.
8. NIBCO INC.
9. Reliable Automatic Sprinkler Co., Inc.
10. Shurjoint Piping Products.
11. Tyco Fire & Building Products LP.
12. United Brass Works, Inc.
13. Venus Fire Protection Ltd.
14. Victaulic Company.
15. Viking Corporation.
16. Watts Water Technologies, Inc.
17. Wilson & Cousins Inc.

B. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel with elastomeric seal
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.5 IRON OS&Y GATE VALVES

A. Subject to compliance with requirements, provide or comparable product by one of the following:

1. American Cast Iron Pipe Company; Waterous Company subsidiary.
2. Clow Valve Company; a division of McWane, Inc.
3. Hammond Valve.
4. Kennedy Valve; a division of McWane, Inc.
5. Mueller Co.; Water Products Division.
6. NIBCO INC.
7. Victaulic Company.
8. Watts Water Technologies, Inc.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze with elastomeric coating
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating
6. Stem: Brass or bronze.

7. Packing: Non-asbestos PTFE.

8. Supervisory Switch: External.
9. End Connections: Grooved

2.6 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   a. Conbraco Industries, Inc.; Apollo Valves.
   b. Fire-End & Croker Corporation.
   c. Fire Protection Products, Inc.
   d. Flowserve.
   e. FNW; Ferguson Enterprises, Inc.
   f. Jomar International, LTD.
   g. Kitz Corporation.
   h. Legend Valve.
   i. Metso Automation USA Inc.
   j. Milwaukee Valve Company.
   k. NIBCO INC.
   l. Potter Roemer.
   m. Red-White Valve Corporation.
   n. Tyco Fire & Building Products LP.
   o. Victaulic Company.
   p. Watts Water Technologies, Inc.

2. Description:

   a. Pressure Rating: 175 psig (1200 kPa
   b. Body Design: Two piece.
   c. Body Material: Forged brass or bronze.
   d. Port size: Full or standard.
   e. Seats: PTFE.
   f. Stem: Bronze or stainless steel.
   g. Ball: Chrome-plated brass.
   h. Actuator: Handlever.
   i. End Connections for Valves NPS 1 (DN 25) through NPS 2-1/2 (DN 65): Threaded ends.
   j. End Connections for Valves NPS 1-1/4 and NPS 2-1/2 (DN 32 and DN 65): Grooved ends.

B. Angle Valves:

1. Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

   a. Fire Protection Products, Inc.
   b. NIBCO INC.
   c. United Brass Works, Inc.

2. Description:

   a. Pressure Rating: 175 psig (1200 kPa)
   b. Body Material: Brass or bronze.
   c. Ends: Threaded.
   d. Stem: Bronze.
   e. Disc: Bronze.
   f. Packing: Asbestos free.
   g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

1. Subject to compliance with requirements, provide or comparable product by one of the following:

a. NIBCO INC.
b. United Brass Works, Inc.

2. Description:

a. Pressure Rating: 175 psig (1200 kPa)
b. Body Material: Bronze with integral seat and screw-in bonnet.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc Holder and Nut: Bronze.
f. Disc Seat: Nitrile.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

A. Comply with requirements in the following Sections for specific valve installation requirements and applications:

1. Section 211100 "Facility Fire-Suppression Water-Service Piping" for application of valves in fire-suppression water-service piping outside the building.
2. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.
3. Section 211316 "Dry-Pipe Sprinkler Systems" for application of valves in dry-pipe, fire-suppression sprinkler systems.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves in position to allow full stem movement.

G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

H. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections.

I. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

END OF SECTION 210523

SECTION 210533 - HEAT TRACING FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes heat tracing for fire-suppression piping with the following electric heating cables:

1. Self-regulating, parallel resistance.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
2. Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.

B. Shop Drawings: For electric heating cable.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

A. Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. BriskHeat.
2. Chromalox.
3. Delta-Therm Corporation.
4. Easy Heat; a division of EGS Electrical Group LLC.
5. Nelson Heat Trace; a division of EGS Electrical Group LLC.
6. Pyrotenax; a brand of Tyco Thermal Controls LLC.
7. Raychem; a brand of Tyco Thermal Controls LLC.
8. Thermon Americas Inc.
9. Trasor Corp.

B. Comply with IEEE 515.1.

C. Heating Element: Pair of parallel No. 16, stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory-assembled, nonheating leads with connectors at one end, and seal the opposite end watertight. Cable shall be capable of crossing over itself once without overheating.

D. Electrical Insulating Jacket: Flame-retardant polyolefin.

E. Cable Cover: Tinned-copper braid and polyolefin outer jacket with ultraviolet inhibitor

F. Maximum Operating Temperature (Power On): 150 deg F (65 deg C)

G. Maximum Exposure Temperature (Power Off): 185 deg F (85 deg C)

H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

I. Capacities and Characteristics:

1. Maximum Heat Output: 3 W/ft. (9.8 W/m)
2. Piping Diameter: as indicated on drawings
3. Number of Parallel Cables: 2
4. Electrical Characteristics for Single-Circuit Connection:

a. Volts: 120
b. Phase1 phase
c. Hertz: 60

2.2 CONTROLS

A. Remote bulb unit with adjustable temperature range from 30 to 50 deg F (minus 1 to plus 10 deg C

B. Snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected cable.

C. Remote bulb on capillary, resistance temperature device, or thermistor for directly sensing pipe-wall temperature.

D. Corrosion-resistant, waterproof control enclosure.

2.3 ACCESSORIES

A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer or as recommended in writing by manufacturer.

B. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 3 mils (0.08 mm) thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.

1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): 3/4 inch (19 mm) minimum.
2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches (150 mm) or Larger: 1-1/2 inches (38 mm) minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install electric heating cable where indicated and according to NFPA 70 and NFPA 13.

B. Install electric heating cable across expansion joints according to manufacturer's written instructions; use cable to allow movement without damage to cable.

C. Install electric heating cables after piping has been tested and before insulation is installed.

D. Install electric heating cables according to IEEE 515.1.

E. Install insulation over piping with electric cables according to Section 210700 "Fire-Suppression Systems Insulation."

F. Install warning tape on piping insulation where piping is equipped with electric heating cables.

G. Set field-adjustable switches and circuit-breaker trip ranges.

3.3 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections

1. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
2. Test cables for electrical continuity and insulation integrity before energizing.
3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

D. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.

E. Cables will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 PROTECTION

A. Protect installed heating cables, including nonheating leads, from damage during construction.

B. Remove and replace damaged heat-tracing cables.

END OF SECTION 210533

SECTION 211100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes fire-suppression water-service piping and related components outside the building and service entrance piping through wall into the building and the following:

1. Pipes, fittings, and specialties.
2. Fire-suppression specialty valves.

B. Utility-furnished products include water meters that are furnished to the site, ready for installation.

C. Related Requirements:

1. Section 211119 "Fire-Department Connections" for exposed-, flush-, and yard-type, fire-department connections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with FM Global's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

A. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.

C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.

D. Grooved-End, Ductile-Iron Pipe Appurtenances:

1. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.

2. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

E. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

F. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.

1. Gaskets: AWWA C111, rubber.

G. Flanges: ASME B16.1, Class 125, cast iron.

2.2 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints:

1. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
2. Pressure Rating: 250 psig (1725 kPa) minimum.

B. Ductile-Iron Deflection Fittings:

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig (1725 kPa) minimum.

2.3 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: high-density, cross-laminated PE film of 0.004-inch (0.10-mm) minimum thickness

C. Form: Sheet

D. Color: Black

2.4 JOINING MATERIALS

A. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.

B. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

2.5 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.
2. Standard: AWWA C219.
3. Center-Sleeve Material: Manufacturer's standard
4. Gasket Material: Natural or synthetic rubber.
5. Pressure Rating: 150 psig (1035 kPa) minimum.
6. Metal Component Finish: Corrosion-resistant coating or material.

2.6 CURB VALVES

A. Curb Valves: Comply with AWWA C800 for high-pressure, service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.

B. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.

1. Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

C. Water Control Valves:

1. Description: Pilot-operation, diaphragm-type, single-seated main water control valve with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.
2. Pressure Rating: Initial pressure of 150 psig (1035 kPa) minimum.
3. Main Valve Body: Cast or ductile iron with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

2.7 ALARM DEVICES

A. General: UL 753 and FM Global's "Approval Guide" listing, of types and sizes to mate and match piping and equipment.

B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig (1725-kPa) working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with excavating, trenching, and backfilling requirements in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Water-Main Connection: Arrange with water utility company for tap of size and in location indicated in water main.

B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Comply with NFPA 24 for fire-service-main piping materials and installation.

D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install encasement for piping according to ASTM A 674 or AWWA C105.

E. Bury piping with depth of cover over top at least 30 inches (750 mm) with top at least below level of maximum frost penetration,

F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

G. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.

1. Terminate fire-suppression water-service piping within the building at the [floor slab] [wall] until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building's fire-suppression water-service piping systems when those systems are installed.

H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

I. Comply with requirements in Section 211200 "Fire-Suppression Standpipes," Section 211313 "Wet-Pipe Sprinkler Systems," and Section 211316 "Dry-Pipe Sprinkler Systems" for fire-suppression-water piping inside the building.

J. Comply with requirements in Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

K. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

L. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.

B. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

C. Ream ends of tubes and remove burrs.

D. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.

E. Copper-Tubing, Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

F. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.

G. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

H. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts.

I. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9.

J. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

K. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139.

L. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.

M. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

N. Do not use flanges or unions for underground piping.

3.4 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.
7. <Insert devices>.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire-suppression water-service piping according to NFPA 24 and the following:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.5 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

D. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.

E. Curb Valves: Install each underground curb valve with head pointed up and with service box.

F. Support valves and piping, not direct buried, on concrete piers. Comply with requirements for concrete piers in [Section 033000 "Cast-in-Place Concrete."] [Section 033053 "Miscellaneous Cast-in-Place Concrete."]

3.6 CONNECTIONS

A. Connect fire-suppression water-service piping to utility water main

B. Connect fire-suppression water-service piping to interior fire-suppression piping.

3.7 FIELD QUALITY CONTROL

A. Use test procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described below.

B. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

C. Hydrostatic Tests: Test at not less than one-and-one-half times the working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to zero psig (zero kPa). Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

D. Prepare test and inspection reports.

3.8 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground fire-suppression water-service piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic fire-suppression water-service piping or fire-suppression water-service piping with electrically insulated fittings, on main electrical meter panel. Comply with requirements for identifying devices in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING

A. Clean and disinfect fire-suppression water-service piping as follows:

1. Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.

2. Use purging[and disinfecting] procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for 24 hours.
b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow it to stand for three hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging[and disinfecting] activities.

3.10 PIPING SCHEDULE

A. Underground fire-suppression water-service piping NPS 6 to NPS 12 (DN 150 to DN 300) shall be one of the following:

1. Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.
2. Mechanical-joint, ductile-iron pipe; mechanical-joint,; glands, gaskets, and bolts; and gasketed joints.
3. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

3.11 VALVE SCHEDULE

A. Underground fire-suppression water-service shutoff valves NPS 2 (DN 50) and smaller shall be corporation valves or curb valves with ends compatible with piping.

B. Underground fire-suppression water-service shutoff valves NPS 3 (DN 80) and larger shall be[one of] the following:

1. 175-psig (1200-kPa)] [250-psig (1725-kPa), UL-listed or FM Global-approved, iron, nonrising-stem gate valves.

END OF SECTION 211100

SECTION 211119 - FIRE-DEPARTMENT CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exposed-type fire-department connections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.

PART 2 - PRODUCTS

2.1 EXPOSED-TYPE FIRE-DEPARTMENT CONNECTION

A. Subject to compliance with requirements, provide or comparable product by one of the following:

1. American Fire Hose & Cabinet.
2. Elkhart Brass Mfg. Company, Inc.
3. Fire-End & Croker Corporation.
4. Fire Protection Products, Inc.
5. GMR International Equipment Corporation.
6. Guardian Fire Equipment, Inc.
7. Venus Fire Protection Ltd.
8. Wilson & Cousins Inc.

B. Standard: UL 405.

C. Type: Exposed, projecting, for wall mounting.

D. Pressure Rating: 175 psig (1200 kPa) minimum.

E. Body Material: Corrosion-resistant metal.

F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

G. Caps: Brass, lugged type, with gasket and chain.

H. Escutcheon Plate: Round, brass, wall type.

I. Outlet: Back, with pipe threads.

J. Number of Inlets: Two

K. Escutcheon Plate Marking: Similar to "AUTO SPKR."

L. Finish: Polished chrome plated

M. Outlet Size: NPS 6 (DN 150)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.

B. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall-type fire-department connections.

B. Install yard-type fire-department connections in concrete slab support. Comply with requirements for concrete in Section 033000 "Cast-in-Place Concrete."

C. Install two protective pipe bollards on sides of each fire-department connection. Comply with requirements for bollards in Section 055000 "Metal Fabrications."

D. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

END OF SECTION 211119

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Specialty valves.
3. Sprinklers.
4. Alarm devices.
5. Pressure gages.

B. Related Requirements:

1. Section 211119 "Fire Department Connections" for exposed-, flush-, and yard-type fire department connections.
2. Section 230523 "General-Duty Valves for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig (1200-kPa) maximum.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For wet-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.

C. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Domestic water piping.
2. Compressed air piping.
3. HVAC hydronic piping.
4. Items penetrating finished ceiling include the following:
    a. Lighting fixtures.
    b. Air outlets and inlets.

B. Qualification Data: For qualified Installer and professional engineer

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Welding certificates.

E. Fire-hydrant flow test report.

F. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

G. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
    a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13.

B. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.

C. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.

1. Sprinkler system design shall be approved by authorities having jurisdiction.

a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
b. Sprinkler Occupancy Hazard Classifications:

1) Building Service Areas: Ordinary Hazard, Group 1
2) Electrical Equipment Rooms: Ordinary Hazard, Group 1
3) General Storage Areas: Ordinary Hazard, Group 1
4) Mechanical Equipment Rooms: Ordinary Hazard, Group 1
5) Office and Public Areas and Restaurant Seating Area: Light Hazard
6) Restaurant Service Areas: Ordinary Hazard, Group 1
7) Cart Charging Station: Ordinary Hazard, Group 2

2. Minimum Density for Automatic-Sprinkler Piping Design:

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a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (4.1 mm/min. over 139-sq. m) area.
b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (6.1 mm/min. over 139-sq. m) area.
c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. (8.1 mm/min. over 139-sq. m) area.

3. Maximum Protection Area per Sprinkler:

a. Office Spaces: 225 sq. ft. (20.9 sq. m)
b. Storage Areas: 130 sq. ft. (12.1 sq. m)
c. Mechanical Equipment Rooms: 130 sq. ft. (12.1 sq. m)
d. Electrical Equipment Rooms: 130 sq. ft. (12.1 sq. m)
e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7

2.2 STEEL PIPE AND FITTINGS

A. Standard-Weight, Black-Steel Pipe: ASTM A 53/A 53M, Grade B Pipe ends may be factory or field formed to match joining method.

B. Schedule 10, Black-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, Schedule 10 in NPS 5 (DN 125) and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 (DN 150 to DN 250), plain end.

C. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Malleable- or Ductile-Iron Unions: UL 860.

E. Cast-Iron Flanges: ASME 16.1, Class 125.

F. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick

a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.

2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.

G. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Grooved-Joint, Steel-Pipe Appurtenances:

1. Pressure Rating: 175-psig (1200-kPa minimum.
2. Painted Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.

3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

I. Steel Pressure-Seal Fittings: UL 213, FM Global-approved, 175-psig (1200-kPa) pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

1.

2.3 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig (1200-kPa) minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Alarm Valves:

1. Standard: UL 193.
2. Design: For horizontal or vertical installation.

3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.

4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175-psig (1200-kPa) minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4 (DN 20).
5. End Connections: Threaded.

2.4 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig (1200-kPa) minimum
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig (1200-kPa) minimum
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1.
2. Standard: UL 199.
3. Pressure Rating: 175 psig (1200 kPa).
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig (1200-kPa) minimum
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250-psig (1725-kPa) minimum
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. Standard: UL 1474.
2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
3. Pressure Rating: 175-psig (1200-kPa) minimum
4. Size: Same as connected piping, for sprinkler.

2.5 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Residential Sprinklers: 175-psig (1200-kPa) maximum.

C. Pressure Rating for Automatic Sprinklers: 175-psig (1200-kPa) minimum.

D. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199
2. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

E. Sprinkler Finishes: bronze

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat
2. Sidewall Mounting: Chrome-plated steel one piece, flat.

G. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.

2.6 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Electrically Operated Alarm Bell:

1. Standard: UL 464.
2. Type: Vibrating, metal alarm bell.
3. Size: 8-inch (200-mm) minimum-diameter.
4. Finish: Red-enamel factory finish, suitable for outdoor use.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Water-Flow Indicators:

1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

4. Type: Paddle operated.
5. Pressure Rating: 250 psig (1725 kPa).
6. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.7 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.

C. Pressure Gage Range: 0- to 250-psig (0- to 1725-kPa) minimum

D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 211100 "Facility Fire-Suppression Water-Service Piping" for exterior piping.

B. Install shutoff valve, pressure gage, drain, and other accessories indicated at connection to water-service piping.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

K. Install alarm devices in piping systems.

L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

N. Fill sprinkler system piping with water.

O. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 210533 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Section 210700 "Fire-Suppression Systems Insulation."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.
2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.

3.7 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.8 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller shall be one of the following:

1. Standard-weight Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight Schedule 40 black-steel pipe with cut- or roll-]grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4 (DN 65 to DN 100, shall be one of the following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

E. Standard-pressure, wet-pipe sprinkler system, NPS 5 (DN 125) and larger shall be one of the following:

1. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.12 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers
2. Rooms with Suspended Ceilings: Concealed sprinklers
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Upright sprinklers

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.

3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

a. Pipes, fittings, and specialties.
b. Specialty valves.
c. Sprinkler specialty pipe fittings.
d. Sprinklers.
e. Alarm devices.
f. Pressure gages.

B. Related Requirements:

a. Section 211119 "Fire Department Connections" for exposed-, flush-, and yard-type fire department connections.
b. Section 230523 "General-Duty Valves for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure of 175-psig (1200-kPa) maximum.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

a. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For dry-pipe sprinkler systems.

a. Include plans, elevations, sections, and attachment details.
b. Include diagrams for power, signal, and control wiring.

C. Delegated-Design Submittal: For dry-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

a. Domestic water piping.
b. Compressed air piping.
c. HVAC hydronic piping.
d. Items penetrating finished ceiling including the following:
e. Lighting fixtures.
f. Air outlets and inlets.

B. Qualification Data: For qualified Installer and professional engineer

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Fire-hydrant flow test report.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dry-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

a. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

a. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

b. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTIONS

A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.

2.2 PERFORMANCE REQUIREMENTS

A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

a. NFPA 13.

B. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.

C. Sprinkler system design shall be approved by authorities having jurisdiction.

a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
b. Sprinkler Occupancy Hazard Classifications:
c. Outdoors Canopies and Restaurant Seating: Light Hazard
d. Cart Charging : Ordinary Hazard, Group 2
e. Minimum Density for Automatic-Sprinkler Piping Design:
f. Light-Hazard Occupancy: 0.10 gpm over 1950-sq. ft. (4.1 mm/min. over 139-sq. m) area.
g. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1950-sq. ft. (8.1 mm/min. over 139-sq. m) area.
h. Special Occupancy Hazard: As determined by authorities having jurisdiction.
i. Maximum Protection Area per Sprinkler: According to UL listing.
j. Maximum Protection Area per Sprinkler:
k. Restaurant seating: 225 sq. ft. (20.9 sq. m)
l. Canopies Areas: 225 sq. ft.
m. Cart Charging: 130 sq. ft. (12.1 sq. m

D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7

2.3 STEEL PIPE AND FITTINGS

A. Standard-Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E Grade B Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Galvanized-Steel Pipe: ASTM A 135/A 135M; ASTM A 795/A 795M, Type E or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Thinwall Galvanized-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.

D. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

E. Galvanized-Steel Couplings: ASTM A 865/A 865M, threaded.

F. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

G. Malleable- or Ductile-Iron Unions: UL 860.

H. Cast-Iron Flanges: ASME B16.1, Class 125.

I. Grooved-Joint, Steel-Pipe Appurtenances:

a.
b. Pressure Rating: 175-psig (1200-kPa minimum.
c. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.

d. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.4 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

a. Standard-Pressure Piping Specialty Valves: 175-psig (1200-kPa) minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Dry-Pipe Valves:

a. Standard: UL 260.
b. Design: Differential-pressure type.
c. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

d. Air-Pressure Maintenance Device:
e. Standard: UL 260.
f. Type: Automatic device to maintain minimum air pressure in piping.
g. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range, and 175-psig (1200-kPa outlet pressure.

h. Air Compressor:
i. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

j. Motor Horsepower: Fractional.
k. Power: 120-V ac, 60 Hz, single phase.

2.5 SPRINKLER PIPING SPECIALTIES

A. General Requirements for Dry-Pipe System Fittings: UL listed for dry-pipe service.

B. Branch Outlet Fittings:

a. Standard: UL 213.
b. Pressure Rating: 175-psig (1200-kPa) minimum
c. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
d. Type: Mechanical-tee and -cross fittings.
e. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
f. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
g. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. Flow Detection and Test Assemblies:

a. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
b. Pressure Rating: [175-psig (1200-kPa) minimum] [300 psig (2070 kPa)].
c. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
d. Size: Same as connected piping.
e. Inlet and Outlet: Threaded.

D. Branch Line Testers:

a. Standard: UL 199.
b. Pressure Rating: 175-psig (1200-kPa) minimum.
c. Body Material: Brass.
d. Size: Same as connected piping.
e. Inlet: Threaded.
f. Drain Outlet: Threaded and capped.
g. Branch Outlet: Threaded, for sprinkler.

E. Sprinkler Inspector's Test Fittings:

a. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
b. Pressure Rating: [175-psig (1200-kPa) minimum] [300 psig (2070 kPa)].
c. Body Material: Cast- or ductile-iron housing with sight glass.
d. Size: Same as connected piping.
e. Inlet and Outlet: Threaded.

F. Adjustable Drop Nipples:

a.
b. Standard: UL 1474.
c. Pressure Rating: 250-psig (1725-kPa) minimum
d. Body Material: Steel pipe with EPDM O-ring seals.
e. Size: Same as connected piping.
f. Length: Adjustable.
g. Inlet and Outlet: Threaded.

G. Flexible Sprinkler Hose Fittings:

a. Standard: UL 1474.
b. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
c. Pressure Rating: 175-psig (1200-kPa) minimum
d. Size: Same as connected piping, for sprinkler.

2.6 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Residential Sprinklers: 175-psig (1200-kPa) maximum.

C. Pressure Rating for Automatic Sprinklers: 175-psig (1200-kPa) minimum.

D. Automatic Sprinklers with Heat-Responsive Element:

a. Nonresidential Applications: UL 199
b. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

E. Sprinkler Finishes: bronze

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

a. Ceiling Mounting: Chrome-plated steel, one piece, flat
b. Sidewall Mounting: Chrome-plated steel one piece, flat.

G. Sprinkler Guards:

a. Standard: UL 199.
b. Type: Wire cage with fastening device for attaching to sprinkler.

2.7 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Pressure Switches:

a. Standard: UL 346.
b. Type: Electrically supervised water-flow switch with retard feature.
c. Components: Single-pole, double-throw switch with normally closed contacts.
d. Design Operation: Rising pressure signals water flow.

C. Valve Supervisory Switches:

a. Standard: UL 346.
b. Type: Electrically supervised.
c. Components: Single-pole, double-throw switch with normally closed contacts.
d. Design: Signals that controlled valve is in other than fully open position.
e. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.8 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.

C. Pressure Gage Range: 0- to 250-psig (0- to 1725-kPa) minimum

D. Label: Include "WATER" or "AIR/WATER" label on dial face.

E. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.3 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

   a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
   b. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valves to drain piping between fire department connections and check valves. Drain to floor drain or to outside building.

K. Connect compressed-air supply to dry-pipe sprinkler piping.

L. Connect air compressor to the following piping and wiring:

a. Pressure gages and controls.
b. Electrical power system.
c. Fire-alarm devices, including low-pressure alarm.

M. Install alarm devices in piping systems.

N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

P. Drain dry-pipe sprinkler piping.

Q. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices, air compressors

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

J. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

K. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

L. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.

M. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.5 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

a. Install valves in vertical position for proper direction of flow, in main supply to system.
b. Install dry-pipe valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
c. Install air compressor and compressed-air-supply piping.
d. Install air-pressure maintenance device with shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range; and 175-psig (1200-kPa) maximum inlet pressure.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.7 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections

a. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
c. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
d. Energize circuits to electrical equipment and devices.
e. Start and run air compressors.
f. Coordinate with fire-alarm tests. Operate as required.
g. Coordinate with fire-pump tests. Operate as required.
h. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.10 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.

D. Standard-pressure, dry-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be the following:

a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

E. Standard-pressure, dry-pipe sprinkler system, NPS 2-1/2 to NPS 4 (DN 65 to DN 100) shall be the following:

a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
b. Standard-weight or Schedule 10, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.11 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

a. Rooms without Ceilings: Upright sprinklers
b. Rooms with Suspended Ceilings: Dry pendent sprinklers concealed sprinklers
c. Wall Mounting: Dry sidewall sprinklers.
d. Spaces Subject to Freezing: Upright sprinklers

B. Provide sprinkler types in subparagraphs below with finishes indicated.

a. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
b. Flush Sprinklers: Bright chrome, with painted white escutcheon.
c. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
d. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211316

SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Grooved-joint expansion joints.
2. Alignment guides and anchors.
3. Pipe loops and swing connections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For expansion joints to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

2.2 PACKLESS EXPANSION JOINTS

1. Expansion Joints for Copper Tubing NPS 2 (DN 50) and Smaller: Copper-alloy fittings with solder-joint end connections.
   a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F (3100 kPa at 21 deg C) and 340 psig at 450 deg F (2340 kPa at 232 deg C) ratings.
   b. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F (4830 kPa at 21 deg C) and 500 psig at 450 deg F (3450 kPa at 232 deg C) ratings.
2. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Copper-alloy fittings with threaded end connections.
   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F (2070 kPa at 21 deg C) and 225 psig at 450 deg F (1550 kPa at 232 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F (2890 kPa at 21 deg C) and 315 psig at 450 deg F (2170 kPa at 232 deg C) ratings.
3. Expansion Joints for Steel Piping NPS 2 (DN 50) and Smaller: Carbon-steel fittings with threaded end connections.
   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 450 psig at 70 deg F (3100 kPa at 21 deg C) and 325 psig at 600 deg F (2250 kPa at 315 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F (4830 kPa at 21 deg C) and 515 psig at 600 deg F (3550 kPa at 315 deg C) ratings.
4. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6 (DN 65 to DN 150): Carbon-steel fittings with flanged end connections.
   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F (1380 kPa at 21 deg C) and 145 psig at 600 deg F (1000 kPa at 315 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F (1900 kPa at 21 deg C) and 200 psig at 600 deg F (1380 kPa at 315 deg C) ratings.

2.3 GROOVED-JOINT EXPANSION JOINTS

A. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.

B. Standard: AWWA C606, for grooved joints.

C. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.

D. Couplings: Seven, flexible type for steel-pipe dimensions. Include ferrous housing sections, ethylene-propylene-diene terpolymer rubber gasket suitable for cold and hot water, and bolts and nuts.

2.4 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides AG-01

1. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding slider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

a. Stud: Threaded, zinc-coated carbon steel.
b. Expansion Plug: Zinc-coated steel.
c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

C. Install grooved-joint expansion joints to grooved-end steel piping.

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install one guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe, and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24; U bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 22016

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

C. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Presealed Systems.

C. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.
    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.

3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 22051

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With rough-brass finish and setscrew fastener.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.

e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass with polished, chrome-plated finish.

f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or rough-brass finish.

g. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B16.18 for solder-joint connections.
4. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 Annex G for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 4 (DN 100)and larger.
2. Handlever: For quarter-turn valves smaller than NPS 4 (DN 100).

H. Valves in Insulated Piping:

1. Include 2-inch (50-mm) stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRASS BALL VALVES

A. One-Piece, Brass Ball Valves:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Forged brass or bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass or stainless steel.
h. Ball: Chrome-plated brass or stainless steel.
i. Port: Reduced.

B. Two-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Two piece.
d. Body Material: Forged brass.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.

i. Port: Full.

C. Two-Piece, Brass Ball Valves with Regular Port and Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Two piece.
d. Body Material: Forged brass.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Regular.

D. Three-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Three piece.
d. Body Material: Forged brass.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

2.3 BRONZE BALL VALVES

A. One-Piece, Bronze Ball Valves with Bronze Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Reduced.

B. Two-Piece, Bronze Ball Valves with Full Port, and Bronze or Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.

i. Port: Full.

C. Three-Piece, Bronze Ball Valves with Full Port and Bronze or Brass Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Three piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

D. Three-Piece, Bronze Ball Valves with Regular Port and Bronze Trim:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Three piece
d. Body Material: Bronze
e. Ends: Threaded or soldered.
f. Seats: PTFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Regular.

E. Two-Piece, Safety-Exhaust, Bronze Ball Valves:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Two piece.
d. Body Material: Bronze, ASTM B 584, Alloy C844.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Chrome-plated brass, with exhaust vent opening for pneumatic applications.
i. Port: Full.

2.4 IRON BALL VALVES

A. Class 125, Iron Ball Valves:

1. Description:

a. Standard: MSS SP-72.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Split body.
d. Body Material: ASTM A 126, gray iron.
e. Ends: Flanged or threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel.

i. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.

2. One piece, brass ball valve.
3. One piece, bronze ball valve with bronze trim.
4. Two-piece, brass ball valves with full port and brass trim.
5. Two-piece, bronze ball valves with full port and bronze or brass trim.
6. Three-piece, brass ball valves with full port and brass trim.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Steel and Iron Valves, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): May be provided with threaded ends instead of flanged ends.
2. Class 150, iron ball valves.

END OF SECTION 220523.12

SECTION 220523.13 - BUTTERFLY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Iron, grooved-end butterfly valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set butterfly valves closed or slightly open.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B16.5 for flanges on steel valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B31.9 for building service piping valves.

C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

D. NSF Compliance: NSF 61 Annex G for valve materials for potable-water service.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Handlever: For valves NPS 6 (DN 150) and smaller.

H. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions.

2.2 VALVES

A. 175 CWP, Iron, Grooved-End Butterfly Valves:

1. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 175 psig (1200 kPa).
c. Body Material: Coated, ductile iron.
d. Stem: Two-piece stainless steel.
e. Disc: Coated, ductile iron.
f. Seal: EPDM.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine mating flange faces for damage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

B. Ductile-Iron, Grooved-End Butterfly Valves: [175] [300] CWP.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Ductile-Iron, Grooved-End Butterfly Valves: [175] [300] CWP.

END OF SECTION 220523.13

SECTION 220523.14 - CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Bronze swing check valves.
2. Iron swing check valves.
3. Iron, grooved-end swing check valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder joint.
5. ASME B31.9 for building services piping valves.

C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

D. NSF Compliance: NSF 61 Annex G for valve materials for potable-water service.

E. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

F. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

G. Valve Sizes: Same as upstream piping unless otherwise indicated.

H. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE SWING CHECK VALVES

A. Class 125, Bronze, Swing Check Valves with Bronze Disc:

1. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: Bronze.

B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Description:

a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: PTFE.

2.3 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged or threaded. See valve schedule articles.
f. Trim: Bronze.
g. Gasket: Asbestos free.

B. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:

1. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged or threaded. See valve schedule articles.
f. Trim: Composition.
g. Seat Ring: Bronze.
h. Disc Holder: Bronze.
i. Disc: PTFE.
j. Gasket: Asbestos free.

2.4 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP, Iron, Grooved-End Swing Check Valves:

1. Description:

a. CWP Rating: 300 psig (2070 kPa).
b. Body Material: ASTM A 536, ductile iron.
c. Seal: EPDM.
d. Disc: Spring operated, ductile iron or stainless steel.

2.5 IRON, CENTER-GUIDED, SPRING-LOADED CHECK VALVES

A. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:

1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126, gray iron.
d. Style: Compact wafer, spring loaded.
e. Seat: Bronze.

B. Class 125, Iron, Globe, Center-Guided Check Valves with Metal Seat:

1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig (1380 kPa).

c. Body Material: ASTM A 126, gray iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: Bronze.
g. Seat: Bronze.

C. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:

1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126, gray iron.
d. Style: Compact wafer, spring loaded.
e. Seat: EPDM or NBR.

D. Class 125, Iron, Globe, Center-Guided Check Valves with Resilient Seat:

1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126, gray iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: EPDM.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

F. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Pump-Discharge Check Valves:

a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
b. NPS 2-1/2 (DN 65) and Larger for Domestic Water: Iron swing check valves with lever and weight or spring; or iron, center-guided, metal-seat or resilient-seat check valves.
c. NPS 2-1/2 (DN 65) and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

C. End Connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded or soldered.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged or threaded.
3. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded.
4. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged or threaded.
5. For Grooved-End Copper Tubing and Steel Piping: Grooved.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: Bronze swing check valves, Class 125 disc with soldered or threaded end connections.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Iron swing check valves, Class 125, metal seats with threaded or flanged end connections.
2. Iron, grooved-end swing check valves, 300 CWP.

END OF SECTION 220523.14

SECTION 220523.15 - GATE VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Iron gate valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. NRS: Nonrising stem.

C. OS&Y: Outside screw and yoke.

D. RS: Rising stem.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set gate valves closed to prevent rattling.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder joint.
5. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 Annex G for valve materials for potable-water service.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. RS Valves in Insulated Piping: With 2-inch (50-mm) stem extensions.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:

1. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

B. Class 125, OS&Y, Iron Gate Valves:

1. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. Use gate valves for shutoff service only.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

C. For Grooved-End Valve ends may be grooved.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: Bronze gate valves, Class 125 RS with threaded ends.

B. Pipe NPS 2-1/2 (DN 65) and Larger: Iron gate valves, Class 125 OS&Y with flanged ends.

END OF SECTION 220523.15

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Fastener systems.
4. Pipe stands.
5. Pipe positioning systems.
6. Equipment supports.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 220516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:[Signed and sealed by a qualified professional engineer.] Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe stands.
4. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) minimum compressive strength and vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa minimum compressive strength.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.6 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
   b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).

11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.

7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: aluminum, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: Black
3. Background Color: White.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
5. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless-steel rivets or self-tapping screws.

7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets o] self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.

2.4 STENCILS

A. Stencils for Piping:

1. Lettering Size: At least 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.
2. Stencil Material: Aluminum.
3. Stencil Paint: Exterior, gloss, acrylic enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: aluminum, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches (100 by 178 mm).
2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to [25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

E. Pipe Label Color Schedule:

1. Domestic Water Piping

   a. Background: Safety green
   b. Letter Colors: White

2. Sanitary Waste and Storm Drainage Piping:

   a. Background Color: Safety black
   b. Letter Color: White

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Cold Water: 1-1/2 inches (38 mm)
   b. Hot Water: 1-1/2 inches (38 mm)

2. Valve-Tag Colors:

   a. Cold Water: Safety green.
   b. Hot Water: Safety green

3. Letter Colors:

   a. Cold Water: White
   b. Hot Water: White

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Sanitary waste piping exposed to freezing conditions.
5. Storm-water piping exposed to freezing conditions.
6. Roof drains and rainwater leaders.
7. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Sustainable Design Submittals:

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
3. Sheet Jacket Materials: 12 inches (300 mm) square.
4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot (3-m) section of NPS 2 (DN 50) straight pipe.
b. One each of a 90-degree threaded, welded, and flanged elbow.
c. One each of a threaded, welded, and flanged tee fitting.
d. One NPS 2 (DN 50) or smaller valve, and one NPS 2-1/2 (DN 65) or larger valve.
e. Four support hangers including hanger shield and insert.
f. One threaded strainer and one flanged strainer with removable portion of insulation.
g. One threaded reducer and one welded reducer.
h. One pressure temperature tap.
i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Block Insulation: ASTM C 552, Type I.
2. Special-Shaped Insulation: ASTM C 552, Type III.
3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
4. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Phenolic:

1. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
2. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
3. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
4. Factory-Applied Jacket: [None] [ASJ]. Requirements are specified in "Factory-Applied Jackets" Article.

K. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus 73 to plus 93 deg C).

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

G. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
2. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
3. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
4. Color: White.

2.6 SEALANTS

A. Joint Sealants for Cellular-Glass and Phenolic Products:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
4. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: Aluminum.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for pipe.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Adhesive: As recommended by jacket material manufacturer.
2. Color: White.
3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

a. Sheet and roll stock ready for shop or field sizing
b. Finish and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Indoor Applications: [1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper
d. Factory-Fabricated Fitting Covers:
    1) Same material, finish, and thickness as jacket.
    2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    3) Tee covers.
    4) Flange and union covers.
    5) End caps.
    6) Beveled collars.
    7) Valve covers.
    8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
    1. Width: 3 inches (75 mm).
    2. Thickness: 11.5 mils (0.29 mm).
    3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
    4. Elongation: 2 percent.
    5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
    6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
    1. Width: 3 inches (75 mm).
    2. Thickness: 6.5 mils (0.16 mm).
    3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
    4. Elongation: 2 percent.
    5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
    6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
    1. Width: 2 inches (50 mm).
    2. Thickness: 6 mils (0.15 mm).
    3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
    4. Elongation: 500 percent.
    5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
    1. Width: 2 inches (50 mm).
    2. Thickness: 3.7 mils (0.093 mm).
    3. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
    4. Elongation: 5 percent.
    5. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.12 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with closed seal.
2. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.080-inch (2.0-mm) nickel-copper alloy.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with 0.062-inch (1.6-mm) wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.11 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.12 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.13 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.14 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.15 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 (DN 25) and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 (DN 32)] and Smaller: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

C. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be[one of] the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.
b. .

F. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be[one of] the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

G. Hot Service Drains:

1. All Pipe Sizes: Insulation shall bethe following:

a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch (25 mm) thick.

3.16 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. None.

3.17 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220719

SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service.

1.3 DEFINITIONS

A. EPDM: Ethylene propylene diene terpolymer rubber.

B. LLDPE: Linear, low-density polyethylene plastic.

C. PA: Polyamide (nylon) plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.

H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

G. NSF Compliance:

1. Comply with NSF 61 Annex G for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 COORDINATION

A. Coordinate connection to water main with civil contractor.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) and ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
2. Copper, Pressure-Seal Fittings:

a. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
b. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.

B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

C. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

1. Grooved-End, Ductile-Iron Pipe Appurtenances:

a. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
b. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

D. Flanges: ASME 16.1, Class 125, cast iron.

2.3 SPECIAL PIPE FITTINGS

A. Ductile-Iron Rigid Expansion Joints:

1. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

   a. Pressure Rating: 250 psig (1725 kPa) minimum.
   b. Expansion Required: <Insert inches (mm)>.

B. Ductile-Iron Flexible Expansion Joints:

1. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

   a. Pressure Rating: 250 psig (1725 kPa) minimum.

C. Ductile-Iron Deflection Fittings:

1. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

   a. Pressure Rating: 250 psig (1725 kPa) minimum.

2.4 JOINING MATERIALS

A. Refer to Section 330500 "Common Work Results for Utilities" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

   a. Standard: AWWA C219.
   b. Center-Sleeve Material: Malleable iron.
   c. Gasket Material: Natural or synthetic rubber.
   d. Pressure Rating: 150 psig (1035 kPa) minimum.
   e. Metal Component Finish: Corrosion-resistant coating or material.

C. Split-Sleeve Pipe Couplings:

1. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
    a. Standard: AWWA C219.
    b. Sleeve Material: Manufacturer's standard
    c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
    d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
    e. Pressure Rating: 150 psig (1035 kPa) minimum.
    f. Metal Component Finish: Corrosion-resistant coating or material.

D. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
    a. Description:
        1) Standard: ASSE 1079.
        2) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
        3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
    a. Description:
        1) Standard: ASSE 1079.
        2) Factory-fabricated, bolted, companion-flange assembly.
        3) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
        4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
    a. Description:
        1) Nonconducting materials for field assembly of companion flanges.
        2) Pressure Rating: 150 psig (1035 kPa.
        3) Gasket: Neoprene or phenolic.
        4) Bolt Sleeves: Phenolic or polyethylene.
        5) Washers: Phenolic with steel backing washers.
5. Dielectric Nipples:
    a. Description:
        1) Standard: IAPMO PS 66
        2) Electroplated steel nipple complying with ASTM F 1545.
        3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
        4) End Connections: Male threaded or grooved.
        5) Lining: Inert and noncorrosive, propylene.

2.6 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: LLDPE film of 0.008-inch (0.20-mm) minimum thickness.
4. Color: Black

2.7 CURB VALVES

A. Manufacturers:

B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

C. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

D. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.

1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient seated gate valves with valve box.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Section 330500 "Common Work Results for Utilities" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Water-Main Connection: coordinate with civil contractor.

B. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

D. Bury piping with depth of cover over top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:

E. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

G. Sleeves are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

H. Mechanical sleeve seals are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

I. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

J. See Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

A. See Section 330500 "Common Work Results for Utilities" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.
8. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
    a. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples
    b. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
4. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.9 CONNECTIONS

A. See Section 330500 "Common Work Results for Utilities" for piping connections to valves and equipment.

B. Connect water-distribution piping to utility water main

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.10 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.11 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Section 330500 "Common Work Results for Utilities" for identifying devices.

3.12 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. aboveground domestic water pipes, tubes, and fittings inside buildings.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper Pressure-Seal-Joint Fittings:

1. Fittings for NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
2. Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Description:

a. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
b. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

I. Copper-Tube, Extruded-Tee Connections:

1. Description: Tee formed in copper tube according to ASTM F 2014.

J. Appurtenances for Grooved-End Copper Tubing:

1. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
2. Mechanical Couplings for Grooved-End Copper Tubing:

a. Copper-tube dimensions and design similar to AWWA C606.
b. Ferrous housing sections.
c. EPDM-rubber gaskets suitable for hot and cold water.
d. Bolts and nuts.
e. Minimum Pressure Rating: 300 psig (2070 kPa).

2.3 CPVC PIPING

A. CPVC Pipe: ASTM F 441/F 441M, Schedule 40 and Schedule 80.

1. CPVC Socket Fittings: ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.
2. CPVC Threaded Fittings: ASTM F 437, Schedule 80.

B. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.

C. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.4 PVC PIPE AND FITTINGS

A. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.

B. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

C. PVC Schedule 80 Threaded Fittings: ASTM D 2464.

2.5 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.

G. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

H. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.6 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

2.7 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

D. Plastic-to-Metal Transition Fittings:

1. Description:

a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.

b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Description:

a. CPVC or PVC four-part union.
b. Brass or stainless-steel threaded end.
c. Solvent-cement-joint or threaded plastic end.
d. Rubber O-ring.
e. Union nut.

2.8 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C.
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Nonconducting materials for field assembly of companion flanges.
2. Pressure Rating: [150 psig (1035 kPa)] <Insert value>.
3. Gasket: Neoprene or phenolic.
4. Bolt Sleeves: Phenolic or polyethylene.
5. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).
4. End Connections: Male threaded or grooved.
5. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

H. Install domestic water piping level without pitch and plumb.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

Q. Install fittings for changes in direction and branch connections.

R. Install PEX piping with loop at each change of direction of more than 90 degrees.

S. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

T. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

U. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

V. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

K. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

L. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 3 (DN 50) and Smaller: Use dielectric couplings or nipples.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.

5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32) and Smaller: 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
5. NPS 3 and NPS 3-1/2 (DN 80 and DN 90): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.

H. Install supports for vertical steel piping every 15 feet (4.5 m).

I. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 (DN 25) and Smaller: 36 inches (900 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
3. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.

J. Install supports for vertical CPVC piping every 60 inches (1500 mm) for NPS 1 (DN 25) and smaller, and every 72 inches (1800 mm) for NPS 1-1/4 (DN 32) and larger.

K. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 (DN 50) and Smaller: 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.

L. Install supports for vertical PVC piping every 48 inches (1200 mm).

M. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.

4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:
        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 (DN 80) and smaller shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A) wrought-copper, solder-joint fittings; and brazed copper pressure-seal fittings; and pressure-sealed joints.
2. PVC, Schedule 40 and Schedule 80; socket fittings; and solvent-cemented joints.

E. Aboveground domestic water piping, NPS 3 (DN 50) and smaller, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B) or ASTM B 88, Type M (ASTM B 88M, Type C); cast- or wrought-copper, solder-joint fittings; and brazed soldered joints.
2. Hard copper tube, [ASTM B 88, Type L (ASTM B 88M, Type B) or ASTM B 88, Type M (ASTM B 88M, Type C); copper pressure-seal-joint fittings; and pressure-sealed joints.
3. CPVC, Schedule 40 and Schedule 80; socket fittings; and solvent-cemented joints.
4. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
5. PVC, Schedule 40 and Schedule 80; socket fittings; and solvent-cemented joints.

3.12 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Water pressure-reducing valves.
3. Balancing valves.
4. Temperature-actuated, water mixing valves.
5. Strainers.
6. Hose bibbs.
7. Drain valves.
8. Water-hammer arresters.
9. Air vents.
10. Trap-seal primer valves.
11. Trap-seal primer systems.
12. Specialty valves.
13. Flexible connectors.

B. Related Requirements:

1. Section 221116 "Domestic Water Piping" for water meters.
2. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
3. Section 224713 "Drinking Fountains" for water filters for water coolers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers :

1. Standard: ASSE 1001.
2. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Rough bronze.

B. Pressure Vacuum Breakers

1. Standard: ASSE 1020.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 5 psig (35 kPa) maximum, through middle third of flow range.
4. Accessories:

a. Valves: Ball type, on inlet and outlet.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig (83 kPa) maximum, through middle third of flow range.
4. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved.
5. Accessories:

a. Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves NPS 2-1/2 (DN 65) and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Beverage-Dispensing-Equipment Backflow Preventers

1. Standard: ASSE 1022.
2. Operation: Continuous-pressure applications.
3. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10).
4. Body: Stainless steel.
5. End Connections: Threaded.

C. Carbonated-Beverage-Dispenser, Dual-Check-Valve Backflow Preventers

1. Standard: ASSE 1032.
2. Operation: Continuous-pressure applications.
3. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10).
4. Body: Stainless steel.
5. End Connections: Threaded.

D. Backflow-Preventer Test Kits

1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.5 WATER PRESSURE-REDUCING VALVES

A. Water Regulators

1. Standard: ASSE 1003.
2. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).
3. Body: Bronze
4. Valves for Booster Heater Water Supply: Include integral bypass.
5. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

B. Water-Control Valves

1. Description: Pilot-operated, diaphragm-type, single-seated, main water-control valve.
2. Pressure Rating: Initial working pressure of 150 psig (1035 kPa) minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.
3. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.
    a. Pattern: Globe-valve design.
    b. Trim: Stainless steel.
4. End Connections: Threaded for NPS 2 (DN 50) and smaller; flangedfor NPS 2-1/2 (DN 65) and larger.

2.6 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves

1. Type: Ball valve with two readout ports and memory-setting indicator.
2. Body: Brass
3. Size: Same as connected piping, but not larger than NPS 2 (DN 50).
4. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

B. Memory-Stop Balancing Valves

1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 2 (DN 50) or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.

9. Handle: Vinyl-covered steel with memory-setting device.

2.7 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices

1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig (860 kPa).
3. Type: Thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded inlets and outlet.
6. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Valve Finish: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves

1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
3. Type: Cabinet-type, thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Cabinet: Factory fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.

C. Individual-Fixture, Water Tempering Valves

1. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
2. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
3. Body: Bronze body with corrosion-resistant interior components.
4. Temperature Control: Adjustable.
5. Inlets and Outlet: Threaded.
6. Finish: Rough or chrome-plated bronze.

2.8 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers

1. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 (DN 65) and larger.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
   a. Strainers NPS 2 (DN 50) and Smaller: 0.020 inch (0.51 mm).
   b. Strainers NPS 2-1/2 to NPS 4 (DN 65 to DN 100): 0.045 inch (1.14 mm.
6. Drain: Pipe plug

2.9 OUTLET BOXES

A. Icemaker Outlet Boxes

1. Mounting: Recessed.

2. Material and Finish: Plastic box and faceplate.
3. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.
4. Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.10 WALL HYDRANTS

A. Nonfreeze Wall Hydrants

1. Standard: ASME A112.21.3M for [concealed] [exposed]-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig (860 kPa).
3. Operation: Loose key.
4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
5. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
6. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
7. Box: Deep, flush mounted with cover.
8. Box and Cover Finish: Polished nickel bronze
9. Operating Keys(s): Two with each wall hydrant.
10. Vacuum Breaker:
    a. Nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
    b. Garden-hose thread complying with ASME B1.20.7 on outlet.

2.11 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.12 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters <Insert drawing designation if any>:

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.13 AIR VENTS

A. Bolted-Construction Automatic Air Vents

1. Body: Bronze.
2. Pressure Rating and Temperature: 125-psig (860-kPa) minimum pressure rating at 140 deg F (60 deg C).
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 (DN 10) minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.14 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device

1. Standard: ASSE 1018.
2. Pressure Rating: 125 psig (860 kPa) minimum.
3. Body: Bronze.
4. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.15 SPECIALTY VALVES

A. Comply with requirements for general-duty metal valves in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," Section 220523.14 "Check Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

B. CPVC Union Ball Valves:

1. Description:

a. Standard: MSS SP-122.
b. Pressure Rating and Temperature: 125 psig (860 kPa)
c. Body Material: CPVC.
d. Body Design: Union type.
e. End Connections for Valves NPS 2 (DN 50) and Smaller: Detachable, threaded.
f. Ball: CPVC; full port.
g. Seals: PTFE or EPDM-rubber O-rings.
h. Handle: Tee shaped.

C. PVC Union Ball Valves:

1. Description:

a. Standard: MSS SP-122.
b. Pressure Rating and Temperature: 125 psig (860 kPa) Body Material: PVC.
c. Body Design: Union type.
d. End Connections for Valves NPS 2 (DN 50) and Smaller: Detachable, threaded.
e. Ball: PVC; full port.
f. Seals: PTFE or EPDM-rubber O-rings.
g. Handle: Tee shaped.

D. CPVC Butterfly Valves:

1. Description:

a. Pressure Rating and Temperature: 125 psig (860 kPa)

b. Body Material: CPVC.
c. Body Design: Lug or wafer type.
d. Seat: EPDM rubber.
e. Seals: PTFE or EPDM-rubber O-rings.
f. Disc: CPVC.
g. Stem: Stainless steel.
h. Handle: Lever.

E. PVC Butterfly Valves:

a. Pressure Rating and Temperature: 125 psig (860 kPa)
b. Body Material: PVC.
c. Body Design: Lug or wafer type.
d. Seat: EPDM rubber.
e. Seals: PTFE or EPDM-rubber O-rings.
f. Disc: PVC.
g. Stem: Stainless steel.
h. Handle: Lever.

F. CPVC Ball Check Valves:

1. Description:

a. Pressure Rating and Temperature: 125 psig (860 kPa)
b. Body Material: CPVC.
c. Body Design: Union-type ball check.
d. End Connections for Valves NPS 2 (DN 50) and Smaller: Detachable, [socket] [or] [threaded].
e. Ball: CPVC.
f. Seals: EPDM- or FKM-rubber O-rings.

G. PVC Ball Check Valves:

1. Description:

a. Pressure Rating and Temperature: 125 psig (860 kPa)
b. Body Material: PVC.
c. Body Design: Union-type ball check.
d. Ball: PVC.
e. Seals: EPDM- or FKM-rubber O-rings.

2.16 FLEXIBLE CONNECTORS

A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig (1380 kPa)
2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.

B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum [200 psig (1380 kPa)] [250 psig (1725 kPa)].
2. End Connections NPS 2 (DN 50) and Smaller: Threaded steel-pipe nipple.
3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve.

G. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

H. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

I. Install water-hammer arresters in water piping according to PDI-WH 201.

J. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

K. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

L. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

M. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Intermediate atmospheric-vent backflow preventers.
3. Reduced-pressure-principle backflow preventers.
4. Carbonated-beverage-machine backflow preventers.
5. Water pressure-reducing valves.
6. Calibrated balancing valves.
7. Primary, thermostatic, water mixing valves.
8. Primary water tempering valves.
9. Outlet boxes.
10. Supply-type, trap-seal primer valves.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa) >.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class(es).

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   a. ANACO-Husky.
   b. Dallas Specialty & Mfg. Co.
   c. Fernco Inc.
   d. Matco-Norca, Inc.
   e. MIFAB, Inc.
   f. Mission Rubber Company; a division of MCP Industries, Inc.
   g. Stant.
   h. Tyler Pipe.

2. Standards: ASTM C 1277 and CISPI 310.

3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   a. ANACO-Husky.
   b. Clamp-All Corp.
   c. Dallas Specialty & Mfg. Co.
   d. MIFAB, Inc.
   e. Mission Rubber Company; a division of MCP Industries, Inc.
   f. Stant.
   g. Tyler Pipe.

2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

E. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   a. MG Piping Products Company.

2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Push-on-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

C. Ductile-Iron, Grooved-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.

2. Ductile-Iron-Pipe Appurtenances:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

      1) Anvil International.
      2) Shurjoint Piping Products.
      3) Star Pipe Products.
      4) Victaulic Company.

b. Grooved-End, Ductile-Iron Fittings: ASTM A 536 ductile-iron castings with dimensions matching AWWA C110/A 21.10 ductile-iron pipe or AWWA C153/A 21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.

c. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.

2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Dallas Specialty & Mfg. Co.
2) Fernco Inc.
3) Mission Rubber Company; a division of MCP Industries, Inc.
4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

b. Standard: ASTM C 1173.

c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.

2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Cascade Waterworks Mfg. Co.
2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.
c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Cascade Waterworks Mfg. Co.
2) Dresser, Inc.
3) EBAA Iron, Inc.
4) JCM Industries, Inc.
5) Romac Industries, Inc.
6) Smith-Blair, Inc.; a Sensus company.
7) The Ford Meter Box Company, Inc.
8) Viking Johnson.

b. Standard: AWWA C219.
c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
d. Center-Sleeve Material: Manufacturer's standard Gasket Material: Natural or synthetic rubber.
e. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Hart Industries International, Inc.
4) Jomar International Ltd.
5) Matco-Norca, Inc.
6) McDonald, A. Y. Mfg. Co.
7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
8) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.

2) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Matco-Norca, Inc.
4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
5) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Advance Products & Systems, Inc.
2) Calpico, Inc.
3) Central Plastics Company.
4) Pipeline Seal and Insulator, Inc.

b. Description:

1) Nonconducting materials for field assembly of companion flanges.
2) Pressure Rating: 150 psig (1035 kPa)
3) Gasket: Neoprene or phenolic.
4) Bolt Sleeves: Phenolic or polyethylene.
5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) Elster Perfection.
2) Grinnell Mechanical Products.
3) Matco-Norca, Inc.
4) Precision Plumbing Products, Inc.
5) Victaulic Company.

b. Description:

1) Standard: IAPMO PS 66
2) Electroplated steel nipple.
3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C End Connections: Male threaded or grooved.
4) Lining: Inert and noncorrosive, propylene.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: Linear low-density polyethylene film of 0.008-inch (0.20-mm) minimum thickness.

C. Form: tube.

D. Color: natural

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install aboveground PVC piping according to ASTM D 2665.

P. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

Q. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

R. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

S. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for [NPS 2 to NPS 4 (DN 65 to DN 100) Use dielectric nipples.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," Section 220523.14 "Check Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

B. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Vertical Piping: MSS Type 8 or Type 42, clamps.
3. Install individual, straight, horizontal piping runs:

   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

4. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
5. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.

G. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.

I. Install supports for vertical PVC piping every 48 inches (1200 mm).

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

5. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings heavy-duty hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Unshielded nonpressure transition couplings.

C. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Unshielded nonpressure transition couplings.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Roof flashing assemblies.
5. Through-penetration firestop assemblies.
6. Miscellaneous sanitary drainage piping specialties.
7. Flashing materials.
8. Grease interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.
2. Section 224300 "Medical Plumbing Fixtures" for plaster sink interceptors.
3. Section 334100 "Storm Utility Drainage Piping" for storm draining piping and piping specialties outside the building.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. FOG disposal systems.
2. Grease interceptors.
3. Grease removal devices.
4. Oil interceptors.

B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

1. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that grease interceptors, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts

1. ASME A112.36.2M, Cast-Iron Cleanouts:
2. ASME A112.3.1, Stainless-Steel Cleanouts:
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Closure: Stainless-steel plug with seal.

B. Metal Floor Cleanouts

1. ASME A112.36.2M, Cast-Iron Cleanouts
2. ASME A112.36.2M, Stainless-Steel Cleanouts:
3. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
4. Size: Same as connected branch.
5. Type: Heavy-duty, adjustable housing Threaded, adjustable housing.
6. Body or Ferrule: Cast iron.
7. Clamping Device: Required.
8. Outlet Connection: Threaded.
9. Closure: Cast-iron plug].
10. Adjustable Housing Material: Cast iron with threads.
11. Frame and Cover Material and Finish: Nickel-bronze, copper alloy finish.
12. Frame and Cover Shape: Round.
13. Top Loading Classification: Heavy Duty.
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
15. Standard: ASME A112.3.1.
16. Size: Same as connected branch.
17. Housing: Stainless steel.
18. Closure: Stainless steel with seal.
19. Riser: Stainless-steel drainage pipe fitting to cleanout.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains

1. Standard: ASME A112.6.3
2. Pattern: Sanitary drain.
3. Body Material: Gray iron
4. Seepage Flange: Required.
5. Anchor Flange: Not required
6. Clamping Device: Not required
7. Coating on Interior and Exposed Exterior Surfaces: Not required
8. Sediment Bucket: Not required
9. Top or Strainer Material: Bronze
10. Top of Body and Strainer Finish: Nickel bronze
11. Top Shape: Round
12. Top Loading Classification: Heavy Duty
13. Funnel: Required where indicated

14. Trap Material: Bronze
15. Trap Pattern: Standard P-trap

2.3 TRENCH DRAINS

A. Trench Drains

1. Standard: ASME A112.6.3 for trench drains.
2. Material: Ductile or gray iron.
3. Flange: Not required.
4. Clamping Device: Not required
5. Outlet: Bottom
6. Grate Material: Ductile iron
7. Top Loading Classification: Heavy Duty
8. Trap Material: Cast iron
9. Trap Pattern: Standard P-trap

2.4 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies

1. Description: Manufactured assembly made of 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch- (1.6-mm thick, lead flashing collar and skirt extending at least 6 inches (150 mm from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
    a. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.5 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Air-Gap Fittings

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

C. Vent Caps

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

D. Expansion Joints

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.

4. Size: Same as connected soil, waste, or vent piping.

2.6 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.

B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness).
2. Vent Pipe Flashing: 8 oz./sq. ft. (2.5 kg/sq. m or 0.27-mm thickness).

C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

E. Fasteners: Metal compatible with material and substrate being fastened.

F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

G. Solder: ASTM B 32, lead-free alloy.

H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.7 GREASE INTERCEPTORS

A. Grease Interceptors

1. Cast-Iron or Steel Grease Interceptors:
2. Plastic Grease Interceptors:
3. Standard: ASME A112.14.3 for intercepting and retaining fats, oils, and greases from food-preparation wastewater.
4. Plumbing and Drainage Institute Seal: Not required.
5. Body Material: Cast iron
6. Interior Lining: [Corrosion-resistant enamel
7. Exterior Coating: Corrosion-resistant enamel
8. Flow Rate: 15 GPM
9. Cleanout: Integral
10. Mounting: Recessed, flush with floor
11. Flow-Control Fitting: Not required
12. Operation: Manual cleaning

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:

1. Install grease interceptors on cast-in-place concrete equipment base(s). Retain one of two subparagraphs below. Retain first for projects in seismic areas; retain second for projects not in seismic areas. Indicate vibration isolation and seismic-control device type and minimum deflection in supported equipment schedule on Drawings.
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
3. Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
    b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
    c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

H. Assemble and install ASME A112.3.1, stainless-steel channel drainage systems according to ASME A112.3.1. Install on support devices so that top will be flush with surface.

I. Assemble non-ASME A112.3.1, stainless-steel channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

J. Assemble FRP channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

K. Assemble plastic channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

L. Install fixture air-admittance valves on fixture drain piping.

M. Install stack air-admittance valves at top of stack vent and vent stack piping.

N. Install air-admittance-valve wall boxes recessed in wall.

O. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

P. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

Q. Install deep-seal traps on floor drains and other waste outlets, if indicated.

R. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

S. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

T. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

U. Install vent caps on each vent pipe passing through roof.

V. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

W. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

X. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

Y. Assemble components of FOG disposal systems and install on floor. Install trap, vent, fresh-air inlet, and flow-control fitting according to authorities having jurisdiction. Install shelf fastened to reinforcement in wall construction and adjacent to unit, unless otherwise indicated. Install culture bottle, culture metering pump, timer, and control on shelf. Install tubing between culture bottle, metering pump, and chamber.

Z. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.
2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

AA. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Grease interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 334100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water (30 kPa)

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For siphonic roof drainage system. Include calculations, plans, and details.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and ASTM C 1540.
2. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Standard: ASTM C 1277.
2. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Push-On-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

C. Ductile-Iron, Grooved-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.
2. Ductile-Iron-Pipe Appurtenances:
   a. Grooved-End, Ductile-Iron Fittings: ASTM A 536 ductile-iron castings with dimensions matching AWWA C110/A21.10 ductile-iron pipe or AWWA C153/A21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.
   b. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

E. Solvent Cement: ASTM D 2564.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in ODs or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C 1173.
   b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. Sleeve Materials:
      1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Standard: ASTM C 1460.
b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Standard: AWWA C219.
b. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
c. Gasket Material: Natural or synthetic rubber.
d. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

2. Dielectric Unions:

a. Description:

1) Standard: ASSE 1079.

2) Pressure Rating: 150 psig (1035 kPa at 180 deg F (82 deg C).
3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.

3) Pressure Rating: 150 psig (1035 kPa)
4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Description:

1) Nonconducting materials for field assembly of companion flanges.

2) Pressure Rating: 150 psig (1035 kPa Gasket: Neoprene or phenolic.
3) Bolt Sleeves: Phenolic or polyethylene.
4) Washers: Phenolic with steel-backing washers.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: High-density, crosslaminated PE film of 0.004-inch (0.10-mm minimum thickness.

C. Form: Sheet

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:

1. Building Storm Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 100) and larger.
2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

O. Install steel piping according to applicable plumbing code.

P. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

Q. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."
2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Drainage Piping: Unshielded nonpressure transition couplings.
3. In Aboveground Force-Main Piping: Fitting-type transition couplings.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
2. Vertical Piping: MSS Type 8 or Type 42, clamps.
3. Individual, Straight, Horizontal Piping Runs:
    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
4. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
5. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
2. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
3. NPS 6 and NPS 8 (DN 150 and DN 200): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
4. NPS 10 and NPS 12 (DN 250 and DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.
5. Spacing for 10-foot (3-m) pipe lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

G. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 (DN 150) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.

C. Underground storm drainage piping NPS 6 (DN 150) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty, cast-iron,] hubless-piping couplings; and coupled joints.

END OF SECTION 221413

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof drains.
2. Miscellaneous storm drainage piping specialties.
3. Cleanouts.
4. Flashing materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Large-Sump, General-Purpose Roof Drains

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
    a. Josam Company.
    b. Marathon Roofing Products.
    c. MIFAB, Inc.
    d. Smith, Jay R. Mfg. Co.
    e. Tyler Pipe.
    f. Watts Water Technologies, Inc.
    g. Zurn Plumbing Products Group; Specification Drainage Operation.
3. Standard: ASME A112.6.4, for general-purpose roof drains.
4. Body Material: Cast iron
5. Dimension of Body: Nominal 14-inch (357-mm) diameter.
6. Combination Flashing Ring and Gravel Stop: Required.
7. Flow-Control Weirs: Not required

8. Outlet: Bottom
9. Extension Collars: Not required
10. Dome Material: Cast iron
11. Perforated Gravel Guard: Stainless steel
12. Vandal-Proof Dome: Not required
13. Water Dam: 2 inches (51 mm) high

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Downspout Adaptors:

1. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
2. Size: Inlet size to match parapet drain outlet.

B. Downspout Boots

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout and NPS 4 (DN 100) outlet.

2.3 CLEANOUTS

A. Floor Cleanouts

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Josam Company.
   b. Oatey.
   c. Sioux Chief Manufacturing Company, Inc.
   d. Smith, Jay R. Mfg. Co.
   e. Tyler Pipe.
   f. Watts Water Technologies, Inc.
   g. Zurn Plumbing Products Group; Light Commercial Products Operation.
   h. Zurn Plumbing Products Group; Specification Drainage Operation.
3. Standard: ASME A112.36.2M, for threaded, adjustable housing cleanouts.
4. Size: Same as connected branch.
5. Type: Adjustable housing
6. Body or Ferrule Material: Cast iron
7. Clamping Device: Not required
8. Outlet Connection: Threaded.
9. Closure: Brass plug with straight threads and gasket
10. Adjustable Housing Material: Cast iron with threads
11. Frame and Cover Material and Finish: Painted cast iron
12. Frame and Cover Shape: Round
13. Top-Loading Classification: Heavy Duty
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

2.4 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
   a. ProSet Systems Inc.
3. Standard: ASTM E 814, for through-penetration firestop assemblies.
4. Size: Same as connected pipe.
5. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
6. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
7. Special Coating: Corrosion resistant on interior of fittings.

2.5 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M,12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness).

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
   1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
   2. Install expansion joints, if indicated, in roof drain outlets.
   3. Position roof drains for easy access and maintenance.

B. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.

C. Install downspout boots at grade with top 6 inches (152 mm) above grade. Secure to building wall.

D. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.

E. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate cleanouts at base of each vertical soil and waste stack.

F. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

G. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

H. Install horizontal backwater valves in floor with cover flush with floor.

I. Install drain-outlet backwater valves in outlet of drains.

J. Install test tees in vertical conductors and near floor.

K. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

L. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.

M. Assemble channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

N. Install through-penetration firestop assemblies in plastic conductors at concrete floor penetrations.

O. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. (30-kg/sq. m) lead sheets, 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of 4.0-lb/sq. ft. (20-kg/sq. m) lead sheets, 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches (250 mm) and with skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 221429 - SUMP PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Packaged drainage-pump units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles

B. Wiring Diagrams: For power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

PART 2 - PRODUCTS

2.1 PACKAGED DRAINAGE-PUMP UNITS

A. Packaged Pedestal Drainage-Pump Units:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
    a. AMT; a subsidiary of the Gorman-Rupp Company.
    b. Goulds Pumps; ITT Corporation.
    c. Liberty Pumps.
    d. Little Giant Pump Co.
    e. Pentair Pump Group; Hydromatic Pumps.
    f. Pentair Pump Group; Myers.
    g. Sta-Rite Industries, Inc.
    h. Zoeller Company.
3. Description: Factory-assembled and -tested, automatic-operation, freestanding, sump-pump unit.
4. Pump Type: Wet-pit-volute, single-stage, separately-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
5. Pump Casing: Corrosion-resistant material, with strainer inlet, design that permits flow into impeller, and vertical discharge for piping connection.
6. Impeller: Aluminum, brass, or plastic.
7. Motor: With built-in overload protection and mounted vertically on sump pump column.
8. Power Cord: Three-conductor, waterproof cable of length required but not less than 72 inches (1830 mm), with grounding plug and cable-sealing assembly for connection at pump.
9. Control: Float switch.

B. Packaged Submersible Drainage-Pump Units:

1. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
    a. ABS Pumps Inc.
    b. Bell & Gossett Domestic Pump; ITT Corporation.
    c. Glentronics, Inc.
    d. Goulds Pumps; ITT Corporation.
    e. Grundfos Pumps Corp.
    f. Liberty Pumps.
    g. Little Giant Pump Co.
    h. McDonald, A. Y. Mfg. Co.
    i. Pentair Pump Group; Hydromatic Pumps.
    j. Pentair Pump Group; Myers.
    k. Sta-Rite Industries, Inc.
    l. Zoeller Company.
2. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, sump-pump unit.
3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
4. Casing: Metal
5. Impeller: Brass
6. Pump Seal: Mechanical.
7. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection.
8. Power Cord: Three-conductor, waterproof cable of length required but not less than 72 inches (1830 mm), with grounding plug and cable-sealing assembly for connection at pump.
9. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings
10. Control: Motor-mounted float switch.
11. Basin: Plastic.

C. Capacity and Characteristics:

1. Capacity: 20 gpm (L/minute).
2. Total Dynamic Head: 15 feet (kPa).

3. Speed: 1750 rpm
4. Discharge Pipe Size: 1” NPS
5. Electrical Characteristics:
    a. Motor Horsepower: 1/2
    b. Volts: 240
    c. Phases: Three.
    d. Hertz: 60.
    e. Full-Load Amperes: 30
6. Basin: Not Required.

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation and filling are specified in Section 312000 "Earth Moving."

3.2 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump pump installation.

3.3 INSTALLATION

A. Pump Installation Standards: Comply with HI 1.4 for installation of sump pumps.

3.4 CONNECTIONS

A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Pumps and controls will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 221429

SECTION 223400 - FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, power-vent, gas-fired, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated.Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of commercial, gas-fired domestic-water heater, from manufacturer.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Source quality-control reports.

E. Field quality-control reports.

F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

1. <Double click to insert sustainable design text for additional requirement for water efficiency.>

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: Five years.
2) Controls and Other Components: Two year(s).

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS

A. Commercial, Power-Vent, Gas-Fired, Storage, Domestic-Water Heaters:

1. Standard: ANSI Z21.10.3/CSA 4.3.
2. Storage-Tank Construction: Non-ASME-code steel with 150-psig (1035-kPa) working-pressure rating.
    a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
        1) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
        2) NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
    b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    c. Lining: Glass complying with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
3. Factory-Installed Storage-Tank Appurtenances:
    a. Anode Rod: Replaceable magnesium.
    b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
    c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
    d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
    e. Jacket: Steel with enameled finish.
    f. Burner: For use with power-vent, gas-fired, domestic-water heaters and natural-gas fuel.
    g. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
    h. Temperature Control: Adjustable thermostat.
    i. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
    j. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
4. Special Requirements: NSF 5 construction.
5. Power-Vent System: Exhaust fan, interlocked with burner.

B. Capacity and Characteristics:

1. HWH-1 Capacity: 100 gal. Recovery: 173 gph at 140 deg F (56 deg C) temperature rise.
2. HWH-2 Capacity 60 Gal. Recovery: 83 gph at 140 deg F (56 deg C) temperature rise.
3. Temperature Setting: 140 deg F (60 deg C)
4. Fuel Gas Demand: see schedule
5. Fuel Gas Input: see schedule
6. Electrical Characteristics:
    a. Volts: 240
    b. Phase: Three
    c. Hertz: 60.
7. Minimum Vent Diameter: 6 inches.

8. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, 125-psig (860-kPa) minimum working-pressure rating, and 225 deg F (107 deg C) continuous-water-temperature rating.
9. Piping: Copper tubing; copper, solder-joint fittings; and brazed or flanged joints.
10. Mounting: Domestic-water heater, tank, and accessories factory mounted on skids.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
2. Construction:

   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Air-Charging Valve: Factory installed.

3. Capacity and Characteristics:

   a. Working-Pressure Rating: 100 psig (690 kPa)
   b. Capacity Acceptable: 4 gal. (15.1 L) minimum.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 (DN 20) with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball-, butterfly-, or gate-type shutoff valves to isolate each domestic-water heater and memory-stop balancing valves to provide balanced flow through each domestic-water heater.

F. Comply with requirements for ball-, butterfly-, or gate-type shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

1. Comply with requirements for balancing valves specified in Section 221119 "Domestic Water Piping Specialties."

G. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

H. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 1/2-psig (3.5-kPa) pressure rating as required to match gas supply.

I. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.

J. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
2. Oil-Fired, Domestic-Water Heaters: ASME rated and stamped.

K. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
2. Oil-Fired, Domestic-Water Heaters: ASME rated and stamped.

L. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

M. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Provide dimension that will support bottom of domestic-water heater a minimum of 18 inches (457 mm) above the floor.

N. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heaters and storage tanks specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base.

1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

C. Install gas-fired, domestic-water heaters according to NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 231123 "Facility Natural-Gas Piping."

D. Install commercial domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

G. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. Assemble and install inlet and outlet piping manifold kits for multiple domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each domestic-water heater outlet. Comply with requirements for valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping," and comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

I. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

J. Fill domestic-water heaters with water.

K. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Comply with requirements for gas piping specified in Section 231123 "Facility Natural-Gas Piping."

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage domestic-water heaters.

END OF SECTION 223400

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

1.3 DEFINITIONS

A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.

B. Remote Water Closet: Located more than 30 feet (9.1 m) from other drain line connections or fixture and where less than 1.5 drainage fixture units are upstream of the drain line connection.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 see schedule on drawings

2.2 FLUSHOMETER VALVES

A. Hard-Wired, Solenoid-Actuator, Piston Flushometer Valves

1. Standard: ASSE 1037.
2. Minimum Pressure Rating: 125 psig (860 kPa).
3. Features: Include integral check stop and backflow-prevention device.
4. Material: Brass body with corrosion-resistant components.
5. Exposed Flushometer-Valve Finish: Chrome plated.
6. Panel Finish: Chrome plated or stainless steel.
7. Style: Concealed.
8. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
9. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
10. Consumption: 1.6 gal. (6 L) per flush.
11. Minimum Inlet: NPS 1 (DN 25).
12. Minimum Outlet: NPS 1-1/4 (DN 32).

2.3 TOILET SEATS

A. Toilet Seats

1. Standard: IAPMO/ANSI Z124.5.
2. Material: Plastic.
3. Type: Commercial Standard
4. Shape: Elongated rim, open front
5. Hinge: Self-sustaining
6. Hinge Material: Noncorroding metal.
7. Seat Cover: Not required.
8. Color: White

2.4 SUPPORTS

A. Water Closet Carrier:

1. Standard: ASME A112.6.1M.
2. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install actuators in locations that are easy for people with disabilities to reach.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224213.16 - COMMERCIAL URINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.
3. Supports.

B. Related Requirements:

1. Section 224600 "Security Plumbing Fixtures" for security urinals.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for urinals.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 STALL URINALS

A. Urinals: Stall, washout type.

1. Fixture:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Straight front.

d. Seam Covers: For 21-inch (535-mm) urinal centers.
e. Strainer: Separate; removable.
f. Water Consumption: Water saving.
g. Spud Size and Location: NPS 3/4 (DN 20); top.
h. Outlet Size and Location: NPS 2 (DN 50); bottom for separate trap.
i. Color: White.

2. Flushometer Valve: see schedule

2.2 WALL-HUNG URINALS

A. Urinals Wall hung, back outlet, blowout.

1. Fixture:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.

c. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
d. Water Consumption: Water saving.

e. Spud Size and Location: NPS 1-1/4 (DN 32); [back] [top].
f. Outlet Size and Location: NPS 2 (DN 50); back.
g. Color: White.

2. Flushometer Valve: see schedule
3. Waste Fitting:

a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
b. Size: NPS 2 (DN 50).

4. Support: Type I Urinal Carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.
5. Urinal Mounting Height: Standard.

2.3 URINAL FLUSHOMETER VALVES

A. Hard-Wired, Solenoid-Actuator, Piston Flushometer Valves

1. Standard: ASSE 1037.
2. Minimum Pressure Rating: 125 psig (860 kPa).
3. Features: Include integral check stop and backflow-prevention device.
4. Material: Brass body with corrosion-resistant components.
5. Exposed Flushometer-Valve Finish: Chrome plated.

6. Panel Finish: Chrome plated or stainless steel.
7. Style: Concealed

8. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
9. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Consumption: 1.0 gal. (3.8 L) per flush.
11. Minimum Inlet: NPS 1 (DN 25)
12. Minimum Outlet: [NPS 1-1/4 (DN 32)

2.4 SUPPORTS

A. Type I Urinal Carrier:

1. Standard: ASME A112.6.1M.

B. Type II Urinal Carrier:

1. Standard: ASME A112.6.1M.

C. Type I Sink Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.

B. Examine walls and floors for suitable conditions where urinals will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.
5. Install trap-seal liquid in waterless urinals.

B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed urinals and fittings.

C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.16

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.
3. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 See schedule on drawings

A. Lavatory : Rectangular, flat rim, enameled, cast iron, flush counter mounted.

1. Fixture:

a. Standard: ASME A112.19.1/CSA B45.2.
b. Type: For flush mounting with kit.
c. Nominal Size: Rectangular, [18 by 15 inches (457 by 381 mm)] [20 by 18 inches (508 by 457 mm)].
d. Faucet-Hole Punching: [Three holes, 2-inch (51-mm)] [Three holes, 4-inch (102-mm)] centers.
e. Faucet-Hole Location: Top.
f. Color: [White] <Insert color>.
g. Mounting Materials: With stainless-steel ring, and sealant.

2. Faucet: Automatically Operated Lavatory Faucets"

2.2 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

A. Lavatory see schedule on drawings: Rectangular, self-rimming, vitreous china, counter mounted.

1. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.

2. Faucet: Automatically Operated Lavatory Faucets"

2.3 SOLID-BRASS, AUTOMATICALLY OPERATED LAVATORY FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets : Automatic-type, hard-wired, electronic-sensor-operated, mixing solid-brass valve.

1. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.

2.4 SUPPORTS

A. Type II Lavatory Carrier:

1. Standard: ASME A112.6.1M.

B. Type III Lavatory Carrier:

1. Standard: ASME A112.6.1M.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle

F. Risers:

1. NPS 1/2 (DN 15)
2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces riser.

2.6 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/4 (DN 32).
2. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

2.7 SUPPORTS

A. Type II Lavatory Carrier:

1. Standard: ASME A112.6.1M.

B. Type III Lavatory Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

a. Service sinks.
b. Sink faucets.
c. Supply fittings.
d. Waste fittings.
e. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
b. Include rated capacities, operating characteristics[, electrical characteristics,] and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

a. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
b. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

A. Service Sinks Enameled, cast iron, trap standard mounted.

a. Fixture: see schedule on drawings
b. Standard: ASME A112.19.1/CSA B45.2.
c. Type: Service sink with back.
d. Back: Plain
e. Color: White.
f. Mounting: NPS 3 (DN 80) P-trap standard with grid strainer inlet, cleanout, and floor flange.
g. Rim Guard: On front and sides.
h. Faucet: see schedule
i. Support: Type II sink carrier.

2.2 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets : Manual type, two-lever-handle mixing valve.

a. Commercial, Solid-Brass Faucets.
b. Standard: ASME A112.18.1/CSA B125.1.
c. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
d. Body Type: Centerset
e. Body Material: Commercial, solid brass
f. Finish: Chrome plated
g. Maximum Flow Rate: 2.2 gpm (8.3 L/min)
h. Handle(s): Wrist blade, 4 inches (102 mm
i. Mounting Type: Deck, exposed
j. Spout Type: Rigid, solid brass with wall brace
k. Retain first option in "Vacuum Breaker" Subparagraph below for service-sink and other faucets with hose-thread outlet.
l. Vacuum Breaker: Required for hose outlet.
m. Spout Outlet: Hose thread according to ASME B1.20.7

2.3 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF/ANSI 61 Annex 61, "Drinking Water System Components - Health Effects," for faucet-spout-outlet materials that will be in contact with potable water.

B. Description: Chrome-plated brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.4 SUPPORTS

A. Type II Sink Carrier:

a. Standard: ASME A112.6.1M.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle

F. Risers:

a. NPS 1/2 (DN 15)
b. ASME A112.18.6, braided or corrugated stainless-steel flexible hose

2.6 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

a. Size: NPS 1-1/2 (DN 40).

b. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

2.7 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.8 SUPPORTS

A. Water Closet Carrier:

a. Standard: ASME A112.6.1M.
b. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

a. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."
b. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224713 - DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains see schedule on drawings

1. Standards: Comply with ICC A117.1 and NSF 61 Annex G.
2. Pedestal: Round with offset to receptor
3. Receptor(s):
    a. Number: Two
    b. Material: Bronze
    c. Shape: Round
    d. Bubbler: One for each receptor, with adjustable stream regulator.
    e. Drain: Grid type with NPS 1-1/4 (DN 32) tailpiece.
4. Maximum water flow: 0.15 gpm.
5. Controls: Push button
6. Access to Internal Components: Panel in pedestal.
7. Supply Piping: NPS 1/2 (DN 15) with shutoff valve.
8. Drain Piping: NPS 1-1/2 (DN 40) minimum trap and waste.

2.2 SUPPORTS

A. Type I Water Cooler Carrier:

1. Standard: ASME A112.6.1M.

B. Type II Water Cooler Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Install recessed drinking fountains secured to wood blocking in wall construction.

C. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball or gate shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224713

SECTION 230001 – CONSTRUCTION ADMINISTRATION FOR HVAC WORK

PART 1 - GENERAL

1.1 GENERAL

A. This Section contains requirements for Construction Administration of HVAC work. These requirements are in addition to any requirements listed elsewhere in the Contract Documents. Where conflicts exist between this section and other sections, the more stringent requirement shall apply.

1.2 REQUESTS FOR INFORMATION

A. Requests For Information (RFI) are questions posed by the Contractor intended to resolve vagueness and conflicts during construction.

B. To submit a RFI, the Contractor must fill out the Request For Information form found in Appendix A of this specification section. Only RFI written on this enclosed form will be acknowledged.

C. Prior to submitting a RFI, the Contractor must thoroughly review the Construction Documents and Specifications and forward the RFI only if the issue in question cannot be resolved. If a RFI questions a clearly noted item or standard construction method, which should be known by the Contractor, the Engineer may back charge the Contractor for time spent responding to the RFI.

D. When submitting an RFI, the Contractor must where possible, offer a solution which addresses the conflict or question.

E. Alternately, the Contractor may, where approved by Engineer, submit an RFI electronically using a common Subject Line format. An electronically submitted RFI must include all information found on the form found in Appendix A:

1. Subject Line Example: Neptune Green Grove – [Trade Specific] RFI XXX
2. All RFI requests must be copied electronically to the architect (where applicable).

1.3 SCHEDULE OF VALUES

A. Prior to initiating any work, the Contractor shall submit a Schedule of Values on an AIA G-703 Continuation Sheet outlining Material and Labor costs for each item.

B. Include in the Schedule of Values a line item for resolving Punchlist issues equal to 5% of the total contract value.

C. No Payment Applications will be processed until the Schedule of Values form has been approved by the Engineer.

1.4 EQUIPMENT MANUFACTURER LIST

A. Within ten (10) business days of the contract award date, the Contractor shall submit a list of equipment manufacturers, for the engineer's review and approval, that he intends to use on this project.

1.5 SHOP DRAWING SUBMISSION SCHEDULE

A. Prior to submitting any Shop Drawings, the Contractor shall issue a Shop Drawing Submission Schedule. The purpose of this schedule is to identify which items require Shop Drawings and when these Shop Drawings will be submitted to the Engineer. By agreeing to this schedule at the beginning of the project, Shop Drawings will be reviewed in a timely fashion and long lead items can be prioritized and reviewed first.

B. Refer to the Shop Drawing Submission Schedule in Appendix A of this specification section. The Contractor shall list all the items that require submittals per the Contract Documents and Specifications. The Contractor shall fill out the Submittal Date column for each item and return the completed form to the Engineer for review. The Contractor may use a different form of his choosing provided the required information is provided.

C. No Shop Drawings will be reviewed until the Shop Drawing Submission Schedule is approved by the Engineer.

1.6 SHOP DRAWINGS

A. Shop Drawings will not be reviewed until the Equipment Manufacturer List and Shop Drawing Submission Schedule have been submitted to, and approved by, the Engineer.

B. Shop Drawings must include a completed copy of the Shop Drawing Submittal Form found in Appendix A of this specification section.

1. The Contractor must review and stamp all Shop Drawings prior to submission. Space has been provided for the Contractor's stamp on the Shop Drawing Submittal Form. Submittals without the Contractor's stamp will be returned unchecked.

C. The Contractor shall provide a maximum of six (6) copies of submittals to the Engineer for review. Additional Shop Drawings may be marked-up and processed for an additional fee to the Contractor.

1. Submitted items shall be clearly identified on all copies of the Shop Drawings. The Engineer will return any Shop Drawings that are not clearly marked.

D. It is the responsibility of the Contractor to make every attempt to ensure thoroughness and accuracy of his submittals. If Shop Drawings are not approved following a maximum of two (2) reviews, the Contractor will be backcharged for the Engineer's effort.

1.7 SUBSTITUTIONS

A. Substitutions for specified equipment must include a detailed comparison checklist identifying all pertinent similarities and differences between the two items. Substituted items without a comparison checklist will not be considered.

1. Where substituted items affect other trades, this Contractor is responsible for adjusting the installation as required to accommodate the substitution. This includes, but is not limited to, changes in Architectural, Structural, Mechanical, Electrical, Plumbing and Fire Protection Systems. This Contractor will pay for all associated costs.

B. Incomplete submittals will be returned rejected.

1.8 SERVICE INTERRUPTION SCHEDULE

A. Within ten (10) business days of the contract award date, the Contractor shall submit a Schedule of Shutdowns of equipment and/or systems for Owner and Engineer review.

B. The Contractor shall notify the Owner and Engineer in writing at least five (5) business days prior to each equipment and/or system shutdown.

1.9 SUBSTANTIAL COMPLETION LETTER

A. The purpose of this letter is to inform the Engineer that the Contractor has reached Substantial Completion.

B. Upon Substantial Completion, the Contractor shall copy the Substantial Completion Letter onto company letterhead, complete the letter and send it to the Engineer. Refer to Appendix A of this specification for this letter.

C. This letter shall be received at the Engineer's office no later than four (4) weeks before the project completion date. Upon receiving the letter, the Engineer will perform a Punch List. The Contractor shall have two (2) weeks to complete the Punch List items upon receiving the Punch List.

1.10 PUNCHLIST COMPLETION LETTER

A. The purpose of this letter is to inform the Engineer that the Contractor has completed all Punchlist items. The Contractor must ensure that all Punchlist items are indeed complete prior to submitting this letter.

B. Upon Punchlist Completion, the Contractor shall copy the Punchlist Completion Letter onto company letterhead, complete the letter and send it to the Engineer. Refer to Appendix A of this specification for this letter.

C. This letter shall be received at the Engineer's office no later than One (1) week before the project completion date. Upon receiving this letter, the Engineer will perform a final walkthrough.

D. Should the Engineer discover during the final walkthrough that all of the Punchlist items have not been completed, the time and expenses associated with a return visit by the Engineer shall be chargeable to the Contractor.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION - Not Used.

END OF SECTION 230001

Appendix A

Construction Administration Forms

REQUEST FOR INFORMATION RFI ID (by Arch/Engr) _____

Project ID: [XXXXX-XX] Project Name: [ ] Project Location: [ ]

Requestor's Information

Name _____ Phone # _____

Firm Name _____ Date of Request _____

Proposed Reviewer's Name (optional) _____

Certification by Requestor

I certify that I have thoroughly reviewed the Documents and am unable to reconcile this issue. I acknowledge that if the issue is easily reconcilable by reviewing the Documents or is asking direction on standard construction methods that should be known by the Contractor, the Professionals can backcharge the Requestor for the effort involved in the review and response.
X_____ date _____

RFI Classification

Related RFI ID's _____ Urgency (typical response within 5 business days) _____ days

If urgency requires a fast turnaround, state why faster than normal response is needed:

_____

Which Disciplines are involved with this RFI? _____

Which Drawing ID's & which Specification Sections are involved? _____

Request

Request Title (30 characters or less, used as an abbreviated title in RFI Log)

_____

Request Description:

_____

_____

Possible Solutions:

_____

_____

Engineer's Response:

☐ See Attached Sketch ☐ See Attached Description ☐ See Comments Above

SHOP DRAWING SUBMISSION SCHEDULE

Project Name: [ ]
DLB Project ID: [ ]

Contractor: _____

Completed By: _____

Date: _____

HVAC

#	Submittal Date	Item	#	Submittal Date	Item
1			36		
2			37		
3			38		
4			39		
5			40		
6			41		
7			42		
8			43		
9			44		
10			45		
11			46		
12			47		
13			48		
14			49		
15			50		
16			51		
17			52		
18			53		
19			54		
20			55		
21			56		
22			57		
23			58		
24			59		
25			60		
26			61		
27			62		
28			63		
29			64		
30			65		
31			66		
32			67		
33			68		
34			69		
35			70		

SHOP DRAWING SUBMISSION SCHEDULE

Project Name: [ ]
DLB Project ID: [ ]

Contractor: _____

Completed By: _____

Date: _____

HVAC

#	Submittal Date	Item	#	Submittal Date	Item
71			106		
72			107		
73			108		
74			109		
75			110		
76			111		
77			112		
78			113		
79			114		
80			115		
81			116		
82			117		
83			118		
84			119		
85			120		
86			121		
87			122		
88			123		
89			124		
90			125		
91			126		
92			167		
93			128		
94			129		
95			130		
96			131		
97			132		
98			133		
99			134		
100			135		
101			136		
102			137		
103			138		
104			139		
105			140		

SHOP DRAWING SUBMISSION SCHEDULE

Project Name: [ ]
DLB Project ID: [ ]

Contractor: _____

Completed By: _____

Date: _____

HVAC

#	Submittal Date	Item	#	Submittal Date	Item
141			176		
142			177		
143			178		
144			179		
145			180		
146			181		
147			182		
148			183		
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173			208		
174			209		
175			210		

SHOP DRAWING SUBMITTAL FORM

Project Name:

To: DLB Associates
265 Industrial Way West
Eatontown, NJ 07724

From: _____

Attention:

Date: _____

Phone #: (732) 774-2000

DLB Project ID #: [ ] _____

We are sending you:

☐ Prints, ☐ Sepia/Vellums, ☐ Manufacturer's Literature, ☐ Letter, ☐ _____

Purpose: Shop Drawings Is this a Resubmittal?: YES / NO If YES Previous Submittal #: _____

Referencing: Drawing Number(s): _____ Specification Section(s): _____

COPIES	DESCRIPTION
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

REMARKS:

CONTRACTOR'S STAMP

Filing: Construction

If material is not as listed, please call at once.

Copy _____

SHEET _____ OF _____

Date:_____

[dlb Construction Manager]
DLB Associates Consulting Engineers, P.C.
265 Industrial Way West
Eatontown, NJ 07724
(732) 774-2000

Re: Substantial Completion Notification
[Project Name]
[Project Address]
(DLB Project # [ ])

Dear _____:

Please be advised that we have reached Substantial Completion for the above mentioned project. We understand that DLB Associates should receive this letter at least four (4) weeks prior to the project completion date. We are prepared for the Punchlist review and assure that any items found to be incomplete will be fixed within two (2) weeks of receiving the Punchlist.

Should you have any questions, please do not hesitate to contact this office.

Very truly yours,

_____
(company)

x_____
(signature)

_____
(print)

c:

Date:_____

[dlb Construction Manager]
DLB Associates Consulting Engineers, P.C.
265 Industrial Way West
Eatontown, NJ 07724
(732) 774-2000

Re: Punchlist Completion Notification
[Project Name]
[Project Address]
(DLB Project # [ ])

Dear _____:

Please be advised that we have completed all Punchlist items for the above mentioned project and consider the construction to be 100% complete. We understand that DLB Associates should receive this letter at least one (1) week prior to the project completion date. We are prepared for the final walk through and review.

Should you have any questions, please do not hesitate to contact this office.

Very truly yours,

_____
(company)

x_____
(signature)

_____
(print)

c:

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, Part 3 Standards and be similar to:

1. USEM, Type “TV-1’ or
2. GE, Type K.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Inverter-Duty Motors: Class F insulation.
3. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.

B. Related Sections:

1. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel or stainless steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel or stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa), ASTM C 552, Type II cellular glass with 100-psig (688-kPa), or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting", Section 099123 "Interior Painting" and Section 099600 "High Performance Coatings."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers, and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.

21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Spring hangers.
2. Restrained isolation roof-curb rails.

1.3 DEFINITIONS

A. IBC: International Building Code.

1.4 PERFORMANCE CRITERIA

A. Seismic-Restraint Loading: Refer To Structural Drawings.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Air-Mounting System Performance Certification: Include natural frequency, load, and damping test data performed by an independent agency.

E. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Building Classification Category:
2. Minimum 10 lb/sq. ft. multiplied by maximum area of HVAC component projected on vertical plane normal to wind direction, and 45 degrees either side of normal.

B. Seismic-Restraint Loading: Refer to Structural drawings.

2.2 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ace Mountings Co., Inc.
b. Mason Industries, Inc.
c. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.3 RESTRAINED ISOLATION ROOF-CURB RAILS

A. Manufacturers: Subject to compliance with requirements, provide products by one the following:

1. Ace Mountings Co., Inc.
2. Mason Industries, Inc.
3. Thybar Corporation.

B. Description: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic and wind forces.

C. Upper Frame: The upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic and wind forces.

D. Lower Support Assembly: The lower support assembly shall be formed sheet metal section containing adjustable and removable steel springs that support the upper frame. The lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches (50 mm) of rigid, glass-fiber insulation on inside of assembly. Adjustable, restrained-spring isolators shall be mounted on elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.

E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch (6 mm) thick.

F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

B. Equipment Restraints:

1. Install seismic Snubbers on HVAC equipment mounted on vibration isolators. Locate Snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.

C. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post connection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

9. Test and adjust restrained-air-spring isolator controls and safeties.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION 230548

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Rooftop Units
b. Variable-air-volume systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 ACTION SUBMITTALS

A. LEED Submittals:

1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing".
2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing".

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 15 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 15 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.

B. TAB Conference: Meet with Engineer, Owner, Construction Manager on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.7 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.8 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine operating safety interlocks and controls on HVAC equipment.

L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Balance variable-air-volume systems the same as described for constant-volume air systems.
2. Set terminal units and supply fan at full-airflow condition.
3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

   a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.

8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

   a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
3. Set terminal units at full-airflow condition.
4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.
7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.6 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3.8 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.9 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.

4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Settings for supply-air, static-pressure controller.
    e. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Terminal units.
5. Position of balancing devices.

E. Rooftop Unit Test Reports: For Rooftop unit with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches (mm), and bore.
    i. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.

d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Filter static-pressure differential in inches wg (Pa).
f. Preheat-coil static-pressure differential in inches wg (Pa).
g. Cooling-coil static-pressure differential in inches wg (Pa).
h. Outdoor airflow in cfm (L/s).
i. Return airflow in cfm (L/s).
j. Outdoor-air damper position.
k. Return-air damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch (mm) o.c.
f. Make and model number.
g. Face area in sq. ft. (sq. m).
h. Tube size in NPS (DN).
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm (L/s).
b. Average face velocity in fpm (m/s).
c. Air pressure drop in inches wg (Pa).
d. Outdoor-air, wet- and dry-bulb temperatures in deg F (deg C).
e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
h. Refrigerant expansion valve and refrigerant types.
i. Refrigerant suction pressure in psig (kPa).
j. Refrigerant suction temperature in deg F (deg C).

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.

f. Arrangement and class.
g. Sheave make, size in inches (mm), and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Suction static pressure in inches wg (Pa).

H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated air flow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual air flow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

I. Air-Terminal-Device Reports:

1. Unit Data:

a. System and terminal unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm (L/s).

b. Air velocity in fpm (m/s).
c. Preliminary air flow rate as needed in cfm (L/s).
d. Preliminary velocity as needed in fpm (m/s).
e. Final air flow rate in cfm (L/s).
f. Final velocity in fpm (m/s).
g. Space temperature in deg F (deg C).

J. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.10 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
c. Verify that balancing devices are marked with final balance position.
d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer , Owner, and Construction Manager.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Engineer, Owner, and Construction Manager.
3. Engineer, Owner and Construction Manager shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.11 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Indoor, concealed supply and return.

B. Indoor, exposed supply and return.

C. Outdoor, exposed supply and return.

D. Related Sections:
   1. Section 233113 "Metal Ducts" for duct liners.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. LEED Submittals:

   1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
   3. Detail application at linkages of control devices.
   4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket or Type III with factory-applied FSP jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; SOFTR All-Service Duct Wrap.

D. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ or with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F (927 deg C). Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a 1 or 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Johns Manville; Super Firetemp M.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1 or 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; FlameChek.
b. Johns Manville; Firetemp Wrap.
c. Nelson Fire Stop Products; Nelson FSB Flameshield Blanket.
d. Thermal Ceramics; FireMaster Duct Wrap.
e. 3M; Fire Barrier Wrap Products.
f. Unifrax Corporation; FyreWrap.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
    b. Eagle Bridges - Marathon Industries; 570.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
    b. Eagle Bridges - Marathon Industries; 550.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
    d. Mon-Eco Industries, Inc.; 55-50.
    e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    b. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
5. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges - Marathon Industries; 405.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
c. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. ABI, Ideal Tape Division; 488 AWF.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
    c. Compac Corporation; 120.
    d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.8 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. ITW Insulation Systems; Gerrard Strapping and Seals.
    b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) AGM Industries, Inc.; CWP-1.
        2) GEMCO; CD.
        3) Midwest Fasteners, Inc.; CD.
        4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.

    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

        1) AGM Industries, Inc.; CHP-1.
        2) GEMCO; Cupped Head Weld Pin.

3) Midwest Fasteners, Inc.; Cupped Head.

4) Nelson Stud Welding; CHP.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.

2) GEMCO; Perforated Base.

3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.

c. Spindle: Copper- or zinc-coated, low-carbon steel or Aluminum or Stainless steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.

d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, galvanized-steel or aluminum or stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; RC-150.

2) GEMCO; R-150.

3) Midwest Fasteners, Inc.; WA-150.

4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

2.9 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover

insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply return and outdoor air.
2. Indoor, exposed supply return and outdoor air.

B. Items Not Insulated:

1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.

5. Vibration-control devices.
6. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air and return air duct insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

B. Concealed, rectangular, supply-air and return air duct insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

C. Concealed, rectangular, outdoor-air duct insulation shall be one of the following:

1. Mineral-Fiber Blanket: 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.
2.

D. Concealed, supply air and return-air plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

E. Concealed, outdoor-air plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

F. Exposed, round and flat-oval, supply-air and return air duct insulation shall be one of the following:

1. Mineral-Fiber Board: 1-1/2 inches (38 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) nominal density.

G. Exposed, rectangular, supply-air and return air duct and return air insulation shall be one of the following:

1. Mineral-Fiber Board: 1-1/2 inches (38 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) nominal density.

END OF SECTION 230713

SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

PART 1 GENERAL

1.0 DESCRIPTION

A. General: The control system shall be as shown and consist of a high-speed, peer-to-peer network of DDC controllers and operator workstation residing on the third floor and communicating on a BACnet IP (Internet Protocol) network. The operator workstation(s) shall be a personal computer (PC) with a color monitor, mouse, keyboard, and printer. The PC will allow a user to interface with the network via multi-tasking dynamic color graphics. Each mechanical system, building floor plan, and control device will be depicted by point-and-click graphics. Systems using gateways to route proprietary devices and objects to BACnet are not acceptable.

B. For Local Area Network installations provide access to the control system via the Internet. The owner shall provide a connection to the Internet via high-speed cable modem, ADSL, ISDN, T1 or through the facility ISP. The owner shall pay for all monthly Internet access fees and connection charges.

C. The control system shall be supplied with a complete web enabled package. The system shall support unlimited users using standard web browsers such as Internet Explorer and Chrome. The web server software shall operate on standard industry PC servers. Proprietary servers or “black boxes” are not acceptable. Web browser software shall be manufactured by the control system manufacturer and shall have the same look and feel as the operating system. Third party web software is not acceptable.

D. The system will provide for future expansion to include monitoring of the card access, fire alarm, and lighting control systems.

E. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The Operator Workstations installed for this project shall not require any hardware additions or software revisions in order to expand the system.

1.1 APPROVED CONTROL SYSTEM CONTRACTORS AND MANUFACTURERS

A. The base bid shall be Delta Controls by Delta Connects (Matthew Kleine, Account Manager (862)241-9217). Other manufacturers may bid subject to meeting all requirements of the specification and receiving approval from the engineer 30 days prior to bid. A comparison of the alternate system to the base bid system must be submitted 45 days prior to bid for review process. If approved, other manufacturer's bids shall be shown as an add or deduct from the base bid on the bid form. Include project references with contact information for at least three installations of the proposed system with the request for approval package.

1.2 QUALITY ASSURANCE

A. Contractor/Manufacturer Qualifications
1. *The Installer shall have an established working relationship with the Control System Manufacturer, and be the authorized representative of the Manufacturer at bid time.*
2. *The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.*
3. *All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be available for at least 5 years after completion of this contract.*

1.3 CODES AND STANDARDS

A. All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:
1. *National Electric Code (NEC)*
2. *2014 NYC Building Code*
3. *2014 NYC Mechanical Code*
4. *ASHRAE 135-2004*
5. *FCC Regulation, Part 15- Governing Frequency Electromagnetic Interference*
6. *Underwriters Laboratories UL916*

1.4 SYSTEM PERFORMANCE

A. Performance Standards. The system shall conform to the following:

1. *Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be less than 2 seconds. Analog objects should start to adjust within 2 seconds*
2. *Object Scan. All changes of state and change of analog values will be transmitted over the high-speed Ethernet network such that any data used or displayed at a controller or workstation will have been current within the previous 2 seconds*
3. *Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds*
4. *Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 1 second. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control*
5. *Performance. Programmable controllers shall be able to execute DDC PID control loops at a frequency of at least once per second. The controller shall scan and update the process value and output generated by this calculation at this same frequency*
6. *Stability of Control. Control loops shall maintain measured variable at setpoint within the tolerances listed in Table 2*

A. TABLE 1: Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5ºC [±1ºF]
Ducted Air	±0.5ºC [±1ºF
Outside Air	±1.0ºC [±2ºF]
Dewpoint	±1.5ºC [±3ºF]
Water Temperature	±0.5ºC [±1ºF]
Delta-T	±0.15ºC[±0.25ºF]
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Airflow (terminal)	±10% of full scale *(see Note 1)*
Airflow (measuring stations)	±5% of full scale
Air Pressure (ducts)	±25 Pa [±0.1 "W.G.]
Air Pressure (space)	±3 Pa [±0.01 "W.G.]
Water Pressure	±2% of full scale *(see Note 2)*
Electrical (A, V, W, Power factor)	5% of reading *(see Note 3)*
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO_2)	±50 ppm
Note 1: 10%-100% of scale	
Note 2: For both absolute and differential pressure	
Note 3: Not including utility-supplied meters	

B. TABLE 2: Control Stability and Accuracy

Controlled Variable	*Control Accuracy*	*Range of Medium*
Air Pressure	*±50 Pa [±0.2" w.g.]* *±3 Pa [±0.01" w.g.]*	*0-1.5 kPa [0-6" w.g.]* *-25 to 25 Pa [-0.1 to 0.1" w.g.]*
Airflow	*±10% of full scale*	
Temperature	*±0.5ºC [±1.0ºF]*	
Humidity	*±5% RH*	
Fluid Pressure	*±10 kPa [±1.5 psi]*	*0-1 kPa [1-150 psi]*
" " differential	*±250 Pa [±1.0" w.g.]*	*0-12.5 kPa [0-50"w.g.]*

1.5 SUBMITTALS

A. Product Data and Shop Drawings: Contractor shall provide shop drawings or other submittals on all hardware, software, and installation to be provided. No work may begin on any segment of this project until submittals have been reviewed and approved for conformity with the design intent. Three copies are required. All drawings shall be done in DXF format and provided on magnetic/optical disk and as full-size Mylar drawings. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:

1. *Direct Digital Control System Hardware:*

   a) A complete bill of materials of equipment to be used shall be listed indicating quantity, manufacturer, model number, and other relevant technical data.
   b) Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions for the items listed below and other relevant items not listed below:

      i Direct Digital Controller (controller panels)
      ii Transducers/Transmitters
      iii Sensors (including accuracy data)
      iv Actuators
      v Relays/Switches
      vi Control Panels
      vii Power Supply
      viii Batteries
      ix Wiring

   c) Wiring diagrams and layouts for each control panel. Show all termination numbers
   d) Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware

2. *Central System Hardware and Software*

   a) A complete bill of material of equipment used indicating quantity, manufacturer, model number, and other relevant technical data.
   b) Manufacturer's description and technical data, such as product specification sheets and installation/maintenance instructions for the items listed below and other relevant items not listed below:

      i Central Processing Unit
      ii Monitors
      iii Printers

iv Keyboard
v Power Supply
vi Battery Backup
vii Interface Equipment Between CPU and Control Panels
viii Operating System Software
ix Operator Workstation Software
x Color Graphic Software
xi Third-party Software

c) A schematic diagram for all control wiring, communication wiring and power wiring shall be provided. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers, function and data link protocol(s). Show all interface wiring to the control system
d) Provide detailed riser diagrams of wiring between central control unit, routers, gateways and all control panels

3. *Controlled Systems:*

a) A schematic diagram of each controlled system. The schematics shall have all control points/objects labeled and with point/object names shown or listed. The schematics shall graphically show the location of all control elements in the system
b) A schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, it shall be labeled with the same name. All terminals shall be labeled
c) An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number
d) A mounting, wiring, and routing plan view drawing. The drawing shall be done in ¼" scale. The design shall take into account HVAC, electrical and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work
e) A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system
f) A point/object list for each system controller including inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc

4. *Quantities of items submitted shall be reviewed, but are the responsibility of the Contractor*
5. *A description of the proposed process along with all report formats and checklists to be used in Part 3: "Control System Demonstration and Acceptance."*

6. *A BACnet Protocol Implementation Conformance Statement (PICS) for each type of controller and Operator Workstation included in the submittal. PICS to include for each product, as a minimum, a list of BACnet functional groups supported, BACnet services supported, BACnet data link options available and BACnet objects provided*

B. Schedules:

1. *Within one month of contract award, provide a schedule of the work indicating the following:*

    a) Intended sequence of work items
    b) Start dates of individual work items.
    c) Duration of individual work items
    d) Planned delivery dates for major material and equipment, and expected lead times
    e) Milestones indicating possible restraints on work by other trades or situations.

2. *Provide monthly written status reports indicating work completed, revisions to expected delivery dates, etc. An updated project schedule shall be included.*

C. Project Record Documents: Upon completion of installation, submit three copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:

1. *Project Record Drawings. These shall be as-built versions of the submittal shop drawings. One set of magnetic media including DXF drawing files also shall be provided*
2. *Testing and Commissioning Reports and Checklists. Completed versions of all reports and checklists, along with all trend logs, used to meet the requirements of Part 3: "Control System Demonstration and Acceptance."*
3. *Certification of the pressure test required in Part 3: "Control Air Tubing."*
4. *Operation and Maintenance (O & M) Manual. This shall include as-built versions of the submittal product data. In addition to the information required for submittals, the O & M manual shall include:*

    a) Names, addresses, and 24-hour telephone numbers of Contractors installing equipment, and the control systems and service representatives of each
    b) Engineering, Installation, and Maintenance Manual(s) that explain how to design and install new points/objects, panels, and other hardware; preventive maintenance and calibration procedures; how to debug hardware problems; and how to repair or replace hardware
    c) A listing and documentation of all custom software created using the programming language, including the setpoints, tuning parameters, and object database. One set of magnetic/optical media containing files of the software and database also shall be provided
    d) A list of recommended spare parts with part numbers and suppliers
    e) Complete original issue documentation, installation, and maintenance information for all third-party hardware provided, including computer equipment and sensors
    f) Licenses, guarantee, and warranty documents for all equipment and systems

g) Recommended preventive maintenance procedures for all system components, including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions

D. Training Manuals: The Contractor shall provide a course outline and training manuals for all training classes at least six weeks prior to the first class. The Engineer may modify any or all of the training course outline and training materials to meet the needs of the Owner. Review and approval by the Engineer shall be completed at least three weeks prior to the first class

1.6 WARRANTY

A. Warrant all work as follows:

1. *Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.*
2. *All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period*
3. *At the end of the final start-up, testing, and commissioning phase, if equipment and systems are operating satisfactorily to the Engineer, the Engineer shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of acceptance shall be the start of warranty.*
4. *Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Contractor shall be provided at no charge during the warranty period. Any upgrades or functional enhancements associated with the above mentioned items also can be provided during the warranty period for an additional charge to the Owner by purchasing an in-warranty technical support agreement from the Contractor. Written authorization by the Owner must, however, be granted prior to the installation of any of the above-mentioned items.*
5. *Exception: The Contractor shall not be required to warrant reused devices, except for those that have been rebuilt and/or repaired. The Contractor shall warrant all installation labor and materials, however, and shall demonstrate that all reused devices are in operable condition at the time of Engineer's acceptance.*

1.7 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project-developed software and documentation shall become the property of the Owner. These include, but are not limited to:
   1. *Project graphic images*
   2. *Record drawings*
   3. *Project database*
   4. *Project-specific application programming code*
   5. *All documentationProducts*

1.8 SECTION INCLUDES

A. Materials

B. Communication

C. Building Controllers

D. Advanced Application Controllers

E. Application Specific Controllers

F. Input/ Output Interface

G. Auxiliary Control Devices

H. Wiring and Raceways

1.9 MATERIALS

A. All products used in this project installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of two years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's Representative in writing. Spare parts shall be available for at least five years after completion of this contract.

1.10 COMMUNICATION

A. All control products provided for this project shall comprise a BACnet internetwork. Communication involving control components (i.e., all types of controllers and Operator Workstations) shall conform to ANSI/ASHRAE Standard 135-2004, BACnet.

B. Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this section.

C. The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, switches, and routers necessary for the internetwork.

D. All controllers shall have a communication port for connections with the Operator Workstations using the BACnet Data Link/ Physical layer protocol.

E. Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:

1. *Connection of an Operator Workstation device to any one controller on the internetwork will allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internetwork.*
2. *All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internetwork. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internetwork value passing.*

F. The time clocks in all controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.

G. The network shall have a 10% minimum capacity for future I/O expansion and future installation of a operator workstation should the owner decide to add one at a later date.

H. Custom Application Programming. Provide the tools to create, modify, and debug custom application programming. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded. The programming language shall have the following features:

a) The language shall be English language oriented, be based on the syntax of BASIC, FORTRAN, C, or PASCAL, and allow for free-form programming (i.e., not column-oriented or "fill in the blanks").
b) A full-screen character editor/programming environment shall be provided. The editor shall be cursor/mouse-driven and allow the user to insert, add, modify, and delete custom programming code. It also shall incorporate word processing features such as cut/paste and find/replace.
c) The programming language shall allow independently executing program modules to be developed. Each module shall be able to independently enable and disable other modules.
d) The editor/programming environment shall have a debugging/simulation capability that allows the user to step through the program and observe any intermediate values and/or results. The debugger also shall provide error messages for syntax and execution errors.
e) The programming language shall support conditional statements (IF/THEN/ELSE/ELSE-IF) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.

f) The programming language shall support floating point arithmetic using the following operators: +, -, /, x, square root, and x-to-the-y-power. The following mathematical functions also shall be provided: natural log, log, trigonometric functions (sine, cosine, etc.), absolute value, and minimum/maximum value from a list of values.

g) The programming language shall have predefined variables that represent time of day, day of the week, month of the year, and the date. Other predefined variables shall provide elapsed time in seconds, minutes, hours, and days. These elapsed time variables shall be able to be reset by the language so that interval-timing functions can be stopped and started within a program. Values from all of the above variables shall be readable by the language so that they can be used in a program for such purposes as IF/THEN comparisons, calculations, etc.

h) The language shall be able to read the values of the variables and use them in programming statement logic, comparisons, and calculations.

i) The programs shall support online changes with the ability to read real time values without exiting the program. Sample programs and syntax help functions shall be resident in the program.

1.11 BUILDING CONTROLLERS

A. General. Provide an adequate number of BACnet® Building Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements. Additionally, provide Building Controllers where shown on the drawings.

1. *The Energy Management and Control System shall be comprised of one or more independent, standalone, microprocessor-based Building Controllers to manage the global strategies described in the System Software section.*
2. *The Building Controller shall have sufficient memory to support its operating system, database, and programming requirements.*
3. *Data shall be shared between networked Building Controllers.*
4. *The operating system of the Building Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.*
5. *Controllers that perform scheduling shall have a battery or super-cap backed up real-time clock.*

B. Communication

1. *Each Building Controller shall support direct Ethernet or a communications card. The Building Controller shall be connected to the BACnet network using the ISO 8802-3 (Ethernet) Data Link/ Physical layer protocol, or BACnet IP (Annex J).*
2. *Each Building Controller with a communications card shall perform BACnet routing if connected to a network of Custom Application and Application Specific Controllers.*
3. *The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol P-T-P for connection to a hand-held workstation/ and/or modem.*

4. *The Building Controller secondary communication network shall support BACnet MS/TP.*

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
   1. *Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 0°C to 40°C [32°F to 100°F] and 10 to 90% RH.*
   2. *Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].*

D. Building Controllers shall be fully peer to peer.

E. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field- removable, modular terminal strips — or to a termination card connected by a ribbon cable.

F. Memory. The Building Controller shall have as a minimum standard SRAM of 256 KB, standard DRAM of 1MB and standard non-volatile 1 MB of flash memory in lieu of EPROM. Memory shall be user extendible through RAM chip sockets and SIMMs for future memory expansion.

G. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. The Building Controller shall maintain all database information including BIOS and programming information in the event of a power loss for at least 72 hours. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

H. Inputs/Outputs.
   1. *Inputs. Controller input/output board shall support dry contact, 0-5 VDC and 0-10 VDC- voltage, 4-20 mA- current and thermistor-resistive signal types on an individual basis for connecting any status or sensing device. Analog resolution shall be minimum 10-bit A to D.*
   2. *Outputs. Controller input/output board shall support plug-and-play I/O modules or built in HAO modules configured with manual-auto-off override switch, potentiometer and input channel for feedback status or an unrelated analog or digital input. Output supported shall be 0-10 VDC. All HAO's shall be supervised.*
   3. *Diagnostics. Controller input board shall have variable intensity LEDs providing input status indication. Outputs shall have variable intensity LEDs indicating the output voltage with Color indication of HAO's status when present.*
   4. *Bump-less Transfer. On analog outputs with override switches, provide a Hand-Auto-Off switch either built-in or external to the board that allows for manual positioning of the output, then transferring the output to automatic without any "bump" in the output voltage (don't go through off before transferring from manual to auto).*

1.12 ADVANCED APPLICATION CONTROLLERS

A. General. Provide an adequate number of BACnet®Advanced Application Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements.

1. *The Advanced Application Controller shall have sufficient memory to support its operating system, database, and programming requirements.*
2. *Advanced Application Controllers shall be fully peer to peer.*
3. *The operating system of the Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.*
4. *All equipment that requires scheduling shall be scheduled in that equipments controller.*
5. *Both firmware and controller database shall be loadable over the network.*
6. *Advanced Application Controllers shall support the following BACnet Interoperability Building Blocks (BIBBs):*

Data Sharing	Alarm & Event	Scheduling	Trending	Device & Network Mgmt.
DS-RP-A,B	AE-N-I-B	SCH-I-B	T-VM-I-B	DM-DDB-A,B
DS-RPM-B	AE-N-E-B	SCH-E-B	T-VM-E-B	DM-DOB-A,B
DS-WP-A,B	AE-ACK-B		T-ATR-B	DM-DCC-B
DS-WPM-B	AE-ASUM-B			DM-TS-B
DS-COV-A,B	AE-ESUM-B			DM-RD-B
	AE-INFO-B			DM-BR-B
				DM-R-B
				DM-OCD-B

B. Communication.
1. *Each Advanced Application Controller shall reside on a BACnet network using the MS/TP or Ethernet Data Link/ Physical layer protocol.*
2. *The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol for connection to portable operators workstation and allow access to the entire network.*

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
1. *Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 0°C to 40°C [32°F to 100°F].*
2. *Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].*

D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips — or to a termination card connected by a ribbon cable.

E. Memory. The Advanced Application Controller shall be non-volatile FLASH memory.

F. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

1.13 APPLICATION SPECIFIC CONTROLLERS

A. General. Provide BACnet® Application Specific Controllers (ASCs) as required to execute the sequence of operations. ASC's are microprocessor-based DDC controllers which through hardware or firmware design are able to control a wide variety of equipment. They shall be fully user-configurable.
1. *Each ASC shall be capable of standalone operation and shall continue to provide control functions without being connected to the network.*
2. *Each ASC will contain sufficient I/O capacity to control the target system.*
3. *Both firmware and controller database shall be loadable over the network*
4. *ASC's shall come with an integrated housing to allow for easy mounting and protection of the circuit board. Only wiring terminals shall be exposed.*
5. *Application Specific Controllers shall support the following BACnet Interoperability Building Blocks (BIBBs):*

Data Sharing	Alarm & Event	Scheduling	Trending	Device & Network Mgmt.
DS-RP-B				DM-DDB-B
DS-RPM-B				DM-DOB-B
DS-WP-B				DM-DCC-B
DS-COV-B				DM-TS-B
				DM-RD-B

B. Communication
   1. *The controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol or BACnet® over ZigBee protocol.*
   2. *Each controller shall have a BACnet Data Link/ Physical layer compatible connection for a laptop computer or a portable operator's tool. This connection shall be extended to a space temperature sensor port where shown and allow access to the entire network.*

C. Environment. The hardware shall be suitable for the anticipated ambient conditions.
   1. *Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at -40°C to 65°C [-40°F to 150°F] and/or suitably installed in a heated or fan cooled enclosure*
   2. *Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].*

D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips.

E. Memory. The Application Specific Controller shall use non-volatile memory and maintain all BIOS and programming information in the event of a power loss.

F. Immunity to power and noise. ASC shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

G. Transformer. Power supply for the ASC must be rated at minimum of 125% of ASC power consumption, and shall be fused or current limiting type.

H. Input/Output. ASC shall support as a minimum, directly connected, a combination of analog outputs and binary outputs and universal software selectable analog or digital inputs. ASC inputs shall support 0-5 VDC-voltage, 4-20mA-current, thermistor-resistance and dry contacts. ASC outputs shall support 0-10 VDC-voltage, digital triac rated at 0.5 amps at 24 VAC

1.14 INPUT/OUTPUT INTERFACE

A. Hardwired inputs and output points/objects may be wired into the system through Building, Advanced Application, or Application Specific Controllers.

B. All input and output points shall be protected such that shorting of the point to itself, to another point, or to ground, will cause no damage to the controller. All input and output points shall be protected from voltage up to 24 volts of any duration, such that contact with this voltage will cause no damage to the controller.

C. Digital inputs shall allow the monitoring of ON/OFF signals from remote devices. The digital inputs shall provide a current of at least 12 mA to be compatible with commonly available control devices, and shall be protected against the effects of contact bounce and noise. Digital inputs shall sense “dry contact” closure without external power (other than that provided by the controller) being applied.

D. Analog inputs shall allow the monitoring of 0-5 VDC, 0-10 VDC-voltage, 4-20 mA-current, or thermistors. Analog inputs shall be compatible, and be field configurable to commonly available sensing devices.

E. Digital outputs shall provide for ON/OFF operation. Digital outputs on Building and Advanced Application Controllers shall have three-position override switches, Hand-Off-Auto with status lights. Outputs shall be selectable for either normally open or normally closed operation.

F. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide a 0 to 10 VDC signal as required to provide proper control of the output device. Analog outputs on Building or Advanced Application Controllers shall have status lights and a two-position (AUTO/MANUAL) switch and manually adjustable potentiometer for manual override. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.

G. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct mounted heating coils, zone dampers, radiation, etc.)

H. Input/Output points/objects shall be universal type, i.e., controller input or output may be designated (in software) as either a binary or analog type point/object with appropriate properties. Application Specific Controllers are exempted from this requirement.

I. Wireless sensors may be used as long as all communication between their associated controller and the rest of the network is BACnet® standard protocol.

J. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The Operator Workstations installed for this project shall not require any hardware additions or software revisions in order to expand the system.

1.15 AUXILIARY CONTROL DEVICES

A. Motorized control dampers, unless otherwise specified elsewhere, shall be as follows:

1. *Control dampers shall be parallel or opposed blade type as below or as scheduled on drawings.*
    a) Outdoor and/or return air mixing dampers and face and bypass (F&BP) dampers shall be parallel blade, arranged to direct air-streams toward each other.
    b) Other modulating dampers shall be opposed blade type.
    c) Two-position shutoff dampers may be parallel or opposed blade type with blade and side seals.
2. *Damper frames shall be 13 gauge galvanized steel channel or 1/8" extruded aluminum with reinforced corner bracing.*

3. *Damper blades shall not exceed 20 cm [8"] in width or 125 cm [48"] in length. Blades are to be suitable for medium velocity performance (10 m/s [2,000 fpm]). Blades shall be not less than 16 gauge.*
4. *Damper shaft bearings shall be as recommended by manufacturer for application, Oilite or better.*
5. *All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 50 L/s·m² [10 cfm per sq. ft.] at 1000 Pa [4" w.c.] differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s [1,500 fpm].*
6. *Individual damper sections shall not be larger than 125 cm x 150 cm [48" x 60"]. Provide a minimum of one damper actuator per section.*
7. *Modulating dampers shall provide a linear flow characteristic where possible.*
8. *Dampers shall have exposed linkages.*

B. Electric damper actuators.

1. *The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.*
2. *Where shown, for power-failure/safety applications, an internal mechanical, spring-return mechanism shall be built into the actuator housing.*
3. *All rotary spring-return actuators shall be capable of both clockwise or counter-clockwise spring-return operation. Linear actuators shall spring-return to the retracted position.*
4. *Proportional actuators shall accept a 0 to 10 VDC or 2 to 10vdc operating range.*
5. *All 24 VAC/VDC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120 VAC or 230 VAC shall not require more than 11 VA.*
6. *All non-spring-return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring-return actuators with more than 7 N·m [60 in-lb] torque capacity shall have a manual crank for this purpose.*
7. *Actuators shall be provided with a raceway fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections*
8. *Actuators shall be UL Standard 873 Listed and CSA Class 4813 02 Certified as meeting correct safety requirements and recognized industry standards.*
9. *Actuators shall be designed for a minimum of 60,000 full-stroke cycles at the actuator's rated torque.*

C. Binary Temperature Devices

1. *Low-voltage space thermostat shall be 24 V, bimetal-operated, with either adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C to 30°C [55°F to 85°F] setpoint range, 1°C [2°F] maximum differential, and vented ABS plastic cover.*

2. *Line-voltage space thermostat shall be bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, UL listed for electrical rating, concealed setpoint adjustment, 13°C to 30°C [55°F to 85°F] setpoint range, 1°C [2°F] maximum differential, and vented ABS plastic cover.*
3. *Low-limit thermostats. Low-limit thermostats shall be vapor pressure type with an element 6 m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any 30 cm [1 ft] section. The low-limit thermostat shall be manual reset only and be supplied as DPST.*

D. Temperature sensors.
1. *Temperature sensors shall be thermistors.*
2. *Duct sensors shall be rigid or averaging as shown. Averaging sensors shall be a minimum of 1.5 m [5 feet] in length.*
3. *Immersion sensors shall be provided with a separable brass well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.*
4. *Space sensors shall be equipped with the following:*

   a) programmable buttons for setpoint adjustment and override
   b) 3-value, 96-segment LCD display
   c) Communication port connected to entire network
5. *Provide matched temperature sensors for differential temperature measurement.*

E. Humidity sensors.
1. *Duct and room sensors shall have a sensing range of 20% to 80%.*
2. *Duct sensors shall be provided with a sampling chamber.*
3. *Outdoor air humidity sensors shall have a sensing range of 20% to 95% RH. They shall be suitable for ambient conditions of -40°C to 75°C [-40°F to 170°F].*
4. *Humidity sensor's drift shall not exceed 3% of full scale per year.*

F. Flow switches.
1. *Flow-proving switches shall be either paddle or differential pressure type, as shown.*
2. *Differential pressure type switches shall be UL Listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application, or as specified.*

G. Relays.
1. *Control relays shall be UL Listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application*
2. *Time delay relays shall be UL Listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable ±200% (minimum) from setpoint shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 enclosure when not installed in local control panel.*

H. Override timers.

1. *Override timers shall be spring-wound line voltage UL Listed, contact rating and configuration as required by application. Provide 0-to-6-hour calibrated dial unless otherwise specified; suitable for flush mounting on control panel face, located on local control panels or where shown.*

I. Current transmitters
1. *AC current transmitters shall be self-powered combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 0 – 5vdc two-wire output. Unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A full scale, internal zero and span adjustment, and ±1% full scale accuracy at 500 ohm maximum burden*
2. *Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.*
3. *Unit shall be split-core type for clamp-on installation.*

J. Current transformers
1. *AC current transformers shall be UL/CSA recognized and completely encased (except for terminals) in approved plastic material.*
2. *Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full scale output.*
3. *Transformers shall be split-core type for installation on new or existing wiring,*

K. Voltage transmitters
1. *AC voltage transmitters shall be self-powered single loop (two-wire) type, 4 to 20 mA output with zero and span adjustment.*
2. *Ranges shall include 100 to 130 VAC, 200 to 250 VAC, 250 to 330 VAC, and 400 to 600 VAC full-scale, adjustable, with ±1% full-scale accuracy with 500 ohm maximum burden.*
3. *Transmitters shall be UL/CSA recognized at 600 VAC rating and meet or exceed ANSI/ISA S50.1 requirements.*

L. Voltage transformers.
1. *AC voltage transformers shall be UL/CSA recognized, 600 VAC rated, complete with built-in fuse protection.*
2. *Transformers shall be suitable for ambient temperatures of 4 to 55°C [40 to 130°F] and shall provide ±0.5% accuracy at 24 VAC and a 5 VA load.*
3. *Windings (except for terminals) shall be completely enclosed with metal or plastic material.*

M. Power monitors.
1. *Power monitors shall be three-phase type furnished with three-phase disconnect/shorting switch assembly, UL Listed voltage transformers and UL Listed split-core current transformers*
2. *Shall provide a selectable rate pulse output for kWh reading and a 1 –5vdc or 4 to 20 mA output for kW reading. Shall operate with 5 A current inputs with a maximum error of ±2% at 1.0 power factor or ±2.5% at 0.5 power factor.*

N. Current switches
1. *Current-operated switches shall be self-powered, solid-state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.*

O. Pressure transducers
1. *Transducer shall have linear output signal. Zero and span shall be field-adjustable.*
2. *Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage*
3. *Water pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Transducer shall be complete with 1 - 5vdc or 4 to 20 mA output, required mounting brackets, and block and bleed valves.*
4. *Water differential pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (differential pressure) and maximum static pressure shall be 300 psi. Transducer shall be complete with 1 – 5vdc or 4 to 20 mA output, required mounting brackets, and five-valve manifold.*

P. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application, or as shown.

Q. Pressure-Electric (PE) Switches
1. *Shall be metal or neoprene diaphragm actuated, operating pressure rated 0–175 kPa [0–25 psig], with calibrated scale setpoint range of 14–125 kPa [2–18 psig] minimum, UL listed*
2. *Provide one- or two-stage switch action SPDT, DPST, or DPDT, as required by application.*
3. *Shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified*
4. *Shall have a permanent indicating gauge on each pneumatic signal line to PE switches.*

R. Electro-pneumatic (E/P) transducers
1. *Electronic/pneumatic transducer shall provide a proportional 20 to 100 kPa [3 to 15 psig] output signal from a 0 to 10 VDC analog control input.*

S. Local control panels
1. *All indoor control cabinets shall be fully enclosed NEMA 1 construction with [hinged door], key-lock latch, removable sub-panels. A single key shall be common to all field panels and sub-panels*
2. *Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL Listed for 600 volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings*
3. *Provide 120v receptacle at each local panel location.*

T. Hydrogen Sensor.

1. *The gas monitor system shall consist of a single enclosure monitor/readout unit with an internal sample draw system for remote detection. The gas monitor system shall measure and display Hydrogen within battery storage areas and any maintenance areas that may be affected by gas leaks within the system. The system shall provide audio and visual alarms when preset limits are exceeded, including a 4-20 mA output for remote annunciation.*

   Gas monitor shall be the MSA Toxgard® II Gas Monitor by Mechanical Technologies, LLC

2. *The gas monitor system shall consist of a standalone monitor with LED readout unit with an integral quiet operation gas sampling module. The gas monitor shall be enclosed in a wall-mount type enclosure designed to meet a NEMA 4X rating. A switch accessible from the outside of the enclosure shall be provided for the purpose of alarm relay reset audible alarm silencing. The hydrogen monitor sensor shall be a long-life electrochemical fuel cell type. The sensor will not require the periodic addition of reagents.*
3. *The gas sampling system shall be able to obtain an atmospheric sample from up to 120 feet from the monitor enclosure via 0.25" sample tubing constructed from polyurethane, polyethylene, copper or stainless steel. An end-of-line or in-line filter shall be incorporated to keep any foreign matter out of the sample tubing.*
4. *Monitor shall be provided with internal four-digit LED readout to display the gas concentration. The value displayed shall be a direct reading of the hydrogen concentration (0 to 25%). System status indictors will also be provided with the LED display to provide notification of alarm status, calibration sequence and any internal system alarms.*
5. *Alarm set point levels – three separate alarm set point levels shall be provided. The set points shall be independently adjustable for any value within the readout range. The set points shall provide drive signals to user interface relays. An auxiliary remote rest switch relay is included for remote annunciation.*
6. *Visual alarm indicators – the monitor shall be capable of mounting separate lights indicating when the present limits for CAUTION, WARNING, and/or ALARM set points have been exceeded. Visual alarms will remain on as long as alarms are exceeded.*
7. *Front panel horn/alarm acknowledge switch – this push button switch shall silence the internal audible alarm indicator when alarm points are exceeded. The remote reset relay will permit the silencing of the audible alarm from a remote location.*
8. *System power requirements – the system shall operate on 120 VAC, 60 Hz. Power shall not exceed 40 watts from its internal DC supply. An internal, push button, reset circuit breaker shall be provided.*
9. *Maximum system maintenance requirements – the system shall require no periodic maintenance other than periodic checking of sensor response to a known concentration of gas. The system shall have UL approval.*

1.16 WIRING AND RACEWAYS

A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of Division 16

B. All insulated wire to be copper conductors, UL labeled for 90C minimum service.

PART 2 EXECUTION

2.0 SECTION INCLUDES

A. Examination

B. Protection

C. Coordination

D. General Workmanship

E. Field Quality Control

F. Existing Equipment

G. Wiring

H. Communication Wiring

I. Installation of Sensors

J. Actuators

K. Identification of Hardware and Wiring

L. Controllers

M. Programming

N. Control System Checkout and Testing

O. Control System Demonstration and Acceptance

P. Cleaning

2.1 EXAMINATION

A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started

B. The Contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started

C. The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate — or if any discrepancies occur between the plans and the Contractor's work, and the plans and the work of others — the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by — and at the expense of — this Contractor.

2.2 PROTECTION

A. The Contractor shall protect all work and material from damage by its work or employees, and shall be liable for all damage thus caused

B. The Contractor shall be responsible for its work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects

2.3 COORDINATION

A. Site
1. *Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs its work before coordinating with other trades, so as to cause any interference with work of other trades, the Contractor shall make the necessary changes in its work to correct the condition without extra charge*
2. *Coordinate and schedule work with all other work in the same area, or with work which is dependent upon other work, to facilitate mutual progress.*

B. Submittals. Refer to the "Submittals" Article in Part 1 of this specification for requirements

C. Test and Balance
1. *The Contractor shall furnish all tools necessary to interface to the control system for test and balance purposes*
2. *The Contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours*
3. *In addition, the Contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.*
4. *The tools used during the test and balance process will be returned at the completion of the testing and balancing*

D. Life Safety
1. *Duct smoke detectors required for air handler shutdown are supplied and installed under Division 26 - Electrical . The Division 26 Contractor shall interlock smoke detectors to air handlers for shutdown as described in Part 3: "Sequences of Operation".*

2. *Smoke dampers and actuators required for duct smoke isolation are provided under another Division 23 Section*
3. *Fire/smoke dampers and actuators required for fire rated walls are provided under another Division 23 Section. Control of these dampers shall be by Division 26.*

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the Contractor as follows:

1. *All communication media and equipment shall be provided as specified in Part 2: "Communication" of this specification.*
2. *Each supplier of controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.*
3. *The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this Section and those provided under other sections or divisions of this specification.*

2.4 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment

C. Install all equipment in readily accessible locations as defined by Chapter 1, Article 100, Part A of the National Electrical Code (NEC).

D. All wiring shall be verified for its integrity to ensure continuity and freedom from shorts and grounds

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

2.5 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this specification

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship

C. Contractor shall have work inspected by local and/or state/provincial authorities having jurisdiction over the work

2.6 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes and Division 26 of this specification. Where the requirements of this section differ with those in Division 26, the requirements of this section shall take precedence

B. All NEC Class 1 (line voltage) wiring shall be UL Listed in approved raceway per NEC

C. All low-voltage wiring shall meet NEC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations including ceiling return air plenum, approved cables not in EMT may be used, provided that cables are UL Listed for the intended application. For example, cables used in ceiling plenum shall be UL Listed specifically for that purpose.

E. All wiring in mechanical, electrical, or service rooms — or where subject to mechanical damage — shall be installed in EMT at levels below 3m [10ft].

F. Do not install Class 2 wiring in EMT containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).

G. Do not install wiring in raceway containing tubing

H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it, and *neatly* tied at 2m [6ft] intervals

I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems

J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals

L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the Contractor shall provide step-down transformers.

M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points/objects

N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations

O. Size of raceway and size and type of wire shall be the responsibility of the Contractor, in keeping with the manufacturer's recommendation and NEC requirements, except as noted elsewhere.

P. Include one pull string in each raceway 2.5 cm [1"] or larger

Q. Use coded conductors throughout with different colored conductors

R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

S. Conceal all raceways, except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15cm [6”] from high-temperature equipment (e.g., steam pipes or flues).

T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

U. Adhere to Division 26 requirements where raceway crosses building expansion joints

V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of all vertical raceways.

W. The Contractor shall terminate all control and/or interlock wiring, and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site

X. Flexible metal raceways and liquid-tight, flexible metal raceways shall not exceed 1 m [3 ft] in length and shall be supported at each end. Flexible metal raceway less than ½ “ electrical trade size shall not be used. In areas exposed to moisture — including chiller and boiler rooms — liquid-tight, flexible metal raceways shall be used.

Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (per code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed

2.7 COMMUNICATION WIRING

A. The Contractor shall adhere to the items listed in the “Wiring” Article in Part 3 of the specification

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.

C. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring

D. Maximum pulling, tension, and bend radius for cable installation as specified by the cable manufacturer shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.

F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to the manufacturer’s instructions

G. All runs of communication wiring shall be un-spliced when that length is commercially available

H. All communication wiring shall be labeled to indicate origination and destination data.

I. Grounding of coaxial cable shall be in accordance with NEC regulations Article on Communications Circuits, Cable and Protector Grounding

2.8 INSTALLATION OF SENSORS

A. Install all sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequately for the environment within which the sensor operates

C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing. Should wall mounting be unavailable, the proper sensor should be furnished to accommodate the situation.

D. All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings

E. Sensors used in mixing plenums shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across duct. Each bend shall be supported with a capillary clip

F. Low limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m of sensing element for each 1 m^2 [1 ft. of sensing element for each 1 ft^2] of coil area

G. Install outdoor air temperature sensors on north wall complete with sun shield at designated location.

H. Differential air static pressure

1. *Supply Duct Static Pressure: Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the high-pressure tap tubing of the corresponding building static pressure sensor (if applicable), or to the location of the duct high-pressure tap and leave open to the plenum.*
2. *Return Duct Static Pressure: Pipe the low-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the high-pressure tap tubing of the corresponding building static pressure sensor*
3. *Building Static Pressure: Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover at the specified location*
4. *The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer*
5. *All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment*

6. *Air differential pressure sensors shall have gauge tees mounted adjacent to the taps.*

2.9 ACTUATORS

A. Mount and link control damper actuators per manufacturer's instructions.
   1. *To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage*
   2. *Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.*
   3. *Provide all mounting hardware and linkages for actuator installation.*

B. Electric/Electronic
   1. *Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° available for tightening the damper seals. Actuators shall be mounted following manufacturer's recommendations*

2.10 IDENTIFICATION OF HARDWARE AND WIRING

A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 5 cm [2"] of termination with the DDC address or termination number.

B. Permanently label or code each point/object of field terminal strips to show the instrument or item served.

C. Identify control panels with minimum 1 cm [½"] letters on laminated plastic nameplates.

D. Identify all other control components with permanent labels. All plug-in components shall be labeled such that removal of the component does not remove the label.

E. Identify room sensors relating to terminal box with nameplates.

F. Manufacturers' nameplates

G. Identifiers shall match record documents

2.11 CONTROLLERS

A. Provide a separate controller for each RTU or other HVAC system.

B. Building Controllers and Advanced Application Controllers shall be selected to provide a minimum of 15% spare I/O point/object capacity for each point/object type found at each location. If input /objects are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point/object used.
   1. *Future use of spare capacity shall require providing the field device, field wiring, point/object database definition, and custom software. No additional controller boards or point/object modules shall be required to implement use of these spare points*

2.12 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25% of available memory free for future use.

B. Point/object Naming: System point/object names shall be modular in design, allowing easy operator interface without the use of a written point/object index. Object names shall be case-sensitive and clearly spell out the function of each object. Submit naming scheme to owner for prior approval. Do not use cryptic abbreviations. Valid examples are:

1. *RTU-1 Supply Air Temperature*
2. *FCU-1 Room Temperature*
3. *VAV-103 Room Temperature Trend*

C. Software Programming

1. *Provide programming for the system and adhere to the sequences of operation provided. The Contractor also shall provide all other system programming necessary for the operation of the system, but not specified in this document. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:*

    a) Text-based:

        i must provide actions for all possible situations
        ii must be modular and structured
        iii must be commented

    b) Graphic-based

        i must provide actions for all possible situations
        ii must be documented

    c) Parameter-based

        i must provide actions for all possible situations
        ii must be documented

D. Operator Interface

1. *Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each DX Gas Fired Rooftop Units, Split Type DX Units, Smoke Purge Equipment and all terminal equipment. Point/object information on the graphic displays shall dynamically update. Show on each graphic all input and output points/objects for the system. Also show relevant calculated points/objects such as setpoints*
2. *Show terminal equipment information on a "graphic" summary table. Provide dynamic information for each point/object*

3. *The Contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all Operator Workstation software and their functions as described in this section. This includes any operating system software, the Operator Workstation database, and any third-party software installation and integration required for successful operation of the operator interface*

2.13 CONTROL SYSTEM CHECKOUT AND TESTING

A. Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's Representative is notified of the system demonstration.

1. *The Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification*
2. *Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight*
3. *Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations*
4. *Verify that all binary output devices (relays, solenoid valves, two-position actuators, magnetic starters, etc.) operate properly and that the normal positions are correct*
5. *Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to damper blade travel*
6. *Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.*
7. *Alarms and Interlocks*

    a) Check each alarm separately by including an appropriate signal at a value that will trip the alarm
    b) Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c) Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

2.14 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Demonstration

1. *Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests*

2. *The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process and as specified in the "Control System Checkout and Testing" Article in Part 3 of this specification. The Engineer will be present to observe and review these tests. The Engineer shall be notified at least 10 days in advance of the start of the testing procedures.*
3. *The demonstration process shall follow that approved in Part 1: "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration*
4. *The Contractor shall provide at least two persons equipped with two-way communication, and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor.*
5. *As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.*
6. *Demonstrate compliance with Part 1: "System Performance*
7. *Demonstrate compliance with Sequences of Operation through all modes of operation*
8. *Demonstrate complete operation of Operator Workstation*
9. *Additionally, the following items shall be demonstrated:*

    a) DDC Loop Response. The Contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in setpoint, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
    b) Demand limiting. The Contractor shall supply a trend data output showing the action of the demand-limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting setpoint, and the status of shed-able equipment outputs.
    c) Optimum Start. The Contractor shall supply a trend data output showing the capability of the algorithm. The hour-by-hour trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas
    d) Interface to the building fire alarm system

e) Operational logs for each system that indicate all setpoints, operating points, mode, and equipment status shall be submitted to the Architect/Engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.

f) Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The Contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance

1. *All tests described in this specification shall have been performed to the satisfaction of both the Engineer and Owner prior to the acceptance of the control system as meeting the requirements of Completion. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Engineer. Such tests shall then be performed as part of the warranty.*
2. *The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1: "Submittals."*

2.15 CLEANING

A. The Contractor shall clean up all debris resulting from its activities daily. The Contractor shall remove all cartons, containers, crates, etc., under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the Contractor shall clean all of its work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

PART 3 INSTRUCTIONS TO OTHER CONTRACTORS

3.0 CONTROL DAMPER INSTALLATION

A. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

B. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼" larger than damper dimensions and shall be square, straight, and level.

C. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm [1/8"] of each other.

D. Follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.

E. Install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade).

F. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

G. Provide a visible and accessible indication of damper position on the drive shaft end.

H. Support ductwork in area of damper when required to prevent sagging due to damper weight.

I. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

3.1 CONTROLS COMMUNICATION PROTOCOL

A. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points/object list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ASHRAE Standard 135-2004 (BACnet). Controllers shall communicate with other BACnet objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of ASHRAE Standard 135-2004.

B. Distributed Processing. The Controller shall be capable of standalone operation and shall continue to provide control functions without being connected to the network.

C. I/O Capacity. The Controller shall contain sufficient I/O capacity to control and monitor the target system.

D. Communication. The Controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol. Each network of controllers shall be connected to one Building Controller. The Controller shall have a BACnet Data Link/ Physical layer compatible connection for a laptop computer or a portable operator's tool.

E. Environment. The hardware shall be suitable for the anticipated ambient conditions. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].

F. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

G. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 3 days.

H. Immunity to Power and Noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

I. Transformer. Power supply for the Controller must be rated at minimum of 125% of power consumption, and shall be fused or current limiting type.

J. Protocol Implementation Conformance Statement (PICS). Supplier of the electronic controls packaged with this equipment shall provide to the controls contractor a PICS list, complete with object list and wiring diagrams for proper and complete interface

3.2 STARTUP AND CHECKOUT PROCEDURES

A. Start up, check out, and test all hardware and software, and verify communication between all components

B. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.

C. Verify that all analog and binary input/output points/objects read properly.

D. Verify alarms and interlocks.

E. Verify operation of the integrated system

END OF SECTION 230923

SECTION 230993 - SEQUENCES OF OPERATIONS

PART - GENERAL

1.0 SECTION INCLUDES

1.1 Variable Air Volume RTU-1, RTU-2

1.2 Constant Volume RTU-3, RTU-4

1.3 VAV-Perimeter

1.4 VAV-Interior

1.5 Exhaust Fans

1.6 Cart Storage Ventilation System

1.7 Split AC units

1.8 Kitchen Ventilation System

1.9 Electric Unit / Wall Heater

1.10 Electric Duct Heater

1.1 VAV PACKAGED ROOF TOP UNIT WITH GAS FIRED HEATING AND DX COOLING (RTU-1 & RTU-2)

A. Safeties

1. Supply and return smoke detectors shall stop the supply fan upon the presence of smoke through the FAS.
2. Low suction and high discharge pressure switches shall stop the supply fan when duct pressure exceeds design. The fan shall remain off until the pressure switches are manually reset.

B. Warm Up

1. During the heating season, a warm up program shall be invoked if the average space temperatures from the VAV boxes are below 60^{o}F upon unit start up. During the warm up mode, the mixed air dampers shall be at 100% return air. The gas heating will be enabled. The VAV boxes shall revert to warmup mode control.
2. After warm-up (average space temperature above 69F), the supply air temperature setpoint shall be controlled as described in occupied mode.

C. Occupied Mode

1. The rooftop unit shall be started based upon a start time optimization program, time of day schedule, or manual command and run continuously.
2. All associated VAV boxes shall be enabled when the unit starts.
3. Upon a command to start, the outside air, return air, and relief air dampers shall modulate to minimum position.
4. The supply fan variable speed drive shall be controlled to maintain the supply static pressure setpoint of 1.5”wc, sensed at a point on the supply duct where 2/3 of the CFM is discharged to the space.

5. The external exhaust fan variable speed drive shall be controlled to 80% of the supply fan speed.
6. The DX cooling shall cycle to maintain supply air setpoint.
7. The gas heating shall cycle to maintain a minimum preheat plenum of 45F (Adjustable).
8. Economizer mode shall be available whenever the outside air enthalpy is less than the air handling unit return air enthalpy. If economizer is available and there is a rise in temperature above temperature setpoint, the outside air damper(s) and/or exhaust air damper(s) shall be modulated open from minimum position to 100% open as necessary to maintain temperature setpoint. The return air damper(s) shall modulate closed as the outside air and exhaust air damper(s) modulate open. If the outside air damper is 100% open and there is a further rise in temperature above temperature setpoint, the outside air damper shall remain 100% open and the DX cooling shall be modulated as necessary to maintain the supply temperature setpoint.
9. When air economizer is not available, the DX staging and gas heating shall cycle as necessary to maintain discharge setpoint. The return air, outside air, and exhaust air dampers shall modulate as necessary to maintain the minimum outside air required for ventilation.
10. The supply temperature setpoint shall be reset based on VAV cooling commands. Every 15 minutes each box cooling command shall be polled. If 20% of the VAVs are below 50% cooling command, decrease supply air setpoint by 1°F. If 20% of the box cooling commands are greater than 90%, increase the supply air setpoint by 1°F. If neither condition exists, supply temperature setpoint shall remain unchanged. If both conditions exist, supply temperature setpoint shall remain unchanged. This program shall be activated after Warm Up is completed. The supply air temperature setpoint shall remain between the limits of 55°F and 65°F at all times.

D. Unoccupied Mode

1. The supply fan shall remain off. The supply fan speed drive(s) shall be set to 0%. The return damper shall open and the outside air and relief air dampers shall close. The DX cooling shall remain off. The gas heat shall cycle as necessary to maintain a heating discharge air temperature of 45°F.
2. If any space temperature falls below 60□F (adj.), the supply fan shall run as per occupied mode until the return air exceeds 64□F. The supply air setpoint shall be 80□F. The unit shall run a minimum of 1/2 hour after start up.
3. If any space temperature rises above 80□F (adj.), the supply fan shall run as per occupied mode air until the return air falls below 76□F. The supply air setpoint shall be 55□F. The unit shall run a minimum of 1/2 hour after start up.

E. DDC Points:

1. Unit on/off
2. Supply Air Temperature
3. Duct Static Pressure (2/3 Downstream)
4. Filter Differential Pressure
5. Fan Discharge High Static Pressure Safety
6. Fan Intake Low Static Pressure Safety
7. Mixed Air Temperature
8. Return Air Temperature
9. Return Air CO2
10. Return Air Humidity
11. Supply Fan VFD Speed
12. Supply Fan VFD Status (normal/fault)
13. Supply Fan Status
14. Supply Fan VFD Control
15. DX Staging Control
16. Gas Heating Control
17. Outside Air Damper Control
18. Return Air Damper Control

19. Outside Air Temperature
20. Outside Air Humidity

1.2 CONSTANT VOLUME PACKAGED ROOF TOP UNIT WITH GAS FIRED HEATING AND DX COOLING (RTU-3 & RTU-4)

A. Safeties

1. Supply and return smoke detectors shall stop the supply fan upon the presence of smoke through the FAS.
2. Low suction and high discharge pressure switches shall stop the supply fan when duct pressure exceeds design. The fan shall remain off until the pressure switches are manually reset.

B. Warm Up

1. During the heating season, a warm up program shall be invoked if the space temperature is below 60^{o}F upon unit start up. During the warm up mode, the mixed air dampers shall be at 100% return air. The gas heating will be enabled.
2. After warm-up, the supply air temperature setpoint shall be controlled as described in occupied mode.

C. Occupied Mode

1. The rooftop unit shall be started based upon a start time optimization program, time of day schedule, or manual command and run continuously.
2. Upon a command to start, the outside air, return air, and relief air dampers shall modulate to minimum position.
3. The DX cooling shall cycle to maintain supply air setpoint.
4. The gas heating shall cycle to maintain a minimum preheat plenum of 45F.
5. Economizer mode shall be available whenever the outside air enthalpy is less than the unit return air enthalpy. If economizer is available and there is a rise in temperature above temperature setpoint, the outside air damper(s) and/or exhaust air damper(s) shall be modulated open from minimum position to 100% open as necessary to maintain temperature setpoint. The return air damper(s) shall modulate closed as the outside air and exhaust air damper(s) modulate open. If the outside air damper is 100% open and there is a further rise in temperature above temperature setpoint, the outside air damper shall remain 100% open and the DX cooling shall be modulated as necessary to maintain the supply temperature setpoint.
6. When air economizer is not available, the DX staging and gas heating shall cycle as necessary to maintain discharge setpoint. The return air, outside air, and exhaust air dampers shall modulate as necessary to maintain the minimum outside air required for ventilation.

D. Unoccupied Mode

1. The supply fan shall remain off. The return damper shall open and the outside air and relief air dampers shall close. The DX cooling shall remain off. The gas heat shall cycle as necessary to maintain a heating discharge air temperature of 45°F.
2. If any space temperature falls below 60degF (adj.), the supply fan shall run as per occupied mode until the return air exceeds 64degF. The supply air setpoint shall be 80degF. The unit shall run a minimum of 1/2 hour after start up.
3. If any space temperature rises above 80degF (adj.), the supply fan shall run as per occupied mode air until the return air falls below 76degF. The supply air setpoint shall be 55degF. The unit shall run a minimum of 1/2 hour after start up.

E. DDC Points:

1. Unit on/off
2. Supply Air Temperature
3. Filter Differential Pressure
4. Mixed Air Temperature
5. Return Air Temperature
6. Return Air CO2
7. Return Air Humidity
8. Supply Fan Status (normal/fault)
9. Supply Fan Status
10. Supply Fan VFD Control
11. DX Staging Control
12. Gas Heating Control
13. Outside Air Damper Control
14. Return Air Damper Control
15. Outside Air Temperature
16. Outside Air Humidity

1.3 PERIMETER VARIABLE AIR VOLUME (VAV) BOXES W/ ELECTRIC REHEAT

A. Coordinate factory mounting and wiring of Terminal Unit controller, actuator, and transducer with the VAV box manufacturer.

B. Provide space sensors with local adjustable setpoints adjustments limited to +/-2F from base setpoint and an occupancy override button. Provide an LCD display to read the actual temperature, setpoint and outside air temperature.

C. Occupied/unoccupied/warmup schedules shall coordinate with the RTU serving these boxes.

D. Occupied Mode

1. Upon a fall in space temperature below setpoint, the VAV box shall modulate the damper to the minimum CFM setting. Upon a further fall in space temperature 2F below setpoint, the electric reheat shall cycle on to maintain the space temperature setpoint. Upon a rise in space temperature the VAV box damper shall modulate between the minimum and maximum CFM setting to maintain the space temperature setpoint. The minimum and maximum CFM settings shall be those scheduled on the mechanical drawings.

E. Unoccupied Mode

1. When the primary fan system serving the VAV box is not running, the VAV box damper shall close.
2. If the space temperature falls below the unoccupied setback temperature setpoint of 60°F or rises above the unoccupied setup temperature setpoint of 80°F, the fan system serving the VAV box shall be energized and the VAV box shall open 100%. If the box is calling for heat, start the electric reheat. The box damper shall go to minimum when space reaches 64F or 76F.
3. The VAV DDC controller shall be programmed for occupancy override as shown on the schedules. By depressing the occupancy override button located on the space temperature sensor, the VAV box shall be restored to the occupied temperature setpoint for 2 hours.
4. If 20% of the VAV boxes are commanded to override when the RTU is not running , then the RTU shall start.

F. DDC Points:

1. Schedule occupied/unoccupied/override
2. Space temperature
3. Discharge temperature
4. Space temperature set points, occupied
5. Space temperature set points, unoccupied
6. Current CFM
7. CFM setpoint
8. Reheat command %

1.4 INTERIOR VARIABLE AIR VOLUME (VAV) BOXES

A. Coordinate factory mounting and wiring of Terminal Unit controller, actuator, and transducer with the VAV box manufacturer.

B. Provide space sensors without adjustment or displays.

C. Occupied/unoccupied/warmup schedules shall coordinate with the AHU serving these boxes.

D. Occupied Mode

1. Upon a fall in space temperature below setpoint, the VAV box shall modulate the damper to the minimum CFM setting. Upon a rise in space temperature the VAV box damper shall modulate between the minimum and maximum CFM setting to maintain the space temperature setpoint. The minimum and maximum CFM settings shall be those scheduled on the mechanical drawings.

E. Unoccupied Mode

1. When the primary fan system serving the VAV box is not running, the VAV box damper shall close.
2. If the space temperature falls below the unoccupied setback temperature setpoint of 60°F or rises above the unoccupied setup temperature setpoint of 80°F, the fan system serving the VAV box shall be energized and the VAV box shall open 100%. The box damper shall go to minimum when space reaches 64F or 76F.

F. DDC Points:

1. Schedule occupied/unoccupied
2. Space temperature
3. Space temperature setpoints, occupied
4. Space temperature setpoints, unoccupied
5. Current CFM
6. CFM setpoint

1.5 EXHAUST FANS (EF-6 & EF-7)

A. BMS contractor shall provide any interlock wiring to the fans associated damper.

B. Occupied Mode

1. On a call to start from the Master Schedule, the BMS shall open any associated damper and enable the fan to start.

C. Unoccupied Mode

1. On a call to stop from the Master Schedule, the BMS shall shut down the fan and close any associated damper.

D. DDC Points:

1. Fan enable/disable
2. Schedule

1.6 CART STORAGE VENTILATION SYSTEM (TF-1,DF-1 & EF-5)

A. BMS contractor shall provide any interlock wiring to the make-up air fan and associated exhaust fan

B. Provide space sensor and hydrogen sensor:

1. The make-up air unit and associated exhaust fan unit shall be started based upon a start time optimization program, time of day schedule, or manual command. The TF-1 and EF-5 shall run intermittently or continuously based on hydrogen sensor setpoints (4% LEL) or the space temperature setpoints.

2. Upon a command to start, the outside air damper shall open and the make-up air unit TF-1 shall be energized to run. The associated exhaust fan EF-5 shall also run in sequence with TF-1

3. Upon a fall in space temperature below setpoint, the duct gas furnace shall modulate the gas valve to maintain space temperature sensor setpoint of 65 degF (Adjustable).

4. When the space temperature is above setpoint and the hydrogen sensor is below the 4% LEL limits for a duration of 30 minutes (adjustable), a signal will be sent to the TF-1 & EF-5 to be de-energized. A time delay (15 minutes - adjustable) will be set to prevent short cycling of the TF-1 & EF-5 operation.

5. At anytime the space temperature falls below setpoint or the hydrogen sensor is above the 4% LEL setpoint, the TF-1 & EF-5 shall be commanded to run for a minimum of one hour. A time delay (15 minutes - adjustable) will be set to prevent short cycling of the TF-1 & EF-5 operation.

E. DDC Points:

1. Schedule occupied/unoccupied
2. TF-1 & EF-5 Fan enable/disable
3. Space temperature setpoint
4. Space temperature
5. Hydrogen %LEL setpoint
6. Hydrogen %LEL reading
7. Supply Duct Discharge temperature

1.7 SPLIT TYPE AIR CONDITIONING UNITS (AC-1 THRU AC-4)

A. The unit manufacture shall be responsible for furnishing factory installed controls capable of communicating BACnet MS/TP for integration with the Building Management System (BMS).

B. Control contractor shall provide all communication loop/interlock wiring between the FCUs, thermostats, branch controllers, and condensing units as shown by the FCU manufacturer.

C. Control contractor shall mount the factory provided thermostat in a location specified by the mechanical drawings.

D. DDC Points:

1. Space temperature setpoint
2. Space temperature
3. Space occupied/unoccupied status
4. Master Schedule
5. Alarms

1.8 KITCHEN VENTILATION SYSTEM (EF-1, EF-2, EF-4, MUA-3 & MUA-5)

A. The kitchen hood shall have manual controls to activate hood operation.

B. Kitchen exhaust fan

1. When the kitchen hood manual control is turned on, the associated kitchen exhaust fan shall be energized to run in sequence with the make-up air unit.

C. Kitchen make-up air unit

1. The discharge duct temperature sensor shall modulate the gas valve to maintain discharge air temperature setpoint of 45 degF (Adjustable).

D. DDC Points:

1. Schedule occupied/unoccupied
2. Kitchen exhaust fan and make-up air fan status

1.9 ELECTRIC UNIT/WALL HEATER (EUH-1, EUH-2 & EWH-1)

A. Control contractor shall mount the factory provided thermostat in a location specified by the mechanical drawings.

B. DDC Points:

1. Space temperature setpoint
2. Space temperature

1.10 ELECTRIC DUCT HEATER (EUH-1 THRU EDH-5)

C. Control contractor shall mount the factory provided thermostat in a location specified by the mechanical drawings.

D. DDC Points:

1. Space temperature setpoint
2. Space temperature

END OF SECTION 230993

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig (690 kPa) minimum unless otherwise indicated.
2. Service Regulators: 100 psig (690 kPa) minimum unless otherwise indicated.

3. Minimum Operating Pressure of Service Meter: 5 psig (34.5 kPa), 10 psig (69 kPa) or 20 psig (138 kPa).

B. Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 2 psig (13.8 kPa) but not more than 5 psig (34.5 kPa), and is reduced to secondary pressure of more than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa).

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Service meters. Indicate pressure ratings and capacities. Include bypass fittings and meter bars.
6. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/4 inch per foot (1:50).

2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Welding certificates.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For motorized gas valves, pressure regulators and service meters to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify Engineer no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Engineer written permission.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

6. Mechanical Couplings:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

        1) Dresser Piping Specialties; Division of Dresser, Inc.
        2) Smith-Blair, Inc.

b. Steel flanges and tube with epoxy finish.
c. Buna-nitrile seals.
d. Stainless-steel or Steel bolts, washers, and nuts.
e. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
f. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

7. Transition Service-Line Risers: Factory fabricated and leak tested.

a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
b. Outlet shall be threaded or flanged or suitable for welded connection.
c. Bridging sleeve over mechanical coupling.
d. Factory-connected anode.
e. Tracer wire connection.
f. Ultraviolet shield.
g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

8. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal.

1) Dresser Piping Specialties; Division of Dresser, Inc.
2) Smith-Blair, Inc.

b. Steel flanges and tube with epoxy finish.
c. Buna-nitrile seals.
d. Stainless-steel or Steel bolts, washers, and nuts.
e. Factory-installed anode for steel-body couplings installed underground.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches (1830 mm.)

B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

C. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (862 kPa).

D. Basket Strainers:

1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (862 kPa).

E. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig (5170 kPa).

F. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig (862 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.

6. Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig (862 kPa).
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4140 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig (4140 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

   a. Lee Brass Company.
   b. McDonald, A. Y. Mfg. Co.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig (862 kPa).
7. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. McDonald, A. Y. Mfg. Co.
   b. Mueller Co.; Gas Products Div.
   c. Xomox Corporation; a Crane company.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig (862 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

H. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flowserve.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   c. McDonald, A. Y. Mfg. Co.
   d. Milliken Valve Company.
   e. Mueller Co.; Gas Products Div.
   f. R&M Energy Systems, A Unit of Robbins & Myers, Inc.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.

7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig (862 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 MOTORIZED GAS VALVES

A. Automatic Gas Valves: Comply with ANSI Z21.21.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ASCO Power Technologies, LP; Division of Emerson.
   b. Dungs, Karl, Inc.
   c. Eaton Corporation; Controls Div.
   d. Eclipse Combustion, Inc.
   e. Honeywell International Inc.
   f. Johnson Controls.

2. Body: Brass or aluminum.
3. Seats and Disc: Nitrile rubber.
4. Springs and Valve Trim: Stainless steel.
5. Normally closed.
6. Visual position indicator.
7. Electrical operator for actuation by appliance automatic shutoff device.

B. Electrically Operated Valves: Comply with UL 429.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ASCO Power Technologies, LP; Division of Emerson.
   b. Dungs, Karl, Inc.
   c. Eclipse Combustion, Inc.
   d. Goyen Valve Corp.; Tyco Environmental Systems.
   e. Magnatrol Valve Corporation.
   f. Parker Hannifin Corporation; Climate & Industrial Controls Group; Skinner Valve Div.
   g. Watts Regulator Co.; Division of Watts Water Technologies, Inc.

2. Pilot operated.
3. Body: Brass or aluminum.
4. Seats and Disc: Nitrile rubber.
5. Springs and Valve Trim: Stainless steel.
6. 120-V ac, 60 Hz, Class B, continuous-duty molded coil, and replaceable.
7. NEMA ICS 6, Type 4, coil enclosure.
8. Normally closed.
9. Visual position indicator.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.

3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2-1/2 (DN 65) and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Actaris.
   b. American Meter Company.
   c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   d. Invensys.
   e. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 100 psig (690 kPa).

C. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Actaris.
   b. American Meter Company.
   c. Eclipse Combustion, Inc.
   d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   e. Invensys.
   f. Maxitrol Company.
   g. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.

11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 5 psig (34.5 kPa).

D. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Canadian Meter Company Inc.
b. Eaton Corporation; Controls Div.
c. Harper Wyman Co.
d. Maxitrol Company.
e. SCP, Inc.

2. Body and Diaphragm Case: Die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
9. Maximum Inlet Pressure: 5 psig (34.5 kPa).

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Hart Industries International, Inc.
d. Jomar International Ltd.
e. Matco-Norca, Inc.
f. McDonald, A. Y. Mfg. Co.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
h. Wilkins; a Zurn company.

2. Description:

a. Standard: ASSE 1079.

b. Pressure Rating: 150 psig (1035 kPa) or 250 psig (1725 kPa).
c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Capitol Manufacturing Company.

b. Central Plastics Company.
c. Matco-Norca, Inc.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
e. Wilkins; a Zurn company.

2. Description:

a. Standard: ASSE 1079.
b. Factory-fabricated, bolted, companion-flange assembly.

c. Pressure Rating: 150 psig (1035 kPa) or 300 psig (2070 kPa).
d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Description:

a. Nonconducting materials for field assembly of companion flanges.

b. Pressure Rating: 150 psig (1035 kPa).
c. Gasket: Neoprene or phenolic.
d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.

2.8 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 INDOOR PIPING INSTALLATION

A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.

2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches (38 mm) of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.

3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.

4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

   a. Exception: Tubing passing through partitions or walls does not require striker barriers.

5. Prohibited Locations:

   a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
   b. Do not install natural-gas piping in solid walls or partitions.

Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

R. Connect branch piping from top or side of horizontal piping.

S. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

T. Do not use natural-gas piping as grounding electrode.

U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

V. Install pressure gage downstream from each line regulator. Pressure gages are specified in Section 230519 "Meters and Gages for HVAC Piping."

W. Install sleeves for piping penetrations of walls, ceilings, and floors.

X. Install sleeve seals for piping penetrations of concrete walls and slabs.

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.5 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

3.6 HANGER AND SUPPORT INSTALLATION

A. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches (2438 mm); minimum rod size, 3/8 inch (10 mm).
2. NPS 1-1/4 (DN 32): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8 inch (10 mm).
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches (2743 mm); minimum rod size, 3/8 inch (10 mm).
4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet (3 m); minimum rod size, 1/2 inch (13 mm).
5. NPS 4 (DN 100) and Larger: Maximum span, 10 feet (3 m); minimum rod size, 5/8 inch (15.8 mm).

D. Install hangers for horizontal drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8 (DN 10): Maximum span, 48 inches (1220 mm); minimum rod size, 3/8 inch (10 mm).
2. NPS 1/2 and NPS 5/8 (DN 15 and DN 18): Maximum span, 72 inches (1830 mm); minimum rod size, 3/8 inch (10 mm).
3. NPS 3/4 and NPS 7/8 (DN 20 and DN 22): Maximum span, 84 inches (2134 mm); minimum rod size, 3/8 inch (10 mm).
4. NPS 1 (DN 25): Maximum span, 96 inches (2440 mm); minimum rod size, 3/8 inch (10 mm).

E. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8 (DN 10): Maximum span, 48 inches (1220 mm); minimum rod size, 3/8 inch (10 mm).
2. NPS 1/2 (DN 15): Maximum span, 72 inches (1830 mm); minimum rod size, 3/8 inch (10 mm).
3. NPS 3/4 (DN 20) and Larger: Maximum span, 96 inches (2440 mm); minimum rod size, 3/8 inch (10 mm).

3.7 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.8 LABELING AND IDENTIFYING

A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.9 PAINTING

A. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.

b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel flat, semigloss, or gloss.

d. Color: Yellow.

B. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

a. Prime Coat: Alkyd anticorrosive or Quick-drying alkyd metal primer.

b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex flat), low sheen semigloss or gloss.
d. Color: Yellow.

2. Alkyd System: MPI INT 5.1E.

a. Prime Coat: Alkyd anticorrosive or Quick-drying alkyd metal primer.

b. Intermediate Coat: Interior alkyd matching topcoat.
c. Topcoat: Interior alkyd flat, semigloss or gloss.
d. Color: Yellow.

C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.12 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG (3.45 kPa)

A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG (3.45 kPa) AND LESS THAN 5 PSIG (34.5 kPa)

A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with steel welding fittings and welded joints.

C. Underground, below building, piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 5 PSIG (34.5 kPa)

A. Aboveground Piping: Maximum operating pressure more than 5 psig (34.5 kPa).

B. Aboveground, Branch Piping: Steel pipe with steel welding fittings and welded joints.

C. Aboveground, distribution piping shall be the following:

1. Steel pipe with steel welding fittings and welded joints.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 (DN 50) and smaller at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 (DN 65) and larger at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 (DN 50) and smaller shall be the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

D. Distribution piping valves for pipe sizes NPS 2-1/2 (DN 65) and larger shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

2. Bronze plug valve.
3. Cast-iron, lubricated plug valve.

E. Valves in branch piping for single appliance shall be the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 231123

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Refrigerant pipes and fittings.
2. Refrigerant piping valves and specialties.
3. Refrigerants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve, refrigerant piping, and piping specialty.

1. Include pressure drop, based on manufacturer's test data, for the following:

a. Thermostatic expansion valves.
b. Solenoid valves.
c. Hot-gas bypass valves.
d. Filter dryers.
e. Strainers.

B. Shop Drawings:

1. Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes; flow capacities; valve arrangements and locations; slopes of horizontal runs; oil traps; double risers; wall and floor penetrations; and equipment connection details.
2. Show piping size and piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
3. Show interface and spatial relationships between piping and equipment.
4. Shop Drawing Scale: 1/4 inch equals 1 foot

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to 2010 ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 PRODUCT STORAGE AND HANDLING

A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-134a:

1. Suction Lines for Air-Conditioning Applications: 115 psig.
2. Suction Lines for Heat-Pump Applications: 225 psig.
3. Hot-Gas and Liquid Lines: 225 psig.

B. Line Test Pressure for Refrigerant R-407C:

1. Suction Lines for Air-Conditioning Applications: 230 psig.
2. Suction Lines for Heat-Pump Applications: 380 psig.
3. Hot-Gas and Liquid Lines: 380 psig.

C. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8/A5.8M.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Working Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.3 REFRIGERANTS

A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines NPS 3-1/2 (DN 90) and Smaller] for Conventional Air-Conditioning Applications: Copper, Type L , drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines , and Suction Lines for Heat-Pump Applications: Copper, Type L , drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Safety-Relief-Valve Discharge Piping: Copper, Type L , drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC DDC" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
5. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

S. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod, 1/4 inch (6.4 mm).
2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod, 1/4 inch (6.4 mm).
3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod, 1/4 inch (6.4 mm).
4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod, 3/8 inch (9.5 mm).

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.
    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
2. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).

3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

END OF SECTION 232300

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Double-wall round ducts and fittings.
4. Sheet metal materials.
5. Duct liner.
6. Sealants and gaskets.
7. Hangers and supports.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.

4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment[, seismic restraints,] and vibration isolation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches (1830 mm) in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL ROUND DUCTS AND FITTINGS

A. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

B. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

    a. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm) in Diameter: Flanged.

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

    a. Fabricate round ducts larger than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.
    b. Fabricate flat-oval ducts larger than 72 inches (1830 mm) in width (major dimension) with butt-welded longitudinal seams.

3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Inner Duct: Minimum 0.028-inch (0.7-mm) perforated galvanized sheet steel having 3/32-inch- (2.4-mm-) diameter perforations, with overall open area of 23 percent solid sheet steel.

D. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)at 75 deg F (24 deg C) mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).

2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils (0.10 mm) thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil (0.025 mm) thick on opposite surface.
3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

F. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

G. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: Black.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

H. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

I. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.5 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

a. Maximum Thermal Conductivity:

1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K at 75 deg F (24 deg C) mean temperature.

2) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K) at 75 deg F (24 deg C) mean temperature.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
2. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

C. Natural-Fiber Duct Liner: 85 percent cotton, 10 percent borate, and 5 percent polybinding fibers, treated with a microbial growth inhibitor and complying with NFPA 90A or NFPA 90B.

1. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at75 deg F (24 deg C) mean temperature when tested according to ASTM C 518.
2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to ASTM E 84; certified by an NRTL.
3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

D. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, [0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick aluminum; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

E. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.

6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).

7. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

a. Fan discharges.
b. Intervals of lined duct preceding unlined duct.
c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm (12.7 m/s) or where indicated.

9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

a. Sheet Metal Inner Duct Perforations: 3/32-inch (2.4-mm) diameter, with an overall open area of 23 percent.

10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.6 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches (102 mm).
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.

4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive or negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for10-inch wg (2500-Pa) static-pressure class, positive or negative.

2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.7 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet (6 m) in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg (750 Pa): Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply Ducts with a Pressure Class of 2-Inch wg (500 Pa) or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
    c. Return Ducts with a Pressure Class of 2-Inch wg (500 Pa) or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
    d. Exhaust Ducts with a Pressure Class of 2-Inch wg (500 Pa) or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.
    e. Outdoor Air Ducts with a Pressure Class of 2-Inch wg (500 Pa) or Higher: Test representative duct sections totaling no less than 50 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

A. Supply and Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units

    a. Pressure Class: Positive 1-inch wg (250 Pa).
    b. Minimum SMACNA Seal Class: A or B.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Constant-Volume Rooftop Units

    a. Pressure Class: Positive 2-inch wg (500 Pa).
    b. Minimum SMACNA Seal Class: A or B.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Variable-Air-Volume Rooftop Units

    a. Pressure Class: Positive 3-inch wg (750 Pa)
    b. Minimum SMACNA Seal Class: A or B.
    c. SMACNA Leakage Class for Rectangular: 6.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.
    e. SMACNA Leakage Class for Round and Flat Oval: 6

B. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

    a. Pressure Class: Negative 2-inch wg (500 Pa).

b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.

a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
b. Concealed: Carbon-steel sheet.
c. Welded seams and joints.
d. Pressure Class: Positive or negative 3-inch wg (750 Pa).
e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
f. SMACNA Leakage Class: 3.

3. Ducts Connected to Dishwasher Hoods:

a. Type 304, stainless-steel sheet.
b. Exposed to View: No. 4 finish.
c. Concealed: No. 2D finish.
d. Welded seams and flanged joints with watertight EPDM gaskets.
e. Pressure Class: Positive or negative 2-inch wg (500 Pa).
f. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
g. SMACNA Leakage Class: 3.

C. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units

a. Pressure Class: Positive or negative 2-inch wg (500 Pa)] .
b. Minimum SMACNA Seal Class: A or B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units

a. Pressure Class: Positive or negative 2-inch wg (500 Pa)] [3-in
b. Minimum SMACNA Seal Class: A or B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

D. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.
2. PVC-Coated Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

3. Stainless-Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

4. Aluminum Ducts: Aluminum or galvanized sheet steel coated with zinc chromate.

E. Liner:

1. Supply Air Ducts: Fibrous glass 1 inch (25 mm) thick.
2. Return Air Ducts: Fibrous glass 1 inch (25 mm) thick.
3. Transfer Ducts: Fibrous glass 1 inch (25 mm) thick.

F. Double-Wall Duct Interstitial Insulation:

1. Supply Air Ducts: 1 inch (25 mm) thick.
2. Return Air Ducts: 1 inch (25 mm) thick.

G. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Velocity 1000 fpm (5 m/s) or Lower:

      1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.

      2) Mitered Type RE 4 without vanes.

   b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):

      1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.

      2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.

      3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

   c. Velocity 1500 fpm (7.6 m/s) or Higher:

      1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.

      2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

      3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
   b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
   c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

   a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

      1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.

2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.

3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.

4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, [12 Inches (305 mm)] <Insert dimension> and Smaller in Diameter: Stamped or pleated.

c. Round Elbows, [14 Inches (356 mm)] <Insert dimension> and Larger in Diameter: [Standing seam] [Welded].

H. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap.
c. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Smoke dampers.
7. Combination fire and smoke dampers.
8. Flange connectors.
9. Turning vanes.
10. Duct-mounted access doors.
11. Flexible connectors.
12. Flexible ducts.
13. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. LEED Submittals:

1. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Product Data for Prerequisite EA 2: Documentation indicating that duct insulation R-values comply with tables in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of the total number installed for each type, kind or size.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Exposed-Surface Finish: Mill phosphatized.

B. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Ruskin Company.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm (10 m/s).

D. Maximum System Pressure: 3-inch wg (0.8 kPa).

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel for installation in galvanized ducts 0.063-inch-thick extruded aluminum for installation in aluminum ducts or with mitered and welded corners; flanges for attaching to walls and flangeless frames for installing in ducts.

F. Blades: Multiple single-piece blades, off-center pivoted, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Neoprene, mechanically locked.

I. Blade Axles:

1. Material: Nonferrous metal for use with a damper with an aluminum frame. Galvanized steel for use with a damper with a galvanized steel frame.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Aluminum for use with a damper with an aluminum frame or galvanized steel for use with a damper with a galvanized steel frame.

K. Return Spring: Adjustable tension.

L. Bearings: Synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.
4. Chain pulls.

5. Screen Mounting: Mounted in sleeve on the inlet side of the damper.

   a. Sleeve Thickness: 20 gage minimum.
   b. Sleeve Length: 6 inches minimum.

6. Screen Material: Galvanized steel for use with a damper with a galvanized steel frame or aluminum for use with a damper with an aluminum frame.
7. Screen Type: Bird.
8. 90-degree stops.

2.4 BAROMETRIC RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.

5. Ruskin Company.

B. Suitable for horizontal or vertical mounting.

C. Maximum Air Velocity: 2000 fpm (10 m/s).

D. Maximum System Pressure: 3-inch wg (0.8 kPa) .

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel for installation in galvanized steel ducts 0.063-inch-thick extruded aluminum for installation in aluminum ducts or with mitered and welded corners; flanges for attaching to walls and flangeless frames for installing in ducts and mounting flange.

F. Blades:

1. Multiple, 0.025-inch-thick, roll-formed aluminum.
2. Maximum Width: 6 inches.
3. Action: Parallel.
4. Balance: Gravity.
5. Off-center pivoted.

G. Blade Seals: Neoprene.

H. Blade Axles: Galvanized steel for use with a damper with a galvanized steel frame and nonferrous metal for use with a damper with an aluminum frame.

I. Tie Bars and Brackets:

1. Material: Aluminum for use with a damper with an aluminum frame or galvanized steel for use with a damper with a galvanized steel frame.
2. Rattle free with 90-degree stop.

J. Return Spring: Adjustable tension.

K. Bearings: Synthetic.

L. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

2.5 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Steel, manual volume dampers shall be used with galvanized steel ductwork.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Air Balance Inc.; a division of Mestek, Inc.
b. American Warming and Ventilating; a division of Mestek, Inc.
c. McGill AirFlow LLC.
d. Nailor Industries Inc.
e. Ruskin Company.

3. Standard leakage rating, with linkage outside airstream.
4. Suitable for horizontal or vertical applications.

5. Frames:

    a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel for installation in galvanized steel ducts.
    b. Mitered and welded corners.
    c. Flanges for attaching to walls and flangeless frames for installing in ducts.

6. Blades:

    a. Multiple or single blade.
    b. Parallel-blade design for 2-position control or opposed-blade design for modulating applications.
    c. Stiffen damper blades for stability.
    d. Galvanized-steel for use with a damper with a galvanized steel frame, 0.064 inch thick.

7. Blade Axles: Galvanized steel.
8. Bearings:

    a. Oil-impregnated bronze.
    b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft; 'tab-mounted' axles will not be accepted.

9. Tie Bars and Brackets: Galvanized steel.

B. Standard, Aluminum, Manual Volume Dampers:

1. Aluminum, manual volume dampers shall be used with aluminum ductwork.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Ruskin Company.
    f. Vent Products Company, Inc.

3. Standard leakage rating, with linkage outside airstream.
4. Suitable for horizontal or vertical applications.
5. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; mitered and welded corners; flanges for attaching to walls and flangeless frames for installing in ducts.
6. Blades:

    a. Multiple or single blade.
    b. Parallel-blade design for 2-position control or opposed-blade design for modulating applications.
    c. Stiffen damper blades for stability.
    d. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.

7. Blade Axles: Nonferrous metal.
8. Bearings:

    a. Oil-impregnated bronze.
    b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft; 'tab-mounted' axles will not be accepted.

9. Tie Bars and Brackets: Aluminum.

C. Low-Leakage, Steel, Manual Volume Dampers:

1. Steel, manual volume dampers shall be used with galvanized steel ductwork.
2. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Ruskin Company.
    f. Vent Products Company, Inc.

3. Comply with AMCA 500-D testing for damper rating.

4. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
5. Suitable for horizontal or vertical applications.
6. Frames:

    a. Hat shaped.
    b. 0.094-inch-thick, galvanized sheet steel for installation in galvanized steel ducts.
    c. Mitered and welded corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

7. Blades:

    a. Multiple or single blade.
    b. Parallel-blade design for 2-position control or opposed-blade design for modulating applications.
    c. Stiffen damper blades for stability.
    d. Galvanized, roll-formed steel, 0.064 inch thick.

8. Blade Axles: Galvanized steel.
9. Bearings:

    a. Oil-impregnated bronze.
    b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft; ‘tab-mounted’ axles will not be accepted.

10. Blade Seals: Neoprene.
11. Jamb Seals: Cambered stainless steel.
12. Tie Bars and Brackets: Galvanized steel.
13. Accessories:

    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

D. Low-Leakage, Aluminum, Manual Volume Dampers:

1. Aluminum, manual volume dampers shall be used with aluminum ductwork.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Ruskin Company.

3. Comply with AMCA 500-D testing for damper rating.

4. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
5. Suitable for horizontal or vertical applications.
6. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; mitered and welded corners; flanges for attaching to walls and flangeless frames for installing in ducts.
7. Blades:

   a. Multiple or single blade.
   b. Parallel-blade design for 2-position control or opposed-blade design for modulating applications.
   c. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.

8. Blade Axles: Nonferrous metal.
9. Bearings:

   a. Oil-impregnated bronze.
   b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft; 'tab-mounted' axles will not be accepted.

10. Blade Seals: Neoprene.
11. Jamb Seals: Cambered Aluminum.
12. Tie Bars and Brackets: Aluminum.
13. Accessories:

    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

E. Jackshaft:

1. Size: 0.5-inch diameter for lengths 36 inches or less; 1-inch minimum diameter for lengths longer than 36 inches.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

F. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.6 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. McGill AirFlow LLC.
5. Nailor Industries Inc.
6. Ruskin Company.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 0.094-inch-thick, galvanized sheet steel.
3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.

2. Parallel-blade design for 2-position control and opposed-blade design for modulating applications.
3. Galvanized-steel or aluminum.
4. 0.064 inch thick single skin for velocities 1000 feet per minute or less 0.0747-inch-thick dual skin for velocities greater than 1000 feet per minute.
5. Blade Edging: Closed-cell neoprene.

E. Blade Axles: 1/2-inch-diameter; galvanized steel for steel blades and nonferrous metal for aluminum blades; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).

F. Bearings:

1. Oil-impregnated bronze.
2. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft; 'tab-mounted' axles will not be accepted.
3. Thrust bearings at each end of every blade.

2.7 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Nailor Industries Inc.
6. Prefco; Perfect Air Control, Inc.
7. Ruskin Company.

B. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 2000-fpm (10-m/s) velocity.

D. Fire Rating: 1-1/2 and 3 hours. Rating shall be in accordance with the rating of walls or partitions shown on the Architectural Drawings.

E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.39 inch (9.9 mm) thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.024-inch- or 0.034-inch- thick, galvanized sheet steel.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 165 deg F (74 deg C) rated, fusible links.

K. Heat-Responsive Device: Electric Pneumatic, replaceable link and switch package, factory installed, 165 deg F (74 deg C) rated.

2.8 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.9 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. METALAIRE, Inc.
5. SEMCO Incorporated.
6. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal and Fibrous Glass Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.10 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Greenheck Fan Corporation.
5. McGill AirFlow LLC.
6. Nailor Industries Inc.
7. Ventfabrics, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 (7-2M), "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Vision panel.
d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside handles.
d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

2.11 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. Ventfabrics, Inc.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory or shop fabricated with a fabric strip 3-1/2 inches wide for ducts with a maximum dimension of 18 inches and 5-3/4 inches wide for ducts with a maximum dimension larger than 18 inches attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.

E. Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd.
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C).

F. Thrust Limits Installed on Discharges of Fans that have a shut off pressure in excess of 6 inches W.C.: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.12 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Noninsulated, Flexible Duct: Supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).

C. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

D. Flexible Duct Connectors:

1. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size with both outside and inside, if applicable, layers of flexible duct taped independently to sheet metal duct with aluminum tape.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in SMACNA’s, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts and aluminum accessories in aluminum ducts.

C. Install backdraft control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. To minimize duct noise generated by volume dampers, locate dampers at least two duct diameters from fittings and as far away as possible from outlets. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
2. Adjacent to and close enough to fire to reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
3. At each change in direction and at maximum 50-foot spacing to facilitate duct cleaning.
4. Upstream and downstream from turning vanes.
5. Control devices requiring inspection.
6. Elsewhere as indicated.

H. Install access doors with swing against duct static pressure.

I. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

J. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

K. Install flexible connectors to connect ducts to equipment.

L. Connect terminal units to supply ducts directly.

M. Connect diffusers to ducts with maximum 60-inch lengths of flexible duct strapped in place.

N. Connect flexible ducts to metal ducts with nylon draw bands with both outside and inside, if applicable, layers of flexible duct taped independently to sheet metal duct with aluminum tape.

O. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Centrifugal roof ventilators.
2. Upblast propeller roof exhaust fans.
3. Ceiling-mounted ventilators.
4. In-line centrifugal fans.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual Project site elevations

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.9 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATOR

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Aerovent.
2. Greenheck Fan Corporation.
3. Loren Cook Company.
4. PennBarry.

B. Housing: Removable, spun aluminum, square, one piece, aluminum base with venture inlet cone.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum hub wheel with backward inclined blades.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

G. Roof Curbs: Galvanized steel, mitered and welded corners, 1-1/2” thick, rigid, fiberglass insulation adhered to inside walls. Overall height: 14 inches. Manufacture curb for roof slope.

H. Capacities and Characteristics: Refer to equipment schedule.

2.2 UPBLAST CENTRIFUGAL ROOF EXHAUST FANS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Aerovent.
2. Greenheck Fan Corporation.
3. Loren Cook Company.
4. PennBarry.

B. Housing: Removable, spun aluminum, square, one piece, aluminum base with venture inlet cone.

C. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

D. Fan Wheels: Aluminum hub wheel with backward inclined blades.

E. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

F. Roof Curbs: Galvanized steel, mitered and welded corners, 1-1/2" thick, rigid, fiberglass insulation adhered to inside walls. Overall height: 14 inches. Manufacture curb for roof slope.

G. Capacities and Characteristics: Refer to equipment schedule.

2.3 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Aerovent.
2. Greenheck Fan Corporation.
3. Loren Cook Company.
4. PennBarry.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
3. Companion Flanges: For inlet and outlet duct connections.
4. Fan Guards: 1/2- by 1-inch (13- by 25-mm) mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

G. Capacities and Characteristics: Refer to equipment schedule.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.5 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Equipment Mounting:

1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust damper linkages for proper damper operation.
6. Verify lubrication for bearings and other moving parts.
7. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
8. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
9. Shut unit down and reconnect automatic temperature-control operators.
10. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

C. Lubricate bearings.

END OF SECTION 233423

SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Shutoff, single-duct air terminal units.
2. Shutoff, single-duct air terminal units with electric heat.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.
2. Liners and adhesives.
3. Sealants and gaskets.
4. Seismic-restraint devices.

B. LEED Submittals:

1. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Wiring Diagrams: For power, signal, and control wiring.
3. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

D. Delegated-Design Submittal:

1. Materials, fabrication, assembly, and spacing of hangers and supports.

2. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Size and location of initial access modules for acoustic tile.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Anemostat Products; a Mestek Company.
2. Carnes.
3. Environmental Technologies, Inc.
4. Nailor Industries Inc.
5. Price Industries.

6. Titus.
7. Tuttle & Bailey.

B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034-inch (0.85-mm) steel, single wall.

1. Casing Lining: Adhesive attached, 1-inch- (25-mm-) thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

    a. Cover liner with nonporous foil.
    b. Cover liner with nonporous foil and perforated metal.

2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections, size matching inlet size.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Regulator Assembly: System-air-powered bellows section incorporating polypropylene bellows for volume regulation and thermostatic control. Bellows shall operate at temperatures from 0 to 140 deg F (minus 18 to plus 60 deg C), shall be impervious to moisture and fungus, shall be suitable for 10-inch wg (2500-Pa) static pressure, and shall be factory tested for leaks.

E. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 3 percent of nominal airflow at 3-inch wg (750-Pa) 6-inch wg (1500-Pa) inlet static pressure.
2. Damper Position: Normally open or closed.

F. Electric Coils:

G. Direct Digital Controls: Bidirectional damper operators and microprocessor-based controller and room sensor. Control devices shall be compatible with temperature controls specified in Section 230900 "Instrumentation and Control for HVAC" and shall have the following features:

1. Damper Actuator: 24 V, powered closed, spring return open or powered open.
2. Terminal Unit Controller: Pressure-independent, variable-air-volume controller with electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes, and having the following features:

    a. Occupied and unoccupied operating mode.
    b. Remote reset of airflow or temperature set points.
    c. Adjusting and monitoring with portable terminal.
    d. Communication with temperature-control system specified in Section 230900 "Instrumentation and Control for HVAC."

3. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal.

H. Control Sequence:

1. Suitable for operation with duct pressures between 0.25- and 3.0-inch wg (60- and 750-Pa) inlet static pressure.
2. System-powered, wall-mounted thermostat.

2.4 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Steel Cables: Galvanized steel complying with ASTM A 603 Stainless steel complying with ASTM A 492.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

2.5 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service and Development for the State of California an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

B. Restraint Cables: ASTM A 603, galvanized or ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; with an automatic-locking and clamping device or double-cable clips.

C. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

2.6 SOURCE QUALITY CONTROL

A. Factory Tests: Test assembled air terminal units according to ARI 880.

1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

C. Install wall-mounted space sensors.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Hangers Exposed to View: Threaded rod and angle or channel supports.

C. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install hangers and braces designed to support the air terminal units and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems." ASCE/SEI 7.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on air terminal units that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service an agency acceptable to authorities having jurisdiction.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

3.4 CONNECTIONS

A. Install piping adjacent to air terminal unit to allow service and maintenance.

B. Connect ducts to air terminal units according to Section 233113 "Metal Ducts."

C. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.5 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Air terminal unit will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 233600

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

A. RELATED DOCUMENTS

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

C. SUMMARY

D. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Perforated diffusers.
3. Linear slot diffusers.
4. Adjustable bar registers and grilles.
5. Fixed face registers and grille.

E. Related Sections:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

F. ACTION SUBMITTALS

G. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

H. INFORMATIONAL SUBMITTALS

I. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

J. Source quality-control reports.

PART 2 - PRODUCTS

A. Rectangular and Square Ceiling Diffusers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Carnes.
b. Nailor Industries Inc.

c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Size: 24 by 24 inches (600 by 600 mm).
6. Face Style: Plaque.
7. Mounting: T-bar.
8. Pattern: Adjustable.

B. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anemostat Products; a Mestek company.Carnes.
b. Nailor Industries Inc.
c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel backpan and pattern controllers, with steel face.
4. Finish: Baked enamel, color selected by Architect.
5. Face Size: 12 by 12 inches (300 by 300 mm),24 by 12 inches (600 by 300 mm), 24 by 24 inches (600 by 600 mm).
6. Duct Inlet: Round or Square.
7. Face Style: Flush.
8. Mounting: T-bar.

C. Linear Slot Diffuser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Carnes.
b. Nailor Industries Inc.
c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material - Shell: Aluminum.
4. Material - Pattern Controller and Tees: Aluminum.
5. Finish - Face and Shell: [Baked enamel, black] <Insert finish>.
6. Finish - Pattern Controller: [Baked enamel, black] <Insert finish>.
7. Finish - Tees: Baked enamel, color selected by Architect.
8. Slot Width: 1/2 inch.
9. Number of Slots: Three.

D. REGISTERS AND GRILLES

E. Adjustable Bar Register:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Carnes.
b. Nailor Industries Inc.
c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Core Construction: Integral.
5. Frame: 1-1/4 inches (32 mm)wide.
6. Mounting: Concealed.

F. SOURCE QUALITY CONTROL

G. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

A. EXAMINATION

B. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. INSTALLATION

E. Install diffusers, registers, and grilles level and plumb.

F. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

G. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

H. ADJUSTING

I. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 235513 - GAS-FIRED DUCT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes gas-fired duct heaters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of gas-fired duct heater.

1. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For gas-fired duct heaters: Include plans, elevations, sections, and attachment details.

1. Prepare by or under the supervision of a qualified professional engineer detailing fabrication and assembly of gas-fired duct heaters, as well as procedures and diagrams.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Include diagrams for signal and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which equipment will be attached.
2. Items penetrating roof and the following:
    a. Duct, vent, and gas piping rough-ins and connections.

B. Seismic Qualification Certificates: For gas-fired duct heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gas-fired duct heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of gas-fired duct heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. List of Manufacturers:

1. Reznor (a Norteck Company) – Basis of Design
2. Sterling
3. Modine

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Gas-fired duct heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Fabrication Requirements: Fabricate and reinforce suspension attachments of gas-fired duct heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when gas-fired duct heater is anchored to building structure.
2. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Capacities and Characteristics:

1. Heat Exchanger: Stainless steel.
2. Burner Material: Stainless steel.

3. Venting: Power vented.

4. Venting: Indoor, separated combustion, power vented.

   a. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.

5. Gas Control Valve: Modulating.

6. Annual Fuel Utilization Efficiency: 80 percent.

2.3 MANUFACTURED UNITS

A. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.8/CSA 2.6.

B. Fuel Type: Design burner for natural gas having characteristics same as those of gas available at Project site.

C. Indoor External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.

   1. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.

D. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.

E. Power Venter: Integral, motorized centrifugal fan interlocked with gas valve.

F. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.

   1. Ignition: Electronically controlled electric spark with flame sensor.

   2. Fan Thermal Switch: Operates fan on heat-exchanger temperature.

   3. Control transformer.

   4. High Limit: Thermal switch or fuse to stop burner.

   5. Thermostat: Two-stage, wall-mounted type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect gas-fired duct heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written instructions.

B. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

   1. Spring hangers are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

   2. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC" for spring hangers and seismic restraints.

   3. Restrain the unit to resist code-required horizontal acceleration.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to gas-fired duct heaters, allow space for service and maintenance.

C. Gas Piping: Comply with Section 231123 "Facility Natural-Gas Piping." Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

D. Vent Connections: Comply with Section 235123 "Gas Vents."

E. Duct Connections: Comply with Section 233113 "Metal Ducts."

F. Electrical Connections: Comply with applicable requirements in electrical Sections.

1. Install electrical devices furnished with heaters but not specified to be factory mounted.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Verify bearing lubrication.
3. Verify proper motor rotation.
4. Test Reports: Prepare a written report to record the following:
    a. Test procedures used.
    b. Test results that comply with requirements.
    c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Gas-fired duct heater will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain gas-fired duct heaters.

END OF SECTION 235513.16

SECTION 237413 - PACKAGED OUTDOOR ROOFTOP UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes packaged, outdoor, rooftop unit with the following components and accessories:

1. Direct-expansion cooling.
2. Economizer outdoor- and return-air damper section.
3. Integral, space temperature controls.
4. Roof curbs.

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

B. ECM: Electrically commutated motor.

C. RTU: Rooftop unit.

D. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

E. VAV: Variable-air volume.

1.4 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. LEED Submittals:

1. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
2. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

D. Delegated-Design Submittal: For RTU supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which RTUs will be attached.
2. Roof openings
3. Roof curbs and flashing.

B. Manufacturer Wind Loading Qualification Certification: Submit certification that specified equipment will withstand wind forces identified in "Performance Requirements" Article and in Section 230548 "Vibration and Seismic Controls for HVAC."

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Manufacturer Seismic Qualification Certification: Submit certification that RTUs, accessories, and components will withstand seismic forces defined in "Performance Requirements" Article and in Section 230548 "Vibration and Seismic Controls for HVAC."

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Field quality-control test reports.

E. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fan Belts: Two sets for each belt-driven fan.
2. Filters: Two sets of filters for each unit.

1.8 QUALITY ASSURANCE

A. ARI Compliance:

1. Comply with ARI 203/110 and ARI 303/110 for testing and rating energy efficiencies for RTUs.
2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE Compliance:

1. Comply with ASHRAE 15 for refrigeration system safety.
2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
3. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

E. UL Compliance: Comply with UL 1995.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
2. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than three years from date of Substantial Completion.
3. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Trane (Basis Of Design)
2. McQuay International, Daikin Industries
3. Carrier Corporation
4. York; A Johnson Controls Company

2.2 CASING

A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.

1. Exterior Casing Thickness: 0.079 inch (2.0 mm) thick.

C. Inner Casing Fabrication Requirements:

1. Inside Casing: Galvanized steel, 0.034 inch (0.86 mm) thick.

D. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.

1. Materials: ASTM C 1071, Type I.
2. Thickness: 1 inch (25 mm).
3. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or faced with a plain or coated fibrous mat or fabric.
4. Liner Adhesive: Comply with ASTM C 916, Type I.

E. Condensate Drain Pans: Formed sections of stainless-steel sheet, a minimum of 2 inches (50 mm) deep, and complying with ASHRAE 62.1.

1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
2. Drain Connections: Threaded nipple.
3. Pan-Top Surface Coating: Corrosion-resistant compound.

F. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

2.3 FANS

A. Direct-Driven Supply-Air Fans: Single inlet single width, airfoil, centrifugal; with permanently lubricated, ECM motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

B. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.

C. Relief-Air Fan: Propeller, shaft mounted on permanently lubricated motor.

D. Seismic Fabrication Requirements: Fabricate fan section, internal mounting frame and attachment to fans, fan housings, motors, casings, accessories, and other fan section components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when fan-mounted frame and RTU-mounted frame are anchored to building structure.

E. Fan Motor: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.4 COILS

A. Supply-Air Refrigerant Coil:

1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.

3. Condensate Drain Pan: Stainless steel formed with pitch and drain connections complying with ASHRAE 62.1.

B. Outdoor-Air Refrigerant Coil:

1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.

2.5 REFRIGERANT CIRCUIT COMPONENTS

A. Number of Refrigerant Circuits: Two.

B. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief.

C. Refrigeration Specialties:

1. Refrigerant: R-410A.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.
9. Low-ambient kit high-pressure sensor.
10. Hot-gas reheat solenoid valve with a replaceable magnetic coil.

2.6 AIR FILTRATION

A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Pleated: Minimum 90 percent arrestance, and MERV 8.

2.7 DAMPERS

A. Outdoor-Air Damper: Linked damper blades, for 0 to 25 percent outdoor air, with motorized damper.

B. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

1. Damper Motor: Modulating with adjustable minimum position.
2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

2.8 ELECTRICAL POWER CONNECTION

A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.9 CONTROLS

A. Control equipment and sequence of operation are specified in Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC DDC."

B. DDC Controller:

1. Controller shall have volatile-memory backup.
2. Safety Control Operation:

   a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.

   b. Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.

3. Unoccupied Period:

   a. Heating Setback: 10 deg F (5.6 deg C).
   b. Cooling Setback: System off.
   c. Override Operation: Two hours.

4. Supply Fan Operation:

   a. Occupied Periods: Run fan continuously.
   b. Unoccupied Periods: Cycle fan to maintain setback temperature.

5. Refrigerant Circuit Operation:

   a. Occupied Periods: Cycle or stage compressors**,** and operate hot-gas bypass to match compressor output to cooling load to maintain discharge temperature and humidity. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.

   b. Unoccupied Periods: Compressors off.
   c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.

6. Hot-Gas Reheat-Coil Operation:

   a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
   b. Unoccupied Periods: Reheat not required.

7. Economizer Outdoor-Air Damper Operation:

   a. Occupied Periods: Open to 20 percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II. Controller shall permit air-side economizer operation when outdoor air is less than 60 deg F (15 deg C). Use outdoor-air enthalpy to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper. During economizer cycle operation, lock out cooling.
   b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

C. Interface Requirements for HVAC Instrumentation and Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide BACnet or LonWorks compatible interface for central HVAC control workstation for the following:

a. Adjusting set points.
b. Monitoring supply fan start, stop, and operation.
c. Inquiring data to include outdoor-air damper position, supply- and room-air temperature and humidity.
d. Monitoring occupied and unoccupied operations.
e. Monitoring constant and variable motor loads.
f. Monitoring variable-frequency drive operation.
g. Monitoring cooling load.
h. Monitoring economizer cycles.
i. Monitoring air-distribution static pressure and ventilation air volume.

2.10 ACCESSORIES

A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open.

B. Low-ambient kit using variable-speed condenser fans for operation down to 35 deg F (1.7 deg C).

C. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.

D. Coil guards of painted, galvanized-steel wire.

E. Hail guards of galvanized steel, painted to match casing.

2.11 ROOF CURBS

A. Roof curbs with vibration isolators and wind or seismic restraints are specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.

1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
   a. Materials: ASTM C 1071, Type I or II.
   b. Thickness: 2 inches (50 mm).
2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
   a. Liner Adhesive: Comply with ASTM C 916, Type I.
   b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
   c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
   d. Liner Adhesive: Comply with ASTM C 916, Type I.

C. Curb Height: 14 inches (355 mm).

2.12 CAPACITIES AND CHARACTERISTICS (Refer To Rooftop Unit Schedule On Drawings)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Equipment Mounting:

B. Roof Curb: Install on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Units and Ducts."Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction. Secure RTUs to upper curb rail, and secure curb base to roof framing with anchor bolts.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.

C. Tests and Inspections:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Remove packing from vibration isolators.
10. Inspect operation of barometric relief dampers.
11. Verify lubrication on fan and motor bearings.
12. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
13. Adjust fan belts to proper alignment and tension.
14. Start unit according to manufacturer's written instructions.
    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.
15. Inspect and record performance of interlocks and protective devices; verify sequences.
16. Operate unit for an initial period as recommended or required by manufacturer.
17. Calibrate thermostats.
18. Adjust and inspect high-temperature limits.
19. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
20. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:
    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
21. Inspect controls for correct sequencing of mixing dampers, refrigeration, and normal and emergency shutdown.
22. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.

d. Outdoor-air intake volume.

23. Simulate maximum cooling demand and inspect the following:

a. Compressor refrigerant suction and hot-gas pressures.
b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

24. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTU.

END OF SECTION 237413

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air-handling unit.
2. Gaskets: One set for each access door.
3. Fan Belts: One set for each air-handling unit fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five years from date of Substantial Completion.

b. For Parts: One year from date of Substantial Completion.

c. For Labor: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. List of Manufacturers:

1. Mitsubishi Electric – Basis of Design

2. Daikin

3. Trane

4. Carrier

2.2 INDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

2. Insulation: Faced, glass-fiber duct liner.

3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.

4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

6. Fan Motors:

   a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

   b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

   c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

8. Filters: Permanent, cleanable.

9. Condensate Drain Pans:

   a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

      1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.

      2) Depth: A minimum of 2 inches (50 mm) deep.

   b. Single-wall, stainless-steel sheet.

   c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.

      1) Minimum Connection Size: NPS 1 (DN 25).

   d. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Floor-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.

   a. Discharge Grille: Steel with surface-mounted frame.

   b. Insulation: Faced, glass-fiber duct liner.

   c. Drain Pans: Galvanized steel, with connection for drain; insulated.

2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.

3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

4. Fan: Direct drive, centrifugal, with power-induced outside air.

5. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

6. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.

2) Minimum Arrestance and MERV according to ASHRAE 52.2.

3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Disposable Panel Filters:

1) Factory-fabricated, viscous-coated, flat-panel type.

2) Thickness: 1 inch (25 mm).

3) Arrestance according to ASHRAE 52.1: 80.

4) MERV according to ASHRAE 52.2: 8.

5) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.

6) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

C. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.

2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.

3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

4. Fan: Direct drive, centrifugal.

5. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

c. Enclosure Type: Totally enclosed, fan cooled.

d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.

e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.

f. Mount unit-mounted disconnect switches on exterior of unit.

6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

7. Condensate Drain Pans:

   a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

      1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.

      2) Depth: A minimum of 1 inch (25 mm) deep.

   b. Single-wall, stainless-steel sheet.

   c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.

      1) Minimum Connection Size: NPS 1 (DN 25).

8. Air Filtration Section:

   a. General Requirements for Air Filtration Section:

      1) Comply with NFPA 90A.

      2) Minimum Arrestance and MERV according to ASHRAE 52.2.

      3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

   b. Disposable Panel Filters:

      1) Factory-fabricated, viscous-coated, flat-panel type.

      2) Thickness: 1 inch (25 mm).

      3) MERV according to ASHRAE 52.2: 8.

      4) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.

      5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

2.3 INDOOR UNITS (6 TONS (21 kW) OR MORE)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

2. Insulation: Faced, glass-fiber duct liner.

3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.

4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

6. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

c. Three-phase, permanently lubricated, ball-bearing motors with built-in thermal-overload protection.

d. Wiring Terminations: Connect motor to chassis wiring with plug connection.

7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

8. Filters: 1 inch (25 mm) thick, in fiberboard frames. Permanent, cleanable.

9. Condensate Drain Pans:

a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.

2) Depth: A minimum of 2 inches (50 mm) deep.

b. Single-wall, stainless-steel sheet.

c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.

1) Minimum Connection Size: NPS 1 (DN 25).

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Variable-Frequency Controllers:

1. Description: NEMA ICS 2, IGBT, PWM, VFC; listed and labeled as a complete unit and arranged to provide variable speed of an NEMA MG 1, Design B, three-phase induction motor by adjusting output voltage and frequency.

2. Output Rating: Three-phase; 6 to 60 Hz, with voltage proportional to frequency throughout voltage range.

3. Unit Operating Requirements:

a. Input ac voltage tolerance of 208 V, plus or minus 5 percent.

b. Input-frequency tolerance of 06/11 Hz, plus or minus 6 percent.

c. Minimum Efficiency: 96 percent at 60 Hz, full load.

d. Minimum Displacement Primary-Side Power Factor: 96 percent.

e. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.

f. Starting Torque: 100 percent of rated torque or as indicated.

g. Speed Regulation: Plus or minus 1 percent.

4. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.

5. Internal Adjustability Capabilities:

a. Minimum Speed: 5 to 25 percent of maximum rpm.

b. Maximum Speed: 80 to 100 percent of maximum rpm.

c. Acceleration: 2 seconds to a minimum of 22 seconds.

d. Deceleration: 2 seconds to a minimum of 22 seconds.

e. Current Limit: 50 percent to a minimum of 110 percent of maximum rating.

6. Self-Protection and Reliability Features:

a. Input transient protection by means of surge suppressors.

b. Undervoltage and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.

c. Adjustable motor overload relays capable of NEMA ICS 2, performance.

d. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.

e. Instantaneous line-to-line and line-to-ground overcurrent trips.

f. Loss-of-phase protection.

g. Reverse-phase protection.

h. Short-circuit protection.

i. Motor overtemperature fault.

7. Automatic Reset/Restart: Attempts three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bidirectional autospeed search shall be capable of starting into rotating loads, spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.

8. Power-Interruption Protection: Prevents motor from re-energizing after a power interruption until motor has stopped.

9. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

10. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back, based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

11. Door-mounted, digital status lights shall indicate the following conditions:

a. Power on.

b. Run.

c. Overvoltage.

d. Line fault.

e. Overcurrent.

f. External fault.

12. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual-speed-control potentiometer and elapsed-time meter.

13. Meters or digital readout devices and selector switch, mounted flush in controller door and connected, to indicate the following controller parameters:

a. Output frequency (Hertz).

b. Motor speed (rpm).

c. Motor status (running, stop, fault).

d. Motor current (amperes).

e. Motor torque (percent).

f. Fault or alarming status (code).

g. Proportional-integral-derivative feedback signal (percent).

h. DC-link voltage (volts dc).

i. Set-point frequency (Hertz).

j. Motor output voltage (volts).

14. Control Signal Interface:

a. Electric Input Signal Interface: A minimum of two analog inputs (0 to 10 V or 0/4-20 mA) and six programmable digital inputs.

b. Remote signal inputs capable of accepting any of the following speed-setting input signals from the control system:

1) 0 to 10-V dc.

2) 0-20 or 4-20 mA.

3) Potentiometer using up/down digital inputs.

4) Fixed frequencies using digital inputs.

5) RS485.

6) Keypad display for local hand operation.

c. Output signal interface with a minimum of one analog output signal (0/4-20 mA), which can be programmed to any of the following:

1) Output frequency (Hertz).

2) Output current (load).

3) DC-link voltage (volts dc).

4) Motor torque (percent).

5) Motor speed (rpm).

6) Set-point frequency (Hertz).

d. Remote indication interface with a minimum of two dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:

1) Motor running.

2) Set-point speed reached.

3) Fault and warning indication (overtemperature or overcurrent).

4) High- or low-speed limits reached.

15. Communications: RS485 interface allows VFC to be used with an external system within a multidrop LAN configuration. Interface shall allow all parameter settings of VFC to be programmed via BMS control. Provide capability for VFC to retain these settings within the nonvolatile memory.

16. Integral Disconnecting Means: NEMA AB 1, instantaneous-trip circuit breaker with lockable handle.

17. Accessories:

a. Devices shall be factory installed in controller enclosure unless otherwise indicated.

b. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

c. Standard Displays:

1) Output frequency (Hertz).

2) Set-point frequency (Hertz).

3) Motor current (amperes).

4) DC-link voltage (volts dc).

5) Motor torque (percent).

6) Motor speed (rpm).

7) Motor output voltage (volts).

2.4 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.

b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.

c. Refrigerant Charge: R-410A.

d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.

4. Fan: Aluminum-propeller type, directly connected to motor.

5. Motor: Permanently lubricated, with integral thermal-overload protection.

6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).

7. Mounting Base: Polyethylene.

2.5 OUTDOOR UNITS (6 TONS (21 kW) OR MORE)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.

b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.

c. Refrigerant Charge: R-410A.

d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.

4. Fan: Aluminum-propeller type, directly connected to motor.

5. Motor: Permanently lubricated, with integral thermal-overload protection.

6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).

7. Mounting Base: Polyethylene.

2.6 ACCESSORIES

A. Control equipment and sequence of operation are specified in Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC DDC."

B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.

2. 24-hour time control of system stop and start.

3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.

4. Fan-speed selection including auto setting.

D. Automatic-reset timer to prevent rapid cycling of compressor.

E. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

F. Drain Hose: For condensate.

G. Additional Monitoring:

1. Monitor constant and variable motor loads.

2. Monitor variable-frequency-drive operation.

3. Monitor economizer cycle.

4. Monitor cooling load.

5. Monitor air distribution static pressure and ventilation air volumes.

2.7 CAPACITIES AND CHARACTERISTICS (Refer to Equipment Schedules on the Drawings)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:

1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

B. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 238216 - ELECTRIC RESISTANCE AIR COILS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electric resistance air coils.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil.

2. Include rated capacities, operating characteristics, and pressure drops for each air coil.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which coil location and ceiling-mounted access panels are shown and coordinated with each other.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. ASHRAE Compliance: Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

2.2 COILS

A. Manufacturers:

1. Q-Mark

2. Berko
3. Indeeco.
4. Brasch Co.

B. Testing Agency Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Coil Assembly: Comply with UL 1995.

D. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.

E. Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, and fastened to supporting brackets.

F. High-Temperature Coil Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or casing.

1. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.

G. Frames: Galvanized-steel channel frame, minimum 0.052 inch thick for slip-in or flanged mounting.

H. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:

1. Magnetic contactor.
2. Mercury contactor.
3. Toggle switches; one per step.
4. Step controller.
5. Time-delay relay.
6. Pilot lights; one per step.
7. Airflow proving switch.

I. Thermostats: Wall-mounted thermostats, with temperature range from 50 to 90 deg F (10 to 32 deg C), and 2.5 deg F (1.4 deg C) throttling range.

J. Capacities and Characteristics: See Electric Duct Heater Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install coils level and plumb.

B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

C. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare test and inspection reports.

END OF SECTION 238216

SECTION 238239.13 - CABINET UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cabinet unit heaters with centrifugal fans and electric-resistance heating coils.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. DDC: Direct digital control.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include location and size of each field connection.
4. Include details of anchorages and attachments to structure and to supported equipment.
5. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
6. Indicate location and arrangement of piping valves and specialties.
7. Indicate location and arrangement of integral controls.
8. Wiring Diagrams: Power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

D. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.

E. Samples for Verification: Finish colors for each type of cabinet unit heater indicated with factory-applied color finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which cabinet unit heaters will be attached.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:
    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
6. Perimeter moldings for exposed or partially exposed cabinets.

B. Seismic Qualification Certificates: Submit certification that cabinet unit heaters, accessories, and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Include detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cabinet Unit-Heater Filters: Furnish [one] <Insert number> spare filter(s) for each filter installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers List:

1. Q-Mark
2. Berko
3. Indeeco
4. Brasch Co.

2.2 DESCRIPTION

A. Factory-assembled and -tested unit complying with AHRI 440.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 2021.

2.3 PERFORMANCE REQUIREMENTS

A. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.4 COIL SECTION INSULATION

A. Insulation Materials: ASTM C 1071; surfaces exposed to airstream shall have erosion-resistant coating to prevent erosion of glass fibers.

1. Thickness: 1 inch.
2. Thermal Conductivity (k-Value): 0.26 Btu x in./h x sq. ft. at 75 deg F mean temperature.
3. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
4. Adhesive: Comply with ASTM C 916 and with NFPA 90A or NFPA 90B.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

2.5 CABINETS

A. Material: Steel with baked-enamel finish with manufacturer's standard paint, in color selected by Architect.

1. Vertical Unit, Exposed Front Panels: Minimum 0.0528-inch- thick galvanized sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
2. Horizontal Unit, Exposed Bottom Panels: Minimum 0.0528-inch- thick galvanized sheet steel, removable panels secured with tamperproof cam fasteners and safety chain.
3. Recessed Flanges: Steel, finished to match cabinet.
4. Control Access Door: Key operated.
5. Base: Minimum 0.0528-inch- (1.35-mm-) thick steel, finished to match cabinet, 4 inches high with leveling bolts.

2.6 FILTERS

A. Minimum Arrestance: And a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Glass Fiber Treated with Adhesive: 80 percent arrestance and MERV 5.

2.7 COILS

A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit

controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.

2.8 CONTROLS

A. Fan and Motor Board: Removable.

1. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Wiring Terminations: Connect motor to chassis wiring with plug connection.

B. Control devices and operational sequences are specified in Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993 "Sequence of Operations for HVAC DDC."

C. Basic Unit Controls:

1. Control voltage transformer.
2. Unit-mounted thermostat with the following features:
   a. Heat-off switch.
   b. Fan on-auto switch.
   c. Manual fan-speed switch.
   d. Deg F (Deg C) indication.
3. Unit-mounted temperature sensor.

D. Interface with DDC System for HVAC Requirements:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at central workstation.
3. Interface shall be BAC-net or LonWorks compatible for central DDC system for HVAC workstation and include the following functions:
   a. Adjust set points.
   b. Cabinet unit-heater start, stop, and operating status.
   c. Occupied and unoccupied schedules.

E. Electrical Connection: Factory-wired motors and controls for a single field connection.

2.9 CAPACITIES: See Equipment Schedules on the Drawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive cabinet unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install cabinet unit heaters to comply with NFPA 90A.

B. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

3.3 CONNECTIONS

A. Comply with safety requirements in UL 1995.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain cabinet unit heaters.

END OF SECTION 238239.13

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less – **Not Permitted**.
3. Metal-clad cable, Type MC, rated 600 V or less.
4. Armored cable, Type AC, rated 600 V or less – **Not Permitted**.
5. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.3 DEFINITIONS

A. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. See the Evaluations for discussion of UL's "Wire and Cable Marking and Application Guide."
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

D. Conductor Insulation:

1. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
2. Type THHN and Type THWN-2: Comply with UL 83.
3. Type XHHW-2: Comply with UL 44.

E. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit and multicircuit with color-coded conductors].

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.

G. Armor: Steel interlocked.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.

D. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

E. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

F. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

G. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

H. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

I. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

J. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway or Metal-clad cable, Type MC.

K. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

M. VFC Output Circuits: Type TC-ER cable with braided shield in raceway.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each of the following visual and electrical tests:
    a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    b. Test bolted connections for high resistance using the following:
        1) Calibrated torque wrench.
    c. Inspect compression-applied connectors for correct cable match and indentation.
    d. Inspect for correct identification.
    e. Inspect cable jacket and condition.
    f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    g. Continuity test on each conductor and cable.
    h. Uniform resistance of parallel conductors.

C. Cables will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Ground bonding common with lightning protection system.
2. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Test wells.
2. Ground rods.
3. Ground rings.
4. Grounding arrangements and connections for separately derived systems.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

1) Test wells.
2) Ground rods.
3) Ground rings.
4) Grounding arrangements and connections for separately derived systems.

b. Instructions for periodic testing and inspection of grounding features at test wells based on NETA MTS.

1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

E. Conduit Hubs: Mechanical type, terminal with threaded hub.

F. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

G. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

H. Water Pipe Clamps:

1. Mechanical type, two pieces with zinc-plated bolts.

a. Material: Tin-plated aluminum.
b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Pad-Mounted Transformers and Switches: Coordinate with PSEG and provide per their standards. At a minimum, install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12 inches deep, with cover.

1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.

1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 24 inches from building's foundation.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Report measured ground resistances that exceed the following values:
    1. Power System: 10 ohms.

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Requirements:

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Hangers.
b. Steel slotted support systems.
c. Trapeze hangers.
d. Clamps.
e. Turnbuckles.
f. Sockets.
g. Eye nuts.
h. Saddles.
i. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Trapeze hangers. Include product data for components.
2. Steel slotted-channel systems.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which hangers and supports will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Items penetrating finished ceiling, including the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Projectors.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Material: Galvanized steel.
2. Channel Width: 1-5/8 inches or 1-1/4 inches as required.
3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: **Steel** hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least **25** percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
5. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Provide for all floor / ground mounted equipment.

B. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Sustainable Design Submittals:

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. IMC: Comply with ANSI C80.6 and UL 1242.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. FMC: Comply with UL 1; zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

a. Material: Steel.

b. Type: Setscrew or compression.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

H. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 (interior) or Type 4 (exterior) unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type (interior) or Flanged-and-gasketed type (exterior) unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

F. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).

1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device Box Dimensions: 4 inches by 2-1/8 inches by 2-1/8 inches deep minimum.

K. Gangable boxes are allowed.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of fiberglass.

1. Standard: Comply with SCTE 77.
2. Color of Frame and Cover: Gray.
3. Configuration: Designed for flush burial with closed bottom unless for grounding or otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC", “GROUNDING”, etc.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC or IMC.
2. Concealed Conduit, Aboveground: GRC or IMC.
3. Underground Conduit: RNC, Type EPC-40-PVC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: GRC or IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

P. Surface Raceways:

1. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces or interior to exterior.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

BB. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Install Underground Warning Tape

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Standalone daylight-harvesting switching and dimming controls.
4. Indoor occupancy sensors.
5. Switchbox-mounted occupancy sensors.
6. High-bay occupancy sensors.
7. Lighting contactors.
8. Emergency shunt relays.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

C. This section includes designated design to a lighting control manufacturer.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show installation details for the following:
    a. Occupancy sensors.
2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment will be attached.
3. Items penetrating finished ceiling, including the following:
    a. Luminaires.
    b. Air outlets and inlets.

c. Speakers.
d. Sprinklers.
e. Access panels.
f. Control modules.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media. Provide names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of lighting control software.
b. Faulty operation of lighting control devices.

2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OUTDOOR PHOTOELECTRIC SWITCHES

1. Designed to interface with the lighting control panel

2.2 DAYLIGHT-HARVESTING DIMMING CONTROLS

A. System Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed.

1. Lighting control set point is based on two lighting conditions:

a. When no daylight is present (target level).
b. When significant daylight is present.

2. System programming is done with two hand-held, remote-control tools.

a. Initial setup tool.
b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.

B. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit to detect changes in indoor lighting levels that are perceived by the eye.

C. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lux).

2.3 INDOOR OCCUPANCYAND VACANCY SENSORS

A. General Requirements for Sensors:

1. Ceiling-mounted, solid-state indoor occupancy sensors.
2. Dual technology.
3. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Operation:

   a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

5. Mounting:

   a. Sensor: Suitable for mounting in any position on a standard outlet box.
   b. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

B. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.

2.5 LIGHTING CONTACTORS

A. Description: Electrically operated and electrically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.

2.6 EMERGENCY SHUNT RELAY

A. Description: NC, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.

1. Coil Rating: 120 or 277 V.

2.7 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SENSOR INSTALLATION

A. Comply with NECA 1.

B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.3 CONTACTOR INSTALLATION

A. Comply with NECA 1.

B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.4 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Lighting control devices will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262200 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Distribution, dry-type transformers rated 600 V and less, with capacities up to 1500 kVA.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.

B. Shop Drawings:

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
3. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each transformer type from single source from single manufacturer.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Transformers Rated 15 kVA and Larger: Comply with DOE2016 energy-efficiency levels.

D. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.

E. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Aluminum or Copper.

F. Shipping Restraints: Paint or otherwise color code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NFPA 70, and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Enclosure: Ventilated.

1. NEMA 250: Core and coil shall be encapsulated within resin compound to seal out moisture and air.
2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.

D. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: Gray.

E. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

F. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 115-deg C rise above 40-deg C ambient temperature.

2.4 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.

1. Resistance measurements of all windings at the rated voltage connections and at all tap connections.
2. Insulation Resistance Tests:

a. High-voltage to ground.
b. Low-voltage to ground.
c. High-voltage to low-voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install transformers level and plumb on a concrete base with vibration-dampening supports.

B. Construct concrete bases and anchor floor-mounted transformers according to manufacturer's written instructions and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

C. Secure transformer to concrete base according to manufacturer's written instructions.

D. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.

E. Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS for dry-type, air-cooled, low-voltage transformers. Certify compliance with test parameters.

D. Remove and replace units that do not pass tests or inspections and retest as specified above.

E. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 262200

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Distribution, lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. MCCB: Molded-case circuit breaker.

D. SPD: Surge protective device.

E. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each

type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.5 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI Types: Two> spares for each panelboard.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.
    a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    b. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
4. Finishes:
    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Galvanized steel.

F. Phase, Neutral, and Ground Buses:

1. Material: Copper.
    a. Plating shall run entire length of bus.
    b. Bus shall be fully rated the entire length.
2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

G. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Copper.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

H. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective

devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.3 DISTRIBUTION, LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1.

B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

C. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

D. SPD (for the main service panel and all generator supplied panelboards).

1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
2. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

    a. Line to Neutral: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
    b. Line to Ground: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
    c. Neutral to Ground: 1200 V for 480Y/277 V or 700 V for 208Y/120 V.
    d. Line to Line: 2000 V for 480Y/277 V or 1200 V for 208Y/120 V.

3. SCCR: Equal to the SCCR of the panelboard in which installed.
4. Inominal Rating: 20 kA.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

    a. Inverse time-current element for low-level overloads.
    b. Instantaneous magnetic trip element for short circuits.
    c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
3. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
4. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
f. Shunt Trip: 120-V trip coil energized from separate circuit for elevator feed.

B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 262813 "Fuses."
2. Fused Switch Features and Accessories:

a. Standard ampere ratings and number of poles.
b. Mechanical cover interlock with a manual interlock override, to prevent the opening of the cover when the switch is in the on position. The interlock shall prevent the switch from being turned on with the cover open. The operating handle shall have lock-off means with provisions for three padlocks.
c. Auxiliary Contacts: One normally open and normally closed contact(s) that operate with switch handle operation. For use when fed by a VFD and to be wired to signal a downstream switch is opening.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NECA 407.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to

workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407.

D. Equipment Mounting:

1. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Mount top of trim 90 inches above finished floor unless otherwise indicated.

F. Mount panelboard cabinet plumb and rigid without distortion of box.

G. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

H. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker instantaneous trip ranges to their maximum value.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

I. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

J. Install filler plates in unused spaces.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Do not perform optional tests. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Panelboards will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Straight-blade convenience.
2. GFCI receptacles.
3. Pendant cord-connector devices.
4. Toggle switches.
5. Decorator-style convenience.
6. Wall switch sensor light switches with dual technology sensors.
7. Wall switch sensor light switches with passive infrared sensors.
8. Wall switch sensor light switches with ultrasonic sensors.
9. Wall plates.
10. Floor service outlets.

1.3 DEFINITIONS

A. Abbreviations of Manufacturers' Names:

1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. SPD: Surge protective device.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

D. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.3 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

2.4 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Single Pole:
2. Three Way:
3. Four Way:

2.6 WALL SWITCH SENSOR LIGHT SWITCH, DUAL TECHNOLOGY

A. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual technology.

1. Rated 960 W at 120-V ac for tungsten lighting, 10 A at 120-V ac or 10 A at 277-V ac for fluorescent or LED lighting, and 1/4 hp at 120-V ac.
2. Adjustable time delay of 20 minutes.
3. Able to be locked to Automatic-On mode.
4. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
5. Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.

2.8 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Rectangular brass with satin finish.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable

2.9 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

2. Wiring Devices Connected to Emergency Power System: Red.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use field printed machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
4. Using the test plug, verify that the device and its outlet box are securely mounted.
5. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Wiring device will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
    b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

1.8 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

C. Comply with NFPA 70.

1.9 FUSIBLE SWITCHES

A. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 600-V ac.
4. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate fuses.
5. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Coordinate rating with VFD shunt input.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

1.10 NONFUSIBLE SWITCHES

A. Not to be used if short circuit rating for equipment immediately upstream is greater than 5,000A. Where a non-fused is shown on documents in this instance, provide a fused switch.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Coordinate rating with VFD shunt input
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

1.11 MOLDED-CASE CIRCUIT BREAKERS

A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be fully rated for their short circuit duty.

D. MCCBs shall be equipped with a device for locking in the isolated position.

E. =

F. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.

G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

1.12 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

2.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

2.3 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Install fuses in fusible devices.

D. Comply with NFPA 70 and NECA 1.

2.4 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

2.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 262816

SECTION 262913 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following enclosed controllers rated 600 V and less:

1. Full-voltage magnetic.
2. Multispeed.

B. Related Section:

1. Section 262923 "Variable-Frequency Motor Controllers" for general-purpose, ac, adjustable-frequency, pulse-width-modulated controllers for use on variable torque loads in ranges up to 200 hp.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. MCCB: Molded-case circuit breaker.

C. MCP: Motor circuit protector.

D. N.C.: Normally closed.

E. N.O.: Normally open.

F. OCPD: Overcurrent protective device.

G. SCR: Silicon-controlled rectifier.

1.4 PERFORMANCE REQUIREMENTS

1.5 ACTION SUBMITTALS

A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.

B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.

1. Show tabulations of the following:

a. Each installed unit's type and details.
b. Factory-installed devices.

c. Nameplate legends.
d. Short-circuit current rating of integrated unit.
e. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.

2. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
2. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
3. Manufacturer's written instructions for setting field-adjustable overload relays.
4. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

1.8 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.9 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.11 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.

1. Configuration: Nonreversing.
2. MCP Disconnecting Means:
    a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
    b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
3. Contactor Coils: Pressure-encapsulated type.
    a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
4. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
5. Control Circuits: 24-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
6. Solid-State Overload Relay:
    a. Switch or dial selectable for motor running overload protection.
    b. Sensors in each phase.
    c. Class 10 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.

2.2 ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: Type 1.
2. Outdoor Locations: Type 3R.
3. Kitchen Areas: Type 4X, stainless steel.
4. Other Wet or Damp Indoor Locations: Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.

2.3 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

B. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

B. Install fuses in each fusible-switch enclosed controller.

C. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."

D. Install thermal overload relays. Select setting based on actual nameplate full-load amperes after motors have been installed.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved nameplate.
3. Label each enclosure-mounted control and pilot device.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices and facility's central control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control selection devices where applicable.

1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Construction Manager before increasing settings.

C. Set the taps on reduced-voltage autotransformer controllers at [50] [65] [80] percent.

D. Set field-adjustable circuit-breaker trip ranges

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 262913

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

B. Related Requirements:

1. Section 262419 "Motor-Control Centers" for VFCs installed in motor-control centers.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. DDC: Direct digital control.

C. EMI: Electromagnetic interference.

D. LED: Light-emitting diode.

E. NC: Normally closed.

F. NO: Normally open.

G. OCPD: Overcurrent protective device.

H. PID: Control action, proportional plus integral plus derivative.

I. RFI: Radio-frequency interference.

J. VFC: Variable-frequency motor controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and rating of VFC indicated.

1. Include dimensions and finishes for VFCs.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each VFC indicated.

1. Include mounting and attachment details.

2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Required working clearances and required area above and around VFCs.
2. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements.
3. Show support locations, type of support, and weight on each support.
4. Indicate field measurements.

B. Qualification Data: For testing agency.

C. Product Certificates: For each VFC from manufacturer.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
b. Manufacturer's written instructions for setting field-adjustable overload relays.
c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

A. General Requirements for VFCs:

1. VFCs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508A.

B. Application: Variable torque.

C. VFC Description: Variable-frequency motor controller, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.

1. Units suitable for operation of NEMA MG 1, Design A and Design B motors, as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
2. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.

D. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

E. Output Rating: Three phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.

F. Unit Operating Requirements:

1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of VFC input voltage rating.
2. Input AC Voltage Unbalance: Not exceeding 5 percent.
3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
4. Minimum Efficiency: 97 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or speed condition.
6. Minimum Short-Circuit Current (Withstand) Rating: 65 kA.
7. Speed Regulation: Plus or minus 10 percent.
8. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.
9. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.

G. Inverter Logic: Microprocessor based, 16 bit, isolated from all power circuits.

H. Internal Adjustability Capabilities:

1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration:
4. Deceleration:
5. Current Limit: 30 to minimum of 150 percent of maximum rating.

I. Self-Protection and Reliability Features:

1. Surge Suppression: Factory installed as an integral part of the VFC, complying with UL 1449 SPD, Type 1 or Type 2.
2. Surge Suppression: Field-mounted surge suppressors complying with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits," UL 1449 SPD, Type 2.
3. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
4. Under- and overvoltage trips.
5. Inverter overcurrent trips.
6. VFC and Motor-Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
7. Critical frequency rejection, with three selectable, adjustable deadbands.
8. Instantaneous line-to-line and line-to-ground overcurrent trips.
9. Loss-of-phase protection.
10. Reverse-phase protection.
11. Short-circuit protection.
12. Motor-overtemperature fault.

J. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.

K. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.

L. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

M. Integral Input Disconnecting Means and OCPD: UL 489, instantaneous-trip circuit breaker with pad-lockable, door-mounted handle mechanism.

2.2 CONTROLS AND INDICATION

A. Status Lights: Door-mounted LED indicators displaying the following conditions:

1. Power on.
2. Run.
3. Overvoltage.
4. Line fault.
5. Overcurrent.
6. External fault.

B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.

1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
    a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.

C. Historical Logging Information and Displays:

1. Real-time clock with current time and date.
2. Running log of total power versus time.
3. Total run time.

D. Indicating Devices: Digital display mounted flush in VFC door and connected to display VFC parameters including, but not limited to:

1. Output frequency (Hz).
2. Motor speed (rpm).
3. Motor status (running, stop, fault).
4. Motor current (amperes).
5. Motor torque (percent).
6. Fault or alarming status (code).
7. PID feedback signal (percent).
8. DC-link voltage (V dc).
9. Set point frequency (Hz).
10. Motor output voltage (V ac).

E. Control Signal Interfaces:

1. Electric Input Signal Interface:

a. Coordinate with BMS control.

F. Interface with DDC System for HVAC: Factory-installed hardware and software shall interface with DDC system for HVAC to monitor, control, display, and record data for use in processing reports. VFC settings shall be retained within VFC's nonvolatile memory.

1. Communication Interface: Comply with BACNET. Communication shall interface with DDC system for HVAC to remotely control and monitor lighting from a DDC system for HVAC operator workstation. Control features and monitoring points displayed locally at lighting panel shall be available through the DDC system for HVAC.

2.3 LINE CONDITIONING AND FILTERING

A. Input Line Conditioning: 3% line reactor.

2.4 ENCLOSURES

A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

B. Comply with NECA 1.

3.3 CONTROL WIRING INSTALLATION

A. Install wiring between VFCs and remote devices central-control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control devices where applicable.

1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.4 IDENTIFICATION

A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each VFC with engraved nameplate.
3. Label each enclosure-mounted control and pilot device.

B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Acceptance Testing Preparation:

1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

E. Tests and Inspections:

1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Test each motor for proper phase rotation.
5. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
6. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
7. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. VFCs will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

B. Set field-adjustable circuit-breaker trip ranges

C. Set field-adjustable pressure switches.

3.8 PROTECTION

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION 262923

SECTION 263213 - ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged engine-generator sets for [emergency] [standby] power supply with the following features:

1. Natural Gas engine.
2. Unit-mounted cooling system.
3. Unit-mounted control and monitoring.
4. Performance requirements for sensitive loads.
5. Fuel system.
6. Outdoor enclosure.

B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.3 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

B. LP: Liquid petroleum.

C. EPS: Emergency power supply.

D. EPSS: Emergency power supply system.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in cubic feet per hour at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
5. Include generator efficiency at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
6. Include air flow requirements for cooling and combustion air in cfm at 0.8 power factor, with air supply temperature of 95, 80, 70, and 50 deg F. Provide drawings showing requirements and limitations for location of air intake and exhausts.

7. Include generator characteristics, including, but not limited to kw rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine-generator set and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports, including, but not limited to the following:

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

B. Field quality-control reports.

C. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
b. Operating instructions laminated and mounted adjacent to generator location.
c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating but no fewer than one of each.
2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
4. Tools: Each tool listed by part number in operations and maintenance manual.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. ASME Compliance: Comply with ASME B15.1.

B. NFPA Compliance:

1. Comply with NFPA 37.
2. Comply with NFPA 70.
3. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

C. UL Compliance: Comply with UL 2200.

D. Engine Exhaust Emissions: Comply with EPA Tier 2 requirements and applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

2.3 ASSEMBLY DESCRIPTION

A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Governor: Adjustable isochronous, with speed sensing.

D. Emissions: Comply with EPA Tier 2 requirements.

E. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

F. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.
2. Output Connections: Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

G. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: Comply with NFPA 110, Type 10, system requirements.

H. Generator-Set Performance for Sensitive Loads:

1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.

a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.

2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.

4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
    a. Provide permanent magnet excitation for power source to voltage regulator.
10. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.4 ENGINE

A. Fuel: Natural gas.

B. Rated Engine Speed: 1800 rpm.

C. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
    a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

F. Cooling System: Closed loop, liquid cooled, with remote radiator and integral engine-driven coolant pump. Comply with requirements in Section 232113 "Hydronic Piping" for coolant piping.

1. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
2. Fan: Driven by multiple belts from engine shaft.
3. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

G. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

1. Minimum sound attenuation of 25 dB at 500 Hz.
2. Sound level measured at a distance of 25 feet (8 m) from exhaust discharge after installation is complete shall be [78] dBA or less.

H. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

I. Starting System: 24-V electric, with negative ground.

1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least [twice] [three times] without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
9. Battery Charger: Current-limiting, automatic-equalizing and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F (minus 40 deg C) to 140 deg F (plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss

of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GASEOUS FUEL SYSTEM

A. Natural-Gas Piping: Comply with requirements in Section 231123 "Facility Natural-Gas Piping."

B. Gas Train: Comply with NFPA 37.

C. Engine Fuel System:

1. Natural-Gas, Vapor-Withdrawal System:

a. Carburetor.
b. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
c. Fuel Filters: One for each fuel type.
d. Manual Fuel Shutoff Valves: One for each fuel type.
e. Flexible Fuel Connectors: Minimum one for each fuel connection.

2.6 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.

B. Provide minimum run time control set for 30 minutes with override only by operation of a remote emergency-stop switch.

C. Comply with UL 508A.

D. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine-generator set battery.

E. Indicating Devices : As required by NFPA 110 for Level 1 system, including the following:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. EPS supplying load indicator.
5. Ammeter and voltmeter phase-selector switches.
6. DC voltmeter (alternator battery charging).
7. Engine-coolant temperature gage.
8. Engine lubricating-oil pressure gage.
9. Running-time meter.
10. Current and Potential Transformers: Instrument accuracy class.

F. Protective Devices and Controls in Local Control Panel: Shutdown devices and common visual alarm indication as required by NFPA 110 for Level 1 system, including the following:

1. Start-stop switch.
2. Overcrank shutdown device.
3. Overspeed shutdown device.
4. Coolant high-temperature shutdown device.
5. Coolant low-level shutdown device.
6. Low lube oil pressure shutdown device.
7. Air shutdown damper shutdown device when used.
8. Overcrank alarm.
9. Overspeed alarm.
10. Coolant high-temperature alarm.
11. Coolant low-temperature alarm.
12. Coolant low-level alarm.
13. Low lube oil pressure alarm.
14. Air shutdown damper alarm when used.
15. Lamp test.
16. Contacts for local and remote common alarm.
17. Coolant high-temperature prealarm.
18. Generator-voltage adjusting rheostat.
19. Main fuel tank low-level alarm.
    a. Low fuel level alarm shall be initiated when the level falls below that required for operation for the duration required in "Fuel Tank Capacity" Paragraph in "Diesel Fuel-Oil System" Article.
20. Run-Off-Auto switch.
21. Control switch not in automatic position alarm.
22. Low-starting air pressure alarm.
23. Low-starting hydraulic pressure alarm.
24. Low cranking voltage alarm.
25. Battery-charger malfunction alarm.
26. Battery low-voltage alarm.
27. Battery high-voltage alarm.
28. Generator overcurrent protective device not closed alarm.

G. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

H. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

1. Overcrank alarm.
2. Coolant low-temperature alarm.
3. High engine temperature prealarm.
4. High engine temperature alarm.
5. Low lube oil pressure alarm.
6. Overspeed alarm.
7. Low fuel main tank alarm.
8. Low coolant level alarm.
9. Low cranking voltage alarm.
10. Contacts for local and remote common alarm.
11. Audible-alarm silencing switch.
12. Air shutdown damper when used.
13. Run-Off-Auto switch.
14. Control switch not in automatic position alarm.

15. Fuel tank derangement alarm.
16. Fuel tank high-level shutdown of fuel supply alarm.
17. Lamp test.
18. Low cranking voltage alarm.
19. Generator overcurrent protective device not closed.

I. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

J. Emergency-Stop Switch: on controller.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.

1. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

B. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489.

1. Tripping Characteristic: Designed specifically for generator protection.
2. Trip Rating: Matched to generator output rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.

C. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:

1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms. Contacts shall be available for load shed functions.
2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

D. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.

1. Indicate ground fault with other generator-set alarm indications.
2. Trip generator protective device on ground fault.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Enclosure: Dripproof.

G. Instrument Transformers: Mounted within generator enclosure.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
2. Maintain voltage within 30 percent on one step, full load.
3. Provide anti-hunt provision to stabilize voltage.
4. Maintain frequency within 15 percent and stabilize at rated frequency within [2] [5] seconds.

I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

J. Subtransient Reactance: 10 percent.

2.9 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Prefabricated or pre-engineered galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure, erected on concrete foundation.

1. Hinged Doors: With padlocking provisions.
2. Space Heater: Thermostatically controlled and sized to prevent condensation.
3. Lighting: Provide weather resistant LED lighting with 30 footcandles average maintained.
4. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
5. Muffler Location: Within enclosure.

B. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
3. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

C. Interior Lights with Switch: Factory-wired, vapor-proof fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.

1. AC lighting system and connection point for operation when remote source is available.

D. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

2.10 VIBRATION ISOLATION DEVICES

A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Minimum Deflection: [1 inch (25 mm)].

B. Comply with requirements in Section 232116 Hydronic Piping Specialties" for vibration isolation and flexible connectors materials for steel piping.

C. Comply with requirements in Section 233113 "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.

D. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.11 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.12 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Test generator, exciter, and voltage regulator as a unit.
3. Full load run.
4. Maximum power.
5. Voltage regulation.
6. Transient and steady-state governing.
7. Single-step load pickup.
8. Safety shutdown.
9. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Equipment Mounting:

1. Install packaged engine generators on cast-in-place concrete equipment bases.
2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

C. Install packaged engine-generator to provide access, without removing connections or accessories, for periodic maintenance.

D. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints.

E. Installation requirements for piping materials and flexible connectors are specified in Section 232116 "Hydronic Piping Specialties." Copper and galvanized steel shall not be used in the fuel-oil piping system.

F. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine-generator to allow service and maintenance.

C. Connect cooling-system water piping to engine-generator set with flexible connectors.

D. Connect engine exhaust pipe to engine with flexible connector.

E. Connect fuel piping to engines with a gate valve and union and flexible connector.

1. Natural-gas piping, valves, and specialties for gas distribution are specified in Section 231123 "Facility Natural-Gas Piping."
2. Install manual shutoff valve in a remote location to isolate natural-gas supply to the generator enclosure.

3. Vent gas pressure regulators outside building a minimum of 60 inches (1500 mm) from building openings.

F. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

G. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90 degree bend in flexible conduit routed to the generator set from a stationary element.

H. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.4 IDENTIFICATION

A. Identify system components according to Section 230553 "Identification for HVAC Piping and Equipment" and Section 260553 "Identification for Electrical Systems."

B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections.

D. Tests and Inspections:

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in the first two subparagraphs as specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.

a. Visual and Mechanical Inspection

1) Compare equipment nameplate data with drawings and specifications.
2) Inspect physical and mechanical condition.
3) Inspect anchorage, alignment, and grounding.
4) Verify the unit is clean.

b. Electrical and Mechanical Tests

1) Perform insulation-resistance tests in accordance with IEEE 43.

a) Machines larger than 200 horsepower (150 kilowatts). Test duration shall be 10 minutes. Calculate polarization index.
b) Machines 200 horsepower (150 kilowatts) or less. Test duration shall be one minute. Calculate the dielectric-absorption ratio.

2) Test protective relay devices.
3) Verify phase rotation, phasing, and synchronized operation as required by the application.
4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
5) Conduct performance test in accordance with NFPA 110.

6) Verify correct functioning of the governor and regulator.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
   a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
   b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
   c. Verify acceptance of charge for each element of the battery after discharge.
   d. Verify that measurements are within manufacturer's specifications.
4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Exhaust Emissions Test: Comply with applicable government test criteria.
7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
8. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations 25 feet from edge of the generator enclosure and on the property line, and compare measured levels with required values.

E. Coordinate tests with tests for transfer switches and run them concurrently.

F. Test instruments shall have been calibrated within the last 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

G. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

J. Remove and replace malfunctioning units and retest as specified above.

K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes automatic transfer switches rated 600 V and less, including the following:

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, [bypass/isolation switch,]power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Features and operating sequences, both automatic and manual.
b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.5 QUALITY ASSURANCE

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 99.

D. Comply with NFPA 110.

E. Comply with UL 1008 unless requirements of these Specifications are stricter.

F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

K. Neutral Terminal: Solid and fully rated unless otherwise indicated.

L. Battery Charger: For generator starting batteries.

1. Float type, rated 10 A.
2. Ammeter to display charging current.
3. Fused ac inputs and dc outputs.

M. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are acceptable.
2. Switch Action: Double throw; mechanically held in both directions.
3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
4. Conductor Connectors: Suitable for use with conductor material and sizes.
5. Material: copper.
6. Main and Neutral Lugs: Mechanical type.
7. Ground Lugs and Bus-Configured Terminators: Mechanical type.
8. Ground bar.
9. Connectors shall be marked for conductor size and type according to UL 1008.

C. Automatic Delayed-Transition Transfer Switches: Pauses or stops in intermediate position to momentarily disconnect both sources, with transition controlled by programming in the automatic transfer-switch controller. Interlocked to prevent the load from being closed on both sources at the same time.

1. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals for alternative source. Adjustable from zero to six seconds, and factory set for one second.
2. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.
3. Fully automatic break-before-make operation with transfer when two sources have near zero phase difference.

D. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

E. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

F. Electric Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.

G. Automatic Transfer-Switch Controller Features:

1. Controller operates through a period of loss of control power.
2. Undervoltage Sensing for Each Phase of Normal and Alternate Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is unavailable.

H. Large-Motor-Load Power Transfer:

1. Programmed Neutral Switch Position: Switch operator with programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Adjustable pause from 0.5 to 30 seconds minimum, and factory set for 0.5 second unless otherwise indicated. Time delay occurs for both transfer directions. Disable pause unless both sources are live.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Floor-Mounting Switch: Anchor to floor by bolting.

1. Install transfer switches on cast-in-place concrete equipment base(s).
2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
3. Provide workspace and clearances required by NFPA 70.

B. Identify components according to Section 260553 "Identification for Electrical Systems."

C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

D. Comply with NECA 1.

3.2 CONNECTIONS

A. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 271500 "Communications Horizontal Cabling."

E. Route and brace conductors according to manufacturer's written instructions. Do not obscure manufacturer's markings and labels.

F. Brace and support equipment according to Section 260548.16 "Seismic Controls for Electrical Systems."

G. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches (457 mm) in length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:
    a. Compare equipment nameplate data with Drawings and Specifications.
    b. Inspect physical and mechanical condition.
    c. Inspect anchorage, alignment, grounding, and required clearances.
    d. Verify that the unit is clean.
    e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
    f. Verify that manual transfer warnings are attached and visible.
    g. Verify tightness of all control connections.
    h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
        1) Use of low-resistance ohmmeter.
        2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
    i. Perform manual transfer operation.
    j. Verify positive mechanical interlocking between normal and alternate sources.
    k. Perform visual and mechanical inspection of surge arresters.
    l. Inspect control power transformers.
        1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
        2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
        3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
3. Electrical Tests:
    a. Perform insulation-resistance tests on all control wiring with respect to ground.
    b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
    c. Verify settings and operation of control devices.
    d. Calibrate and set all relays and timers.

e. Verify phase rotation, phasing, and synchronized operation.
f. Perform automatic transfer tests.
g. Verify correct operation and timing of the following functions:

1) Normal source voltage-sensing and frequency-sensing relays.
2) Engine start sequence.
3) Time delay on transfer.
4) Alternative source voltage-sensing and frequency-sensing relays.
5) Automatic transfer operation.
6) Interlocks and limit switch function.
7) Time delay and retransfer on normal power restoration.
8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

D. Coordinate tests with tests of generator and run them concurrently.

E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

F. Transfer switches will be considered defective if they do not pass tests and inspections.

G. Remove and replace malfunctioning units and retest as specified above.

H. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.

C. Coordinate this training with that for generator equipment.

END OF SECTION 263600

SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes lightning protection system for the following:

1. Ordinary structures.
2. Caddy shelter.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layouts of the lightning protection system, with details of the components to be used in the installation.
2. Include raceway locations needed for the installation of conductors.
3. Details of air terminals, ground rods, ground rings, conductor supports, splices, and terminations, including concealment requirements.
4. Include roof attachment details, coordinated with roof installation.
5. Calculations required by NFPA 780 for bonding of metal bodies.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Lightning protection system Shop Drawings, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lightning protection cabling attachments to roofing systems and accessories.
2. Lightning protection strike termination device attachment to roofing systems, coordinated with the roofing system manufacturer.
3. Lightning protection system components penetrating roofing and moisture protection systems and system components, coordinated with the roofing system manufacturer.

B. Qualification Data: For Installer.

C. Product Certificates: For each type of roof adhesive for attaching the roof-mounted air terminal assemblies, approved by the roofing-material manufacturer.

D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For lightning protection system to include in maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Dimensioned site plan showing dimensioned route of the ground loop conductor and the ground rod locations. Comply with requirements of Section 017839 "Project Record Documents."
b. A system testing and inspection record, listing the results of inspections and ground resistance tests, as recommended by NFPA 780, Annex D.

B. Completion Certificate:

1. UL Master Label Certificate.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: UL-listed installer, category OWAY or LPI Master Installer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Lightning Protection Standard: Comply with NFPA 780 requirements.

B. UL Lightning Protection Standard: Comply with UL 96A requirements.

C. Lightning Protection Components, Devices, and Accessories: Listed and labeled by a qualified testing agency as complying with UL 96, and marked for intended location and application.

2.2 MATERIALS

A. Air Terminals:

1. Copper.
2. Rounded tip.
3. Threaded base support.

B. Ground Loop Conductor: Tinned copper.

C. Ground Rods:

1. Material: Copper-clad steel.
2. Rods shall be not less than 120 inches (3050 mm) long.

D. Conductor Splices and Connectors: Compression fittings that are installed with hydraulically operated tools, or exothermic welds, approved for use with the class type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lightning protection components and systems according to UL 96A.

B. Install conductors with direct paths from air terminals to ground connections. Avoid bends less than 90 degrees and 8 inches (203 mm) in radius and narrow loops.

C. Conceal conductors within normal view from exterior locations at grade within 200 feet (60 m) of building. Comply with requirements for concealed installations in UL 96A.

1. Roof penetrations required for down conductors and connections to structural-steel framework shall be made using listed through-roof fitting and connector assemblies with solid rods and appropriate roof flashings. Use materials approved by the roofing manufacturer for the purpose. Conform to the methods and materials required at roofing penetrations of the lightning protection components to ensure compatibility with the roofing specifications and warranty.
2. Install conduit where necessary to comply with conductor concealment requirements.
3. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.

D. Ground Ring Electrode: The conductor shall be not less than the main-size lightning conductor.

3.2 CONNECTIONS

A. Aboveground concealed connections, and connections in earth or concrete, shall be done by exothermic welds or by high-compression fittings listed for the purpose.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3.3 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Perform inspections as required to obtain a UL Master Label for system.

B. Prepare test and inspection reports and certificates.

END OF SECTION 264113

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lighting luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
4. Structural members to which luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:

a. Other luminaires.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Ceiling-mounted projectors.

7. Moldings.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of luminaire.

E. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. Recessed Fixtures: Comply with NEMA LE 4.

D. Fixtures shall be as listed in the fixture schedule on the Contract Drawings or as deemed equal by the Architect. If a fixture different than what is shown on the schedule is submitted, fixture data for the base specified product and the substituted product shall be submitted with all difference identified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:

1. Ceiling mount with two 5/32-inch- (4-mm-) diameter aircraft cable supports.
2. Ceiling mount with pendant mount.
3. Ceiling mount with hook mount.

H. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

I. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119

SECTION 265600 – SITE LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide Site Lighting as shown on Plans. Site Lighting shall include all pole mounted parking lot lighting, bollard lights around the building, flag pole uplights and uplights at the existing monument and existing site identification sign as shown on the plans and details.

PART 2 - PRODUCTS

2.1 MATERIALS

A. It will be the responsibility of the contractor to coordinate all construction, electrical service connection and installation of lighting and conduits with the governing utility authority, the County of Union, and electrical plans prepared by DLB Associates.

2.2 LUMINAIRES

A. Site lighting shall be as shown on the contract documents or approved equal. Luminaire substitutions must me of same form and equal performance. Submittals without supporting photometric data and supporting point-by-point light performance analysis plot plan for this project site will not be considered.

B. Parking Lot Lights

1. EcoForm, LED luminaire, 700 mA and 1.2A, 277V, 4000 K Color Temperature, Black Paint, 20-foot mounting height, or approved equivalent.

C. Bollard Lights

1. Corral Bollard LED, 3L35 Light Engine, Black Finish, 277 V, 4-foot height, or approved equivalent.

D. Monument and Site Identification Uplights

1. Dabmar, Model No. DPR-LED18, 12 W integrated LED cast aluminum directional spotlight, 277 V, 4000K Color Temperature, Integrated On-Board Panel bulb type, or approved equivalent.

E. Flagpole Uplights

1. Refer to Section 265619 – Flagpole Lighting System.

2.3 LIGHT POLES

A. Poles shall be straight, round with a 20-foot mounting height. Pole shall be Guardco model SRS-20-4-D1-BLP, or approved equivalent.

2.4 LIGHTING STANDARDS

A. Lighting illumination levels shall be in accordance with the Township of Scotch Plains Ordinance Section 21-5.1(21). A detailed lighting analysis, including, but not limited to, spot foot-candle values, shall be provided using the actual luminaires, fixtures and poles that are to be specified.

2.5 CONCRETE BASES

A. As detailed on the Plans. Bases may be precast or poured in place. Concrete shall be constructed and installed as per the construction details.

2.6 LIGHT OPERATION

A. All lights shall be equipped with a photo cell for operation.

2.7 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions. Luminaire substitutions must be of same form and equal performance. Submittals without photometric data and substantiating point by point analysis will not be considered.

2.8 QUALITY ASSURANCE

A. List of Completed Installations for Lighting Standards and Luminaires: If brand names other than those specified are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations which can prove the proposed products have operated satisfactorily for 3 years.

2.9 CONDUIT

A. Site Lighting Conduit: conduit for site lighting electrification shall be provided in the form of two-inch diameter, schedule 40 PVC, at the lengths and location shown on the Contract Documents. Electric handholes and pullboxes shall be installed, as indicated on the Contract Documents, or as necessary, to construct the lighting systems shown on the plans.

B. Closed Circuit Television (CCTV) Conduit: conduit for CCTV communications and power shall be provided in the form of two-inch diameter, schedule 40 PVC, at the lengths and locations shown on the Contract Documents. Installation of CCTV cameras, wires, and appurtenances to be provided by others.

PART 3 – EXECUTION

3.1 PREPARATION

A. Before installing any Work, lay out the proposed course for the conduits, location of lighting standards, etc. and have same approved. See Electrical design plans and specifications by others for proposed conduit layout, design, details, and specifications.

3.2 INSTALLATION

A. Lighting Standards:

1. Install each lighting standard on concrete base.

2. Prepare a level surface on compacted earth, undisturbed earth or concrete footing. Set bases on the prepared surface. Have all bases checked and approved by the Engineer for level and elevation prior to making any conduit connections.

3. Install lighting standards vertical:

a. Use 2 nuts on each anchor bolt. Run first nut down on the thread to the top of the foundation.
b. Install pole, run second nut down.
c. Adjust pole if necessary, then tighten nuts in accordance with pole manufacturer's recommendations.
d. Grout voids between metal base of lighting standard and concrete base. Create a drain through the grout by slipping a short length of conduit under the base in the wet grout, projecting it into the large drain hole in the base of the lighting standard. Rotate the conduit to finish the drain, then remove conduit.

B. Conduit System:

1. See Site Lighting Plan for proposed conduit layout. Refer to MEP engineering plans, prepared by DLB Associates for electrification information.

END OF SECTION 265600

SECTION 265619 – FLAGPOLE LIGHTING SYSTEM

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall consist of the furnishing, installation and mounting of the lights, luminaires and fixtures as shown on the Plans or as directed by the Engineer, at the three proposed flagpoles.

PART 2 – PRODUCTS

2.1 FLAG POLE LIGHTING:

A. Each luminaire shall be “Inground” Series Floodlight, 100 watt maximum, 120 volt, I-2 lamp, Bronze Finish as manufactured by Hadco. Catalog model number: I2G-H or equal.

B. All lighting shall be installed as per manufacturer’s recommendations.

C. Flagpole lighting shall be design and constructed with a ‘dusk-till-dawn’ lighting controller/sensor. All lighting shall be turned on for a period of 8 hours as a final check after completion of the work.

D. All Lights shall be operative at the end of the test.

PART 3 – EXECUTION

3.1 METHOD OF CONSTRUCTION

A. It will be the responsibility of the Contractor to coordinate all construction, electrical service connection and installation of lighting and conduits with the governing utility authority, owner, and electrical plans prepared by the MEP.

END OF SECTION 265619

SECTION 281300 - ELECTRONIC ACCESS CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Access control door hardware.

B. Related Sections:

1. Division 08 Section “Door Hardware.”
2. Division 26 Section Electrical sections.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
2. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

B. Contractor qualifications:

C. Company with a minimum of 5 (five) years system design, engineering supervision, and installation experience in the access control industry.

D. The contractor will maintain a fully staffed local office. The service center will be staffed service within twenty four (24) hours on a twenty-four (24) hour, 365 days per year basis, whether or not the owner purchases a maintenance contract with the contractor.

E. Within the local service center, the contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements.

F. The contractor must have in-house engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the Operation and Maintenance

Manuals, Training Programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The owner reserves the right to approve the contractor's Project Manager.

G. Testing Agency: Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Pre-Installation Conference: Prior to installation arrange conference between supplier, Owner and related trades to review materials, procedures, and coordinating related work.

I. Sequencing: The work shall be performed in the following sequence, unless directed otherwise by owner or their representative:

1. Installation of wiring, Access Controllers & power supplies.
2. Installation of new field devices and new readers.
3. Installation of front end equipment.
4. Commissioning of the new system.
5. End User training

1.4 WARRANTY

A. All work and system components shall be covered by a one-(1) year warranty against defects in materials and workmanship, commencing with substantial completion of the project, unless otherwise directed by the owner or their representatives

B. During system warranty period, system updates are to be made available at no additional cost to the owner.

C. During warranty period, provide twenty-four (24) hour toll-free technical support..

1.5 SHOP DRAWING SUBMITTALS

A. Shop drawings shall include, but shall not be limited to, the following:

1. Door Hardware for operational description.
2. Submit a complete listing of proposed devices, indicating interconnection equipment locations and specifying terminal/connecter termination locations. Submit a complete set of proposed drawings, identifying equipment locations, types of cabling, numbers of conductors, raceway locations, and termination points of each conductor.

1.6 COORDINATION

A. The work of this Section shall be coordinated with other work of the Contractor.

1. Conduit and raceways as needed for data and electrical hardware items.
2. Fire alarm system life-safety system tie-in (interfacing).
3. Distribute point-to-point wiring diagrams plus riser diagrams to related trades.
4. The placement of all access panels shall be coordinated with all other Trades and with the Architect:

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Acceptance: Upon delivery to the site, Contractor shall inspect all products and materials for any damage. Acceptance of the units constitutes that the inspection has occurred and not damaged or unacceptable products were found, and any damage or unacceptable products would be the responsibility of the Contractor.

B. Product Storage and Handling Requirements

1. Store in temperature and humidity controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F and not more than 80 percent relative humidity, non-condensing.
2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
3. Save original manufacturer’s containers and packing materials and deliver as directed under provisions covering extra materials.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 SYSTEM CAPABILITIES

A. The system is to be designed with upward growth and expansion in mind. All hardware and software components, offered by the manufacturer, shall be easily integrated into the wired and wireless lock system up to 32 locks and 5,000 cardholders of the same manufacturer of the controller and access control system. The system design shall be consistent within a given system and across that system product family in the interest of minimizing the costs of migration and minimizing, if not totally eliminating the need for operator re-training.

B. All hardware shall be provided with enclosures with hinged doors and locks.

1. The controller shall be able to support up to 32 doors and 5,000 cardholders and support smart card, proximity and magnetic stripe technologies.
2. The controller shall be an intelligent device which shall be able to process all transactions in the system. Including but not limited to: Operator login, storing transaction history, generating audit reports, and containing user manual.
3. The controller shall have upgradable embedded flashable firmware.
4. Communication between the controller and the Reader Interface shall be via RS-485 protocol.

2.2 SYSTEM PROGRAMMING

A. The contractor shall furnish and install all hardware, software, devices and components to meet the performance and functional requirements described in these contract documents.

B. Include all items required, whether or not individually specified, to ensure a completely operational integrated Security Protection system. The contractor must complete all database entry (unless otherwise noted), and provide the owner with training on cardholder entry, as well as all system programming. No additional costs shall be allowed to make the system operational or to meet specifications.

2.3 SYSTEM ARCHITECTURE

A. System Description:

1. Primary function is to regulate access through specific portals to Secured areas.
2. Utilize card technology as its primary access device.
3. Surge Protection Components must be protected from voltage surges originating externally to equipment housing and entering through power, communication, signal, control, or sensing leads. Must also include surge protection for external wiring of each conductor-entry connection to components.
4. Power: Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the ACS, shall be provided with the system. Step down power supply with battery backup of at least 4 hours.
5. Backup Power: ACS equipment power shall be supplied from a UPS system, which shall be tied to emergency building power circuits. The UPS shall power the equipment including, but not limited to, the Embedded Controller, electronic locks and lock power supplies for a minimum of 4 hours.

B. General Software Description: The software shall be accessible from any PC with a web browser, and access to the controller's IP address.

C. General Hardware Description:

1. The Hardware shall be expandable to meet all criteria of this document.
2. The Hardware shall include all options to accommodate all devices in the construction documents.

D. The web interface shall be used to program all access control functions, generate reports, display selected transactions, valid and invalid entry activity, and all internal system status such as communication loss/restore, power loss, etc.

E. The system programming should be user friendly and capable of being accomplished by personnel with minimal computer experience. The software shall be of a consistent user interface that is compatible with current software techniques employed by Microsoft and other software developers namely drop down menus, dialogue boxes, check boxes, etc.

F. The System shall provide a means for scheduled automatic backups of any or all database system files.

G. The system shall have the capability to communicate with the controller via LAN/WAN connections utilizing industry standard TCP/IP communication protocol.

H. Web Browser Requirements

1. Internet Explorer (IE 7) will run on Windows XP Service Pack (SP2), Windows XP Professional x64 Edition, and Windows 2003 Service Pack (SP1). Any machine with the recommended amount of memory for Windows (for example, 128 MB for windows XP and 256 MB for Windows XP Professional x64) will meet the memory requirements for Internet Explorer 7.
2. Firefox 2 will run on Windows 98, Windows 98 SE, Windows ME, Windows NT
3. 4.0. Windows 2000, Windows XP (recommended), and Windows Vista. Any computer running with Pentium 500MHz or greater and 128 (MB) RAM will meet memory requirements for Firefox 2.

Note: systems uses port 80 to communicate; as a result this port cannot be blocked by any firewall software.

I. User Manual

1. User manual must be supplied which provides guidelines for using and the system, controller and the hardware that interfaces with it. It is intended for end users of the system.
2. System Owner's Manual This document is designed as a detailed user manual for the system. It shall provide step-by-step instructions for:

a. Setting up personnel, time zones, doors and holidays
b. Assigning access permissions to personnel.
c. Monitoring system activity.
d. Running standard reports.
e. Setting up login permissions.
f. Troubleshooting

2.4 SYSTEM HARDWARE:

A. Security Controller: VBB as manufactured by Vanderbilt Industries.

B. The controller shall incorporate built-in battery in the form of a lithium battery designed to keep clock running for a minimum of 4 hours.

C. The controller shall incorporate a built-in, real time clock for providing scheduled event programming. Clock shall be initially set via the web interface.

D. Hardware Specifications:

1. Embedded Bright Blue Controller

a. Database: 4GB flash drive
b. NEMA 1 rated enclosure
c. Linux operating system
d. Complete Embedded Access Control operating system including user manual
e. 32-bit, 200 MHz NET+ARM microprocessor
f. SSL encryption (OPTION)
g. Web-browsers supported: Internet Explorer 7.0, FireFox
h. 10/100 Base-T Ethernet
i. Supports DHCP or Static IP addressing
j. 64Mb flash memory and 64Mb SRAM
k. Tamper switch
l. Flashable firmware
m. Power requirements: 24 VDC@ 1A
n. Operating temperature: ooc to 49oC; 32oF to 120° F
o. Board dimensions: 11.5" H x 11.5"W
p. Enclosure dimensions: 14" H x 14" W x 3.5" D
q. Memory Battery Backup
r. Power consumption- 300mA (excluding peripheral devices)
s. Ambient temperature 32° to 120° F
t. Humidity- 10% to 85% (non-condensing)

E. Door Security Reader Interface: VBB-RI and VBB-NRI as mfg. by Vanderbilt Industries.

1. Each reader in the system shall have a dedicated Reader Interface.
2. Form C single pole I double throw relays
3. RS-485 communication to controller, (data requires a two wire cable no greater than 4,000 feet from the controller, power requires a two wire cable up to 500 feet from controller or local power supply).
4. The Reader Interface shall support multiple reader technologies including, but not limited to:

    a. Smart Card
    b. Magnetic Stripe (swipe or insertion)
    c. Wiegand (swipe or insertion)
    d. Proximity
    e. Hardware Specifications
    f. Power input - 16VDC to 28VDC
    g. Power consumption- 100mA (without read heads)
    h. Ambient temperature 32°-120°F (without heater)
    i. Humidity- 85% +/- 5%

2.5 POWER SUPPLIES:

A. VBB-3APS as manufactured. by Vanderbilt Industries.

1. AC input and DC output status LED indications
2. Class 2 rated power limited output.
3. Universal110-220 VAC input.
4. One connector for optional distribution boards.
5. Specification:

    a. Power input- 110-220 VAG
    b. Power output- 12 I 24VDC @ 2A field selectable
    c. Enclosure dimension -12.0" H x 14.0" W x4.0" UL 294 Listed for Access Control.

2.6 CARD READERS

A. Multi-Technology and Proximity Readers: Readers available in wall mount, mullion mount, and with or without keypad. They shall be 125 kHz prox. and/or 13.56 MHz contactless readers compatible with all ISO 15693 and ISC 14443 standards. Having a LED red/green visual indicator with audio feedback. Reader shall be made of PBT polymer in charcoal and black colors.

B. Multi-Tech/Proximity Card Reader:- XF1500 series as manufactured. by Vanderbilt Industries.

1. Specifications:

    a. Power supply- Linear DC
    b. Voltage range - 5-16 VDC
    c. Max. current req.- Average 110mA DC, Peak 160mA DC.
    d. Cable spec- 18 AWD 6 conductor stranded/shielded.
    e. System interface- Wiegand.
    f. Cable distance- Wiegand output 500ft. g. Operating temperature- -31F to 151F
    g. Enclosure dimension- 5.1" x 3.25" x .76"
    h. Operating temperature- 14° to 95oF
    i. UL listed for UL294 access control and more.
    j. FCC certification USA and Canada.

2.7 WIRING AND CABLE TYPES:

A. Wiring to be provided under this project includes the following types:

1. Refer to Division 28 Sections for additional cable mounting requirements and information.
2. Contractor shall verify with security equipment manufacturers that cable provided meets manufacturer requirements. Contractor shall be responsible for altering cable specified to meet manufacturer requirements and run distances.

B. CCTV COMMUNICATION CONDUCTORS AND CABLES:

1. To Video Cameras. Description: RG-59/U 75-0hm -Coaxial cable. Belden #8241B/88241, or approved equal.
2. Between video equipment. Description: Micro-Coax RG-100 Coaxial cable.
3. Belden or approved equal.

C. Access Control Communications Conductors and Cables:

1. Cat-5E Communications Cable. Description: 24 AWG bare copper, insulated pairs. Belden #1653A or approved equal.
2. RS 485 Communications. Description: 18-24 AWG, 2-pair, shielded, PVC insulated cable. Belden or approved equal.
3. Communications to and from Card Readers. Description: Six (6) Conductor- Individually Shielded-Plenum Rated -18 AWG, stranded. Belden #83656 or approved equal.

D. Intrusion Detection Communications Conductors and Cables

1. Low voltage power for security equipment. Description: 18 AWG, twisted pair, unshielded. Belden #9740 or approved equal.

E. Grounding and Bonding

1. Class 2 and 3 circuits and equipment shall be grounded in accordance of the current National Electric Code (NEG)

F. Pathways: Pathways shall be in accordance with current NFPA and NEG standards and requirements.

2.8 CREDENTIALS:

A. Multi-Tech/Proximity Credentials: They shall be 125kHz prox. and I or 13.56 MHz contactless credentials compatible with all ISO 14443 standards.

1. Proximity Card Credentials- SXF7510 as mfg. by Vanderbilt Industries.

B. Smart Card credentials: They shall be 13.56 MHz contactless credentials compatible with all ISO 14443 standards.

1. Smart Card Credentials- SXF8520 as mfg. by Vanderbilt Industries.

2.9 DATABASE DESIGN AND MANAGEMENT:

A. Overview: System software shall come fully contained on the controller. System software shall be accessible from any computer with network access and a web browser. No dedicated PC shall be required. The system requires no client or server software installation. Pre-configured and network ready from the manufacture. Any computer running an Internet Explorer 7 or Firefox web browser may be used to access, monitor and manage the end user system. System must be web based and must be able to be accessed like any standard web page on the Internet via a LAN or WAN, and have the ability to run standard reports and to be able to export reports as .csv files which can be opened in MS Excel and other spreadsheet programs. The system user manual must be accessible on controller for viewing or printing.

B. System Security: The system shall be secure both in its operation and administration.

1. Login Requirements:

a. Logging into the system shall be restricted using User ID and password.
b. Only one operator at a time shall be able to log into the system.
c. The operator shall be logged off from the system after an idle period of 15 minutes requiring that their password be re-entered.

2. Operators will have one of three security levels with the following privileges attached:

a. Administrator- Shall allow full access to the system with read/write capabilities.
b. Manager- Shall allow partial access to the system with read/write capabilities.
c. Operator- Shall allow limited access to the system with read only capabilities.

C. System Management: Software shall allow the user to simultaneously monitor and maintain a secure working environment.

1. System Software shall contain the definition of any door or door related hardware that is connected to the system. There shall be a provision to label each device with at least an alphanumeric description to easily identify the door.
2. Activity Monitor: Software shall allow the user to view Personnel Transactions and System and Device Transactions on a self-refreshing screen. The refresh time will be adjustable from 15 seconds to 15 minutes.
3. System State: The software shall provide the ability, via manual override, to place any on all doors into predefined states (i.e. unlocked, lockdown, etc.) without having to change individual cardholder access privileges.
4. Calendar Events: The system shall allow the user to define the Calendar Events (holidays, etc.) according to specific needs.
5. Time Zones: Time zone definitions shall include two intervals, each with start and end times, days of the week, occurrence in the month, and Calendar Events. When configuring time zones, the system must allow for time zones that span over midnight.
6. Door Status: The software shall allow the user to view a single door's state at any time. The status shall be displayed in a dashboard window when received.
7. Site Codes:

a. The software shall be able to assign up to 5 site code numbers ranging from 1 to 999,999.
b. Any lost communication shall not interfere with access being granted at readers as site codes are downloaded and retained in the reader memory.
c. If the site code on a credential does not match that on the reader board, access will be denied.

D. Personnel Management: Software shall provide a simple interface to add, delete or modify personnel information.

1. Personnel information shall include the following fields:

    a. First, last and middle name.
    b. Activation and expiration dates.
    c. Up to 6 user defined fields of additional information.

2. The personnel record shall contain the unique number that is encoded on their assigned credential.
3. Credential Technology Supported:

    a. Proximity
    b. Smart Card
    c. Magnetic Stripe

4. The following fields shall be available for use at the administrator's discretion.

    a. Stamped ID- The number that is "heat stamped" on the card, different from the encoded ID.
    b. Issue Code- This number can be incremented by the operator if the magnetic stripe badge is reissued because it is either damaged or lost.

E. Door Setup: Software shall allow up to 32 doors to be programmed. A simple interface shall be provided to add, delete or modify doors.

1. The software shall provide predefined door types, which include pictures of the door type to choose from.
2. The software shall allow the assignment of time zones to doors for use as an unlock schedule.
3. The software shall allow for programming of toggle functionality at the reader.
4. The software shall allow the assignment of an automatic cancel time for toggle commands to each door.
5. The software will allow global settings for doors:

    a. Credential Technology- Choose what type of credential (proximity, smart card or magnetic stripe) will be used for all doors.
    b. Site Codes- Choose which site codes to use (if any) for all doors.
    c. Anti-passback- Define the Anti-passback reset time (if any) for all doors.

F. Access Privileges: Software shall allow for assignment of access rights to credential holders.

1. Three levels of access rights authorization

    a. Administrator
    b. Manager
    c. Operator

2. These rights shall cover access ability as well as Toggle, Pass-Through, Lockdown and "First Person In" abilities.

    a. Access Privilege Assignment: Software shall allow access to be assigned on a 'by person' or a by group basis.
    b. Access Privilege Expiration: Software shall include the ability to force an expiration of access privileges to any or all doors in the system.

G. Manual Overrides: The software shall provide an ability to manually change a device's normal function, possibly to allow temporary access to a door or to lockdown all doors in an emergency situation.

1. Manual Overrides shall be predefined in the system.

    a. Unlock- Shall manually unlock a door or doors.
    b. Lockdown- Shall manually lock a door or doors so that only credentials designated as "pass-through" will be able to open them.
    c. Suspend Unlock Schedule- Shall override the unlock schedule of a door.
    d. Resume Normal Operation- Shall return a door or doors to its normal state.

2. Some manual override functions shall be able to be activated by a credential

    a. Unlock- Shall be possible with a toggle enabled credential.
    b. Lockdown- Shall be possible with a lockdown credential.

H. Automatic Overrides: The software shall provide a way to override certain tasks automatically on a regular basis (e.g. unlocking the main lobby door during normal business hours).

1. The user shall be able to define the time zones according to the customer's needs.
2. First person in rule-- The system shall provide a secure way to unlock an automatic scheduled door. A valid credential access shall be required to trigger the doors scheduled to unlock during a scheduled period.

I. Report Generation: Software shall allow reports to be generated based on the following criteria:

1. Activity:

    a. All access attempts valid/invalid
    b. All access attempts valid
    c. All access attempts invalid
    d. System User activity
    e. System Events
    f. Contacts
    g. Relays

2. Personnel: Personal information
3. Access:

    a. Access permission by person
    b. Access permission by door

4. Devices: All devices by door selection
5. Configuration:

    a. Time zones
    b. Calendar events

J. Persons with Disability: The software shall allow for special access accommodation to doors for special access needs personnel.

1. When new personnel are added to the system, the operator shall have an option to select a specific field for Special Access Privileges.
2. When new doors are added to the system, the operator shall have the option to set the Special Access Timers to allow for a longer duration of unlock when personnel with special access privileges present their credential.

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to PCs, Controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Furnish or coordinate any inserts required for building into concrete, masonry, and other work, to support and attach work of this section. Furnish or coordinate in ample time to comply with schedule of work into which inserts are built.

B. Verify that power and outlets are in correct locations.

C. Verify that building structure is properly prepared for mounting, attachment and support of equipment.

D. Prior to installation of systems components and devices, verify all required preparations have been properly performed and that substrates are acceptable for installation.

E. Verify all rough-ins and field dimensions.

F. Report in writing to the Architect any prevailing conditions that will adversely affect satisfactory execution of Work in this Section.

1. Owner or their representative reserves the right to review proposed methods of construction/installation, reject proposed methods, and have the installation done in a satisfactory method at the Contractor's cost.

3.3 INSTALLATION OF SYSTEM

A. Install work in accordance with manufacturer’s recommendations, instructions and final Shop Drawings. All control panels and power supplies should be installed so as to allow easy access for service in the future.

B. Anchor components securely in place, plumb, level, and accurately aligned.

C. For card readers that are located in equipment traffic areas, and that are exposed to damage due to collision or impact from forklifts, or manually moved carts, carriers, or other equipment used by the Owner, provide protective bollards, railings, coverings etc. to ensure that all card readers installed are properly protected from such damage.

D. Provide fastenings, plates, and other incidental items required for complete and operational installation.

E. Provide required electrical work in accordance with code requirements.

F. Create and deliver final as built Shop Drawings

3.4 SYSTEM SOFTWARE

A. Develop, install, and test software and databases for the complete and proper operation of systems involved. Assign secured IP address to I or supplied by Owner.

3.5 SYSTEM PROGRAMMING

A. The Contractor shall coordinate with the Owner to ensure that the new components will be properly programmed into the system.

B. Coordination required is as follows, unless directed otherwise by owner or their representative

1. Personal/Staff information
2. Access times for all personal/staff.
3. Definitions of openings for staff access.
4. Holiday definitions.
5. Special access privileges.
6. Lock down conditions.

3.6 SITE QUALITY CONTROL

A. The Contractor shall develop a Final Test and Acceptance (FTA) Plan. The plan shall identify each new system component provided, intent of test, method or methods of test and expected results. Each component listed in the plan shall include space for test part signatures, brief comments, time of test and pass/fail check boxes. The FTA plan shall be submitted to the owner's representative 30 days prior to the scheduled final test.

B. Each system shall test free from interference, opens, grounds, and short circuits.

C. Start-up Test.

1. Following completion of the Final Test, the system shall undergo a thirty (30) day Operational Demonstration Test (ODT) or Burn-In period. This operational demonstration period shall start when all specified systems and equipment have been installed and "Substantial Completion" is reached, with only a moderate number of punch list items remaining.
2. During this period, the system shall be operated under a normal facility traffic load for not less than 30 days. If any item or system fails during the ODT, the 30-day burn-in period shall be suspended for that item until repaired or replaced. Once repaired or replaced, the burn-in period shall recommence.
3. Final system acceptance of the entire project will be withheld until after successful completion of this operational demonstration period for all systems and components.
4. System will not be considered substantially complete until the following activities have been successfully completed:

    a. Acceptance of all submittals.
    b. Delivery of final documentation
    c. Successful Final Test and Inspection

d. Successful Operational Demonstration Test
e. Successful training and demonstration, including operation of systems using the manuals.
f. Purging of Contractor User privileges and return of all key card media.

3.7 OWNER PERSONNEL TRAINING

A. On Site Operator training: instruct operating staff in proper operation, including hands-on training.

1. Minimum of two (2), man-hours covering the operations for each system installed.
2. Training sessions shall be provided to supervisors, staff utilizing systems and equipment provided under this section, maintenance personnel and any other personnel designated by the owner. Contractor should prepare to provide operator training for up to four (4) personnel.
3. Contractor shall be prepared to provide training sessions on all work shifts, including day, evening and night shifts.

B. On Site Administrator training: instruct owner-designated security system administrators for each system installed.

1. Minimum of two (2), man-hours of training for each owner-designated
2. Training to cover all administrative and management functions, features and controls for each system.

3.8 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured during periods when a qualified operator in the employ of Contractor is not present.

B. Protection: Provide protective covers, fenders, and barriers as necessary to maintain. Work of this Section in same condition as installed until time of Substantial Completion.

END OF SECTION 281300

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Remote annunciator.
7. Addressable interface device.
8. Digital alarm communicator transmitter.
9. Radio alarm transmitter.

B. Related Requirements:

1. Section 280513 "Conductors and Cables for Electronic Safety and Security" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. NICET: National Institute for Certification in Engineering Technologies.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.

5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.
    d. Show air-sampling detector pipe routing.
13. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
    a. Trained and certified by manufacturer in fire-alarm system design.
    b. NICET-certified, fire-alarm technician; Level III minimum.
    c. Licensed or certified by authorities having jurisdiction.

D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
g. Record copy of site-specific software.
h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

    1) Equipment tested.
    2) Frequency of testing of installed components.
    3) Frequency of inspection of installed components.
    4) Requirements and recommendations related to results of maintenance.
    5) Manufacturer's user training manuals.

i. Manufacturer's required maintenance related to system warranty requirements.
j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

1.8 PROJECT CONDITIONS

A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.

C. Automatic sensitivity control of certain smoke detectors.

D. All components provided shall be listed for use with the selected system.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices[and systems]:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Carbon monoxide detectors.
6. Automatic sprinkler system water flow.
7. Fire-extinguishing system operation.
8. Dry system pressure flow switch.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm and specific initiating device at fire-alarm control unit.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Close smoke dampers in air ducts of designated air-conditioning duct systems.
8. Recall elevators to primary or alternate recall floors.
9. Activate elevator power shunt trip.
10. Activate emergency shutoffs for gas and fuel supplies.
11. Record events in the system memory.
12. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. High- or low-air-pressure switch of a dry-pipe or preaction sprinkler system.
3. Elevator shunt-trip supervision.
4. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.
6. Display system status on graphic annunciator.

2.3 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
    a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
    b. Include a real-time clock for time annotation of events on the event recorder and printer.
    c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
    d. The FACP shall be listed for connection to a central-station signaling system service.
    e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, two line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 0.

3. Serial Interfaces:

   a. One dedicated RS 485 port for central-station operation using point ID DACT.
   b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
   c. One [USB] [RS 232] port for PC configuration.

D. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Record events by the system printer.
4. Sound general alarm if the alarm is verified.
5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

E. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

F. Elevator Recall:

1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:

   a. Elevator lobby detectors except the lobby detector on the designated floor.
   b. Smoke detector in elevator machine room.
   c. Smoke detectors in elevator hoistway.

2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

   a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble

I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

J. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed, valve-regulated, recombinant lead acid.

K. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated[and power-on status].
    a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
    b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
    c. Multiple levels of detection sensitivity for each sensor.
    d. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    a. Primary status.

b. Device type.
c. Present average value.
d. Present sensitivity selected.
e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 CARBON MONOXIDE DETECTORS

A. General: Carbon monoxide detector listed for connection to fire-alarm system.

1. Mounting: Adapter plate for outlet box mounting.
2. Testable by introducing test carbon monoxide into the sensing cell.
3. Detector shall provide alarm contacts and trouble contacts.
4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
5. Comply with UL 2075.
6. Locate, mount, and wire according to manufacturer's written instructions.
7. Provide means for addressable connection to fire-alarm system.
8. Test button simulates an alarm condition.

2.7 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:

a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, [red] [white].

2.9 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.

B. Material and Finish: Match door hardware.

2.10 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1. Install at the main entrance for the fire department.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.11 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall and to circuit-breaker shunt trip for power shutdown..

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.13 CELLULAR ALARM TRANSMITTER

A. Transmitter shall comply with NFPA 1221 and 47 CFR 90.

B. Description: Manufacturer's standard commercial product; factory assembled, wired, and tested; ready for installation and operation.

1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
2. Normal Power Input: 120-V ac.
3. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
4. Antenna: Capable of communicating to nearby cell site
5. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
6. Antenna-Cable Connectors: Weatherproof.
7. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

C. Functional Performance: Unit shall receive alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
2. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
4. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
5. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
6. Local Fire-Alarm-System, Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.
2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Equipment Mounting: Install fire-alarm control unit on finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.

3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke- or Heat-Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex Ain NFPA 72.
5. HVAC: Locate detectors not closer than [36 inches ((910 mm))] [60 inches ((1520 mm))] from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

H. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

I. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

J. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

K. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.

L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

M. Antenna for Cellular Alarm Transmitter: Mount to building structure where required. Use mounting arrangement and substrate connection that resists wind load without damage.

3.3 PATHWAYS

A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.

B. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
3. Smoke dampers in air ducts of designated HVAC duct systems.
4. Magnetically held-open doors.
5. Electronically locked doors and access gates.
6. Alarm-initiating connection to elevator recall system and components.
7. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
8. Supervisory connections at valve supervisory switches.
9. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
10. Supervisory connections at elevator shunt-trip breaker.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.
    a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111

SECTION 311000 – SITE CLEARING/DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this item, the Contractor shall remove and dispose of all fences, fence foundations, concrete foundations, concrete pads, concrete walls, concrete wall foundations, block walls, block wall foundations, brick walls, brick wall foundations, all curbs, pavers, gates, drainage pipes, utility pipes, utility laterals, fire hydrants, concrete sidewalk, on-site asphalt, lights, light poles, utility poles, signs, bollards, trees, tree roots/stumps, shrubs, hedges, brush, stumps, roots, dirt, stones, and all debris; the removal of which is required for carrying out the work of this project, shall be removed if and where directed. Contractor shall perform test pits to locate any uncertainties in existing subsurface structures to determine if these structures interfere or affect the proposed construction, if and where directed.

B. The Contractor shall remove and dispose of pipes, inlets, manholes, reinforced concrete pavement, bituminous pavement, concrete and bituminous sidewalk, and old curb, as necessary for new construction, if and where directed. Contractor shall remove and store on-site signs, not otherwise paid for; remove and reset any monuments, benches, hole markers, shrubs and fences; remove and reset to grade manhole and catch basin frames, fire hydrants, guide rail, gas and water valves; and complete all other removals and relocations required for the work and not specifically covered elsewhere.

C. Upon the removal of any foundations, walls, tree stumps, tree roots, etc., Contractor is responsible for backfilling open excavations to grades matching existing adjacent ground surface level grades in accordance with the GRADING/BACKFILL OF DEMOLTION AREAS specification.

D. Contractor shall remove and tie off all existing sanitary sewer laterals, water service lines, gas, electric and utility service laterals to be abandoned if and where directed. Contractor shall coordinate all utility removals and tie offs with governing utility authority.

E. Contractor shall remove, and store on-site, all existing concrete bumper blocks from the existing parking lot. The Engineer will determine which ones will be saved for reuse and which ones will be removed from the site. Those blocks to be reused shall be power-washed prior to reuse, to the satisfaction of the Owner and/or Engineer.

F. Contractor shall remove the existing, on-site gasoline fueling station. This demolition includes, but is not limited to, removing the existing fuel tank, foundation, gas register, gas pump, bollards, concrete pads, etc. All removals and demolition shall be performed in accordance with all applicable local, county, state and federal regulations and guidelines.

G. Contractor shall refer to architectural plans and specifications for information pertaining to demolition of existing on-site structures and buildings.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. The lights, signs, inlets, sidewalk, pavement, bollards, curbs, fuel tank and excavation unclassified shall be disposed of in accordance with all applicable regulations.

B. Trees and shrubs to be removed by the Contractor shall have their roots pruned (when adjacent to existing asphalt) and shall be cut and the roots and stumps removed by grubbing shall be refilled with suitable material which shall be solidly compacted in lifts in accordance with the **GRADING/BACKFILL OF DEMOLITION AREAS** specification so as to make the surface at these points conform and match with the adjoining grades. No trees shall be cut outside the specified limits without permission of the Engineer. All stumps shall be completely ground up.

C. Signs shall be removed carefully and shall be shall be returned Union County Parks Department.

D. Manhole frames, catch basin frames, fire hydrants, guide rail, gas valves, water valves, and other structures shall be removed and carefully reset to match proposed grades where indicated to remain. Contractor shall dispose of all demolished and removed debris per federal, state and local regulations.

E. Contractor is responsible for contacting all applicable utility companies prior to the demolition or removal of any utilities. Existing utility poles to remain shall be protected during demolition work.

END OF SECTION 311000

SECTION 312200 – SITE GRADING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Site Grading shall include, but is not limited to, grading, excavation, removal of excess soil from the project site, preparing and compacting all material required for construction of the sub-grade of the entire disturbed area and all incidental work necessary to meet the proposed grades as shown on the Contract Documents and to the satisfaction of the Engineer.

B. Contractors shall refer to section 3.1C, for specific information regarding removal of excess soil.

PART 2 - PRODUCTS

3.1 FILL MATERIAL

A. Borrow material required for site grading shall conform to Section 204 of the NJDOT Standard Specifications. The Contractor shall provide the Engineer with certification attesting that said material is free of contaminants and suitable for this application. The soil shall be smooth, soft and free of depressions, clods, mounds, stones, or other debris, as approved by the Engineer.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A The site shall be graded within the limits shown on the Plans or as directed by the Engineer. The Contractor shall grade the sub-grade according to the elevations shown on the Plans, taking into account the thickness of the layers above, and if necessary borrow materials as approved by the Engineer. The soil shall be placed uniformly in layers not to exceed twelve (12) inches loose thickness. Each layer shall be compacted to 95% density in accordance with Section 204 of the NJDOT Standard Specifications.

A. The Contractor shall make provisions to implement approved dust control measures while performing this work, so as not to impact surrounding residences. Should the Contractor fail to implement these measures, he will be responsible to power-wash all structures, at no additional cost to the Owner.

B. Excess soil to be removed from the work site shall be hauled to the on-site soil disposal location. Refer to the Grading Plan for location of the disposal site. Contractor shall coordinate with the Union County Department of Parks regarding specific location of soil stockpile. Access to the on-site soil stockpile will be from Raritan Road only (hauling through the golf course is strictly prohibited). No construction debris is to be stockpiled in this location. No soil testing of existing on-site soils is required.

END OF SECTION 312200

SECTION 312319 – DEWATERING

PART 1 – GENERAL

1.1 DESCRIPTION

A. The Contractor shall at all times provide ample means and equipment with which to promptly remove and dispose of all water and drainage entering the excavations or other parts of the work, and to keep such excavations dry until the structures to be built therein are completed. In no case will the laying of pipe or placing of masonry be permitted with water in the excavation.

B. Dewatering methods and equipment shall be subject to the approval of the Engineer, and all water removed from the work shall be disposed of in a manner without damage to adjacent properties.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Monitor dewatering systems continuously.

E. Promptly repair damages to adjacent facilities caused by dewatering.

END OF SECTION 312319

SECTION 312323.13 – SITE GRADING/BACKFILL OF DEMOLITION AREAS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Site Grading/Backfill of Demolition Areas shall include grading, excavation, preparing and compacting all material required for construction of the sub-grade of the entire disturbed area and all incidental work necessary to the satisfaction of the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Borrow material required for site grading shall conform to Section 204 of the NJDOT Standard Specifications. The Contractor shall provide the Engineer with certification attesting that said material is free of contaminants and suitable for this application. The soil shall be smooth, soft and free of depressions, clods, mounds, stones, or other debris, as approved by the Engineer.

B. Asphalt is not suitable for re-use as controlled compacted fill or backfill and shall be disposed of in a suitable manner. Topsoil is not suitable for re-use as controlled compacted fill or backfill and shall be disposed of in a suitable manner or stockpiled on-site for future use within landscaped areas to be approved by the Engineer. Excess soil to be removed from the work site shall be hauled to the on-site soil disposal location. Refer to the Grading Plan for location of the disposal site. Contractor shall coordinate with the Union County Department of Parks regarding specific location of soil stockpile. Access to the on-site soil stockpile will be from Raritan Road only (hauling through the golf course is strictly prohibited). No construction debris is to be stockpiled in this location. No soil testing of existing on-site soils is required.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Upon the removal of any foundations, walls, tree stumps, concrete slabs, asphalt, utilities, pipes, etc., Contractor is responsible for backfilling open excavations to grades matching existing adjacent street level grades and existing site level grades.

B. The soil shall be placed uniformly in layers not to exceed twelve (12) inches loose thickness. Each layer shall be compacted to 95% density in accordance with Section 204 of the NJDOT Standard Specifications.

C. After retaining walls are removed, clean fill shall be installed and graded to provide a stable three foot (3’) horizontal/ one foot (1’) vertical maximum slope. The soil shall be placed uniformly in layers not to exceed twelve (12) inches loose thickness. Each layer shall be compacted to 95% density in accordance with Section 204 of the NJDOT Standard Specifications.

D. The Contractor shall make provisions to implement approved dust control measures while performing this work so as not to impact surrounding residences. Should the Contractor fail to implement these measures, he will be responsible to power-wash all structures, at no additional cost to the Owner.

END OF SECTION 312323.13

Section 312500 – SOIL EROSION AND SEDIMENT CONTROL DEVICES

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work performed under this item shall include, but not be limited to, construction of all soil erosion structures, temporary seeding or mulching and general soil stabilization. Soil erosion structures include, but are not limited to, inlet protection, silt fence, hay bale barriers, stabilized construction access pads, and stockpiles.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be in conformance with the Plan and Details, and shall include, but not limited to silt fences, gravel inlet filters, jute matting, hay bales, stabilized construction access pads, dust control measures, fertilizer, temporary vegetative cover and soil stabilization. All materials shall be approved by the Engineer.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. All erosion and sedimentation control measures shall be in place prior to any grading operations or construction of proposed facilities and shall be maintained until construction is complete and the construction area is stabilized. After restoration is complete, temporary control measures shall be removed and disposed of properly.

B. All erosion and sedimentation control measures shall be constructed and maintained in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey," prepared by the New Jersey State Soil Conservation Committee, last revised February 2014.

C. Disturbed areas that will be exposed in excess of 14 days shall be temporarily seeded and/or mulched until proper weather conditions exists for establishment of a permanent vegetative cover, except in areas where final restoration is expected to be completed within seven days after the completion of construction, in which case no temporary protective measures will be required. If final restoration is expected to begin more than seven days and completed more than 30 days after the start of construction, seeding shall be required for temporary protection, except where seasonal conditions are not suitable for growing vegetation. In this case, mulch may be applied until conditions are suitable for establishing vegetative cover or until final restoration is implemented.

END OF SECTION 312500

SECTION 321123 – DENSE GRADED AGGREGATE BASE COURSE

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall include the placement of a layer of ¾-inch Dense Graded Aggregate (DGA), to the thicknesses specified on the plans, including all necessary excavation and removal of all earth, rock, boulders, brick, stone and concrete masonry, including small structures and other materials encountered. It shall also include all necessary transportation, grading, placement and disposal of material.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The stone shall be free from pieces coated with clay, caked stone dust and other objectionable materials. It shall not contain more than 5% of weathered and decomposed rock, not more than 5% of stone of types other than the type being used, in accordance with the Specifications, and not more than 7% by weight of flat or elongated pieces. A flat piece shall be one in which the ratio of the width to thickness of its circumscribing rectangular prism is greater than 5:1, and an elongated piece shall be one in which the ratio of the length to width of its circumscribing rectangular prism is greater than 5:1. The percentage of wear shall be determined in accordance with AASHTO Designation T3.

PART 3 – EXECTUION

3.1 METHODS OF CONSTRUCTION

A. Excavation and backfill of the Dense Graded Aggregate shall be in accordance with Section 202, Roadway Excavation of the current NJDOT Standard Specifications.

END OF SECTION 321123

SECTION 321216 – HOT MIX ASPHALT BASE COURSE, (MIX 19M64)

PART 1 – GENERAL

1.1 DESCRIPTION

A. Hot Mix Asphalt Base Course shall be Mix 19M64, at the 4-inch thickness after compaction, as shown on the construction drawings. This work shall consist of the furnishing and placing of a four-inch-thick bituminous stabilized base course on the prescribed surfaces, locations, in accordance with the Plans, Details and Specifications.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The composition of the Bituminous Stabilized Base Course shall be coarse aggregate, fine aggregate, mineral filler and asphalt cement. These shall be as shown in the NJDOT Standard Specifications, except that the materials shall conform to the requirements as shown for "Stone Mix". All reference to gravel mix is deleted.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. After spreading and strike-off, and while hot, each course shall be compacted thoroughly and uniformly by rolling. The rolling shall be done with a ten (10) ton roller until the mixture is thoroughly compacted to the satisfaction of the Engineer.

B. A tack coat shall be applied to any one or more layers of the Bituminous Stabilized Base Course, if in the opinion of the Engineer such layer or layers become coated with dust, dirt, or other foreign material sufficiently to prevent a good bond between the layers of Base Course or between the completed Base Course and Surface Course.

END OF SECTION 321216

SECTION 321217 – HOT MIX ASPHALT SURFACE COURSE, (MIX 9.5M64)

PART 1 – GENERAL

1.1 DESCRIPTION

A. Bituminous Concrete Surface Course shall be Mix 9.5M64, constructed in a single layer, and conforming to the lines and grades and at the 2-inch and 2½-inch thicknesses after compaction, as shown on the Construction Drawings. This surface course shall be installed on the existing base after the application of a tack coat, in accordance with these specifications.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The bituminous materials for Mix 9.5M64 shall consist of asphalt cement. The penetration grade shall be 85/100, conforming to the requirements specified therefore in Section 904, bituminous materials of the NJDOT standard specifications unless otherwise directed by the Laboratory. All other materials shall be as shown in the Standard Specifications.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. This article shall be as set forth in the "NJDOT Standard Specifications." The Contractor shall be responsible for hiring an independent laboratory, which has been approved by the Engineer, for the purpose of taking pavement cores. These cores shall be tested to determine the conformance of the materials with the Specifications. Tests will be made for composition, air voids, and thickness. The Contractor shall supply the Engineer with two (2) copies of all results.

END OF SECTION 321217

SECTION 321319 – REINFORCED CONCRETE SIDEWALKS/SLABS, 6” THICK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall include the construction of Portland Cement Concrete Aprons, Concrete Pads and the subgrade the excavation, removal and disposal of all materials of whatever nature required for the construction of driveways and concrete pads.

B. All ADA-compliant curb ramps, associated landings, and slopes, shall all be constructed using 6”-thick, reinforce concrete, per this specification section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be as those specified for Concrete Sidewalk and Driveways, as specified in Section 607, Sidewalks and Driveways of the N. J. Department of Transportation Standard Specifications.

B. All concrete shall be 4000 psi concrete.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Methods of construction shall be the same as for Concrete Sidewalk, as specified in Section 607, Sidewalks and Driveways of the NJDOT Standard Specifications.

B. Excavation shall be in accordance with Section 202 of the NJDOT Standard Specifications.

END OF SECTION 321319

SECTION 321416 – SIDEWALK BRICK PAVERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall include the installation of sidewalk brick pavers with 4" thick concrete base; therefore, all scoring patterns, the excavation and removal of all earth, rock, boulders, brick, stone and concrete masonry including small structures existing concrete and other material encountered of whatever nature, required for the construction of the sidewalk pavers. It shall also include the transportation of excavated materials; the construction of embankments with the materials excavated. The disposal of unsuitable and surplus materials; and other work as herein described.

1.2 REFERENCES

A. American Society of Testing materials (ASTM)

- C902 Standard Specification for Pedestrian and Light Traffic Paving Brick
- C1272 Standard Specification for Heavy Vehicular Paving Brick
- C136 Method for Sieve Analysis for Fine and Coarse Aggregate.
- C67 Method of Sampling and Testing Brick and Structural Clay Tile.
- C33 Specification for Concrete Aggregates.
- C144-89 Standard Specification for Aggregate for Masonry Mortar.

1.3 SUBMITTALS

A. Submit shop or product drawings and product data.

B. Submit samples of brick paving units to indicate color and size selections. Color will be selected by Engineer from manufacturer's available colors.

C. Submit sieve analysis for grading of bedding and joint sand.

D. Submit test results for compliance of paving unit requirements to ASTM C 902 or ASTM C 1272 from and independent testing laboratory.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver brick pavers to the site in steel banded, plastic banded, or plastic wrapped cubes or on pallets capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.

B. Sand shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be secured in place.

1.5 ENVIRONMENTAL CONDITIONS

A. Do not install sand or pavers during heavy rain or snowfall.

B. Do not install frozen sand.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

A. BRICK PAVER FIELD

1. Brick paver field shall be precast concrete, and shall have spacer tabs/bars, shall be 'A' Grade pavers manufactured/supplied by CST Pavers, or approved equivalent.

2. Brick paver field shall be set in a running bond pattern, running parallel with the adjacent roadway (see Paver Layout construction detail).

3. Brick paver shall be 6 inches wide, 9 inches long, 2-3/8 inches thick with a chamfer and lug separator.

4. Concrete Pavers shall be "Contempra", colored "Brown Flash", manufactured by CST Pavers, or approved equivalent.

B. RED BRICK PAVER BORDER

1. Border brick pavers shall be precast concrete, and shall have spacer tabs/bars, shall be 'A' Grade pavers manufactured/supplied by CST Pavers, or approved equivalent.

2. Brick paver border shall be set in a double row on the outer edges of the brick paver field (two rows along the back, and two rows along the front).

3. Concrete Paver bonds shall be "Ridgestone", colored "Antique Gray", manufactured by CST Pavers, or approved equivalent.

C. Pavers shall meet the following requirements set forth in ASTM C 902, specification for Pedestrian and Light Traffic Paving Brick or C 1272 specification for Heavy Vehicular Paving Brick and shall conform to the PX standard.

1. Minimum average compressive strength of 10,000 psi.

2. The average cold water absorption shall not be greater than 6% with no individual unit testing greater than 7%. Absorption test results may not be achieved through the use of sealers or other products applied to the clay paver. (Sealer protection degrades over time requiring re-application after several years.)

3. Resistance of 50 freeze-thaw cycles, when tested in accordance with ASTM C67. In addition, the clay paver must pass CSA-A231.2 freeze thaw test in saline solution without the use of sealers or other products applied to the paver. A test report must be submitted by the manufacturer. (Salt is the most common substance used for de-icing during the winter months.)

4. Dimensional tolerances should meet the PX standard. The dimensional tolerances around the mean values for length, width, and depth shall be 1/16 inch. (Studies show that dimensional tolerances are directly linked to joint width size and proper interlock.)

5. The pavers should be solid units without core holes or other perforations.

6. The contractor shall ensure that the manufacturer conducts a test sampling of 24 pavers every 50,000 pavers manufactured to determine the pavers compliance with dimensional and water absorption characteristics. The 24-paver sample shall be representative of the color mix in the typical finished package and chosen on a consistent basis from one kiln car. (Proper control procedures and testing are standard operating procedure for high quality manufacturers.)

1.2 BEDDING AND JOINT SAND

A. Base requirements shall be determined by specifier, taking into consideration the type of traffic to be used on pavers. Base material shall be 4" to 12" compacted to 95% density. (See construction details).

B. Base material shall consist of sound, durable particle, free from clay, silt or organic materials. Material should be 100% crushed with fine graded to the following limits.

Sieve Size	% Passing
1 inch	100
¾ inch	70-100
3/8 inch	50-80
No. 4	35-65
No. 10	25-50
No. 40	15-30
No. 200	5-12

C. Setting bed shall consist of 4" thick reinforced concrete below a layer of sand 1" to 1½" thick. After setting bed is screeded it will not be disturbed. (See construction detail).

D. Setting bed shall conform to following gradation:

Sieve Size	% Passing
3/8 inch	100
No. 4	90-96
No. 100	10-30

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subgrade preparation and compaction conform to requirements.

B. Verify the compacted base is dry, uniform, even and ready to support sand, pavers and imposed lads. Do not fill low areas with bedding sand when adjusting final base course, use base material.

3.2 METHOD OF CONSTRUCTION

A. Methods of construction shall be in accordance with the current Standard Sidewalks and Driveways Specification.

B. Excavation shall be in accordance with the current Standard Specifications.

C. All operations pertaining to handling, measuring and batching materials, and mixing concrete, shall conform to the requirements specified in the current Standard Handling, Measuring, and Batching Materials Specification; and the current Standard Mixing Concrete in the Specification.

D. Subgrade to be compacted by others to 95% density, with particular attention being paid to trenches and filled foundation areas.

E. Layering of interlocking pavers shall be done by experienced crew members. Pavers should be laid hand-tight in desired pattern with care taken to maintain straight and true lines.

F. Cutting where necessary can be accomplished by either a double blade splitter or masonry saw.

G. After pavers are installed and the cutting has been completed, the pavers shall be compacted into the lose setting bed with a vibrating plate type compactor. One pass on all areas.

H. Sand shall be swept into the joints and vibrated with a vibrating plate type compactor until joints are full. Joints must be filled all the way to the bottom of the chamfer on the paver edges. Excess sand will be swept from the site.

I. The final surface elevations shall not deviate more than 3/8 inch under a 10-foot straightedge.

J. The surface elevation of the pavers shall be 1/8 to 1/4 inch above any adjacent drainage inlets, concrete collars, utility boxes or channels.

END OF SECTION 321416

SECTION 321613.13 – CONCRETE VERTICAL CURB & DEPRESSED CURBS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Concrete Vertical Curbs and Depressed Curbs shall include the excavation and removal of all earth, rock, boulders, brick, stone and concrete masonry, including small structures and other materials encountered of whatever nature, required for the construction of concrete curb. It shall also include the transportation and disposal of the excavated materials; the construction of embankments with the materials excavated; the disposal of unsuitable and surplus materials; and other work as shown on the plans or specified herein.

B. Construction of curbing within the existing parking lot as shown on the plans shall include sawcutting and pavement restoration, two (2) foot wide in accordance with contract documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. NJDOT Standard Specifications Subsection 605.02.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Construction shall be in accordance with Section 605 – Curbs of the NJDOT Standard Specifications.

B. On-site curb shall be 6”-wide at the top, 18”-deep, 9”-wide at the bottom and installed with a 6” curb reveal as per the Plans and Details.

C. Excavation and backfill shall conform to the requirements of Section 202 - Roadway Excavation of the NJDOT Standard Specifications. The backfill and curb foundation shall be well compacted by means of flat-faced mechanical tampers, or by other means to be approved by the Engineer, and in accordance with Subsection 203.06 of the NJDOT Standard Specifications.

D. Curbs at handicap ramps shall be depressed so that the top is flush with the adjacent pavement or shoulder surface.

END OF SECTION 321613.13

SECTION 321623 – CONCRETE SIDEWALK, 4” THICK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall include the construction of Portland Cement Reinforced Concrete Sidewalk Paving and the subgrade the excavation and removal of all earth, rock, boulders, brick, stone, and concrete masonry structures including small structures, existing concrete sidewalk, and other materials encountered of whatever nature required for the construction of the concrete sidewalks, walkways, and paths as per the Contract Documents.

B. This item shall also include the construction of a 4”-thick concrete sub-base for brick or concrete pavers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be as those specified for Concrete Sidewalk and Driveways, as specified in Section 607, Sidewalks and Driveways of the N. J. Department of Transportation Standard Specifications.

B. All concrete shall be 4000 PSI concrete.

PART 3 - EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Methods of construction shall be the same as for Concrete Sidewalk, as specified in Section 607, Sidewalks and Driveways of the NJDOT Standard Specifications.

B. Excavation shall be in accordance with Section 202 of the NJDOT Standard Specifications.

END OF SECTION 321623

SECTION 321713.19 – PRECAST CONCRETE BUMPER BLOCKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of reinstalling the existing precast concrete bumper blocks as indicated on the contract documents.

B. Precast wheel stops shall consist of the reinforcement, anchoring and concrete wheel stops (also known as concrete bumper blocks) in conformance with the details and at locations shown on the plans or as directed by the Engineer.

C. Contractor shall remove, and store on-site, all existing concrete bumper blocks from the existing parking lot. The Engineer will determine which ones will be saved for reuse and which ones will be removed from the site. Those blocks to be reused shall be power-washed prior to reuse, to the satisfaction of the Owner and/or Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Concrete shall be a minimum of 5,000 psi air-entrained concrete or per New Jersey Department of Transportation Specifications.

B. Wheel-stops shall be with two #4 rebars.

C. Standard length shall be 6’-0” in length.

D. Two ¾” diameter thru-holes for anchoring.

PART 3 - EXECUTION

3.1 METHOD OF CONSTRUCTION

A. Concrete Wheel stops shall be constructed at the locations shown on the plans or as directed by the Engineer. Tapered side design to relieve tension on setting pins. Slots on underside to allow drainage and allow units to be lifted with forklift. Graduated taper on ends.

B. Concrete and Reinforcement shall meet all New Jersey Department of Transportation Specifications.

END OF SECTION 321713.19

SECTION 321720 – ADA-ACCESSIBLE CURB RAMPS WITH TRUNCATED DOMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. ADA-Accessible Curb Ramps shall consist of a ramp area of sloping concrete sidewalk, a landing area of regular concrete sidewalk, sidewalk curb ramp delineation (Truncated Dome Mats-Armor Tile - Dark Gray – Set in Fresh Concrete or approved equal), and two transitional section of sloping sidewalk, all in conformance with the details shown on the plans or as directed by the Engineer. Adjacent curbs shall be transitioned according to the varying heights stipulated in the plans and/or details.

B. All concrete for ADA curb ramps shall be 6-thick reinforced concrete (see Section 321319).

PART 2 – MATERIALS

A. DWS Truncated Dome Mats shall be manufactured by:

Detectable Warning Systems
Box 232, 17853 Santiago Blvd., #107
Villa Park, CA 92861
Phone: (866) 999-7452 Fax: (714) 974-3246
(OR APPROVED EQUAL)

Color Shall be SAFETY RED

Adhesive shall be Safti-Trax/Duraback as manufactured by:

Cote-L Industries, Inc.
1542 Jefferson St.
Teaneck, NJ 07666
Phone: (201) 836-0733 Fax: (201) 836-5220
(OR APPROVED EQUAL)

PART 3 – EXECUTION

3.1 METHOD OF CONSTRUCTION

A. Curb Ramps shall be constructed at the locations shown on the plans or as directed by the Engineer. The sub-grade shall be constructed in the same manner as described for sidewalks. Each separate portion of the ramp shall be constructed so as to conform the slope designated for that specific section, as shown on the plan detail or as directed by the Engineer.

B. Public Sidewalk Curb Ramp Delineation shall be in accordance with Section 607 of the Standard State Specifications.

END SECTION 321720

SECTION 321723 – PAVEMENT MARKINGS (LONG LIFE)

PART 1 – GENERAL

1.1 DESCRIPTION

A. In this item, the Contractor shall be responsible for the applying of white, blue and yellow lines, including, but not limited to, linestriping, handicap parking spaces, parking spaces, median lines, stop lines, or cross-walks having a 0.015-inch wet film thickness, the cleaning of surfaces, furnishing and placing of paint, protecting the wet paint against deformation, smear or smudge, maintenance of traffic on the pavement surfaces and in accordance with layout as shown on plans, or as directed by the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials shall be in accordance with Section 912.34, Pavement Stripes or Markings of the Standard Specifications.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Pavement linestriping shall be in accordance with Section 617 - Traffic Stripes of the Standard Specifications.

B. Immediately prior to striping, all dirt, loose chalky paint, or other foreign matter shall be removed from the pavement surface by method to be approved by the Engineer.

C. Striping shall not be applied until the Engineer has approved the degree of cleanliness or condition of the pavement surface.

D. All painted lines laid improperly, whether they have to do with alignment, pattern, or pavement cleanliness shall be removed, to the satisfaction of the Engineer, and properly repainted.

E. The Contractor shall be responsible for the chalking and/or the layout of lines, in accordance with the Plans, or as directed by the Engineer.

F. Striping shall not start until one and one half (1-1/2) hours has elapsed after sunrise, nor shall it continue after 3:00 p.m., unless otherwise specified by the Engineer or his Representatives.

G. Striping shall be applied only on a thoroughly dry surface and during period of favorable weather.

END OF SECTION 321723

SECTION 323123 - PRIVACY FENCE AND GATES

PART 1 – GENERAL

1.1 DESCRIPTION

A. This specification provides information for the installation of polyvinyl chloride (PVC) privacy fence and gates with the size shown on the associated plans and construction details.

1.2 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.3 PRODUCT WARRANTY

A. Provide manufacturer's Lifetime Limited Warranty.

1.4 SUBMITTAL

A. Changes in specification may not be made after the bid date.

B. Shop Drawings: Layout of fence and gates with dimensions, details and finishes of component accessories and post foundations.

C. Product Data: Manufacturer's catalogue cuts indicating material compliance and specified options.

D. Samples: Color selections for PVC. If requested, samples of materials.

PART 2 – MATERIALS

2.1 MANUFACTURER

A. Products from other qualified manufacturers having a minimum of 5 years' experience manufacturing PVC fencing will be acceptable by the architect as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size, and fabrication. PVC Profiles, lineals & extrusions used as components must "meet or exceed" the minimum performance guidelines laid out in ASTM 964-02.

B. Approved Manufacturer:

Master Halco, Inc.
4000 W. Metropolitan Drive, Suite 400
Orange, California 92868
Phone (800) 229-5615 Fax (714) 385-0107
Site: www.fenceonline.com E-mail: spec@fenceonline.com

OR APPROVED EQUAL

C. PVC privacy fence and gates shall have a nominal height of 6 feet for the Legend Vinyl Series Model or the selected approved equal.

2.2 MATERIAL

A. Pickets, rails, and posts fabricated from PVC extrusion. The PVC extrusions shall comply with ASTM D 1784, Class 14344B and have the following characteristics:

Specific Gravity (+/- 0.02):	1.4
Using 0.125 specimen Izod impact ft.-lbs./in. notch:	23.0
Tensile strength, psi:	6,910
Tensile modulus, psi:	336,000
Flexural yield strength, psi:	10,104
Flexural modulus, psi:	385,000
DTUL at 264 psi:	67° C

B. Color of vinyl fence and gates shall be black. Contractor shall submit color sample to Owner and Architect for review prior to purchasing.

2.3 SETTING MATERIAL

A. Concrete: Minimum 28-day compressive strength of 3,000 psi (20 MPa).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.1 INSTALLATION

A. Follow individual installation instructions for the appropriate style in setting posts. Set gate posts for gate opening specified in the construction drawings. Posts shall be placed 24 to 36 inches in the ground, depending upon the style of fence and local conditions and set in concrete (see individual installation instructions for the appropriate style).

B. Gate posts and corner posts on all fences and line posts on taller fences shall be filled with concrete for additional strength.

C. Place assembled fence sections into position and slide rails into posts. The rails are secured into posts by tabs which are notched into the rails and catch on the inside wall of the post.

D. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.

END OF SECTION 323123

SECTION 323200 – MODULAR BLOCK RETAINING WALL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work shall consist of furnishing and construction of an Allan Block or approved equal Modular Block Retaining Wall System or equal in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown on the Plans.

B. Work includes preparing foundation soil, furnishing and installing compacted granular leveling pad, ¾" clean stone unit drainage fill and reinforced compacted earth backfill, 4" perforated PVC drain, to the lines and grades shown on the construction drawings.

C. Work includes furnishing and installing geogrid soil reinforcement of the type, size, location, and lengths designated on the plans.

D. This work does not include construction of CMU block walls with stone veneer. Contractor shall refer to Architectural plans and specifications for CMU block walls with stone veneer.

1.2 RELATED SECTIONS

A. Section 312200 – Site Grading

1.3 REFERENCE DOCUMENTS

A. American Society for Testing and Materials (ASTM)

1. ASTM C-1372 Specification for Segmental Retaining Wall Units
2. ASTM D-422 Particle Size Analysis
3. ASTM D-698 Laboratory Compaction Characteristics of Soil -Standard Effort
4. ASTM D-4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
5. ASTM D-4595 Tensile Properties of Geotextiles - Wide Width Strip
6. ASTM D-5262 Unconfined Tension Creep Behavior of Geosynthetics
7. ASTM D-3034 Polyvinyl Chloride Pipe (PVC)
8. ASTM D-1248 Corrugated Plastic Pipe
9. ASTM D-4475 Horizontal Shear Strength of Pultruded Reinforced Plastic Rods

B. Geosynthetic Research Institute (GRI)

1. GRI-GG4 Determination of Long Tern Design Strength of Geogrids
2. GRI-GG5 Determination of Geogrid (soil) Pullout

C. National Concrete Masonry Association (NCMA)

1. NCMA SRWU-1 Test Method for Determining Connection Strength of SRW
2. NCMA SRWU-2 Test Method for Determining Shear Strength of SRW

1.4 SUBMITTALS/CERTIFICATION

A. Contractor shall submit a manufacturer's certification, prior to start of work, that the retaining wall system components meet the requirements of this specification and the structure design.

B. Contractor shall submit construction shop drawings with design calculations for the retaining wall system certified by a Professional Engineer registered in the state of the NJ. The engineering designs, techniques, and material evaluations shall be in accordance with the Manufacturer's Design Manual, NCMA Design Guidelines for Segmental Retaining Walls, or the AASHTO Standard Specifications for Highway Bridges, Section 5.8 (whichever is applicable to designer).

C. Contractor shall submit a test report documenting strength of specific modular concrete unit and geogrid reinforcement connection. The maximum design tensile load of the geogrid shall be equal to the laboratory tested ultimate strength of geogrid / facing unit connection at a maximum normal force limited by the "Hinge Height" of the structure divided by a safety factor of 1.5. The connection strength evaluation shall be performed in accordance with NCMA test method SRWU-1.

D. Contractor shall submit color samples with shop drawings for review by Architect and owner.

1.5 QUALITY ASSURANCE

A. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude by the wall installer where the specific retaining wall system has been constructed successfully. Contact names and telephone numbers shall be listed for each project.

B. Engineer may provide soil testing and quality assurance inspection during earthwork and wall construction operations. Contractor shall provide any quality control testing or inspection not provided by the Engineer. Engineer's quality assurance program does not relieve the contractor of responsibility for quality control and wall performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall check all materials upon delivery to assure that the proper type, grade, color, and certification has been received.

B. Contractor shall protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

PART 2 – PRODUCTS

2.1 DEFINITIONS

A. Modular Unit - a concrete retaining wall element machine made from Portland cement, water, and aggregates.

B. Structural Geogrid - a structural element formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and

C. Unit Drainage Fill - drainage aggregate, which is placed within and immediately behind the modular concrete units.

D. Reinforced Backfill - compacted soil, which is placed within the reinforced soil volume as outlined on the plans.

2.2 MODULAR CONCRETE RETAINING WALL UNITS

A. Modular concrete units shall conform to the following architectural requirements:

1. Face color – As selected by project architect.
2. Face finish - sculptured rock face in angular tri-planer configuration. Other face finishes will not be allowed without written approval of Engineer.
3. Bond configuration - running with bonds nominally located at midpoint vertically adjacent units, in both straight and curved alignments.
4. Exposed surfaces of units shall be free of chips, cracks or other imperfections when viewed from a distance of 10 feet under diffused lighting.

Note: product submittal for modular concrete unit to be provided to project architect prior to construction or ordering the proposed units.

B. Modular concrete materials shall conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.

C. Modular concrete units shall conform to the following structural and geometric requirements measured in accordance with appropriate references or approved equals:

1. Compressive strength: ≥ 3000 psi (21 MPa);
2. Absorption: 8 % (6% in northern states) for standard weight aggregates;
3. Dimensional tolerances: ± 1/8" (3 mm) from nominal unit dimensions not including rough split face, ±1/16" (1.5 mm) unit height - top and bottom planes;
4. Unit size: 8" (203 mm) (H) x 12" (457 mm)(W);
5. Unit weight: 100 lbs/unit (45 kg) minimum for standard weight aggregates;
6. Inter-unit shear strength: 1500 plf (21 kN/m) minimum at 2 psi (13 MPa) normal pressure;
7. Geogrid/unit peak connection strength: 1000 plf (14 kN/m) minimum at 2-psi (13 MPa) normal force.

D. Modular concrete units shall conform to the following constructability requirements:

1. Wall batter of 4.4 degrees per design and construction details;
2. Alignment and grid positioning mechanism - fiberglass pins, two per unit minimum;
3. Maximum horizontal gap between erected units shall be ≤ ½-inch (13 mm).

2.3 SHEAR CONNECTORS

A. Shear connectors shall be 1/2-inch (12 mm) diameter thermoset isopthalic polyester resin-pultruded fiberglass reinforcement rods or equivalent to provide connection between vertically and horizontally adjacent units. Strength of shear connectors between vertical adjacent units shall be applicable over a design temperature of 10 degrees F to + 100 degrees F (-10 to 40 degrees C).

B. Shear connectors shall be capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.

2.4 BASE LEVELING PAD MATERIAL

A. Material shall consist of a compacted crushed stone base as shown on the construction drawings.

2.5 UNIT DRAINAGE FILL

A. Unit drainage fill shall consist of clean 1" (25 mm) minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
1-inch (25 mm)	100
3/4-inch (19 mm)	75-100
No. 4	0 - 10
No. 50	0 - 5

B. One cubic foot, minimum, of drainage fill shall be used for each square foot of wall face. Drainage fill shall be placed within cores of, between, and behind units to meet this requirement.

2.6 REINFORCED BACKFILL

A. Reinforced backfill shall be free of debris and meet the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
2-inch (25 mm)	100
3/4-inch (19 mm)	75-100
No. 40	0 - 60
No. 200	0 - 35

Plasticity Index (PI) <15 and Liquid Limit <40 per ASTM D-4318.

B. The maximum aggregate size shall be limited to 3/4 inch (19 mm) unless field tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.

C. Material can be site-excavated soils where the above requirements can be met. Unsuitable soils for backfill (high plastic clays or organic soils) shall not be used in the backfill or in the reinforced soil mass.

D. Contractor shall submit reinforced fill sample and laboratory test results to the Architect/Engineer for approval prior to the use of any proposed reinforced fill material.

2.7 GEOGRID SOIL REINFORCEMENT

A. Geosynthetic reinforcement shall consist of geogrids manufactured specifically for soil reinforcement applications and shall be manufactured from high tenacity polyester yarn or high-density polyethylene. Polyester geogrid shall be knitted from high tenacity polyester filament yarn with a molecular weight exceeding 25,000 Meg/m and a carboxyl end group values less than 30. Polyester geogrid shall be coated with an impregnated PVC coating that resists peeling, cracking, and stripping.

B. Ta, Long Term Allowable Tensile Design Load, of the geogrid material shall be determined as follows:

1. Ta = Tult / (RFcr*RFd*RFid*FS)
   Ta shall be evaluated based on a 75-year design life.
2. Tult, Short Term Ultimate Tensile Strength

Tult is based on the minimum average roll values (MARV)

3. RFcr, Reduction Factor for Long Term Tension Creep
   RFcr shall be determined from 10,000-hour creep testing performed in accordance with ASTM D5262. Reduction value = 1.60 minimum.
4. RFd, Reduction Factor for Durability
   RFd shall be determined from polymer specific durability testing covering the range of expected soil environments. RFd = 1.10 minimum.
5. RFid, Reduction Factor for Installation Damage
   RFid shall be determined from product specific construction damage testing performed in accordance with GRI-GG4. Test results shall be provided for each product to be used with project specific or more severe soil type. RFid = 1.05 minimum.
6. FS, Overall Design Factor of Safety
   FS shall be 1.5 unless otherwise noted for the maximum allowable working stress calculation.

C. The maximum design tensile load of the geogrid shall not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection as limited by the "Hinge Height" divided by a factor of safety of 1.5. The connection strength testing and computation procedures shall be in accordance with NCMA SRWU-1 Test Method for Determining Connection Strength of SRW.

D. Soil Interaction Coefficient, Ci
Ci values shall be determined per GRI:GG5 at a maximum 0.75-inch (19 mm) displacement.

E. Manufacturing Quality Control
The geogrid manufacturer shall have a manufacturing quality control program that includes QC testing by an independent laboratory.
The QC testing shall include:

Tensile Strength Testing
Melt Flow Index (HDPE)
Molecular Weight (Polyester)

2.8 DRAINAGE PIPE

A. The drainage pipe shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D-3034 or corrugated HDPE pipe manufactured in accordance with ASTM D-1248.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Contractor shall excavate to the lines and grades shown on the construction drawings. Engineer's representative shall inspect the excavation and approve prior to placement of leveling material or fill soils. Proof roll foundation area as directed to determine if remedial work is required.

B. Over-excavation and replacement of unsuitable foundation soils and replacement with approved compacted fill will be compensated as agreed upon with the Engineer.

3.2 BASE LEVELING PAD

A. Compacted granular base leveling pad shall be placed to the lines and grades shown on the construction drawings, to a minimum thickness of 6 inches (150 mm) and extend laterally a minimum of 6" (150 mm)

in front and a minimum of 12" behind the modular wall unit. The overall width of the leveling pad shall be 2.5' as per the design and construction details.

B. Compacted granular base leveling pad shall be compacted to a minimum of 95 % Standard Proctor density per ASTM D-698

C. Leveling pad shall be prepared to insure full contact to the base surface of the concrete units.

3.3 MODULAR UNIT INSTALLATION

A. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.

B. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.

C. Install shear/connecting devices per manufacturer's recommendations.

D. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.

E. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

3.4 STRUCTURAL GEOGRID INSTALLATION

A. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.

B. Geogrid reinforcement shall be placed at the strengths, lengths, and elevations shown on the construction design drawings or as directed by the Engineer.

C. The geogrid shall be laid horizontally on compacted backfill and attached to the modular wall units. Place the next course of modular concrete units over the geogrid. The geogrid shall be pulled taut, and anchored prior to backfill on the geogrid.

D. Geogrid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps between adjacent pieces of geogrid are not permitted.

3.5 REINFORCED BACKFILL PLACEMENT

A. Reinforced backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.

B. Reinforced backfill shall be placed and compacted in lifts not to exceed 8 inch lifts and compacted to 95% maximum proctor density to achieve an installed unit soil weight of 120pcf and an angle of internal friction of 30 degrees. Lift thickness shall be decreased to achieve the required density, unit soil weight, and angle of internal friction as required.

C. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum, + 0%, - 3%.

D. Only lightweight hand-operated equipment shall be allowed within 3 feet (1m) from the tail of the modular concrete unit.

E. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches (150 mm) is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

F. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH (15 KPH). Sudden braking and sharp turning shall be avoided.

G. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.6 CAP INSTALLATION

A. Cap units shall be glued to underlying units with an all-weather adhesive recommended by the manufacturer.

3.7 AS-BUILT CONSTRUCTION TOLERANCES

A. Vertical alignment: ± 1.5" (40 mm) over any 10' (3 m) distance.

B. Wall Batter: within 2 degrees of design batter.

C. Horizontal alignment: ± 1.5" (40 mm) over any 10' (3 m) distance.
Corners, bends & curves: ± 1 ft (300 mm) to theoretical location.

D. Maximum horizontal gap between erected units shall be ≤ 1/2 inch (13 mm).

3.8 FIELD QUALITY CONTROL

A. Quality Assurance - The Engineer shall/may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction control testing.

B. Quality assurance should include foundation soil inspection. Verification of geotechnical design parameters, and verification that the contractor’s quality control testing is adequate as a minimum. Quality assurance shall also include observation of construction for general compliance with design drawings and project specifications. Quality assurance is best performed by the site geotechnical engineer.

C. Quality Control – The Contractor shall engage inspection and testing services to perform the minimum quality control testing described in the retaining wall design plans and specifications. Only qualified and experienced technicians and engineers shall perform testing and inspection services.

D. Quality control testing shall include soil and backfill testing to verify soil types and compaction and verification that the retaining wall is being constructed in accordance with the design plans and project specifications.

END OF SECTION 323200

SECTION 323914 – BOLLARDS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall consist of permanent, non-removable steel pipe bollards with concrete bases as shown on the Contract Plans, or as directed by the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Bollards shall be 4 inch diameter.

B. Bollards shall extend 48 inches above finished grade.

C. Bollards shall be constructed of steel in accordance with ASTM A36 with 25 percent recycled-material content.

D. Bollards shall be painted Caution Yellow

1. Coordinate color of permanent bollards to match that of the removable locking bollards (Section 323913).

E. Bollards shall be filled with 3,000 psi concrete.

F. Concrete footings for bollards shall be constructed with 3,000 psi concrete within a 48 inch long by 24 inch diameter sono-tube.

1. Concrete footings for bollards shall be 42 inches long and constructed to be 6 inches below finished grade.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Bollards shall be 4 inches in diameter, filled with 3,000psi concrete, painted caution yellow (unless otherwise directed by the engineer), and constructed within a 3000-psi concrete filled 24" diameter sonotube. The bollard shall be constructed with 4-inch steel pipe and shall extend a minimum of 4 feet above and below the ground surface elevation.

B. The bollard shall extend a minimum of four (4) feet above grade and four (4) below the ground surface elevation.

C. Bollards shall be painted after approval of installation of both the permanent and removable/locking bollards by the Owner and the Engineer.

END OF SECTION 323914

SECTION 328400 – LANDSCAPE IRRIGATION SYSTEM

PART 1- GENERAL

A. Under this item, the Contractor shall coordinate with the Owners Irrigation Contractor who will prepare and submit an irrigation design of an In-Ground Irrigation System prepared by an approved Irrigation Design Specialist. The contractor shall be responsible for the below items as marked accordingly. Work under this item includes, but is not necessarily limited to, the following:

1) Proposed Irrigation Layout & Shop Drawing submittals. **(Work to be Performed By Others)**
2) Coordination of new water service with utility company.
3) Construction of new water service and backflow preventer from clubhouse to location as indicated on the plans, including all required permits.
4) Construction of all sleeves of a maximum size of 4" diameter, underneath the sidewalk, driveway and parking area as required by the Irrigation Contractor. The General Contractor is responsible to coordinate this with the Owner and/or Engineer.
5) Trenching, excavation, and backfill for the entire system. **(Work to be Performed By Others)**
6) Installing fully operational irrigation system with all sprinklers, controllers, decoders, and control wires, piping, isolation valves, valve boxes and materials necessary to install a completely automatic irrigation system. **(Work to be Performed By Others)**
7) Testing all systems and making operative. **(Work to be Performed By Others)**
8) Preparing "Record Drawing" drawings. **(Work to be Performed By Others)**
9) First Year Winterization & following Spring Activation. **(Work to be Performed By Others)**
10) Exterior solenoid valves and rain sensor **(Work to be Performed By Others)**
11) Maintenance & Operation Training and Demonstration **(Work to be Performed By Others)**
12) Operation Maintenance Manual & Instructional Video. **(Work to be Performed By Others)**

1.1 IRRIGATION DESIGN SPECIALIST

A. The Contractor shall obtain the services of an Irrigation Design Specialist to prepare an irrigation design proposal for the landscaped areas designated on the plans. The Irrigation Design Specialist shall have a minimum of five (5) years experience performing commercial irrigation design work. The designer's experience shall be of a similar size and scope to the work shown on the drawings. Certification with a specialty in "Commercial Irrigation Design" (CID-Commercial will equate to four years of experience) by the Irrigation Association, Fairfax, Va., shall be considered proof of the requisite experience, however, any equivalent combination of education and experience may be submitted for approval. The combination of experience and CID requirements not being met will be Grounds For Rejection of submitted layout plan: In selection and installation of sprinkler heads, irrigation specialist shall select the appropriate sprinkler heads to keep the paved areas, sidewalks, roadways, sitting areas, playground, etc. relatively dry without compromising the full irrigation of turf and planting areas. The valve boxes shall be located as unobtrusively as feasible.

B. Existing trees shall be protected in accordance with plans and specifications.

1.2 CONFERENCE

A. Before any work is started, a site conference shall be held between the Contractor, the Irrigation Design Specialist, the Irrigation Sub/Contractor, the Landscape Architect and Engineer or Owner's Agent concerning the work to be performed under this Item. Tree protection shall be reviewed at this conference and siting, layout, hand and/or pneumatic excavation or tunneling shall be discussed. Contractor shall schedule conference at the convenience of the Owner's Representative.

1.3 EXISTING PLANTS AND SITE CONDITIONS

A. The Contractor shall take necessary precautions to protect existing site conditions. Should damage be incurred, the Contractor shall repair the damage to its original condition at his own expense.

1.4 COORDINATION

A. The General Contractor shall install PVC pipe or galvanized heavy wall steel sleeves under roadways, sidewalks, and pathways to facilitate installation of the irrigation system. The Irrigation Sub/Contractor shall coordinate and cooperate with other Contractors to enable the work to proceed as rapidly and efficiently as possible.

B. Coordinate and cooperate with other contractors to enable the work to proceed as rapidly and efficiently as possible. The Contractor shall call for mark out from New Jersey One Call Center 811 or 1-800-272-1000 and notify the Owner or Owner's Agent four (4) days prior to his commencement of installation of the irrigation system. The Contractor shall verify all site features and utilities to include but not limited to the items below. The contractor shall not proceed with installation of irrigation system without written permission from owner's agent.

1.5 PERMITS

A. The Contractor shall obtain all necessary permits and pay all required fees, at no additional cost to the County, to any governmental agency having jurisdiction over the work. The Contractor as required shall arrange inspections required by local ordinances during the course of construction.

1.6 LICENSES

A. A Licensed Plumber shall make all plumbing connections. A Licensed Electrician shall perform all electrical work. All Irrigation Contractors shall be licensed in the State of New Jersey and shall submit their license number with the bid.

1.7 REJECTION

A. Union County reserves the right to reject any proposed design layout, material, or work, which does not conform to the Contract Documents. Rejected work shall be removed or corrected at the Contractor's expense immediately upon notification by the Engineer or Owner's Representative.

1.8 IRRIGATION WATERING SCHEDULE

A. The Contractor shall provide an irrigation watering schedule. The irrigation watering schedule shall provide the run time, active days, precipitation rate, soil infiltration rate, and soil water holding capacity in an Excel Spread Sheet format for each zone. The irrigation watering schedule will shall be stamped by the CID, CIC, CLWM.

1.9 FINAL ACCEPTANCE

A. Final acceptance of the work may be obtained from the Owner upon the satisfactory completion of all the work.

1.10 GUARANTEE

A. All work shall be guaranteed for one year from date of acceptance against all defects in material, equipment and workmanship. Guarantee shall also cover repair of damage to any part of the premises resulting from leaks or other defects in material, equipment and workmanship to the satisfaction of the Owner. Repairs, if required, shall be done promptly at no cost to the Owner.

PART 2 – PRODUCTS

2.1 GENERAL

A. Unless otherwise herein specified, all materials and methods of construction shall conform to the requirements of the Supplemental general conditions.

B. For proper coordination of materials used in the Irrigation system, all materials shall be purchased from the same supply source, although not necessarily the material of a single manufacturer. All materials throughout the system shall be new. All materials shall meet or exceed the specifications of the materials installed in the previous phase.

C. Irrigation system shall utilize the HydroPoint Weather Track ET Pro3 controller and all associated compatible materials, or approved equal.

D. All materials throughout the system shall be new and in perfect condition. After award of the Contract, and prior to beginning the work, the Contractor shall submit for approval two copies of the complete list of materials which he proposes to install. Quantities of materials and equipment need not be included. No deviations from the specifications shall be allowed.

E. All material and product names specified herein are for a basis of design. All proprietary products are as specified or as approved equivalent.

2.2 PLASTIC PIPING AND FITTINGS

A. All piping 2.5” and larger pipe shall be Gasket Joint SDR 21 Class 200 PVC Pipe, extruded from 100 percent virgin polyvinyl chloride conforming to ASTM D 2241 and shall be continuously and permanently marked with the manufacturers name, material, size and schedule or type. Pipe shall conform to all specifications form ASTM, Department of Commerce, NSFTL (NSF) or the latest revisions. Pipe shall be Crestline or IPEX only or approved equal.

B. All 2.5” pipe and small shall be SWBE SDR 21 Class 200 PVC Pipe, extruded from 100 percent virgin polyvinyl chloride conforming to ASTM D 2241 and shall be continuously and permanently marked with the manufacturers name, material, size and schedule or type. Pipe shall conform to all specifications form ASTM, Department of Commerce, NSFTL (NSF) or the latest revisions. Pipe shall be Crestline or IPEX only or approved equal.

1. All fittings on 2.5” and smaller shall be SCH 40 PVC conforming to ASTM D-2466. No saddle or clamp type fittings shall be used.

2. All fittings 3” and larger shall be Harco DI fittings with Joint Restraints and Thrust blocking shall be at all directional changes and terminations, thrust size shall be in accordance with pipe manufacturer’s specifications.

C. All pipes for sleeves shall be SCH 40 PVC conforming to ASTM D-1785. Sleeve sizes shall be large enough to accommodate the bell housing of the ring tight pipe or the solvent weld belled end pipe. As a minimum, the sleeve pipe ID shall be 2.5 times the irrigation pipe OD as measured at the bell housing.

2.3 SOLVENT CEMENT

A. Solvent cement shall be compatible with PVC pipe and of proper consistency.

2.4 ISOLATION VALVES

A. Two and one half inch (2 ½”) and smaller isolation and drain valves shall be screwed bonnet, bronze body, solid-wedge type gate valves with threaded ends, non-rising stems, and shall be rated for a normal operating pressure (cold water) of at least 200 PSI. They shall be Nibco T-113 Series Isolation Valve.

B. Main line isolation valves three inches (3”) or larger shall be iron body, bronze mounted units which meet AWWA specification C509, as manufactured by Waterous. They shall have a working pressure rating for cold water of at least 200 PSI. The valves shall have push-on ends specifically designed for use with PVC pipe. The valves shall be equipped with non-rising stems and 2” square cast iron operating nuts.

2.5 VALVE BOXES

A. Access to all Electric valves and flow sensor shall be provided by Dura standard rectangular boxes and extensions. The valve boxes and extensions shall be 12” standard rectangular with Green cover, model PVC120, as manufactured by Dura Plastics.

B. Access to all gate valves and ground rods shall be provided by Dura 10” Round Valve Box. The valve boxes shall be 10” round with Green cover, model PVC100, as manufactured by Dura Plastics.

C. All valves shall be centered and plumb in all valve boxes

2.6 REMOTE CONTROL VALVES 3.7a 1” and .75” RAIN BIRD PGA SERIES ELECTRIC VALVE

A. The electric remote control valve shall be a normally closed 24 VAC 50/60 Hz (cycles/second) solenoid actuated globe/angle pattern design capable of having a flow rate of 5 – 50 units flow with a pressure loss not to exceed 7.5 units. The valve pressure rating shall be less than 150 PSI.

B. The valve body and bonnet shall be constructed of high impact, weather resistant PVC with stainless steel screws. The valve shall have manual open/close control (internal bleed) for manually opening and closing the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box.

C. The valve shall house a fully-encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing, and a leverage handle for easy turning. This 24 VAC 50/60 Hz solenoid shall open with 19.6 VAC minimum at 150 psi. At 24 VAC, average inrush current shall not exceed 0.41 amps. Average holding current shall not exceed 0.28 amps.

D. The valve shall have a flow control stem for accurate manual regulation and/or shut off of outlet flow. The valve must open or close in less than 1 minute at 150 PSI and less than 30 seconds at 20 PSI.

D. The valve construction shall provide for all internal parts to be removable from the top of the valve without disturbing the valve installation. The body shall have a removable 0-ringed plug for installation in either globe or angle configuration.

E. The electric valve shall be manufactured by Rain Bird Corporation, Commercial Division, Tucson, Arizona, USA, or approved equivalent.

2.7 RAIN BIRD ROOT WATERING SYSTEM

A. The Root Watering Series shall be designed to maximize tree and shrub transplanting survivability. It shall consist of a perforated polyethylene cylinder in 18" length and 4" width for trees. The rigid mesh material shall help support the horizontal movement of water into the root zone and adjacent soil. The cylinder shall support pea gravel fill to provide better top-to-bottom water dispersion and firmness against root compression. RWS shall be designed with an integrated bubbler and optional check valve. The water being emitted from the bubbler will help train roots away from surfaces and hardscapes, minimize surface erosion and reduce waste due to runoff. The factory-assembled RWS shall come configured with swing assemblies and/or spiral barbed fittings in order to promote irrigation design flexibility, accommodate all tree and shrub sizes, and help save installation time by being ready to install out of the box.

B. The assemblies and fittings shall enable RWS to be directly connected to PVC or polyethylene lateral lines. Models shall be provided without fittings that support integration with drip line. It shall help trees and shrubs establish deeper and broader roots for better stability against high winds and quicker, healthier growth. The subsurface irrigation design shall improve watering efficiency by minimizing the total volume of water used to irrigate trees and shrubs and minimize water lost due to evaporation and run off. It shall improve the aesthetics of the landscape by installing at finish grade level and minimizing root damage to hardscapes. RWS shall support an extra-wide molded collar to provide convenient access to the bubbler and drip line fastener. It shall support a locking grate cover to help deter vandalism. RWS units should be installed on their own watering zone in order to improve irrigation efficiency and management.

C. The root watering system shall be a model number RWS-M-B-1401 and shall be manufactured by Rain Bird Corporation, Commercial Division, Tucson, Arizona, USA, or approved equivalent.

2.8 DRIP IRRIGATION

A. Drip irrigation shall be Techline self- cleaning, pressure-compensating dripperline. The dripperline shall consist of nominal-sized one-half inch low density linear polyethylene tubing, housing internal pressure compensating, self cleaning, integral drip emitters. The tubing shall have an outside diameter of .67inches and an inside diameter of .57 inches, the emitters shall have the ability to independently regulate discharge rates, with varying input pressure rates. The emitter discharge rate shall be 0.6 GPH. The emitters shall continuously clean themselves while in operation; the spacing between emitters shall be 18 inches. As manufactured by the Netafim Company or equal.

1. Each drip zone shall have two (2) 10-F-01-operation pressure indicators set at each end visible to view. The drip zone in the courtyard shall have one (1) indicator placed at the end of the drip zone in an economy turf box, for verification of operation.

2. Techline 17mm (.57) fittings shall be used for all connections to dripperline and as required to complete the drip irrigation system. TLS6 soil staples shall be placed every 3’ and two (2) staples shall be used on all fittings, i.e. tees, elbows, crosses and couplings.

3. All Techline drip zones shall use automatic flush valves at the ends of each independent zone area or dripperline. When drip zones are split in the middle by a zone valve there shall be a flush valve on each leg of the drip zone. This valve shall be capable of flushing one (1) gallon at the beginning of the drip cycle. The flush valve shall be Netafim model Tl050MFV-1 or approved equal. All flush valves shall be in an economy turf box to be flush with finished grade.

4. All Techline drip zones shall have an air/vacuum relief valve at its high points. The purpose of this valve is to evacuate air from the zone at start up and to relieve vacuum at system shut down. The air/vacuum valve shall be Netafim model TLAVRV ½" MPT threads with a maximum operating pressure of 140 PSI or approved equal. All air/vacuum valves shall be in an economy turf box to be flush with finished grade.

5. All drip zones shall be controlled by 1"or 75" RainBird Series Electric Pressure Regulating Valve with 1" Manual Disc Filter with 200 Mesh SS Screen (RBY-200SSMX) (RBY-200-SSMX).

6. All electric dripperline zones valves shall have a disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs shall be constructed of chemical resistant thermoplastic for corrosion resistance. All disc filters shall be placed in a standard valve box with drip zone valve and other accessories as shown on the details, to be flush with finished grade.

7. The installation of all drip zones shall be in the strictest accordance's with the manufactures standards and practices for the use of dripline applications. The Contractor shall bring to the attention of the general manager and irregularities that may arise during the installation of these drip zones. The dripper line shall be pinned at 36" intervals with 8" sod staples.

B. All dripperline tubing shall be installed at finished grade and covered with 3" of mulch. The Contractor shall provide a trench for the tubing to lie in and use TLSG soil staples every Three feet on center to insure that the dripperline tubing does not "porpoise". The tubing shall be installed in accordance with all details on plans and the "Netafim Techline Design Guide".

2.9 QUICK COUPLER VALVES AND YARD HYDRANT

A. Quick coupler valves shall be 1" Buckner Quick Coupler Valves with vinyl locking covers, model BKQCV100RL as manufactured by Buckner or approved equal.

B. Swing joints for Quick Coupler Valves shall be 1" triple swing joint kits with double O-ring seals at threaded connections and brass insert model PVC1A111118 as manufactured by Dura or approved equal.

C. Yard Hydrant to be Model 591XXX 1" inlet Non-freeze lead free and USDA approved lubricants and chall comply with all drinking water standards. Yard Hydrant shall be marked as non-potable drinking water when connected to the irrigation system. Ground Hydrant, the valve housing shall be installed as per manufacturers Technical Data information. Non-Freeze Ground Hydrant shall be Model No. 5951XX as manufactured by Jay R. Smith MFG. CO. Montgomery, Alabama 36109-0237

2.10 CONTROLLER

A. WEATHERTRAK ET PRO3 CONTROLLER

1. The controller shall use hybrid control technology and be capable of automatic, semi-automatic, and manual operations. All programming shall be accomplished with a push button programming and a large three-line LCD. The Controller shall be offered in an indoor locking cabinet. The controller shall carry a five year warranty.

2. The WeatherTRAK ET Pro3 shall have the following features:
   a. Station counts from 1-48 stations.
   b. Built-in remote with free WeatherTRAK Mobile app or Pro-Max –UA, TRC Commander 32 Interface
   c. Non-volatile memory stores settings without battery
   d. Remote web-based programming at WeatherTRAK.net
   e. Indoor/outdoor wall mount or optional pedestal style with key-locking enclosure in high-impact plastic. This is a NEMA 3R rated weather resistant enclosure.
   f. Two programs with seven independent water day patterns and schedules. Each program has two start times with up to 20 cycles, with one water window per program. A second start time is available for High ET requirements in "Auto mode" only.
   g. Proven water savings and runoff reduction in more than 23 independent, multi-year studies including a 100% pass rate of the Irrigation Association's (IA) Smart Water Application Technology™ performance test (SWAT™ Test) conducted by the Center for Irrigation Technology.
   h. Built-in sprinkler, soil, slope, plant other databases noted as;
      i. 14 different sprinkler types including drip emitters
      ii. Default or user-defined precipitation rate based on each sprinkler type
      iii. Default or user-defined sprinkler efficiencies based on each sprinkler type
      iv. 17 different plant types
      v. Default or user-defined root depths from 2-36" in 1" increments
      vi. Default or three, user-defined crop coefficients (Kc) for custom plants and native grasses on a monthly basis
      vii. 5 soil types based on USDA soil texture classifications
      viii. 4 microclimates (sun exposure levels)
      ix. 5 slope gradients
      x. 4 locations of sprinklers based on slope gradient
      xi. 2 Usable Rainfall settings (None or 100%)

3. The controller shall have a customizable and independent program for each station/zone. Each station shall be programmable in one of four modes: Fully Automated, User Programmed with ET Mode, User Programmed without ET Mode, and Off Mode. The controller shall have a built-in wireless radio receiver that receives ET updates sent from the ET Everywhere Service no fewer than six times daily. Each controller shall have an assigned ET microzone that will allow it to receive the local weather for the controller's exact longitude and latitude coordinates. This shall be determined and automatically provided by HydroPoint Data Systems, Inc upon service activation.

4. Central communication (two-way) Central Internet Management (CIM) provides wireless communication to the WeatherTRAK Central web link at www.weathertrak.net. accessed through a secure login and password issued by HydroPoint Customer Service. The WeatherTRAK LC Central series shall incorporate remote manual water from a mobile app for a Smart Phone or iPad tablet with Internet connectivity.

5. The controller shall be WeatherTRAK ET PRO3 2-WIRE Series Controller model WTPRO3 as manufactured by HydroPoint Data Systems, Petaluma, California.

2.11 WIRE

A. All 24-volt decoder control wires from controller to the electric valves shall be #14/1 wire as manufactured by Paige Electric. Splices and connections to the decoders and electric valves shall be with 3M DBR-Y -6 connectors.

B. When wires must go into the building the proper splice boxes must be used and the same size corresponding wire size shall be used at the splice box location. All wire shall be Paige electric and shall conform to ASTM B3 or B-8 for soft drawn bare copper wire with polyethylene insulation.

2.12 RAIN SENSOR

A. The Controller shall have a rain sensor that will shut the irrigation cycle off during periods of rain or rainfall accumulated amounts. The rain sensor shall interrupt the controller's common wire and be able to test communication between the sensor and receiver. The rain sensor shall be RainBird Wireless Rain Sensor or approved equal.

2.13 FLOW SENSOR MASTER VALVE

A. Master Valve Flow Meter shall be Hydrometer NO Valve with Photo Diode Normally open with a flow rate of between 21 GPM and 380 GPM with a Normal flow rate of 264 GPM Cast iron polyester coated EEC approvals (class). Accuracy across flow range ± 2% valve shall be as manufactured by Weather-Trak. Communication wire shall be 18/3 PE180096TH-100 shielded wire by Paige Electric.

2.14 GROUNDING

A. All line surge arrestors and controllers shall be grounded in accordance with the manufacturer's recommendations and shall be 10 Ohms or less as metered by a "Megger" from James G. Biddle Co. of Plymouth Meeting, PA. or approved equal. All ground rods shall be a minimum diameter of 5/8" and a length of 8 feet. The ground wires shall be minimum 6 AWG bare copper connecting the ground rod and the ground lug on the controller. To prevent the electrode-discharged energy from re-entering the underground wires and cables, all electrodes shall be installed away from said wires and cables. The spacing between any two electrodes shall be 16 – 20' so they don't compete for the same soil. All ground circuit connections shall be made using an exothermic welding process by utilizing products such as Cadweld "One Shots". Solder shall be not permitted to make connections.

B. All ground wires shall be installed in as straight a line as possible, and if it is necessary to make a turn or bend it should be done in a sweeping curve with a minimum radius of 8" and a minimum included angle of 90°. Mechanical clamps shall be permitted only temporarily during the resistance test process, but should be replaced with Cadweld "One Shot" kits immediately afterward. Should the grounding requirements not be achieved the Contractor shall submit a cost and options for reducing the resistance readings to the general Contractor for his approvals. See detail sheet for recommended standards. All grounding fields shall be installed and megged prior to any internal wiring of the controller.

C. Surge devices shall be at all dead ends and not more than 500' apart, surge devices shall be at the controller on each leg of the cable path there shall be two (2) legs run.

PART 3 - EXECUTION

3.1 ACCURACY

A. Lay out work as accurately as possible to the drawings. The drawings, though carefully drawn, are generally diagrammatic to the extent that swing joints, offsets and all fittings are not shown.

3.2 COVERAGE

A. The Contractor shall be responsible for full and complete coverage of all irrigated areas and shall make any necessary minor adjustments at no additional cost to the Owner.

B. If not specified on the plans, the Contractor shall be responsible for proper sprinkler head placement and adjustment.

3.3 REVISIONS

A. Any major revisions to the irrigation system must be submitted and answered in written form, along with any negotiated change in contract price.

3.4 EXCAVATING AND TRENCHING

A. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations to their original condition and in a manner approved by the Owner.

B. Trenches shall be made wide enough to allow a minimum of 2 inches between parallel pipe lines. Trenches for pipe lines shall be made of sufficient depths to provide minimum cover from finish grade as follows:

1. 30" minimum cover over main lines.
2. 18" minimum cover over control wires from controller to valves.
3. 18" minimum cover over lateral lines to sprinkler heads.

C. Maintain all warning signs, shoring, barricades, flares and red lanterns as required by the Safety Orders of the Division of Industrial Safety and any local ordinances. Contractor shall also repair, and bring back to conditions before damaged and drain pipes in field this shall be done at the Contractor’s own expense.

3.5 PIPE LINE ASSEMBLY

A. Install remote control valves where shown and group together where practical. Place no closer than 6 inches to walk edges, buildings, and walls.

B. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush.

C. Pipe may be assembled and welded on the surface. Snake pipe from side to side of trench bottom to allow for expansion and contraction.

D. Make all connections between plastic pipe and metal valves or steel pipe with threaded fittings using plastic male adapters.

E. Contractor shall take necessary precautions not to disturb field drainage system, should contractor damage any drainage pipe he shall repair any damage at his cost and shall notify the owner of where the damage occurred and map on his irrigation “AS BUILT”.

3.6 CLOSING PIPE AND FLUSHING LINES

A. Cap or plug all openings as lines have been installed to prevent the entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

B. Thoroughly flush out all water lines before installing heads, valves and other hydrants.

C. Test in accordance with paragraph on Hydrostatic Tests.

D. Upon completion of the testing, the Contractor shall complete drip assembly and adjust for proper distribution.

3.7 HYDROSTATIC TESTS

A. Before backfilling, the entire system shall be hydrostatically tested and inspection.

B. Request the presence of the Owner or Consultant in writing at least 48 hours in advance of testing.

C. Testing is to be accomplished at the expense of the Contractor and in the presence of the Owner.

D. Center load piping with small amount of backfill to prevent arching or slipping under pressure.

E. Apply a continuous and static water pressure of 80 PSI when welded plastic joints have cured at least 24 hours and with the risers capped as follows:

1. Main lines and sub mains to be tested for 1 hour.
2. Lateral lines to be tested for 1 hour. (If laterals and individual sub-mains downstream of control valves have less than 90 PSI working pressure or less than 10 GPM flow, hydrostatic tests are waived for these laterals).

F. Leaks exposed during tests shall be repaired and the system re-tested to the satisfaction of the Engineer. On completion of the work, satisfactory evidence shall be furnished by the Contractor to show that all work has been installed in accordance with the ordinances and code requirements.

3.8 REMOTE CONTROL VALVE INSTALLATION

A. Remote Control Valves shall be installed as shown on the drawings and grouped together where practical. Remote Control Valves shall be installed a minimum of 6” away from sidewalk edges, buildings and walls. As much as is practical, the valve boxes shall not be located in playing areas of athletic fields.

3.9 MOUNTING RAIN SENSOR

A. Mount the rain sensor on a wall or roof surface close to the timer/controller inside, in order to minimize the wire length between the two, and the chance of wire breakage. The sensor and enclosure must be mounted where they will receive rainfall, but not in the path of sprinkler spray, as well as high enough to be secure from vandalism. The sensor should not be mounted on the north side of a building, or where constant shade may prevent the sensor from drying soon enough to permit activation of the sprinkler system when required.

B. After mounting the sensor securely, run the control wiring to the sensor in ¾” dia. PVC conduit, securing with steel straps a maximum of every five feet (5'). If an extension to the twenty-five feet (25') of wire provided is needed, the following table will determine the minimum wire gauge Required:

Extension:	25 - 50'	50 - 100'	100' +
Wire Gauges	20 AWG	18 AWG	16 AWG

3.10 AUTOMATIC CONTROLLER

A. Connect proposed remote control valves to proposed controller in a logical sequence to correspond with specification of the Owner or the Irrigation Consultant.

3.11 AUTOMATIC CONTROL WIRING

A. Install 14/1 wire in common mainline trenches wherever possible.

B. Install wires at least 16-18 inches below finish grade and lay to the side and below main line. Provide looped slack at valves, Min. 48" and snake wires in trench to allow for contraction of wires. Tie wires in bundles at ten foot intervals.

C. Any splices must be installed in an existing valve box or separate valve box installed flush with finished grade with DBY/R-6 splice kits.

D. All wire passing under existing or future paving, construction, etc., shall be encased in plastic or galvanized steel conduit extending at least 12 inches beyond edges of paving or construction.

E. All wire passing under existing or future paving, construction, etc., shall be encased in galvanized steel conduit extending at least 12 inches beyond edges of paving or construction. A total of two spare control wires shall be installed from the irrigation controller to the farthest valve on the main line. The spares shall be looped through each valve box between the irrigation controller and the farthest valve.

3.12 WINTERIZATION AND SPRING ACTIVATION

A. The Contractor shall perform complete blow-out of the irrigation system with compressed air in the late fall, no sooner than October 15, and no later than November 15, unless otherwise directed by the Engineer. The Contractor shall also activate the system the following Spring. The Owner's Personnel shall be present for both these operations.

3.13 O & M TRAINING AND DEMONSTRATION

A. After testing is completed and approved by the Engineer, a training and demonstration session shall be held for Union County staff as to the Operations and maintenance (O&M) of the irrigation system. The installed irrigation system shall be demonstrated for one day (maximum 6 hours) for Union County Staff. The demonstrations shall include manual and automatic operation including pumping. The demonstration shall also include identification and operation of each component, trouble shooting for each component, winterizing the system, removal and replacement of defective components, general and specific requirements for system maintenance, and a check list for frequent attention of components. Highlights of the demonstration, including identification of components shall be videotaped for future training.

3.14 O & M MANUAL & VIDEOTAPE

A. The Contractor shall furnish six (6) copies of the O & M Manual (Operation & Maintenance Manual) for the irrigation system and the associated mechanical system. The manual shall include a checklist for trouble shooting and corrective measures in addition to operation and maintenance instructions. The Contractor shall also furnish to O & M an instructional video as described above on operation and maintenance of the irrigation system.

3.15 SUBMITTALS

A. All submittals shall be in accordance with the requirements of the General and Supplementary Conditions.

B. IRRIGATION DESIGN SPECIALIST QUALIFICATIONS

1. The Contractor shall submit for approval, the name and qualifications of the proposed Irrigation Design Specialist including CID certification. As an alternate to certification, experience and a minimum of three (3) professional references, and sample drawings for three commercial (3) designs of five (5) acres or larger, may be submitted. Submittal must be a minimum of 4 weeks prior to the proposed irrigation system installation date. The Irrigation Design Specialist shall be meet the qualifications listed on the first page of this item under the heading Irrigation Design Specialist:

C. IRRIGATION LAYOUT AND SHOP DRAWINGS

1. The Contractor shall submit the Design Proposal and Shop Drawings in accordance with the requirements of the General and Supplementary Conditions prior to manufacture. The system shall be designed to cover areas as shown on the planting plan. The minimum distribution uniformity shall be 80%. A shop drawing is required, showing layout of the complete irrigation system, including the main line pipe, lateral pipe, electrical wire, controller locations, remote control valves, quick-coupling valves, all sprinkler heads locations and spray pattern. All drawings must be prepared, signed and sealed by the approved Irrigation Design Specialist. Also, see Grounds for Rejection, Irrigation Design Specialist heading.

D. CATALOG CUTS

1. The Contractor shall submit Catalog cuts of the sprinkler heads, valves, and all connected piping for approval prior to installation.

E. RECORD DRAWING DRAWINGS

1. The Contractor shall prepare "Record Drawing" drawings in accordance with Section C, Article 9. Submission of Record Drawing for this item shall not be waived and shall be submitted as soon after installation as possible. Drawings shall show the irrigation system as installed, including the main line pipe, lateral pipe, electrical wire, electrical controller locations, remote control valves, quick-coupling valves, all sprinkler heads, drip areas, etc. Deviations from the shop drawings made during construction shall be noted. The drawings shall also indicate and show approved substitutions of size, material and manufacturer's name and catalog name and catalog number. Record Drawing shall also have an Irrigation Schedule that shall be outlined in a report by a CLWM (Certified Landscape Water Manager) as certified by the Irrigation Association.

F. WARRANTY

1. The Contractor shall submit the manufacturers’ standard warranties for all materials to include but not be limited to the controller, rain sensor, sprinkler heads and valves. Contractor shall be responsible for one winterization and one spring turn on and re adjustment of heads and valves.

G. O & M MANUAL & VIDEOTAPE

1. The Contractor shall furnish two (2) copies of the Operation & Maintenance Manual and one (1) instructional videotape (all labeled with name of site and contract number).

H. REFERENCE MATERIALS

1. The following submittals shall be prepared in a reasonable size/scale, laminated and mounted or hooked on the wall in the building at the site, as directed by the Engineer.

2. A detailed suggested watering schedule for the site. If automatic system, include start times, days and run time.

3. One copy of a laminated O & M Manual hooked to wall as described above.

4. Name and phone number of supplier(s) for all replacement parts.

5. Detailed guide for trouble-shooting common system operation problems.

6. Detailed Winterization / Spring Activation instructions.

END SECTION 328400

SECTION 329119 – TOPSOIL AND SOD

PART 1 – GENERAL

1.1 DESCRIPTION

A. The scope of work includes all labor, materials, tools, supplies, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of Topsoil and /or the modification of existing site soil for use, and sod, complete as shown on the drawings and as specified herein.

B. The scope of work in this section includes, but is not limited to, the following:

1. Locate, purchase, deliver and install Topsoil and soil amendments.
2. Harvest and stockpile existing site soils suitable for Topsoil.
3. Modify existing stockpiled site soil.
   a. Modify existing site soil in place for use as Topsoil.
   b. Install existing or modified existing soil for use as Topsoil.
4. Fine grade Planting Soil.
5. Clean up and disposal of all excess and surplus material.
6. Locate, purchase, deliver and install sod.

1.2 CONTRACT DOCUMENTS

A. Shall consist of specifications, general conditions, and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

1.3 RELATED DOCUMENTS AND REFERENCES

A. Related Documents:

1. Drawings and general provisions of contract, including general and supplementary condtions and Division I specifications, apply to work of this section.

2. Related Specification Sections:
   a. Section 329300 – Landscaping
   b. Section 328400 – Landscape Irrigation System
   c. Section 329219 – Hydroseeding

B. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the Specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.

1. ASTM: American Society of Testing Materials cited section numbers.

2. U.S. Department of Agriculture, Natural Resources Conservation Service, 2003. National Soil Survey Handbook, title 430-VI. Available Online.

3. *Methods of Soil Analysis*, as published by the Soil Science Society of America (http://www.soils.org/).

4. Up by Roots: healthy soils and trees in the built environment. 2008. J. Urban. International Society of Arboriculture, Champaign, IL.

1.4 VERIFICATION

A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner's Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner's Representative.

1.5 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or among any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.

1.6 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to the Contractor's actions.

1.7 CHANGES IN WORK

A. The Owner's Representative may order changes in the work, and the contract sum adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

B. All changes in the work, notifications and Contractor's request for information (RFI) shall conform to the contract general condition requirements.

1.8 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and

shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest possible time that can be coordinated with other work and seasonal weather demands but not more than 180 (one hundred and eighty) days after notification**.**

1.9 DEFINITIONS

A. Acceptable drainage: Drainage rate is sufficient for the plants to be grown. Not too fast and not too slow. Typical rates for installed Planting Soil are between 1 - 5 inches per hour. Turf soils are often higher, but drainage rates above 2 - 3 inches per hour will dry out very fast. In natural undisturbed soil a much lower drainage rate, as low as 1/8 inch per hour can still support good plant growth. Wetland plants can grow on top of perched water layers or even within seasonal perched water layers, but could become unstable in high wind events.

B. Amendment: material added to Topsoil to produce Planting Soil Mix. Amendments are classified as general soil amendments, fertilizers, biological, and pH amendments.

C. Biological Amendment: Amendments such as Mycorrhizal additives, compost tea or other products intended to change the soil biology.

D. Compacted soil: soil where the density of the soil is greater that the threshold for root limiting, and further defined in this specification.

E. Compost: well decomposed stable organic material as defined by the US Composting Council and further defined in this specification.

F. Drainage: The rate at which soil water moves through the soil transitioning the soil from saturated condition to field capacity. Most often expressed as saturated hydraulic conductivity (Ksat; units are inches per hour).

G. End of Warranty Acceptance: The date when the Owner's Representative accepts that the plants and work in this section meet all the requirements of the warranty. It is intended that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation (if applicable) work run concurrent with each other, and further defined in this specification.

H. Existing Soil: Mineral soil existing at the locations of proposed planting after the majority of the construction within and around the planting site is completed and just prior to the start of work to prepare the planting area for soil modification and/or planting, and further defined in this specification.

I. Fertilizer: amendment used for the purpose of adjusting soil nutrient composition and balance.

J. Fine grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes or drag rakes other suitable devices, and further defined in this specification, and further defined in this specification.

K. Finished grade: surface or elevation of Planting Soil after final grading and 12 months of settlement of the soil, and further defined in this specification.

L. Graded soil: Soil where the A horizon has been stripped and relocated or re-spread; cuts and fills deeper than 12 inches, and further defined in this specification.

M. Installed soil: Imported soil and existing site soil that is spread and or graded to form a planting soil, and further defined in this specification.

N. Minor disturbance: Minor grading as part of agricultural work that only adjusts the A horizon soil, minor

surface compaction in the top 6 inches of the soil, applications of fertilizers, installation of utility pipes smaller than 18 inches in diameter thru the soil zone.

O. Owner's Representative: The person or entity, appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.

P. Ped: a clump or clod of soil held together by a combination of clay, organic matter, and fungal hyphae, retaining the original structure of the harvested soil.

Q. Planting Soil: Topsoil, or Planting Soil Mixes which are imported or existing at the site, or made from components that exist at the site, or are imported to the site; and further defined in this specification.

R. Poor drainage: Soil drainage that is slower than that to which the plants can adapt. This is a wide range of metrics, but generally if the soil is turning grey in color it is reasonable preferable to either to plant moisture adaptive plants at smaller sizes that are young in age with shallow root balls or look at options to improve the drainage.

S. Scarify: Loosening and roughening the surface of soil and sub soil prior to adding additional soil on top, and further defined in this specification.

T. Soil Fracturing: Deep loosening the soil to the depths specified by using a back hoe, and further defined in this specification.

U. Soil Horizons: as defined in the USDA National Soil Survey Handbook:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/
scientists/?cid=nrcs142p2_054242.

V. Soil Ripping: Loosening the soil by dragging a ripping shank or chisel thru the soil to the depths and spacing specified, and further defined in this specification.

W. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tine tilling machine, roto tiller, (or spade tiller), and further defined in this specification.

X. Soil trenching: Cutting narrow trenches thru the soil at the depths and spacing specified to loosen the soil profile, and further defined in this specification.

Y. Subgrade: surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing Planting Soil.

Z. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil, and Irrigation installation (if applicable) where the Owner's Representative accepts that all work in these sections is complete and the Warranty period has begun. This date may be different than the date of substantial completion for the other sections of the project, and further defined in this specification.

AA. Topsoil: naturally produced and harvested soil from the A horizon or upper layers or the soil as further defined in this specification.

BB. Undisturbed soil: Soils with the original A horizon intact that have not been graded or compacted. Soils that have been farmed, subjected to fire or logged but not graded, and natural forested land will be considered as undisturbed.

1.10 SUBMITTALS

A. See the contract General Conditions for policy and procedures related to submittals.

B. Submit all product submittals four weeks prior to the start of the soil work.

C. Product data and certificates: For each type of manufactured product, submit data and certificates that the product meets the specification requirements, signed by the product manufacturer, and complying with the following:

1. Submit manufacturers or supplier's product data and literature certified analysis for standard products and bulk materials, complying with testing requirements and referenced standards and specific requested testing.

a. For each Compost product, submit the following analysis by a recognized laboratory:
i. pH
ii. Salt concentration (electrical conductivity)
iii. Moisture content %, wet weight basis
iv. Particle size % passing a selected mesh size, dry weight basis
v. Stability carbon dioxide evolution rate mg CO_2-C per g OM per day
vi. Solvita maturity test
vii. Physical contaminants (inerts) %, dry weight basis
viii. US EPA Class A standard, 40CFR §503.13, Tables 1 and 3 levels Chemical Contaminants mg/kg (ppm)

b. For Coarse Sand product, submit the following analysis by a recognized laboratory:
i. pH
ii. Particle size distribution (percent passing the following sieve sizes):
3/8 inch (9.5 mm)
No 4 (4.75 mm)
No 8 (2.36 mm)
No 16 (1.18 mm)
No 30 (0.60 mm)
No 50 (0.30 mm)
No 100 (0.15 mm)
No 200 (.075 mm)

D. Samples: Submit samples of each product and material, where required by Part 2 of the specification, to the Owner's Representative for approval. Label samples to indicate product, characteristics, and locations in the work. Samples will be reviewed for appearance only.

1. Submit samples a minimum of four weeks prior to the anticipated date of the start of soil installation.

2. Samples of all Topsoil, Coarse Sand, Compost and Planting Soil shall be submitted at the same time as the particle size and physical analysis of that material.

E. Soil testing for Imported and Existing Topsoil, existing site soil to be modified as Planting Soil.

1. Topsoil, existing site soil testing: Submit soil test analysis report for each sample of Topsoil, existing site soil and Planting Soil from an approved soil-testing laboratory and where indicated in Part 2 of the specification as follows:
a. Submit Topsoil, Planting Soil, Compost, and Coarse Sand for testing at least four weeks before scheduled installation of Planting Soil Mixes. Submit Planting Soil Mix test no more than 2

weeks after the approval of the Topsoil, Compost and Coarse Sand.

b. If tests fail to meet the specifications, obtain other sources of material, retest and resubmit until accepted by the Owner's Representative.
c. All soil testing will be at the expense of the Contractor.

2. Provide a particle size analysis (% dry weight) and USDA soil texture analysis. Soil testing of Planting Soil Mixes shall also include USDA gradation (percentage) of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay.

3. Provide the following other soil properties:
   a. pH and buffer pH.
   b. Percent organic content by oven dried weight.
   c. Nutrient levels by parts per million including: phosphorus, potassium, magnesium, manganese, iron, zinc and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
   d. Soluble salt by electrical conductivity of a 1:2 soil water sample measured in Milliohm per cm.
   e. Cation Exchange Capacity (CEC).

1.11 OBSERVATION OF THE WORK

A. The Owner's Representative may observe the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

1. The Owner's Representative may utilize the Contractor's penetrometer and moisture meter at any time to check soil compaction and moisture.

B. The Owner's Representative shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Owner's Representative shall be afforded sufficient time to schedule visit to the site. Failure of the Owner's Representative to make field observations shall not relieve the Contractor from meeting all the requirements of this specification.

1. EXISTING SOIL CONDITIONS REVIEW: Prior to the start of any soil modification that will utilize or modify the existing soil.

2. EXCAVATION REVIEW: Observe each area of excavation prior to the installation of any Planting Soil.

3. COMPLETION of SOIL MODIFICATIONS REVIEW: Upon completion of all soil modification and installation of planting soil.

4. COMPLETION OF FINE GRADING AND SURFACE SOIL MODIFICATIONS REVIEW: Upon completion of all surface soil modifications and fine grading but prior to the installation of shrubs, ground covers, or lawns.

1.12 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1.13 QUALITY ASSURANCE

A. Installer Qualifications: The installer shall be a firm having at least 5 years of experience of a scope similar to that required for the work, including the preparation, mixing and installation of soil mixes to support planting. The installer of the work in Section: Planting, shall be the same firm installing the work in this section.

1. The bidders list for work under this section shall be approved by the Owner's Representative.

2. Installer Field Supervision: When any Planting Soil work is in progress, installer shall maintain, on site, an experienced full-time supervisor who can communicate in English with the Owner's Representative.

3. Installer's field supervisor shall have a minimum of five years experience as a field supervisor installing soil, shall be trained and proficient in the use of field surveying equipment to establish grades and can communicate in English with the Owner's Representative.

4. The installer's crew shall be experienced in the installation of Planting Soil, plantings, and irrigation (where applicable) and interpretation of planting plans, and irrigation plans (where applicable).

5. Submit references of past projects and employee training certifications that support that the Contractors meet all of the above installer qualifications and applicable licensures.

B. Soil testing laboratory qualifications: an independent laboratory, with the experience and capability to conduct the testing indicated and that specializes in USDA agricultural soil testing, Planting Soil Mixes, and the types of tests to be performed. Geotechnical engineering testing labs shall not be used.

C. All delivered and installed Planting Soil shall conform to the approved submittals sample color, texture and approved test analysis.

1. The Owner's Representative may request samples of the delivered or installed soil be tested for analysis to confirm the Planting Soil conforms to the approved material.

2. All testing shall be performed by the same soil lab that performed the original Planting Soil testing.

3. Testing results shall be within 10% plus or minus of the values measured in the approved Planting Soil.

4. Any Planting Soil that fails to meet the above criteria, if requested by the Owner's Representative, shall be removed and new soil installed.

D. Soil compaction testing: following installation or modification of soil, test soil compaction with a penetrometer.

1. Maintain at the site at all times a soil cone penetrometer with pressure dial and a soil moisture meter to check soil compaction and soil moisture.
   a. Penetrometer shall be AgraTronix Soil Compaction Meter distributed by Ben Meadows, www.benmeadows.com or approved equal.
   b. Moisture meter shall be "general digital soil moisture meter" distributed by Ben Meadows, www.benmeadows.com or approved equal.

2. Penetrometer readings are impacted by soil moisture and excessively wet or dry soils will read significantly lower or higher than soils at optimum moisture.

1.14 SITE CONDITIONS

A. It is the responsibility of the Contractor to be aware of all surface and subsurface conditions, and to notify the Owner's Representative, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Owner's Representative in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Owner's Representative of such conditions, they shall remain responsible for plant material under the warrantee clause of the specifications.

2. This specification requires that all Planting Soil and Irrigation (if applicable) work be completed and accepted prior to the installation of any plants.

1.15 SOIL COMPACTION – GENERAL REQUIREMENTS

A. Except where more stringent requirements are defined in this specification. The following parameters shall define the general description of the threshold points of soil compaction in existing, modified or installed soil and subsoil.

B. The following are threshold levels of compaction as determined by each method.

1. Acceptable Compaction: Good rooting anticipated, but increasing settlement expected as compaction is reduced and/or in soil with a high organic matter content.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – 75-85%; soil below 75% is unstable and will settle excessively.
   c. Penetration Resistance Method – about 75-250 psi, below 75 psi soil becomes increasingly unstable and will settle excessively.

2. Root limiting Compaction: Root growth is limited with fewer, shorter and slower growing roots.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – above approximately 85%.
   c. Penetration Resistance Method – about 300 psi.

3. Excessive Compaction: Roots not likely to grow but can penetrate soil when soil is above field capacity.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – Above 90%.
   c. Penetration Resistance Method – Approximately above 400 psi

1.16 DELIVERY, STORAGE, AND HANDLING

A. Weather: Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity.

B. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Cover stockpiles with plastic sheeting or fabric at the end of each workday.

C. All manufactured packaged products and material shall be delivered to the site in unopened containers

and stored in a dry enclosed space suitable for the material and meeting all environmental regulations. Biological additives shall be protected from extreme cold and heat. All products shall be freshly manufactured and dated for the year in which the products are to be used.

D. Deliver all chemical amendments in original, unopened containers with original labels intact and legible, which state the guaranteed chemical analysis. Store all chemicals in a weather protected enclosure.

E. Bulk material: Coordinate delivery and storage with Owner's Representative and confine materials to neat piles in areas acceptable to Owner's Representative.

1.17 EXCAVATING AND GRADING AROUND UTILITIES

A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.

B. Determine location of underground utilities and perform work in a manner that will avoid damage. Hand excavate as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.

PART 2 – PRODUCTS

2.1 IMPORTED TOPSOIL

A. Imported Topsoil definition: Fertile, friable soil containing less than 5% total volume of the combination of subsoil, refuse, roots larger than 1 inch diameter, heavy, sticky or stiff clay, stones larger than 2 inches in diameter, noxious seeds, sticks, brush, litter, or any substances deleterious to plant growth. **The percent (%) of the above objects shall be controlled by source selection not by screening the soil.** Topsoil shall be suitable for the germination of seeds and the support of vegetative growth. Imported Topsoil shall not contain weed seeds in quantities that cause noticeable weed infestations in the final planting beds. Imported Topsoil shall meet the following physical and chemical criteria:

1. Soil texture: USDA loam, sandy clay loam or sandy loam with clay content between 15 and 25%. And a combined clay/silt content of no more than 55%.

2. pH value shall be between 5.5 and 7.0.

3. Percent organic matter (OM): 2.0-5.0%, by dry weight.

4. Soluble salt level: Less than 2 mmho/cm.

5. Soil chemistry suitable for growing the plants specified.

B. Imported Topsoil shall be a harvested soil from fields or development sites. The organic content and particle size distribution shall be the result of natural soil formation. **Manufactured soils where Coarse Sand, Composted organic material or chemical additives has been added to the soil to meet the requirements of this specification section shall not be acceptable.**

C. **Imported Topsoil for Planting Soil shall NOT have been screened and shall retain soil peds or clods larger than 2 inches in diameter throughout the stockpile after harvesting.**

D. Stockpiled Existing Topsoil at the site meeting the above criteria may be acceptable.

E. Provide a two gallon sample from each Imported Topsoil source with required soil testing results. The sample shall be a mixture of the random samples taken around the source stockpile or field. The soil sample shall be delivered with soil peds intact that represent the size and quantity of expected peds in the final delivered soil.

2.2 COMPOST

A. Compost: Blended and ground leaf, wood and other plant based material, composted for a minimum of 9 months and at temperatures sufficient to break down all woody fibers, seeds and leaf structures, free of toxic material at levels that are harmful to plants or humans. Source material shall be yard waste trimmings blended with other plant or manure based material designed to produce Compost high in fungal material.

1. Compost shall be commercially prepared Compost and meet US Compost Council STA/TMECC criteria or as modified in this section for "Compost as a Landscape Backfill Mix Component". http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch_Specs.pdf

2. Compost shall comply with the following parameters:
   a. pH: 5.5 - 8.0.
   b. Soil salt (electrical conductivity): maximum 5 dS/m (mmhos/cm).
   c. Moisture content %, wet weight basis: 30 – 60.
   d. Particle size, dry weight basis: 98% pass through 3/4 inch screen or smear.
   e. Stability carbon dioxide evolution rate: mg CO_2-C/ g OM/ day < 2.
   f. Solvita maturity test: > 6.
   g. Physical contaminants (inerts), %, dry weight basis: <1%.
   h. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels.
   i. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.

B. Provide a two-gallon sample with manufacturer's literature and material certification that the product meets the requirements.

2.3 COARSE SAND

A. Clean, washed, sand, free of toxic materials

1. Coarse concrete sand, ASTM C-33 Fine Aggregate, with a Fines Modulus Index of 2.8 and 3.2.

2. Coarse Sands shall be clean, sharp, natural Coarse Sands free of limestone, shale and slate particles. Manufactured Coarse Sand shall not be permitted.

3. pH shall be lower than 7.0.

4. Provide Coarse Sand with the following particle size distribution:

Sieve	Percent passing
3/8 inch (9.5 mm)	100
No 4 (4.75 mm)	95-100
No 8 (2.36 mm)	80-100
No 16 (1.18 mm)	50-85
No 30 (0.60 mm)	25-60
No 50 (0.30 mm)	10-30
No 100 (0.15 mm)	2-10

No 200 (0.75 mm) 2-5

B. Provide a two-gallon sample with manufacturer's literature and material certification that the product meets the requirements.

2.4 LIME

A. ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36 mm) sieve and a minimum 75 percent passing through No. 60 (0.25 mm) sieve.

2. Provide lime in form of dolomitic limestone.

B. Provide manufacturer's literature and material certification that the product meets the requirements.

2.5 SOD

A. Shall be New Jersey certified sod containing approved blend of a tall fescue consisting of three varieties, free from noxious weeds and objectionable grasses. It shall contain all the dense root system of the grass and the soil shall not be less than ¼ inch thick. Before removing the sod, the grass shall be cut to a height of 2 inches and its surface shall be raked clean of all debris. It shall be cut with suitable tools in uniform strips of not less than 12 inches wide.

B. Sod shall be mineral grown on a sandy loam soil from approved sources in the locality of the work where the soil is of such character that it will not break up or crumble during cutting, transportation or laying.

2.6 EXISTING SOIL

A. General definition of existing soil: Surface soil in the areas designated on the soils plan as existing soil, that is not altered, compacted to root limiting density, graded or contaminated before or during the construction process and considered acceptable for planting and long term health of the plants specified either as it exists or with only minor modification.

1. The Owner's Representative shall verify that the soil in the designated areas is suitable at the beginning of planting bed preparation work in that area. In the event that the work of this project construction has damaged the existing soil in areas designated for use as Planting Soil to the point where the soil is no longer suitable to support the plants specified, the Owner's Representative may require modification of the damaged soil up to and including removal and replacement with soil of equal quality to the soil that existed prior to construction. Examples of damage include further compaction, contamination, grading, creation of hard pan or drainage problems, and loss of the O, and or A horizon.
   a. Do not begin work on additional modifications until changes to the contract price are approved by Owner's Representative.
   b. All areas used for construction staging, relocated driveway area and parking shall receive new planting soil.

B. Protect existing soil from compaction, contamination, and degradation during the construction process.

C. Unless otherwise instructed, remove all existing plants, root thatch, and non-soil debris from the surface of the soil using equipment that does not increase compaction of soil to root limiting levels.

D. Modifications:

1. When results of soil tests recommend chemical adjustments, till surface soil to six inches or greater after chemical adjustments have been are applied.

2. Remove existing turf thatch, ground cover plants and weeds.

3. Provide pre-emergent weed control if indicated.

4. Make chemical adjustment as recommended by the soil test.

2.7 PLANTING SOIL MIXES

A. General definition: Mixes of Existing Soil or Imported Topsoil, Coarse Sand, and or Compost to make a new soil that meets the project goals for the indicated planting area. These may be mixed off site or onsite, and will vary in Mix components and proportions as indicated.

B. Planting Mix - Trees and Shrub Beds and Turf Grass Lawn

1. A Mix of Imported Topsoil, Coarse Sand and Compost. The approximate Mix ratio shall be:

Mix component	% by moist volume
Imported Topsoil unscreened	45-50%
Coarse sand	40-45%
Compost	10%

2. Final tested organic matter between 2.75 and 5% (by dry weight).

3. Mix the Coarse Sand and Compost together first and then add to the Topsoil. Mix with a loader bucket to loosely incorporate the Topsoil into the Coarse Sand/Compost Mix. **DO NOT OVER MIX! Do not mix with a soil blending machine. Do not screen the soil.** Clumps of Soil, Compost and Coarse Sand will be permitted in the overall Mix.

4. At the time of final grading, add fertilizer if required to the Planting Soil at rates recommended by the testing results for the plants to be grown.

5. Provide a two-gallon sample with testing data that includes recommendations for chemical additives for the types of plants to be grown. Samples and testing data shall be submitted at the same time.

PART 3 – EXECUTION

3.1 SITE EXAMINATION

A. Prior to installation of Planting Soil, examine site to confirm that existing conditions are satisfactory for the work of this section to proceed.

1. Confirm that the subgrade is at the proper elevation and compacted as required.

2. Confirm that all surface areas to be filled with Planting Soil are free of construction debris, refuse, compressible or biodegradable materials, stones greater than 2 inches diameter, soil crusting films of silt or clay that reduces or stops drainage from the Planting Soil into the subsoil; and/or standing water. Remove unsuitable material from the site.

3. Confirm that no adverse drainage conditions are present.

4. Confirm that no conditions are present which are detrimental to plant growth.

5. Confirm that utility work has been completed per the drawings.

6. Confirm that irrigation work, which is shown to be installed below prepared soil levels, has been completed.

B. If unsatisfactory conditions are encountered, notify the Owner's Representative immediately to determine corrective action before proceeding.

3.2 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines, heads or the conduits of other utility lines that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

3.3 GRADE AND ELEVATION CONTROL

A. Provide grade and elevation control during installation of Planting Soil. Utilize grade stakes, surveying equipment, and other means and methods to assure that grades and contours conform to the grades indicated on the plans.

3.4 SITE PREPARATION

A. Excavate to the proposed subgrade. Maintain all required angles of repose of the adjacent materials as shown on the drawings or as required by this specification. Do not over excavate compacted subgrades of adjacent pavement or structures. Maintain a supporting 1:1 side slope of compacted subgrade material along the edges of all paving and structures where the bottom of the paving or structure is above the bottom elevation of the excavated planting area.

B. Remove all construction debris and material including any construction materials from the subgrade.

C. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope approximately parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.

D. In areas where Planting Soil is to be spread, confirm subgrade has been scarified.

E. Protect adjacent walls, walks and utilities from damage or staining by the soil. Use 1/2 inch plywood and or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.

1. At the end of each working day, clean up any soil or dirt spilled on any paved surface.

2. Any damage to the paving or site features or work shall be repaired at the Contractor's expense.

3.5 SOIL MOISTURE

A. Volumetric soil moisture level, in both the Planting Soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilt point and below field capacity for each type of soil texture within the following ranges.

Soil texture	**Permanent wilting point**	**Field capacity**
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

B. The Contractor shall confirm the soil moisture levels with a moisture meter (Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent). If moisture is found to be too low, the planting holes shall be filled with water and allowed to drain before starting any planting operations. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.

3.6 PLANTING SOIL INSTALLATION

A. Prior to installing any Planting Soil from stockpiles or Planting Soil Mixes blended off site, the Owner's Representative shall approve the condition of the subgrade and the previously installed subgrade preparation and the installation of subsurface drainage.

B. **All equipment utilized to install or grade Planting Soils shall be wide track or balloon tire machines rated with a ground pressure of 4 psi or less. All grading and soil delivery equipment shall have buckets equipped with 6 inch long teeth to scarify any soil that becomes compacted.**

C. In areas of soil installation above undisturbed subsoil, scarify the subgrade material prior to installing Planting Soil.
   1. Scarify the subsoil of the subgrade to a depth of 3 – 6 inches with the teeth of the back hoe or loader bucket, tiller or other suitable device.
   2. Immediately install the Planting Soil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.
   3. In the event that the loosened area becomes overly compacted, loosen the area again prior to installing the Planting Soil.

D. Install the Planting Soil to the required depths, in 12 - 18 inch lifts maximum. Apply compacting forces to each lift as required to attain the required compaction. Scarify the top of each lift prior to adding more Planting Soil by dragging the teeth of a loader bucket or backhoe across the soil surface to roughen the surface.

E. Phase work such that equipment to deliver or grade soil does not have to operate over previously installed Planting Soil. Work in rows of lifts the width of the extension of the bucket on the loader. Install all lifts in one row before proceeding to the next. Work out from the furthest part of each bed from the soil delivery point to the edge of each bed area.

F. Where possible place large trees first and fill Planting Soil around the root ball.

G. Installing soil with soil or mulch blowers or soil slingers shall not be permitted due to the over mixing and soil ped breakdown cause by this type of equipment.

H. Where travel over installed soil is unavoidable, limit paths of traffic to reduce the impact of compaction in Planting Soil. Each time equipment passes over the installed soil it shall reverse out of the area along the same path with the teeth of the bucket dropped to scarify the soil. Comply with the paragraph “Compaction Reduction” (section 3.9) in the event that soil becomes over compacted.

3.7 COMPACTION REQUIREMENTS FOR INSTALLED PLANTING SOIL

A. Compact installed Planting Soil to the compaction rates indicated and using the methods approved for the soil mockup. Compact each soil lift as the soil is installed.

B. Existing soil that is modified by tilling, ripping or fracturing shall have a density to the depth of the modification, after completion of the loosening, such that the penetrometer reads approximately 75 to 250 psi at soil moisture approximately the mid-point between wilting point and field capacity. This will be approximately between 75 and 82% of maximum dry density standard proctor.

C. Installed Planting Soil Mix and re-spread existing soil shall have a soil density through the required depth of the installed layers of soil, such that the penetrometer reads approximately 75 to 250 psi at soil moisture approximately the mid-point between wilt point and field capacity. This will be approximately between 75 and 82% of maximum dry density standard proctor.

D. Planting Soil compaction shall be tested at each lift using a penetrometer.

E. Maintain moisture conditions within the Planting Soil during installation or modification to allow for satisfactory compaction. Suspend operations if the Planting Soil becomes wet. Apply water if the soil is overly dry.

F. Provide adequate equipment to achieve consistent and uniform compaction of the Planting Soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction. Use the same equipment and methods of compaction used to construct the Planting Soil mockup.

G. Do not pass motorized equipment over previously installed and compacted soil except as authorized below.

1. Light weight equipment such as trenching machines or motorized wheel barrows is permitted to pass over finished soil work.

2. If work after the installation and compaction of soil compacts the soil to levels greater than the above requirements, follow the requirements of the paragraph "Over Compaction Reduction" below.

3.8 OVER COMPACTION REDUCTION

A. Any soil that becomes compacted to a density greater than the specified density shall be dug up and reinstalled. This requirement includes compaction caused by other sub-contractors after the Planting Soil is installed and approved.

B. Surface roto tilling shall not be considered adequate to reduce over compaction at levels 6 inches or greater below finished grade.

3.9 INSTALLATION OF CHEMICAL ADDITIVES

A. Following the installation of each soil and prior to fine grading and installation of the Compost till layer,

apply chemical additives as recommended by the soil test, and appropriate to the soil and specific plants to be installed.

B. Types, application rates and methods of application shall be approved by the Owner's Representative prior to any applications.

3.10 FINE GRADING

A. The Owner's Representative shall approve all rough grading prior to the installation of Compost, fine grading, planting, and mulching.

B. Grade the finish surface of all planted areas to meet the grades shown on the drawings, allowing the finished grades to remain higher (10 – 15% of depth of soil modification) than the grades on the grading plan, as defined in paragraph Planting Soil Installation, to anticipate settlement over the first year.

C. Utilize hand equipment, small garden tractors with rakes, or small garden tractors with buckets with teeth for fine grading to keep surface rough without further compaction. **Do not use the flat bottom of a loader bucket to fine grade**, as it will cause the finished grade to become overly smooth and or slightly compressed.

D. Provide for positive drainage from all areas toward the existing inlets, drainage structures and or the edges of planting beds. Adjust grades as directed to reflect actual constructed field conditions of paving, wall and inlet elevations. Notify the Owner's Representative in the event that conditions make it impossible to achieve positive drainage.

E. Provide smooth, rounded transitions between slopes of different gradients and direction. Modify the grade so that the finish grade before adding mulch and after settlement is one or two inches below all paving surfaces or as directed by the drawings.

F. Fill all dips and remove any bumps in the overall plane of the slope. The tolerance for dips and bumps in shrub and ground cover planting areas shall be a 2 inch deviation from the plane in 10 feet. The tolerance for dips and bumps in lawn areas shall be a 1 inch deviation from the plane in 10 feet.

3.11 SOD INSTALLATION

A. Immediately before placing the sod, the topsoil shall be fertilized at the rate indicated on the soil test.

B. The sod shall be laid with staggered joints, and on slopes the placing shall start at the bottom.

C. The sod pieces shall be pressed closely together, and at the top of a slope the upper edge of the sod strips shall be turned into the soil and covered with earth. On slopes steeper than 4:1, the sod shall be held in place with pegs driven flush with the surface of the sod. The pegs shall be not more than 1 foot apart, and not less than 2 pegs shall be used for each strip of sod. The sod shall be pressed into the underlying soil by thorough tamping and rolling.

D. All sodded areas shall be thoroughly watered immediately upon installation.

E. The finished surface shall be smooth, even and to the prescribed lines and contour. The sod shall be kept moist until growth is established.

1. Sod showing evidence of dying or other defects before acceptance of the project shall be replaced.

3.12 CLEAN-UP

A. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, sod, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once installation is complete, wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site. The Owner's Representative seals are to remain on the trees and removed at the end of the warranty period.

1. Make all repairs to grades, ruts, and damage to the work or other work at the site.

2. Remove and dispose of all excess Planting Soil, subsoil, mulch, plants, packaging, and other material brought to the site by the Contractor.

3.13 PLANTING SOIL AND EXISTING SOIL PROTECTION

A. The Contractor shall protect installed and/or existing Planting Soil from damage including contamination and over compaction due to other soil installation, planting operations, and operations by other Contractors or trespassers. Maintain protection during installation until acceptance. Utilize fencing and matting as required or directed to protect the finished soil work. Treat, repair or replace damaged Planting Soil immediately.

B. Loosen compacted Planting Soil and replace Planting Soil that has become contaminated as determined by the Owner's Representative. Planting Soil shall be loosened or replaced at no expense to the Owner.

1. Till and restore grades to all soil that has been driven over or compacted during the installation of plants.

2. Where modified existing soil has become contaminated and needs to be replaced, provide imported soil that is of similar composition, depth and density as the soil that was removed.

3.14 PROTECTION DURING CONSTRUCTION

A. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers.

1. Maintain protection during installation until the date of plant acceptance (see specifications section – Planting). Treat, repair or replace damaged work immediately.

2. Provide temporary erosion control as needed to stop soil erosion until the site is stabilized with mulch, plantings or turf.

B. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including large existing trees, soil, paving, utilities, lighting, irrigation, other finished work and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Owner's Representative shall determine when such cleaning, replacement or repair is satisfactory. Damage to existing trees shall be assessed by a certified arborist.

3.15 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

B. **The date of substantial completion of the planting soil shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.**

3.16 FINAL ACCEPTANCE / SOIL SETTLEMENT

A. At the end of the plant warrantee and maintenance period, (see Specification section - Landscaping) the Owner's Representative shall observe the soil installation work and establish that all provisions of the contract are complete and the work is satisfactory.

1. Restore any soil settlement and or erosion areas to the grades shown on the drawings. When restoring soil grades remove plants and mulch and add soil before restoring the planting. Do not add soil over the root balls of plants or on top of mulch.

B. Failure to pass acceptance: If the work fails to pass final acceptance, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the Owner's Representative.

END OF SECTION 329119

SECTION 329219 – HYDROSEEDING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Provide all materials, labor and equipment necessary to complete all work as shown on the drawings and as specified herein, including, but not limited to, the following:

1. Apply specified treatments to all turfgrass areas as specified on the plans

2. All other labor and materials reasonably incidental to the satisfactory completion of the work, including clean up of the site.

1.2 SUBMITTALS

A. The contractor shall submit letters of compliance, manufacturer's literature, upon written request 10 working days in advance, samples for any of the following items:

1. Seed Mixes (or individual items)

2. Mulches

3. Binders/Tackifiers

4. Fertilizers

B. Product Data: For each type of product indicated.

C. Certification of Grass Seed: From seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

D. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Topsoil shall be as specified in Topsoil and Sod, Section 329119.

B. Turf Grass Seed Mix: A mix of two tall fescue varieties and 10% Kentucky Bluegrass.

C. Retention Basin Seed Mixes: The Retention Basin Seed Mixes shall be the Basin Bottom Mix and Basin Slope Mix as indicated on the plans, or approved equal.

D. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. Prior to seeding at the request of the owner, the contractor shall provide a letter of certification and the original Association of Official Seed Analysts (AOSA) seed test results.

E. Mulch shall be composed of cellulose or wood fiber products with no growth or germination inhibiting substances, and shall be manufactured in such a manner that when thoroughly mixed with seed, fertilizer, organic stabilizer, and water, in the proportions specified, will form homogeneous slurry which is capable of being sprayed to form a porous mat. The fibrous mulch in its air-dry state shall contain no more than 15% by weight of water. The fiber shall have a temporary green dye and shall be accompanied by a certificate of compliance stating that the fiber conforms to these specifications.

F. Organic Stabilizer / Tackfier shall be an organic substance supplied in powder form and shall be psilium-based and packed in clearly marked bags stating the contents of each package.

G. Equipment used for application of slurry shall be a commercial-type Hydro-Seeder and have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry. Tank capacity shall be a minimum of 1,500 gallons and shall be mounted on a truck to allow access to the site. Distribution Lines: Large enough to prevent stoppage and allow for even distribution of slurry over the site. Pump: Shall be able to generate 150 psi at the nozzle.

H. Fertilizer shall be a starter derived from urea formaldehyde (N-P-K 6-24-24). **Do not include fertilizer with the Retention Basin Seed Mixes slurry.**

I. Water: The Contractor is responsible for providing water if site water and/ or the irrigation system is not functional at the time of seeding.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. In newly graded subgrades, loosen subgrade to a minimum depth of 6 inches (150 mm) Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

B. In areas of newly graded subgrades the topsoil shall be spread over the surface in a uniform layer that will produce the prescribed compacted thickness of at least six (6”) inches. When required, ground limestone which has been protected from moisture and is dry and free flowing, shall be evenly spread over the area to be seeded at a rate that will produce a pH value of the soil of 6.5. The area shall then be raked, disked or otherwise worked to incorporate the limestone into the upper 3 to 4 inches of soil to remove stones, roots, debris and other unsuitable material and to form an even surface. The soil shall be in a pliable condition at the time of seeding.

C. If the quantity of topsoil obtained from stripping, or from storage piles when prescribed, or both, is insufficient for the requirements of the project, the Contractor shall furnish the required additional topsoil from other sources

D. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Hydroseeding Preparation: Do all slurry preparation at the job site:

1. Water, mulch, fertilizer, binder and other ingredients shall be added to the tank simultaneously so that the finished load is a homogenous mix of the specified ingredients.
    a. Retention Basin Seed Mixes: Apply 500 lbs of mulch with the seed and 1000 lbs of mulch over top.

2. Seed shall be added last and shall be discharged within 2 hours. Loads held over 2 hours will be recharged with ½ the seed rate before application.

3. Once fully loaded, the complete slurry shall be agitated for 3-5 minutes to allow for uniform mixing.

F. Hydroseeding Application:

1. All hydroseed applications are to be applied in a sweeping motion to form a uniform application and form a mat at the specified rates.

2. Unused Loads: If mixture remains in tank for more than 8 hours it shall be removed from the job site at contractor's expense.

3. Reseeding: After "Final Acceptance", reseeding will be done at the request of the owner and shall be considered extra.

G. The contractor shall hydroseed only on a calm day. No seeding shall be performed on frozen ground or when the temperature is 32 degrees Fahrenheit or lower. Schedules for fertilizing and seeding must be submitted to the engineer for approval prior to the work. Hydroseeding shall be done within ten days following soil preparation.

H. Clean-up

1. General: All turf areas and staging areas shall be maintained in a neat and orderly condition. Keep paved area free of soil.

2. Hydro-Seeding Overspray: Installing contractor is responsible for washing or otherwise cleaning excess material off all area not intended to receive treatment.

3. Debris: Clean up and remove associated materials and debris from project site before Final Acceptance

3.2 MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than 60 days from date of Substantial Completion. When full maintenance period has not elapsed before end of planting season, or if lawn or Retention Basin Seed Mixes are not fully established, continue maintenance during next planting season.

B. Turf Grass Maintenance

1. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

2. Watering: Set irrigation system to keep lawn uniformly moist to a depth of 4 inches .Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Water lawn at a minimum rate of 1 inch per week.

3. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over

and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height: Mow grass 2 to 3 inches high.

4. Lawn Postfertilization: Apply fertilizer to turf grass after initial mowing and when grass is dry. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area. Adjust if necessary depending upon amount of fertilizer applied at initial planting.

C. Retention Basin Seed Mixes Maintenance

1. Begin maintenance immediately after each area is planted and continue until acceptable native grass stand is established, but for not less than 60 days from date of Substantial Completion. **When full maintenance period has not elapsed before end of planting season, or if the native grass stand is not fully established, continue maintenance through next planting season.**

2. During the first growing season after planting, the Contractor shall cut all native grasses to 8" height with a weed eater whenever growth reaches 18-20" height. Typically, a planting will need to be trimmed three to five times. Native grasses shall be cut close to the ground, not lower than 5" or the development of the native grass seedlings will be harmed. The Native grasses to be cut in the spring just after the last frost, before green-up begins.

3. Contractor shall monitor the site and control and any problematic weeds that arise by mechanical means through the second year of maintenance such as Canada thistle and curly dock.

4. Native Grass Establishment Period
   a. The Owners Representative will reinspect the native grass areas approximately one (1) year after the start of the plant establishment period. When the coverage does not meet the Satisfactory Seeded Native Grasses requirements the Contractor shall reseed the areas identified to have inadequate coverage, without cost to Owner. Reseeding shall occur in the next optimal seeding season.
   b. The Owners Representative will reinspect the native grass areas approximately two (2) years after the start of the plant establishment period. When the coverage does not meet the Satisfactory Seeded Native Grasses requirements the Contractor shall reseed the areas identified to have inadequate coverage, without cost to Owner. Reseeding shall occur in the next optimal seeding season.

5. Satisfactory Seeded Turf Lawn
   a. Satisfactory Turf Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 2 by 2 inches. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

6. Satisfactory Retention Basin Seed Mixes
   a. At end of the two year maintenance period, a healthy, uniform, close stand of grasses and perennials has been established, free of weeds, with coverage exceeding 95 percent over any 10 square feet and bare spots not exceeding 6 by 6 inches. Reestablish native grass areas that do not comply with requirements and continue maintenance until native grass areas are satisfactory.

END OF SECTION 329219

SECTION 329300 – LANDSCAPING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Landscaping shall consist of excavation, furnishing, delivering, installing, monitoring and maintaining, planting of all trees, shrubs, plants, and plantings, “Plant Material”, in the location shown on the Plans and noted in the plant list and all incidental work related thereto. Landscaping shall include furnishing and installing planting soil mix and watering all landscape plantings and provide tree watering bags for all shade trees proposed on the Landscape Plan. Additionally, landscaping includes furnishing and installation of a 1” riverstone, 3” deep, on a geofabric.

1.2 PLANT ESTABLISHMENT PERIOD

A. The Engineer will reinspect the plants approximately 1 year after the start of the plant establishment period. Replace without cost to Owner, within three weeks or as soon as weather and soil conditions permit, plants that are more than 25 percent dead or in an unhealthy condition as determined by the Engineer.

B. The Engineer will reinspect the plants approximately 2 years after the start of the plant establishment period. Replace without cost to Owner, within three weeks or as soon as weather and soil conditions permit, plants that are more than 25 percent dead or in an unhealthy condition as determined by the Engineer.

C. In addition to a plant mateiral’s death, health or structural issues that significantly jeopardize the survivability, proper development, and/or long-term structural integrity of the plant material shall be cause for replacement under this guarantee.

D. Contractor shall supply a watering bag for each tree.

PART 2 – PRODUCTS

2.1 SHADE AND FLOWERING TREES

A. Furnish nursery-grown trees in accordance with good horticultural practices under climatic conditions similar to those of the Project for at least two years, unless specifically noted otherwise. Documentation confirming the point of origin shall be provided to the Engineer prior to delivery.

B. Trees shall comply with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Trees and shrubs shall exceed AAN standards for quality by being exceptionally heavy, uniform, so trained or favored in development and appearance as to be superior in form, density and spread of branches, compactness, and symmetry. Determination of quality shall be made by the Engineer. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, leaf spotting, injuries, abrasions, and disfigurement. All trees shall be quality, nursery-grown stock. Inferior, “B” grade and or “park” grade tree will not be accepted.

C. All trees shall be delivered in a healthy and vigorous condition and free of insects, diseases, girdling roots, and wounds.

D. All single-stemmed trees shall have a single, strong, straight central leader, unless otherwise noted or appropriate for the species.

E. All trees shall have a well-developed, well-spaced and reasonably symmetrical branch scaffold with strong branch attachments. Crown form shall be appropriate for the particular species or variety.

F. Root ball diameter and depth and the ratio of caliber to height shall be within the proportions set forth in the American Standard for Nursery Stock.

G. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

H. Label at least one tree of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

I. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required

1. Provide balled and burlapped grown trees.

2. Branching Height: One-third to one-half of tree height. For street trees branching height shall be one half of tree height

J. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; clump stem form. Provide balled and burlapped tree.

2.3 DECIDUOUS SHRUBS

A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub. Provide balled and burlapped and container-grown shrubs as indicated on the plant list.

B. Label at least one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.4 CONIFEROUS EVERGREENS

A. Form and Size: Specimen-quality, exceptionally heavy, densely branched, symmetrically shaped coniferous evergreens. Provide balled and burlapped trees.

B. Label at least one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.5 BROADLEAF EVERGREENS

A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1. Provide balled and burlapped and container-grown shrubs as indicated on the plant list.

B. Label at least one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.6 OTHER MATERIAL

A. Topsoil: Topsoil shall comply with the requirements in Section “TOPSOIL AND SOD”.

B. Mulch: Mulch around trees, shrubs and perennials shall be double shredded hardwood mulch.

C. Stakes and guys: Install Stakes and Guys per methods and locations as shown on the Drawings in locations, **if and where directed by the Engineer**.

1. Stakes shall be rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

2. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

3. Guy Cable: For large trees: 5-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.

4. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

5. Woven Fabric Guy Ties: Flat, woven, non-fraying, polypropylene material, ¾” wide, white. Arbor Tie or approved equivalent.

D. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs, designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

E. Tree Watering Bags: UV-treated polyethylene irrigation bag reinforced with nylon webbing. All sides to be watertight with ¼” thick heat seals. Bags shall have nylon zippers to allow to be secured to tree or secured to other bags for multiple-bag configuration.

F. River Stone: River Stone shall be a rounded stone with an average size of 1”.

G. Root Barriers:

1. Mechanical barrier and root deflector to prevent tree roots from damaging hardscapes and landscapes.

2. Copolymer Polypropylene barrier designed for root barrier applications.

3. Integral molded vertical root deflecting ribs spaced at 6” (150mm) on center.

4. Thickness: 0.080” (2.032 mm) minimum

5. Interlocking design

6. ISO 9002 certified

7. Tensile strength 3800 PSI, passing ASTM D638

8. Elongation yield 6.3%, passing ASTM D638

9. Flexural modulus 155,000 PSI, passing ASTM D790B

10. Notched Izod Impact 7.1, passing ASTM D256A

11. Rockwell Hardness r-scale 68, passing ASTM D785A

PART 3 – EXECUTION

3.1 GENERAL

A. Construction shall be in accordance with Division 800 – Landscaping in the 2007 NJDOT Standard Specifications.

3.2 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Notify Landscape Architect, in writing, of any conditions that might prevent satisfactory completion. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Test drainage of pits and planting beds. Notify Engineer of potential poor drainage of tree and shrub pits and planting beds. Recommend a program for correction of poor drainage conditions and submit proposal to Engineer. Do not proceed with planting operations in areas of poor drainage until conditions are corrected, or direction is given by the Engineer.

3.3 PREPARATION

A. Install topsoil to bring planting area to rough grade, in 8” lifts, prior to installing plant material. Compact the soil to 90 percent (90%) S.P.D. prior to installing plant material.

B. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

D. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before planting. Make minor adjustments as required.

E. Install topsoil throughout planting area in eight (8) inch lifts to finished grade as shown on the Plans. Compact the soil to 90 percent (90%) S.P.D.

F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.4 PERSONNEL AND WORKMANSHIP

A. All of the Contractor's personnel shall be experienced in tree planting and properly supervised to ensure that property is protected from damage, that the safety of all personnel and the public is protected, and that all work is completed in a professional manner.

B. The Contractor's work crews shall possess and utilize the equipment that is appropriate and necessary to complete the work in a proper, safe and expeditious manner.

C. All work shall be completed in a good workman like manner and in accordance with industry standard and accepted horticultural practices.

3.5 PLANTING, STAKING ROOT-GUARD AND MULCHING PROCEDURES

A. Remove the wire cage prior to planting.

B. Handle trees by the root ball, never by the trunk. Fully support the bottom of the root ball and protect the trunk and limbs from damage when lifting.

C. Identify the location of the true root collar within the root ball — this is not necessarily the top of the root ball.

D. Carefully dig a planting hole that is at least twice as wide as the root ball and to a depth that will ensure that the true root collar remains above the surrounding grade. In restricted areas, dig the bole as wide as possible. Over-digging the depth will cause excessive settling and offers no benefit to the tree. In areas with poor, compacted soil, till additional soil around the hole to 12" deep.

E. Scarify the sides of the planting hole where the soil is compacted or if they become glazed by the digging process. Tamp the bottom of the planting hole, if necessary, to prevent settling.

F. Trees shall be planted such that the root flare is 1" above adjacent grade, unless the drawings indicate otherwise. Tree planting height shall be dictated by the actual root flare rather than the top of rootball as received from growers or nurseries.

1. Tops of tree rootballs shall be no higher than 2" above the tops of main order tree roots.

2. If main order roots are buried greater than 2" but less than 4" below the top of tree rootballs, contractor must trim rootballs by carefully removing soil from the top of the rootballs so that main order roots are within 2" of the top of rootball.

3. If main order roots are buried greater than 4" below the top of rootball, the tree will be rejected and the contractor must remove the tree from the jobsite.

4. The contractor is responsible for ensuring that trees received on site and planted on site meet the aforementioned specifications regarding tree root flare and rootball. **The Engineer reserves the right to reject any tree delivered to the site if tree's root flare is buried greater than 4" below top of rootball.**

G. Add a few inches of soil around the bottom of the root ball to straighten and stabilize it.

H. Install root barrier around the root ball all trees within five feet of a sidewalk, pavement or curb. Root guard side of root ball closest to the adjacent material at a depth of at least 18 inches.

I. Once the tree is stabilized, cut and remove from the planting hole all burlap, twine and wire from at least the upper two-thirds of the root ball (do not fold under).

J. Add several inches of backfill around the sides of the root ball, not over the top. Use soil taken from the hole without amendments and with large stones, debris and hard clods removed unless it is extremely poor quality. Any introduced soil must be similar in texture to the surrounding soil or it will create a problem with water infiltration.

K. Water the soil in to eliminate air pockets — do not tamp. The Contractor shall be responsible for delivering water to the planting sites.

L. Continue backfilling and watering-in lifts of soil until the hole is backfilled to the top of the outer edge of the root ball. Do not backfill over the crown (top center) of the root ball or the root collar. Be sure to eliminate all air pockets.

M. Form a shallow (no more than 3' high) soil saucer outside the edge of the root ball to facilitate watering; All excess soil shall be removed from the site by the Contractor.

N. Spade a neat edge between the soil and surrounding turf and mulch the entire soil surface beneath the tree and within the planting bed with a 3" layer of double shredded hardwood mulch. Keep mulch a few inches from the base of the trunk — never mound mulch against the tree. The root collar shall be visible above grade when all work is complete or the installation will be rejected.

O. Remove all tags, ribbon, twine, etc. from the Plant Material.

P. Remove any dead or damaged branches in accordance with proper pruning practices. No live growth shall be pruned (including "tipping") without prior approval of the Engineer.

Q. Install a minimum of one tree watering bag per tree. Install multiple bags for trees as recommended by the tree watering bag manufacturer. Fill water bags for each tree.

R. Restore the work area to its original condition.

S. Immediately notify the Engineer of any unforeseen circumstances that prevent adherence to these procedures and specifications.

3.6 MAINTENANCE

A. Maintain all exterior plants covered by this Item, as required to establish healthy, viable plantings, including the following maintenance requirements during the maintenance period:

1. Mowing;

2. Edging;

3. Pruning;

4. Cultivating;

5. Watering, including filling tree water bags, do not allow plants to wilt at any time;

6. Weeding;

7. Fertilizing;

8. Mulching;

9. Restoring plant saucers for trees;

10. Maintaining trees support systems at correct tension;

11. Resetting plants to proper grade and vertical position;

12. Insect and Pest Control as required to keep plants free of insects and disease;

13. Restoring or replacing damaged tree wrappings;

14. Removal of trash and debris; and

15. Replacing dead or dying plants.

3.6 FINAL ACCEPTANCE

A. Inspection to determine Final Acceptance of planted areas will be made by the Engineer upon Contractor's request at completion of the two-year Plant Establishment Period. Provide notification at least fifteen (15) working days before requested inspection date.

1. Planted areas will be acceptable provided all requirements, including plant replacements and maintenance, have been complied with and healthy, thriving, and growing plants are established.

2. Remove all Tree Staking and Guying materials, if installed, prior to Final Acceptance inspection.

3. Knock down, regrade, and re-mulch all tree pit saucers prior to Final Acceptance inspection.

3.7 CLEANUP AND PROTECTION

A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.8 DISPOSAL

A. Disposal: Remove surplus soil and waste material, unsuitable soil, trash, and debris, and legally dispose of in accordance with the SITE GRADING specification.

END OF SECTION 329300

SECTION 329400 - LANDSCAPE BOULDER

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall include furnishing, delivering and installing natural landscape boulders in conformance with the details shown on the contract drawings, and where directed by the Engineer. It shall also include but not limited to transportation and delivery, excavation, placement, inspection and disposal of material.

1.2 QUALITY ASSURANCE

A. Provide representative photographs of boulders at supplier's yard prior to purchase for review by Engineer. Following review of photographs, Engineer will review groupings of boulders at supplier's yard for approval.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Boulders: Boulders shall be of sandstone or brownstone or other approved stones readily available within the vicinity of Scotch Plains, New Jersey. They shall be of an approved size, shape and type. Boulder dimensions shall be as shown on the contract drawings.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Boulders delivered shall be clean of marks or scars caused by construction equipment. The Engineer shall be notified two weeks prior to delivery of the boulders to the construction site. The delivered boulders shall receive the approval of the Engineer prior to placement. The Contractor shall notify the Engineer when site preparation is complete.

B. Coordinate placement of boulders with the installation of the retention basin liner and planting soil.

C. The Engineer will direct the placement of boulders in the field. Spacing and location of the boulders shall be as shown on the plans, or as directed by the Engineer. The Contractor shall make adjustments in the boulder placement as directed by the Engineer.

D. The Contractor shall set the boulders with a minimum of ¼ boulder depth buried and backfill around the boulders to set the boulders in a stable position and to prevent future removal or displacement of the boulders.

3.2 MAINTENANCE

A. If, at any time before 12 months after the completion and acceptance of the work, there shall be any settlement requiring repairs to be made along the line of work, or should any defect appear in the work

due to neglect, carelessness or improper construction on the part of the Contractor, the Engineer will notify the Contactor to make such repairs and remedy any defects. The Contractor shall, within 5 days after such notice, begin and carry out such repairs at no additional cost to the owner.

END OF SECTION 329400

SECTION 330130.41 – SEWER CLEANING AND TELEVISING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Sewer cleaning and televising shall consist of the furnishing or all materials, labor, equipment and plant necessary for the performance of all work to properly jet, clean, and televise sewers and document all findings in and report on all sewers designated in accordance with Plans and Specifications in those locations as directed by the Engineer. The Contractor is responsible for probing grit depths for sewer cleaning. The Contractor shall clean and televise all existing storm and existing sanitary lines within the adjacent driveway that fronts the project site. Storm and sanitary lines shall be cleaned and televised after construction.

PART 2 – PROUDCTS

2.1 MATERIALS

A. The Contractor shall supply as a minimum the following equipment for the sewer cleaning:

1. High pressure sewer jetting and vacuum truck

2. Picks, shovels and all other equipment necessary for sewer cleaning.

B. The Contractor shall supply as a minimum the following equipment for the closed circuit television inspection.

1. The television inspection equipment shall consist of a sealed color video camera with an articulating head, a color video monitor for viewing during inspection, one thousand feet of camera cable, water proof camera light, camera skids or powered crawler, power control unit, continuous contract reel assembly, footage meter, Polaroid camera, tow cable and winch (if required), enclosed inspection trailer or truck, and all else necessary for the safe and orderly execution of same.

2. The color camera shall be specifically designed and constructed for the purpose of televising sewers. Same shall have a high resolution lens, capable of spanning 360 degrees circumference and 270 degrees on horizontal axis to televise sewer lines 6-inch in diameter and larger. Focal distance shall be adjustable through a range of 1 inch to infinity. The purpose of the articulating head camera is to view all service connections and to locate all defects, as well as any questionable problem areas.

3. Camera and lighting quality shall be suitable to provide a clear, continuous in-focus picture of the entire inside periphery of the sewer pipe for all conditions encountered during the work. The camera shall be capable of operating efficiently during the work. The camera, television monitor and all other necessary components of the video system shall be capable of producing a minimum 650-line resolution color video picture.

4. Camera construction shall be cable of sustaining shock loads same shall operate only on restricted MCS video band widths which are free from interference from externally generate R.F. signals. The composite video signal output shall be maintained at a minimum of 1.5V through 2000' of cable. The color camera shall have a vidicon target circuit to replace the iris control and it shall adjust automatically to optimum settings for light levels incident on the subject. This compensation shall be achieved without moving parts.

5. The camera housing shall be 3" diameter or less, and the camera housing face plate shall be 5/16" optically ground quartz glass to insure a distortion free image. The front and rear ball assemblies shall be precision threaded to the camera housing and o-ring sealed. The connection from the color camera to the camera cable shall be of the quick disconnect type.

6. The power control unit shall be a solid state unit containing two auto transformers. The purpose for same shall be to regulate the line voltage input for the entire electrical system and to allow for variable control of the voltage to the lighthead. The light control auto-transformers shall allow for varying the light intensity from no light to 10,000 foot candles. Each auto transformance shall have a separate volt meter and indicator light.

7. The lighthead shall be able to produce the proper illumination for all pipe 6" through 24" with no modifications or adjustments.

PART 3 – EXECUTION

3.1 TELEVISING METHODS

A. The television inspection shall be performed utilizing a closed circuit television and shall be performed one reach at a time. Flow will have to be controlled such that flow depth is less than one third of the full flow depth. All sewer reaches must be properly cleaned prior to televising in accordance with the sewer cleaning Specifications, described herein.

B. The Contractor is permitted to use several means to control the flow. A plug may be used and carefully monitored to assure that no surcharging conditions will result or by either bypass pumping or by utilizing the cleaning jets to vacuum the flow from impairing the camera. Bypass pumping into a separate sewer system is permitted provide that said system can handle the additional flow and this operation is approved by the Engineer in advance.

C. During the inspection, the camera is to be stopped and photographs taken at the points where one or more of the following conditions are observed: Infiltration/Inflow Sources, service conditions, structural defects, including broken pipe, cracks, deterioration, punctures, etc., abnormal joint conditions (i.e. horizontal and vertical misalignments) open joints, joints not fully sealed, etc., and any other unusual conditions.

D. The Contractor shall provide a mobile television studio for inspection during the televising. The studio shall be capable of accommodating a skilled technician for the operation of the camera and two authorized personnel. All operation of the equipment shall be controlled above ground.

E. Color video tape recordings of all television inspections shall be made on standard VHS cassette at high speed, 2 hours per tape or DVD. At the start and end of each reach, the recording shall display: date, street, job number, footage flow direction, pipe diameter and a description by the operator. Once the inspection begins, the footage shall be the only information to remain on the screen.

F. The recording shall also have an audio portion describing all physical features of the sewer. Same shall be free from electrical interference and background noise.

G. Camera lighting shall be capable of producing light levels from 50-100 foot candles, which allows a clear, in-focus picture of a minimum of 6 linear feet of the entire periphery of the sewer pipe.

H. <u>The Contractor shall submit five copies to the Engineer's office of all written report logs and video tapes/dvds of the existing sewers in question before beginning construction.</u>

I. The Contractor shall submit five copies of all written report logs and video tapes/DVDs upon completion of inspection and shall be delivered to the Engineer's office within a timely manner after completion of work.

END OF SECTION 330130.41

SECTION 330590.33 – CONCRETE THRUST BLOCK

PART 1 – GENERAL

1.1 DESCRIPTION

A. This work shall consist of the construction of Concrete Thrust Blocks at all vertical and horizontal bends and tees, as shown on the Plans, or as directed by the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Class ‘C’ concrete shall be used throughout.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. All operations pertaining to handling, measuring, and batching materials, and mixing concrete, shall conform to the requirements specified in Section 405.07 - Handling, Measuring and Batching Materials and Section 405.08 - Mixing Concrete in the Standard Specifications.

END OF SECTION 330509.33

SECTION 330531.11 – PVC PIPE

PART 1 – GENERAL

1.1 DESCRIPTION

A. PVC Pipe shall consist of the excavation for the construction of the various sizes and classes of PVC pipe and corresponding cleanouts as shown on the Plans and Details or as otherwise directed by the Engineer. The most conservative (largest quantity) dimension either scaled off the contract documents or labeled on the contract documents shall be applied in the bid.

PART 2 – PRODUCTS

2.1 MATERIALS and TESTING

A. The pipe shall be made of Polyvinyl Chloride (PVC) plastic having a cell classification of 12454B or 12454C or 13364B, (with minimum tensile modulus of 500,000 PSI) as defined in ASTM Specification D1784. Fittings shall be made of PVC plastic having a cell classification of 12454B or 12454C or 13343C as defined in ASTM Specification D1784. Compounds that have different cell classifications because one or more properties are superior to those of the specified compounds are also acceptable.

B. Elastomeric gaskets shall comply with the requirements described in ASTM Specification F477.

C. The pipe and fittings shall meet all the requirements of ASTM Standard D3034-83 for SDR35 PVC pipe for sanitary sewer pipes. Storm conveyance pipes shall be Schedule 40 PVC pipe.

D. Pipe and socket dimensions shall conform to those shown in Tables 1 and 2, respectively (Taken from ASTM D-3034-83).

E. Cleanouts as per Construction Details.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Storm Sewer Pipes shall be constructed in accordance with the N. J. Department of Transportation Standard Specifications.

B. Sanitary Sewer Pipes shall be constructed in accordance with Section 207 - Subsurface Structure Excavation of N. J. Department of Transportation Standard Specifications and the "Sanitary Sewer" Section of these Specifications.

C. All pipe lines shall be tested before backfilling trenches. Tests shall be made between manholes within twelve (12) working days of the completion of such sections of mains. The leakage from the main for such section tested, while the pressure is a 3.5 psig for a period of one hour, shall be no greater than the rate of one hundred (100) gallons per inch-inch mile of pipe in 24 hours.

END OF SECTION 330531.11

SECTION 330533.33 – HDPE DRAINAGE PIPE

PART 1 – GENERAL

1.1 DESCRIPTION

A. This work shall consist of furnishing and installing underground detention basin and conveyance systems composed of lengths of high-density polyethylene (HDPE) pipe. It shall include the required excavation, clean stone, cleanouts (with caps), fabric and any other material, tools, equipment necessary to construct the underground detention basin and conveyance systems as shown on plan. It shall also include the required excavation, clean stone, street pavement sawcutting, street full depth pavement replacement, necessary police traffic directors and any other material, tools, equipment necessary to construct the offsite HDPE conveyance system as shown on plan. The most conservative (largest quantity) dimension either scaled off the contract documents or labeled on the contract documents shall be applied in the bid.

1.2 SUBMITTALS

A. Submit samples and catalogue cuts of the proposed HDPE pipe, geogrid, clean stone, cleanouts and geotextile fabric.

PART 2 – PRODUCTS

2.1 MATERIALS

A. High-density polyethylene pipe shall be Type N-12ST with soil tight joints as manufactured by Advanced Drainage Systems, Inc., Tel. 800-821-6710, or approved equal.

B. Geotextile fabric shall Type 140N as manufactured by Mirafi, Tel. 706-693-2226, or approved equal.

C. Geogrid to be Mirafi Miragrid or approved equal.

2.2 SLOT DRAIN PIPE

A. HDPE Slot Drain Pipe shall be Duraslot, manufactured by Advanced Drainage Systems (ADS), or approved equivalent.

B. Slotted drain portion shall be aluminum, with a 1.75-inch-wide opening, with ADA-compliant grate, 6.5-inch-high slot height.

C. Pipe diameter shall be as specified on the plans. Pipes shall be sloped per the plans.

D. All fittings, end caps, couplers, and all other required appurtenances shall be provided and installed by the Contractor.

E. Slot drain pipe shall be installed, in a concrete trench, in accordance with manufacturer’s specifications.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Excavation, bedding, and backfilling shall conform to Section 207 of the NJDOT Standard Specifications.

B. The underground detentions basins shall be installed in accordance with ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

END OF SECTION 330533.33

SECTION 330561 – MANHOLES, OUTLET CONTROL STRUCTURES, HEADWALLS, GREASE TRAP, INLETS, AND CATCH BASINS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes, but is not limited to Manholes (all sizes and types), Outlet Control Structures, Inlets, Catch Basins, Trench Drains, Precast Concrete Grease Trap and Reset Castings shall consist of the construction of these structures, stone bedding, backfilling and backfill material, and the furnishing and placing of new heads, grates, and covers. The most conservative (largest quanity) dimension either scaled off the contract documents or labeled on the contract documents shall be applied in the bid.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Precast Concrete Manholes (all sizes and types), Concrete Headwalls, Outlet Control Structures and Inlets, Precast Concrete Grease Trap, or approved equal may be used as approved by the Engineer.

B. All materials used in the construction of Manholes (all sizes and types), Outlet Control Structures, Inlets, and Catch Basins, shall conform to Section 603 - Inlets and Manholes of the Standard Specifications. All structural reinforcing shall be epoxy coated.

C. All Type 'B' Inlets shall be Campbell Foundry Pattern No. 2618 with Type-N curb piece (Bicycle Safe & ADA compliant), or approved equal and Type “E” inlets.

1. All Type ‘B’ inlets constructed either partially or wholly within any ADA parking space shall be equipped with an ADA-compliant inlet grate.

D. All castings shall have the name of the Municipality, the date, and the words “Sanitary” or “Storm” stamped or cast clearly and legibly thereon. Units not so furnished will not be accepted for use on Municipal projects. Manhole lids for sanitary sewer construction shall be locking and water tight. Concrete blocks shall conform to the compressive strength and absorption requirements of A.S.T.M. C -139.

E. Recycled Concrete aggregate shall conform to the requirements of Section 901.08; Course aggregate shall be broken stone or washed gravel conforming to the requirements of Section 901.04 and Section 901.05, respectively of the NJDOT Standard Specifications.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Construction for Manholes (all sizes and types), Outlet Control Structures, CDS Units, Inlets, Trench Drains, and Catch Basins shall be in accordance with Section 603 - Inlets and Manholes of the NJDOT Standard Specifications. Particular attention should be brought to Section 603.06 – Pre-cast Concrete Inlets and Manholes, and Section 603.10 - Reconstruction and Conversion of Existing Structures, of the N.J. Department of Transportation Standard Specifications.

B. Excavation shall be in accordance with Subsection 207.04 of the NJDOT Standard Specifications. Backfilling shall be in accordance with Subsection 207.06 of the NJDOT Standard Specifications.

END OF SECTION 330561

SECTION 331005 – FIRE HYDRANT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This work shall consist of the removal, abandonment of existing fire hydrant and replace with new fire hydrant and associated apparatus, construction of concrete thrust blocks at all vertical and horizontal bends and tees typically, as shown on the Plans, and testing, or as directed by the Engineer.

B. Fire hydrants purchased or installed shall meet or exceed all applicable requirements and tests of the latest revisions of ANSI/AWWA Standard C502. Fire hydrants shall meet all test requirements and be listed by Underwriters Laboratories Inc. Fire hydrants shall meet all test requirements and have full approval of Factory Mutual. In addition, fire hydrants shall meet the following requirements

C. Fire hydrants shall be rated for a working pressure of 250 psig. (1,725 kPa).

D. Fire hydrants shall be of the compression type, opening against the pressure and closing with the pressure.

E. Fire hydrants shall have a minimum 5¼ inch main valve opening and a minimum inside lower/upper barrel diameter (I.D.) of 7 inch to assure maximum flow performance. Pressure loss at 1,000 gallons per minute (gpm) shall not exceed 2.50 psi through a 4.5-inch pumper nozzle.

F. Fire hydrants shall be three-way in design, having one integral 5 inch Storz connection pumper nozzle with locking cap and two 2-$^{31}/_{32}$" outside diameter hose nozzles with New York Corp. threads (8-289). Nozzles shall thread counterclockwise into hydrant barrel utilizing O-ring seals. A stainless steel nozzle lock shall be in place to prevent inadvertent nozzle removal.

G. The bonnet assembly shall provide an oil reservoir and lubrication system that automatically circulates lubricant to all stem threads and bearing surfaces each time the hydrant is operated. This lubrication system shall be sealed from the waterway and any external contaminants by use of O-ring seals. An anti-friction washer shall be in place above the thrust collar to further minimize operating torque. The oil reservoir shall be factory filled with a low viscosity, FDA approved, non-toxic oil lubricant which will remain fluid through a temperature range of –600 F. to +1500 F.

H. The operating nut shall be a one-piece design, manufactured of ASTM B584 bronze. It shall have a #7 nut. The operating nut shall be affixed to the bonnet by means of an ASTM B584 bronze hold down nut. The hold down nut shall be threaded into the bonnet in such a manner as to prevent accidental disengagement during the opening cycle of the hydrant. The use of set screws as a means of retention is unacceptable. A resilient weather seal shall be incorporated into the hold down nut, for the purpose of protecting the operating mechanism from the elements.

I. The opening direction shall be left. An arrow shall be cast on the bonnet flange to indicate the specified opening direction.

J. The hydrant bonnet shall be attached to the upper barrel by not less than eight bolts and nuts and sealed by an O-ring.

K. Hydrants shall be a “traffic-model” having upper and lower barrels joined at the ground line by a separate and breakable “swivel” flange providing 360-degree rotation of upper barrel for proper nozzle facing. This flange shall employ not less than eight bolts. The safety flange segments shall be located under the upper barrel flange to prevent the segments from falling into the lower barrel when the hydrant is struck.

The pressure seal between the barrels shall be an O-ring. The proper ground line shall be cast clearly on the lower barrel and shall provide not less than 18 inches of clearance from the centerline of the lowest nozzle to the ground.

L. The operating stem shall consist of two pieces, not less than 1¼ inch diameter (excluding threaded or machined areas) and shall be connected by a stainless steel safety coupling. The safety coupling shall have an integral internal stop to prevent the coupling from sliding down into the lower barrel when the hydrant is struck. Screws, pins, bolts, or fasteners used in conjunction with the stem couplings shall also be stainless steel. The top of the lower stem shall be recessed 2 inches below the face of the safety flange to prevent water hammer in the event of a "drive over" where a vehicle tire might accidentally depress the main valve.

M. The lower barrel shall be an integrally cast unit. The use of threaded on or mechanically attached flanges is deemed unacceptable. The hydrant bury depth shall be clearly marked on the hydrant lower barrel.

N. Composition of the main valve shall be a molded rubber having a durometer hardness of 95 +/- 5 and shall be reversible in design so either side can be used. This will provide a spare in place. Plastic (polyurethane) main valves are unacceptable. The main valve shall have a cross section not less than 1".

O. Hydrants shall be equipped with two drain valves which drain the barrel when the hydrant is closed and seal shut when the hydrant is opened. These drain valves shall be an integral part of the one-piece bronze upper valve plate. They shall operate without the use of springs, toggles, tubes, levers or other intricate synchronizing mechanisms.

P. The upper valve plate, seat ring and drain ring (shoe bushing) must be ASTM B584 bronze and work in conjunction to form an all bronze drain way. A minimum of two internal and two external drain openings are required.

Q. The bronze seat ring shall thread into a bronze drain ring (or shoe bushing) providing a bronze to bronze connection. Seat rings shall be O-ring pressure sealed.

R. The shoe shall be equipped with the AquaGrip system for connection and restraint. A minimum of six bolts and nuts is required to fasten the shoe to the lower barrel.

S. The interior of the shoe including the lower valve plate and stem cap nut shall have a protective coating that meets the requirements of AWWA C550. A stem cap nut shall be utilized, and must be locked in place by a stainless steel lock washer or similar non-corrosive device that will prevent the cap nut from backing-off during normal use.

T. Hydrants shall be warranted by the manufacturer against defects in materials or workmanship for a period of 10 years from the date of manufacture. The manufacturing facility for the hydrant must have current ISO certification.

U. Hydrants shall be made in the U.S.A. The hydrant manufacturer shall certify that all castings including the bonnet, upper barrel, lower barrel and shoe are made in the U.S.A.

V. Hydrants shall be Mueller Super Centurion 250 or approved equal.

W. Failure to comply with any of these above requirements is sufficient cause for rejection of proposed hydrants.

X. The County of Union, the local water provider and/or the Engineer reserve the right to accept only those materials which are in full compliance with these specifications and deemed most advantageous to its interests.

PART 2 – PRODUCTS

2.1 MATERIALS

A. 2007 NJDOT Standard Specifications.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. The hydrants must be set on a concrete base, as shown on the Contract Plans, and in a truly vertical position rodded securely to the gate valve. All backfilling must be well-rammed about them, nozzle connection threads must conform to national standard thread now in use by the Fire Department of the Municipality. Caps must be attached to the hydrant body by acceptable chains. A suitable blind drain shall be provided to receive the hydrant drip. Hydrants will be located a minimum of 18 inches behind the proposed curb face and set in a 4-inch-thick Class “C” Concrete Pad (dimensions to be determined in the field by the Engineer), unless otherwise directed by the Engineer.

3.2 INSPECTION

A. The Governing body, upon the recommendation of the Engineer, may appoint an Inspector, who under the direction of the Engineer, will inspect the valves and hydrants at the factory. He shall have restricted access to all parts of the work as necessary in the performance of his duties. The cost of inspection of rejected valves and hydrants shall be borne by the Contractor, and will be deducted from his estimate.

END OF SECTION 331005

SECTION 331416 – DUCTILE IRON WATER PIPES, SERVICE LINES, HOT BOX ENCLOSURE, AND WATER METER PIT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Ductile Iron Water Pipes shall consist of the excavation for and the construction of the various sizes of water mains, water service lines, tees, bends, and fittings as shown on the Contract Plans, or as otherwise directed by the Engineer.

B. Ductile Iron Pipes for the ductile iron sanitary sewer shown on the Utility Plan, shall also follow this specification.

C. This work shall also include the sizing, design, furnishing, and installation of the required Hot Box enclosure (including all necessary backflow preventers, valves, fittings, and appurtenances) or approved equivalent. The final design and construction of the Hot Box enclosure (or approved equivalent) shall be in accordance with applicable OSHA and Building Code requirements, and shall also meet the requirements of New Jersey American Water.

D. This work shall also include the sizing, design, furnishing and installation of the required precast concrete water pit (including all necessary meters, valves, fittings, and appurtenances). The final design and construction of the water meter pit shall be in accordance with applicable OSHA and Building Code requirements, and shall also meet the requirements of New Jersey American Water.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Ductile Iron Water Pipes and fittings shall have all mechanical joints. All pipe shall be Class 52 cement lined, conforming to Specifications ANSI/AWWA C151/A21.51, C153/A21.53, C110/A21.10 AND C111/A21.11. They shall be rated for working pressures of 350 pounds per square inch shall be furnished in cast lengths of 18 feet or 20 feet. Set screw retaining glands shall be the series 100 (70 ft. lb. or torque on set screws) manufactured by the EBAA Iron, Inc. or approved equal.

B. The outside coating shall be a bituminous coating of either coal-tar or asphalt base, approximately one (1) mil thick and shall be applied in the manner set forth and with materials specified, in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/ A21.10 OR ANSI/AWWA C153/ A21.53 for fittings of latest revision.

C. Cement mortar lining shall be applied to all ductile iron water pipe in the manner set forth and with materials specified in accordance with ANSI/AWWA C104/A21.4 of latest revision. The thickness of lining for ductile iron pipe shall be nowhere less than 1/16" for 3" thru 12" pipe, and 1/8" for 30" thru 48" pipe. The linings may be tapered at the ends. The lengths of the taper shall be as short as practicable, and shall not exceed two (2") inches, in accordance with specifications ANSI/AWWA C104/A21.4 of latest revision.

D. The lining shall be cured in such a manner as to produce a properly Hydrated Mortar Lining that is hard and durable. The cure may be affected by the application of a seal coat to the still moist lining. The finished lining shall conform to Section 4-13 of specifications ANSI/AWWA C104/A21.4 of latest revision.

E. The Owner, upon the recommendation of the Engineer, may appoint an Inspector who, under the direction of the Engineer, will inspect the pipe and special castings at the foundry. He shall have unrestricted access to all parts of the work as necessary in the performance of his duties.

F. The cost of inspection of rejected pipe shall be borne by the Contractor, and will be deducted from his estimates. If foundry rejections exceed fifteen (15%) percent of the total tonnage inspected, the Engineer may require that the remainder of the pipe required be procured from another manufacturer, and the Contractor shall have no redress for any additional expense thereby resulting to him.

G. Hot Box enclosure (or approved equivalent) shall be sized by the Contractor, such that the inner dimensions sufficient to provide an enclosure that meets all requirements of OSHA, Building Code, and New Jersey American Water. The Hot Box Enclosure, or approved equivalent, shall be sized to accommodate the required backflow preventers, valves, fittings, and appurtenances. Hot Box shall be installed on a level 6-inch-thick reinforced concrete pad in accordance with manufacturer's specifications and dimensions. Contractor shall coordinate electrical supply for hotbox heating unit with electrical design by others. Refer to Contract Documents for additional information.

H. Water meter pit shall be sized by the Contractor, such that the inner dimensions sufficient to provide a subsurface enclosure that meets all requirements of OSHA, Building Code, and New Jersey American Water. The water meter pit, shall be sized to accommodate the required meter(s), valves, fittings, and appurtenances. Water Meter Pit shall be precast concrete, and shall be installed on a level 6-inch-thick pad of ¾-inch clean crushed stone, or in accordance with manufacturer's specifications and dimensions. Contractor shall coordinate electrical supply for meter pit heating unit with electrical design by others. Refer to Contract Documents for additional information.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Pipes shall be constructed with a minimum cover of four (4) feet, in accordance with Section 207 - Subsurface Structure Excavation of the N. J. Department of Transportation Standard Specifications. The watermain shall be laid on a six (6) inch bed of 3/4" clean stone as shown on the Plans or as directed by the Engineer.

B. Roadway Excavation of earth shall be in accordance with Section 202 – Roadway Excavation of the NJDOT Specifications.

C. All pipelines shall be tested before backfilling trenches. Tests shall be made between valves, and, as far as practicable, in sections approximately one thousand (1000') feet long, or as may be directed by the Engineer, and within twelve (12) working days of the completion of such sections of mains. The leakage from the main for such section tested, while the pressure is at 150 lbs. per square inch for a period of one (1) hour, shall be no greater than the rate of one hundred (100) gallons per inch mile of pipe in twenty-four hours.

D. The Contractor shall make the tests under the supervision of the Engineer and the Municipal Water Purveyor. Means shall be provided for accurately measuring the water pumped into the pipe lines while under test. A careful record of all tests shall be kept by the Contractor in a manner designated by the Engineer, which record shall at all times be available to the Engineer, and shall become the property of the Engineer upon completion of the contract.

E. Pipe lines shall be flushed clean before testing, and all valves on hydrant branches shall be closed immediately after testing and shall be kept closed; except as permitted or directed. If leakage occurs at a greater rate than specified, the Contractor shall make all necessary repairs at his own expense. After repair, this section of pipe shall be tested again.

F. All tapping valves and sleeves shall be installed under water pressure (wet tap). Valves shall be Metroseal 250 or approved equal, opening in a clockwise direction and will have a working pressure of 200 psi.

3.2 DISINFECTION

A. Upon completion of the work, and after tests have been made, the Contractor, under the supervision of the Engineer and the Municipal Water Purveyor, shall disinfect all pipelines in accordance with the New Jersey Safe Drinking Water Act NJAC 7:10-1.1 - 14.15, et seq., method. Disinfection of pipe shall conform to the provisions of AWWA Specification C601. The Contractor shall provide all labor, equipment and chemicals. The interior surfaces of the pipe shall be smooth and free of extraneous projections and shall be brushed or scrubbed clean of all dirt and foreign substances.

B. Following disinfection, all treated water shall be flushed thoroughly from the pipe line. The Contractor shall be responsible for the disposal of the disinfected solution, and shall, if directed, slowly discharge the solution to prevent it from creating a nuisance or causing damage to any sewers, the sewerage treatment plant, receiving water, adjacent lands or properties.

C. Before final acceptance by the Owner, samples of water from the completed and disinfected pipe line shall be tested by the Contractor. Should these tests fail to indicate a water quality acceptable to the Owner, then the disinfection procedure shall be repeated by the Contractor until acceptance results are obtained.

D. All equipment and devices used for disinfection, temporary connections, and valves for this purpose, together with the disinfecting chemicals and such water as necessary for filling, disinfecting, flushing and refilling shall be furnished by the Contractor.

END OF SECTION 331416

SECTION 331419 – GATE VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall consist of the excavation for and the construction of Gate Valves, as shown on the Contract Plans, or as directed by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Valves shall be Metroseal 250 opening clockwise with a water working pressure of 200 psi, manufactured by U.S. Pipe & Foundry Company, or approved equivalent. They are to be of the type known as ductile iron body, bronze-mounted, resilient-seated Gate Valves, tested to 300 pounds per square inch. Gate valves shall conform to ANSI/AWWA C509 – *Resilient-Seated Gate Valves For Water Supply Service* and ANSI/AWWA C550 – *Protective Epoxy Interior Coatings For Valves And Hydrants.*

B. The Contractor shall furnish and place adjustable cast iron valve boxes and covers with each valve specified. They shall be of the type as manufactured by U.S. Pipe & Foundry Company, or approved equivalent. The covers shall have plainly cast on them the letters "WATER".

C. The Owner, upon recommendation of the Engineer, may appoint an Inspector who, under the direction of the Engineer, will inspect the valves at the factory. He shall have unrestricted access to all parts of the work, as necessary, in the performance of his duties. The cost of inspection of rejected valves shall be borne by the Contractor, and will be deducted from his estimates.

PART 3 - EXECUTION

3.1 METHODS OF CONSTRUCTION

A. The valves must be set, as indicated on the Contract Plans, in a truly vertical position, or as directed by the Engineer. All backfilling must be well rammed about them. Valve boxes and covers shall be provided and set to grade, as determined on the Contract Plans or as directed by the Engineer.

END OF SECTION 331419

SECTION 333113 – SANITARY SEWER

PART 1 – GENERAL

1.1 DESCRIPTION

A. Sanitary sewer construction includes, but is not limited to all excavations and embankments, all shaping of trenches, all shoring and sheeting, laying and joining all pipes of the various kinds and sizes, all sanitary sewer structures and appurtenances, grease trap, cleanouts, as indicated on the Contract Documents. Contractor shall do all backfilling, construct connection to the existing sanitary sewer system and shall do such additional extra work and incidental work as may be considered necessary to construct the sanitary sewer service for the project. He shall furnish all implements, machinery, equipment, tools, labor and materials necessary to the prosecution of the work and shall construct the sewer in accordance with the Contract Documents. The most conservative (largest quanity) dimension either scaled off the contract documents or labeled on the contract documents shall be applied in the bid.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials in accordance with section 330531.11 PVC Pipe, 330561 Manholes, Outlet Control Structures, Grease Trap, Inlets and Catch Basins, and NJDOT Standard Specifications.

PART 3 – EXECUTION

3.1 EXCAVATION

A. TRENCHING

1. The trenches in which the pipe is to be laid, shall be opened in accordance with the grades designated by the Engineer. All excavations shall be open cut from the surface and the trench shall be excavated to a width, as specified by the Engineer. Unless by written consent from the Engineer, no tunneling will be allowed. The Contractor shall grub clear, etc., the surface over the trench wherever it may be necessary and remove from the ground all surplus material of whatever nature and kind.

2. Excavation for pipes in rock shall be made to a grade six (6") inches below the bottom of the pipe barrel, for a width of two (2') feet, and the rock trimmed to remove all projected parts. Selected earth shall then be placed in the trench and thoroughly tamped for a depth of six (6") inches and depressions made in said earth to receive the bells of pipes. The pipes shall be laid upon the earth bed so prepared, and thereafter tested and backfilled, as herein specified. Trenches for house connections will not be opened on both sides of the street at the same time, in a manner to needlessly obstruct the roadway, unless permission has been previously given to close the street.

B. EXECUTION OF CONTRACT

1. In the execution of this contract, the Contractor shall not, without pervious permission of the Engineer, open more than one hundred (100') feet of trench in advance of the completed sewer. The street surface must be restored in good condition and all surplus material and rubbish from that section be immediately removed. The material excavated from the trench shall be all laid compactly in the

sides of the trench and kept trimmed up so that little or no inconvenience may be caused to the traveling public and adjoining tenants. The surplus earth, if any, will be the property of the Contract and must be disposed of by him. The Contractor shall not obstruct the gutter or any passage of surface water along its course.

C. PUBLIC SAFETY

1. The Contractor shall provide, at his own expense, suitable bridges over the trenches, where required, for the accommodation and safety of the traveling public. Also, suitable barriers around the excavation to prevent accidents to the public on the street, and shall place and maintain sufficient red lights on or near the work during the night. A space of twenty (20') feet must be left so that free access may at all times be had to fire hydrants and proper precaution shall be taken as to the locations of fire houses.

D. EMBANKMENT

1. Where embankment may be found necessary to support the foundations of the sewer, or to cover the same, it shall be made on the width and slopes ordered by the Engineer. The ground shall be prepared by carefully grubbing and clearing it, removing all loose rock and stone and all muck and improper material of whatever nature. The embankment formed of good loam, gravel or sand, free from all stones above four (4") inches in diameter, and shall not contain in any place a proportion of stones of or greater than one part to three parts of earth. The material shall be deposited and spread in horizontal layers not more than one (1') foot in thickness in the loose, each layer to be separately compacted, to the satisfaction of the Engineer so that no settlement of the sewer or its appurtenances will thereafter occur.

E. ROCK EXCAVATION

1. Rock, a name for material excavated shall refer to and include the solid ledge-rock formation whenever found in the materials in which the lines and other appurtenances are to be built. It shall refer to that formation which can be removed properly only by means of explosives, barring or wedging or by means of some other recognized methods of quarrying solid rock. All boulders found in the trenches are required to be immediately removed, measuring 1/3 cubic yards or more, and those portions of large boulders projecting into the trenches, requiring removal, will be paid for as rock excavation. Excavation designated as rock excavation shall include the cost of all labor and materials necessary for removing the same. Loose rock, "red horse" or shale that can be excavated or loosened by pick or ploughing, and other material, except solid rock, will be classified as earth excavation.

F. BLASTING

1. There shall be absolutely no blasting permitted on this project.

H. PUMPING AND BAILING

1. The Contractor shall furnish all necessary machinery for the work. He shall pump, bail or otherwise remove any water which may be found or shall accumulate in the trenches and shall perform all work necessary to keep them clear of water while the sewer is being laid. In no case, unless by special permission of the Engineer, shall water be allowed to run through the sewer until the joints have satisfactorily hardened. The disposal of the water, after removal, shall be satisfactory to the Engineer. If in the opinion of the Engineer it is deemed advisable to use well point, the Contractor shall furnish, install, and operate the well point system in order to keep trenches dry.

I. INTERFERENCE WITH EXISTING STRUCTURES AND WATER COURSE

1. In excavating and backfilling trenches and laying sewer, care must be taken not to injure any gas, water, sewer or other pipes, conduits or structures without the order of the Engineer. The Contractor shall, at his own expense, sling, shore up and secure and maintain a continuous flow in said structures, whether the structures run parallel with or across the sewer, and shall repair any damage done to them, and shall keep them in repair, until the final acceptance of the completed work, leaving them in a good condition as when uncovered.

3.2 FOUNDATIONS

A. WORK INCLUDED

1. If in the judgment of the Engineer, the soil does not afford sufficient bearing power to sustain the weight of the pipe, the Contractor may be required to construct a foundation, as specified by the Engineer. This shall be included within the bid.

3.2 PIPE LAYING

A. INSPECTION AND QUALITY OF PIPE

1. No pipe shall be laid, except in the presence of the Engineer or Inspector, and the Engineer shall have the power to order the removal or relaying of any pipe laid contrary to his instructions during his absence or that of his assistants or the Inspector. Previous to being lowered into the trench, each pipe shall be carefully inspected, and those not meeting the requirements of the foregoing specifications shall be rejected and either destroyed or removed from the workwithin ten (10) hours, except pipe suitable for subdrains which may be used for that purpose, but shall be kept apart from the sewer pipe. All lumps and excrescences on the ends of each pipe shall be removed before it is lowered into the trench. Pipes having any defects, which do not cause their rejection, shall be laid as to bring these on the top half of the sewer, and if the bell or spigot be broken the defective place must be liberally covered with neat cement mortar, reinforced with a piece of pipe ring if the Engineer so directs.

B. GRADES AND ALIGNMENTS

1. The pipes shall be so laid in the trench that after the sewer is completed, the interior surface thereof shall conform accurately to the grades and alignments fixed and given by the Engineer. All adjustments to the line and grade of pipes laid directly upon the bottom must be done by scraping away or filling in the earth under the body of the pipe, and not by blocking or wedging up.

2. Before joining, the interior of the joints shall be carefully cleaned of dirt, water or stone, and as each length of pipe is laid and the joining properly done, a swab of disk mould attached to a rope or rod shall be pulled ahead so as to remove earth, stone or other debris which has been permitted to find lodgment therein.

3. All pipes must be laid in perfectly straight lines from inlet or manhole to inlet or manhole, unless directed to the contrary by the Engineer, in writing, as it is a necessary condition of acceptance of the work that all pipe after being laid must be capable of inspection of natural or artificial light from end to end.

4. All pipes previous to being lowered into the trench shall be fitted together and matched so that when joined in the trench they may form a true and smooth line. No pipes shall be trimmed in any case,

and pipes which do not fit truly will be rejected. When necessary, and when directed by the Engineer, the Contractor shall lay the pipe in concrete. Before leaving work for the night, or any other time, the ends of the sewer shall be securely closed with a tight fitting plug.

5. Specials that are required and designed, or are found to be necessary as the work progresses, shall be furnished and set in their proper places. Any omission of the required special intended to be laid, or that may be specially ordered by the Engineer, shall be rectified by the Contractor without compensation.

C. STRAIGHT AND TRUE LINES

1. While the pipes and specials are being laid in each section between the manholes or other permanent openings, light from the remote ends of the section shall remain constantly in plain view throughout the entire length of such section or division. Sections between openings will in general not exceed three hundred (300') feet; in particular cases, distances may be somewhat greater.

D. CLEANING PIPE

1. No sewer shall be laid without the use of a swab. This shall consist of a circular disc of wood, covered with burlap or bagging and fastened to one end of a long pole or rod. The disc shall be such size as to snugly fit the interior of the pipe; it shall be drawn forward as the work progresses to remove all cement that may have entered the interior through the joints. Attention to this detail will greatly lessen the expense of passing a ball through the sewers at the time of completion.

E. TESTING SEWER LINES

1. Before backfilling, and while trench is dry, bulk heads shall be inserted by the Contractor in the pipe at adjacent manholes. The pipe shall be filled with water until ahead of four (4') feet from the top of the pipe at the upper manhole is attained. Another standard method of testing leakage may be substituted, if the opinion of the Engineer deems it advisable.

2. The leakage between any two manholes tested must not exceed the following:

8" Sewer Pipe	2,500 Gallons per mile in 24 Hours
10" Sewer Pipe	4,000 Gallons per mile in 24 Hours
12" Sewer Pipe	5,500 Gallons per mile in 24 Hours
18" Sewer Pipe	12,000 Gallons per mile in 24 Hours
24" Sewer Pipe	15,000 Gallons per mile in 24 Hours
30" Sewer Pipe, or Larger	18,000 Gallons per mile in 24 Hours

Any section having a greater leakage shall be immediately repaired or replaced and tested by the Contractor at his own expense, until such time as leakage in the section is within the limit as specified.

F. TESTING CAST IRON FORCE MAIN

1. The Contractor shall furnish all materials, water, pump, gauges, test heads, plugs, and perform all labor for testing cast iron pipe lines before backfilling. All cast iron pipe, after being laid and jointed, shall be tested at a hydrostatic pressure of 100 pounds per square inch for thirty minutes in the presence of the Engineer or his representative. All pipes, joints, or valves, which in the opinion of the Engineer or his representative show excessive leakage, shall be immediately repaired, as the case necessitates, and the tests repeated until the section is accepted by the Engineer.

G. ADDITIONAL TESTING

1. The Contractor shall also perform a mandrel pull test and air pressure test. In addition, the Contractor shall perform a video inspection of the newly constructed sewer bypass, including the next upstream and downstream structure. All testing shall be in accordance with the Township of Scotch Plains Engineering Department.

H. PROTECTION OF WORK

1. Great care shall be exercised in the protection of the finished work. Joints once made and disturbed shall be subject to immediate rejection. It shall therefore be the duty of the Contractor to take such precautions as may be necessary to avoid the slightest movement in the completed work; while in the act of laying the pipe, in backfilling or in the passage of workmen up and down the trench. At all times, during which pipe is not being laid, the end of the sewer shall be sealed with a tight-fitting plug excepting, however, such cases where special permission has been granted for the draining of trench water through a completed sewer. No trench water shall be drained through a completed sewer until the Engineer has been satisfied that proper precautions have been taken to prevent the admission of said or other material therein.

3.4 BACKFILLING

A. AMOUNT OF PIPE UNCOVERED

1. The backfilling shall follow immediately after the construction of the sewer, and in no case shall there be more than one hundred fifty (150') feet of finished pipe uncovered. The backfill shall be placed in successive lifts not more than twelve (12”) inches thick. Mechanical tampers or vibratory soil compactors use shall be in accordance with Section 2.7.3 of the Standard Specifications, as amended.

3.5 SPECIALS

A. WORK INCLUDED

1. During the progress of the work, Specials shall be inserted as they are required or designated by the Engineer, and they shall be placed at the proper intervals. Where those of the said Specials have been omitted, through carelessness or otherwise on the part of the Contractor, the Specials, so omitted, shall be placed without compensation, other than the price bid for furnishing same.

B. "Y" OR "T" BRANCHES

1. In front of each house, or where directed, the "Y" or "T" Branch will be set and Specials for future use will also be provided. The ends of "Y"s and "T"s left in the sewer must be closed within vitrified detachable covers cemented or covered over with a thin layer of Portland Cement, and where the sewer is being laid under conditions requiring the adoption of and use of a special bituminous joint. The same material used in preparing the joint shall be used in sealing the vitrified cover.

C. MARKER FOR SPECIALS

1. The Contractor shall leave a marker denoting the position of each house connection or "Y" or "T" Branch. The dimensions of same to be one (1") inch by two (2") inches and it shall extend from

the sewer to one (1') foot above the surface of the ground. The price for providing these marks will be included in the price bid for Specials. The price for furnishing Branches, Bends, etc., shall not be interpreted to include the laying of same, but will include Covers, and cementing the same and such other work in connection therewith, as may be designed by the Engineer.

3.6 FINAL INSPECTION

A. NOTIFICATION AND REQUIREMENTS

1. Upon notification by the Contractor of the completion of the work contracted for, the Engineer will inspect all sewers, appurtenances, and all other work done by the Contractor. In each section of pipe/sewer, where intended to be straight, light shall be visible from one end to the other. Any broken cracked pipes, protruding cement or packing, shall be replaced or removed, and the sewer bore left clean and free through its entire length. There shall be no excess amount of leakage into any stretch of sewer. All underdrains shall discharge water freely and give evidence of having a clean open bore. All manholes and other appurtenances shall be of the specified sizes and form and of neat appearance, and their tops shall be set to the proper grade. If the work is found to be in any condition other than in accordance with these Specifications, it shall be brought to proper condition by cleaning, pointing, and if necessary, excavating and rebuilding at the expense of the Contractor.

END OF SECTION 333113

SECTION 334123 – REINFORCED CONCRETE PIPE

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Specification covers reinforced concrete pipe (RCP) intended to be used for the conveyance of storm water, and shall include the excavation for and the construction of reinforced concrete pipe within the project site and within adjacent roadway, in accordance with the applicable Sections and/or Subsections for Storm Drains of the 2007 NJDOT Standard Specifications, and as shown on the Contract Plans and Specifications, or as directed by Neglia Engineering Associates. This item shall include the required core drill connection into existing storm system, sawcutting, water-tight rubber gaskets, dewatering, pavement replacement and pavement restoration as per Contract Plans. The most conservative (largest quantity) dimension either scaled off the contract documents or labeled on the contract documents shall be applied in the bid. Contractor is responsible for any damage to the existing storm systems encountered during construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pipe furnished in accordance with this specification shall be designated as Class I, Class II, Class III, Class IV, and Class V, in accordance with ASTM C76. Reinforced concrete storm pipe shall conform to requirements of current AASHTO Designation M170 and ASTM C76, amended as follows:

1. Fine aggregate shall conform to the requirements of the applicable Sections and/or Subsections; Course aggregate shall be broken stone or washed gravel conforming to the requirements of the applicable Sections and/or Subsections within the 2007 NJDOT Standard Specifications. Elliptical reinforcing will not be permitted in circular pipe. Unless otherwise specifically provided, Class III, Wall B, shall be used as a minimum standard and Class IV, Wall B, shall be used as a minimum for extra strength reinforced concrete culvert pipe.

2. Reinforced concrete pipe shall be Class III, unless otherwise noted on the plans.

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

A. Construction shall be in accordance with the applicable Sections and/or Subsections and excavation and backfill for all drains shall be governed by the provisions of the applicable Sections and/or Subsections for Subsurface Structure Excavation of the 2007 NJDOT Standard Specifications.

END OF SECTION 334123

SECTION 334611 – POND LINER

PART 1 – GENERAL

1.1 DESCRIPTION

A. This work shall consist of furnishing and installing of the Pond Liner in the bottom of the lake to seal the pond after the dredging work has been completed, as directed by the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The Pond Liner shall consist of a layer of sodium bentonite clay encapsulated between a woven and a nonwoven geotextiles needle-punched together and laminated to a thin flexible membrane liner. The material shall be Akwaseal as provided by CETCO Lining Technologies, and distributed by Carmo Supply (Phone 516 794-7904), or approved equal. Prior to using an alternate product, the Contractor must furnish independent test results demonstrating that the proposed alternate material meets all requirements of this specification.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. SURFACE AND SUBGRADE PREPARATION

1. The subgrade or fill material should be free of any angular or sharp rocks larger than 1 inch in diameter as well as any organics or other deleterious materials. Compaction of the subgrade should be in accordance with the design specifications, or, at a minimum, to the extent that no rutting is caused by installation equipment or vehicles.

2. Prior to deployment of the pone liner, the subgrade should be final graded to fill all major voids or cracks and proof rolled to provide a smooth surface for the installation of the liner. The surfaces to be lined should be smooth and free of debris, roots and angular or sharp rocks larger than 1/2 inch (2.5 cm) in diameter. All protrusions extending more than ½ inch from the surface shall either be removed, crushed or pushed into the surface with a smooth drum compactor.

3. Minor variations in the subgrade surface are tolerable; however, no sharp irregularities should exist.

B. POND LINER HANDLING AND PLACEMENT

1. Depending on the type of subgrade at the site, the typical equipment used for deployment may range from an extendible boom forklift to a front end loader or backhoe. Suspending the pond liner roll using a spreader bar assembly and a 20‘ length core pipe, 3” nominal schedule 180 minimum, through the core will facilitate deployment and will prevent damage to the panel edges

caused by the suspending chains or straps. The core pipe shall provide sufficient support to prevent deflection of no more than 3 inches as measured from end to midpoint when a full roll (1500 lbs) is lifted.

2. Flat-bladed vise-type grips may be used by laborers for handling, but are not required. Pond liner may be cut with a sharp utility knife, scissors, or with a battery-powered rotating blade cutter. Panels of pond liner should be installed with the blue laminated membrane surface facing the subgrade. Pond liner rolls are wound at the plant so that they naturally unroll with this orientation.

3. Methods of deployment will vary based on site-specific conditions such as slope angle, berm widths, the type of project, the type of subgrade surface, and the subgrade preparation. As a general guideline, all seams should run parallel to the direction of the slope. Flat areas (less than 10% grade) require no particular orientation; however, attention should be paid to the overlap orientation to prevent seam displacement during cover placement.

4. Deployment should proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation. Pond liner installation can be accomplished such that the liner is unrolled in front of backward-moving equipment. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement of pond liner. If sufficient access is available, the liner may be deployed by suspending the roll at the top of the slope and by pulling the material off the roll and down the slope. Care must be taken to minimize the extent to which Pond liner is dragged across the subgrade in order to avoid damage to the bottom surface of Pond liner.

C. SEAMING PROCEDURES

1. Pond liner seams are formed with a Volclay sodium bentonite or approved equal enhanced overlap. A minimum of a 6-inch to 9-inch overlap should exist at all seam locations. A lap line as well as a match line have been printed on the pond liner panel edges at 6 and 9 inches respectively, to ensure the proper overlap is achieved.

2. The pond liner panels should be adjusted to smooth out any wrinkles or creases between adjacent panels, leaving a proper seam where the overlapping panel covers the lapline of the underlying panel but leaves the matchline exposed.

3. Any native soil and debris should be removed from the contacting pond liner surfaces to ensure seam integrity. The overlapping panel edge should be pulled back and granular Volclay sodium bentonite, similar to that used in the pond liner, itself should be poured continuously, in the middle of the overlap, along all seams and lap areas, at a minimum application rate of one-quarter pound per lineal foot (one bag per roll). Granular bentonite is supplied with each shipment of pond liner for these purposes and for other detail work as required.

D. ANCHORING PROCEDURES

1. Anchor trenches may be excavated in a number of ways, depending upon the size of the project and the maneuvering area available at the top of the slope. The preferred methods are to use a ditch trencher (set to the specified depth) or a small backhoe equipped with a bucket of appropriate width.

2. Pond liner should be placed in the trench such that the end of the panel covers the entire trench floor but does not extend up the rear wall. Dependent upon the slope grade, the anchor trench should be a minimum of 3 feet back from the crest of slope, 2 feet deep and extend 1.5 feet back from the front of the trench. The front edge of the trench should be rounded to eliminate any sharp corners that could cause excessive stress on the liner.

3. The size of the anchor trench depends on site-specific criteria such as the soil type and general condition, the angle and length of the slope, as well as the thickness and type of proposed cover materials. In any case, anchor trench backfill should be well compacted to prevent water intrusion or pending and to prevent liner pullout.

4. When using pond liner in conjunction with other geosynthetic materials, the pond liner may be put in a separate trench or placed as otherwise specified by the engineer.

E. PENETRATION SEALING

1. For sealing around penetrations, a small notch should be made around the circumference of the pipe, into the subgrade. Bentonite Clay should then be packed around the pipe in the notch and on adjacent areas so that the pipe is encased by a pure bentonite seal.

2. The pond liner panel should then be placed over the penetration and slit into a "pie" configuration where the pipe is to protrude. This procedure will create a snug fit between the pond liner and the pipe once the laps are trimmed.

3. More sodium bentonite should then be spread around the cut edges of the pond liner against the pipe and over adjacent areas.

4. To complete the detail, a collar of pond liner should be cut in a manner similar to that made on the main panel and fit around the pipe, with additional Volclay sodium bentonite applied into any gaps that may remain.

5. When pond liner is used above or in conjunction with other geosynthetic materials, notching below the liner may not be possible. In these cases, sprayable bituminous coatings may be applied around the penetrations and any other critical areas. All other penetration sealing steps should be followed to ensure a watertight seal is produced.

F. STRUCTURE SEALING

1. Another critical area in an installation is the attachment or sealing of pond liner to foundation walls, drainage outlets or concrete structures. Sealing panel edges against a wall or foundation is accomplished with the use of pure Volclay bentonite.

2. To start, a small notch should be made against the edge of the object to be sealed. The notch should be packed full of bentonite clay. The pond liner panel is then brought up to the structure and trimmed to fit against the wall of the structure as shown. Care must taken to ensure that the Pond liner is kept directly against the structure as the cover material is applied.

3. Once hydrated, the bentonite clay seal will allow for settlement or other stresses that may tend to pull the Pond liner from the edge.

G. PROTECTIVE COVER

1. The protective cover should be composed of well graded soils, sands or crushed gravel free of sharp edged stones larger than 1 inch (2.5 cm) in diameter. Cover should be spread by low ground pressure equipment.

2. A minimum cover thickness of 12 inches should be kept between heavy equipment and the liner at all times. No vehicles should drive on the pond liner until proper cover has been placed to the specified depth. Cover for the liner should be placed at the bottom of the excavation so that it can be pushed upslope. By staging liner deployment such that one or more access ramps are left unlined until the end of the project, the cover soil can be efficiently delivered to the bottom of the

pond without damaging the liner system. In areas where truck will consistently be riding to deliver cover material a distance of 24 inches must be maintained between the liner and truck wheels.

3. Once the proper depth of cover soils has been applied, compaction equipment may be used.

4. Care should be taken to push materials upslope wherever possible and to avoid pinching or shifting the liner by making sharp turns or sudden stops.

H. DAMAGE

1. Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch over the damage, with a minimum overlap of 12 inches on all edges.

2. Accessory bentonite should be placed between the patch and the repaired material at a rate of a quarter pound per lineal foot of edge spread in a six-inch width.

3. If damage occurs on a slope, the same basic procedure should be used; however, the edges of the patch should be fastened to the repaired liner with contact cement, epoxy, or some other construction adhesive, in addition to the bentonite-enhanced seam.

I. ON-SITE TECHICAL ASSISTANCE

1. The contractor shall arrange for Carmo Supply or approved equal to be on-site for startup activities to ensure proper installation procedures are being employed. The on-site technician must provide documentation demonstrating at least 10 years' experience in the installation of bentonite based liner systems such as Pond liner and has been involved in at least 15 million square feet of installation of these products.

END OF SECTION 334611

SECTION 337000 – SITE ELECTRICAL WORK FOR POND

PART 1 – GENERAL

1.1 DESCRIPTION

A. This specification is a general guideline for necessary electrical work, upgrading the existing electrical equipment and associated work to provide electrical services to an aerator unit and future service for the Wooddale Pond. This specification provides general standards and specific function needed to complete the required work as shown on plans and specifications.

B. Contractors are required to make a site visit, check the existing site conditions, take necessary measurements, and determine the detail scope of work before the bidding process. The work shall include everything presented on Contract Plans, and Specifications, or as necessary to achieve the requirements, and shall include the following major items:

1. Evaluation of the existing service and its capacity to handle the additional load;

2. Coordination with PSE&G including new service request if required;

3. Installation of a new electrical service as required;

4. Install new circuit breaker(s) on the existing/new breaker panel for electrical service to the aerator;

5. Furnish and install all electrical conduits, junction boxes, pull boxes, fittings and concrete footings as required, all wiring, etc.;

6. Install controls, and timer, etc.;

7. Make all connections and testing;

8. Have all work inspected by local municipal inspectors and meet all local requirements; and
Any work incidental to complete the project.

1.2 REQUIREMENTS FOR ELECTRICAL IMPROVEMENTS

A. Contractor shall install new pedestal enclosure to replace the existing main breaker panel, 100-amp service, and rewire as necessary. All existing breakers shall be replaced with new breakers to serve the existing park facilities.

B. The breaker panel shall be installed on the concrete pad by this contractor in the location shown on plan or in the location as designated by the Engineer within the Glen Rock Area Pond.

C. The breaker panel shall have 20 breakers and a separate breaker shall be provided for the aerator.

D. Contractor shall install all electric conduits required for the electric service to the aerator as shown on plans with pull wire and junction boxes from the new breaker panels to the proposed service locations. All conduits shall be properly backfilled.

E. The Contractor shall install all electric conduits and wiring as required on plans and specifications.

F. The actual locations of all panels, conduits, junction boxes, pull boxes, outlets, switches will be determined in the field by Engineer and Contractor. The contractor shall relocate the existing meters on existing poles to the new enclosure or as per PSE&G requirements. Contractor shall obtain all necessary permits required by law, State, County, and all authorities having jurisdiction, and contact PSE&G to complete necessary outdoor service cable from the power source to each service.

G. All work must be supervised and inspected by licensed electrician before system startup and subject to the Union County and/or Township of Scotch Plains electrical inspector and Engineer's inspections and approvals.

1.3 SUBMITTALS

A. The Contractor shall submit six (6) copies of the following documents for Engineer's review and approval.

1 Plans for the installation of conduits, junction boxes, wiring, etc.

2 Manufacturer's Catalog

3 Schematic Wiring Diagram

4 Typical Installation Guides

5 Foundation design plans, anchor bolts layout per manufacturer's instruction.

6 Owner's Manual

7 Written Warranty

PART 2 – PRODUCTS

2.1 MATERIALS

A. The Contractor shall thoroughly familiarize himself with the scope and details of other contractors on this project and shall coordinate his work closely with all other contractors. It shall be the responsibility of the Electrical Contractor to perform his work so as not to delay the work of other trades.

B. The Contractor shall advise the Engineer when any question arises as to the exact location of electrical apparatus, conduit, junction boxes, pull boxes, outlets, switches, panelboard.

C. The Contractor shall obtain and pay for all permits necessary for the electrical work to be performed. He shall obtain and pay for all required certificates of approval, including the Fire Underwriters and deliver the same to the Engineer before final acceptance of the work.

D. Before any certificate of final acceptance is issued, all work is to be completed to the satisfaction of the Engineer, and the Electrical Contractor shall guarantee, in writing, for a period of one year, all material and workmanship commencing with the date of final acceptance by the Owner. The Contractor will agree to make good, by replacement or repair, at his own expense, all defects arising during this year which, in the opinion of the Engineer, are due to faulty material or workmanship.

E. All material and workmanship shall conform to rules and regulations of the latest editions of the National Electric Code, State and local ordinances, and rules and regulations of Public Service, Electric and Gas

Company. The utility company's requirements shall govern in case of conflict with the plans or specifications, except where the plans or specifications call for workmanship or material of higher quality than the utility company. All materials used shall be new and of first quality and shall bear the approval of the Underwriters Laboratories, Inc. and shall be similar and equal in quality and design to the material herein specified. The Contractor shall obtain written approval from the Engineer before substituting manufacturers of material or equipment other than those specified.

F. The Engineer reserves the right to make changes in the location of lights, switches and outlets for a reasonable distance in any direction, including main panelboard. Said changes, if any, will be requested prior to installation and shall be made without additional cost to the Owner.

G. The contractor shall submit the layout drawings with installation details prior to begin construction.

H. Wire and Cable shall be as shown on plan.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. All wires and cables shall meet the applicable requirements of NFPA 70 and UL for the type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

B. Conductors No. 10 AWG and smaller shall be solid, and those No. 8 AWG and larger shall be stranded. Unless indicated otherwise, conductor sizes shown are based on copper. All conductors indicated to be No. 6 and smaller shall be copper. All conductors indicated to be No. 4 AWG and larger shall be copper, at the Contractor's option, unless the type of conductor material is specifically indicated, specified, or required by equipment manufacturer.

C. The conduit sizes shall be as shown on plans and supplied by the County. The contractor shall supply all fittings and adaptors for the conduits used in this project.

D. Install main conduit in parallel with asphalt service road and the branches shall be perpendicular to main conduit. Install in accordance with manufacturer's recommendations. During installation, provide expansion fittings for expansion and contraction to compensate for temperature variations. Expansion fittings shall be watertight and of the type suitable for direct burial. Maintain at least 12 inches away from other utilities and approximate depth of 24 inches from the ground surface.

E. Install nylon pull dragline in each empty conduit and install junction box at the end of the conduit.

F. Junction and Pull Boxes

1. Junctions and pull boxes shall be of weatherproof and shall be used where necessary and convenient for the proper installation of wire.

G. Wiring devices shall be as made by General Electric, Bryant Electric or approved equal. Receptacles shall be 3-wire type with grounded outlet.

H. The Contractor shall be responsible for properly grounding the electrical system in accordance with applicable Codes, rules and regulations.

I. Upon completion of his work, the Contractor shall perform tests and inspection of all equipment, material and wiring as directed by and in the presence of the Engineer, Architect or his representative to determine

whether all provisions of the plans and specifications have been fulfilled. Wiring shall be tested for proper connections, short circuits and grounds, and all equipment shall be tested for proper performance. Upon completion of all tests to the satisfaction of the Architect and electrical inspector, the work will be accepted by, and turned over to the Owner.

J. Upon completion of work, the Contractor shall cleanup all debris resulting from his work. The Electrical Contractor shall neatly patch all openings resulting from his work in ceilings and walls with materials consistent with the existing materials in a neat, workmanlike manner.

END OF SECTION 337000

SECTION 347113 – TIMBER GUIDE RAIL

PART 1 – GENERAL

1.1 DESCRIPTION

A. This item shall include the construction of a Douglas Fir or approved equal Timber Guide Rail. This item shall include the guide rail foundations, posts, rails, hardware, etc. for a complete rail system.

B. Timber guide rail shall be constructed where indicated on the Site Plan.

PART 2 – PRODUCTS

2.1 MATERIALS

A. This section shall conform to the 2007 NJDOT Standard Specifications.

B. The guide rail is to be constructed of Douglas Fir or approved equal with a rough-sawn texture and dark brown Woodlife preservative, pending owner approval.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. Posts shall be driven to the required position. Posts shall be plumb, properly spaced, and to the prescribed line and grade.

B. Prior to driving the posts, the location of underground utility conduits which may conflict with the posts shall be determined. Post spacing may be adjusted by 6 inches or double spacers may be used, as approved, to eliminate such conflicts.

C. Damage to the utility conduit due to construction operations shall be located and repaired without additional compensation.

D. The rail elements shall be constructed with the top edge in a straight line or smooth curve, parallel to or concentric with the roadway. Where a vertical transition is required the top edge of rail elements shall form the chords of a smooth vertical curve. No punching, drilling, reaming, cutting, or welding of the rail elements will be permitted in the field.

E. Excavation and backfill for post holes and concrete anchorages shall conform to Section 202 of the Standard State Specifications.

END OF SECTION 347113

APPENDIX 1 – ASBESTOS IDENTIFICATION REPORT

YOUR GOALS. OUR MISSION.

October 5, 2016

Via US Mail and E-mail: nnetta@nettaarchitects.com

Nicholas J. Netta, AIA
Principal
Netta Architects, LLC
25 Route 22 East, Suite 290
Springfield, New Jersey 07081

RE: Reports of Asbestos, Lead-Based Paint and "Universal Waste" Identification Surveys Related to the Demolition of the Ash Brook Golf Course Clubhouse and Golf Cart Garage
(A) Asbestos Identification Survey
(B) Lead-Based Paint Identification Survey
(C) PCB Mercury Liquid And Lamp Investigation ("Universal Waste")
Ash Brook Golf Course
1210 Raritan Road
Scotch Plains, Union County, New Jersey
T&M Project No. NETA-00120

Dear Mr. Melendez:

Enclosed are two (2) copies each of the three (3) above listed reports for the subject project. Each report presents information regarding the distribution of the hazardous/toxic materials addressed by the subject investigations.

Section 5.0 of the Asbestos Identification Survey report presents an inventory of asbestos-containing materials identified at the Ash Brook Golf Course Clubhouse and Golf Cart Garage and a preliminary assessment of the asbestos management activities that would be associated with the demolition planned for the subject building structures. Section 4.0 of the Lead-Based Paint Identification Survey Report and Section 3.0 of the "Universal Waste" Identification Survey Report each present conclusions concerning each report's findings.

We are pleased to have been given the opportunity to work with you on this project. Should you have any questions, please contact our office.

Respectfully yours,

T&M ASSOCIATES

Mark Worthington
Group Manager

Kevin Burns
Supervising Environmental Scientist

Enclosures
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YOUR GOALS. OUR MISSION.

REPORT OF ASBESTOS IDENTIFICATION SURVEY

RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE
1210 Raritan Road
Scotch Plains, Union County, NJ

Job No. NETA-00120

OCTOBER 5, 2016

PREPARED FOR:

Netta Architects, LLC
25 Route 22 East, Suite 290
Springfield, New Jersey 07081

PREPARED BY:

Kevin Burns
Supervising Environmental Scientist
T&M Associates

Signature

REVIEWED BY:

Mark Worthington
Group Manager
T&M Associates

Signature

ASBESTOS IDENTIFICATION SURVEY
RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE
1210 RARITAN ROAD
SCOTCH PLAINS, UNION COUNTY, NEW JERSEY
JOB NO. NETA-00120

TABLE OF CONTENTS

1.0 INTRODUCTION

T&M Associates (T&M) was retained by Netta Architects, LLC (the Client) to perform an asbestos identification survey of the Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road in Scotch Plains, Union County, New Jersey.

The goal of the asbestos identification survey was the identification of asbestos-containing materials (ACMs), as well as the classification of other suspect materials as non-asbestos-containing, at the subject building structures. A further goal of the survey was the recommendation of appropriate response actions, especially relative to the demolition planned for the subject building structures.

Physical inspection of the subject building structures, and the associated collection of bulk material samples for asbestos content analysis, was performed by Mr. Kevin Burns and Mr. Daniel Schaefer of T&M on September 28, 2016. These personnel are United States Environmental Protection Agency (USEPA)-accredited AHERA Building Inspectors (Accreditation Nos. NAETI 45607 and NAETI 45986, respectfully).

The findings presented in this report are based on observations made at the time T&M personnel were on site, and cannot address changes in the condition of the asbestos-containing materials relative to their status as an environmental hazard subsequent to our investigation.

2.0 METHODS

2.1 Walk through Inspection

Visual observation of the subject building structures and bulk material sampling were conducted concurrently during the walk-through inspections. During the walk-through inspections, physical observations were recorded by the inspection team, including, (i) the presence of suspect or “presumed” (PACMs), as well as salient information relative to assessment of suspect ACMs; (ii) a catalog of materials not considered to be suspect ACM; and, (iii) information relative to limitations on the survey.

Accessible building spaces and interior and exterior building elements were accessed by the inspection team. These spaces included the space above suspended tile ceilings, and above and behind other interior architectural finishes where access was available. The scope of the survey included selective encroachment through interior architectural enclosures, but not dismantlement of mechanical equipment. The inspectors did attempt to investigate through field observations, and extrapolate regarding the quantities of concealed portions of ACM identified, such as insulation concealed behind interior architectural finishes. It should be noted that, while the inspectors attempted to locate all asbestos-containing materials within the subject building structure, due to the lack of an ability to complete an invasive survey where holes are made into all wall/ceiling cavities, additional asbestos-containing materials (such as pipe/fitting insulation, foundation mastic, exterior wall mastic, etc.) may be uncovered during demolition activities which would require removal following the appropriate regulations.

It should also be understood that the scope of the survey did not address potential underground structures (piping systems, etc.) that may be associated with the building structures.

2.2 Bulk Material Sampling Analysis

Each PACM was assigned a "homogeneous material" number (H-number) used to identify it throughout this report.

Bulk sampling of suspected ACM was accomplished by removing a representative piece of the material in question and transferring it into an airtight plastic sample container. Consideration of a material as suspect, and the frequency with which each suspect material was sampled was in general accordance with the USEPA's "Asbestos-Containing Materials in Schools Rule" (40 CFR 763, Subpart E). Although the protocols of this regulation do not specifically and presently apply to the building surveyed herein, they do set an industry standard of care.

Laboratory analysis for asbestos content was performed in accordance with the USEPA approved petrographic method utilizing polarized light microscopy (PLM) with dispersion staining (EPA Method for the Determination of Asbestos in Bulk Samples EPA/600/R-93/116) and NY ELAP protocol. Asphaltic and polymeric samples were dissolved with tetrahydrofuran to aid in separating particulate components from their matrices. Certain non-friable organically bound (NOB) materials that were found to be non-asbestos-containing via PLM analysis were subject to further analysis by Transmission Electron Microscopy (TEM) as a matter of Code.

Samples were analyzed in the laboratory of AmeriSci, NY ("AmeriSci"). AmeriSci's laboratory is accredited for Bulk Asbestos Fiber Analysis through the National Institute of Standards and Technology and National Voluntary Laboratory Accreditation Program (NIST/NVLAP, laboratory accreditation # 200546).

3.0 SUSPECT MATERIALS, SAMPLING & PRESUMED MATERIALS

Subsections 3.1 lists presumed asbestos-containing materials (PACMs) that were observed at the subject building structures and subjected to sampling. Subsection 3.2 below discusses materials not considered to be PACM, and general observations regarding the building structures.

3.1 Materials Subject to Sampling to Determine the Asbestos-Content

Ash Brook Golf Course Clubhouse

Homogeneous ID#	***Material Description***
H-01	Grey cementitious boiler rib paste/packing material
H-02	Grey cementitious hot water tank insulation
H-03	White 2'x2' "pitted and scarred" suspended ceiling tile
H-04	White sheetrock wallboard
H-05	White joint compound associated with white sheetrock wallboard
H-06	Grey cementitious pipe fitting insulation associated with fibrous glass pipe insulation
H-07	White veneer layer of the plaster wall/ceiling system
H-08	Brown undercoat layer of the plaster wall/ceiling system
H-09	Brown composite flooring material
H-10	Tan 9"x9" floor tile

Homogeneous ID#	***Material Description***
H-11	Black asphaltic mastic associated with tan 9”x9” floor tile
H-12	White veneer layer of the plaster wall system
H-13	Brown undercoat layer of the plaster wall system
H-14	Black asphaltic roofing shingle with grey particulates (top layer)
H-15	Black asphaltic roofing shingle with brown and white particulates (bottom layer)
H-16	Black asphaltic roofing felt paper underlayment
H-17	Black asphaltic roofing flashing/sealant compound
H-18	Grey rubberized door caulking compound
H-19	White cementitious window caulking compound

Appropriate samples of each of these materials were gathered for asbestos content analysis.

Golf Cart Garage

Homogeneous ID#	***Material Description***
H-20	Black asphaltic roofing shingle with grey particulates
H-21	Black asphaltic roofing felt paper underlayment

Appropriate samples of each of these materials were gathered for asbestos content analysis.

3.2 Comments regarding Materials not considered to be PACM and Comments on General Observations

Ash Brook Golf Course Clubhouse

The Ash Brook Golf Course Clubhouse was observed to be a two-story clubhouse-type building structure constructed of brickface, stone and concrete masonry unit (CMU) exterior walls, with newer-appearing curtain wall window assemblies, and concrete walls with wood framing supporting a wooden, concrete and/or steel beam and joist ceiling system, all seated on a CMU and concrete foundation. Glazed-block unit walls were also observed in several shower and restroom spaces. The building was also observed to contain a small attic space exhibiting wooden framing.

The subject building was observed to be serviced by a H.B. Smith™ gas-fired sectional boiler unit (c. 1975) and several interior HVAC units and baseboard/fin-tube radiators. The building was also observed to be serviced by an A.O. Smith™ fibrous glass insulated water heater. Uninsulated metal duct work and fibrous glass insulated flex duct were also observed to be associated with the HVAC systems servicing the building spaces.

Typical domestic-type plumbing and fixtures were also observed. Piping throughout the building structure was observed to be insulated with either suspect asbestos-containing pipe fitting insulation, non-suspect fibrous glass pipe insulation and/or non-suspect black foam pipe insulation or observed to be uninsulated.

CMU block walls, glazed block and associated grout, ceramic wall and floor tiles and associated grout, 2'x2' "cellulose" ceiling tiles, fibrous glass pipe insulation, carpeting, fibrous glass batting insulation, wood paneling and pressboard materials were observed and considered to be non-suspect materials.

It should be understood, and considered highly, that suspect materials such as refractory paste, gaskets, and insulation may exist built into the boiler unit. Any such materials encountered upon renovations, demolition or dismantlement should be considered to be ACM until determined otherwise.

Golf Cart Garage

The Golf Cart Garage was observed to be a one-story garage-type building structure constructed of concrete masonry unit (CMU) walls and wood framing supporting a wooden beam and joist ceiling system, all seated on a concrete pad. Glazed-block unit walls were also observed in several shower and restroom spaces.

CMU block walls and vinyl siding were observed and considered to be non-suspect materials.

4.0 ANALYTICAL RESULTS – BULK MATERIAL SAMPLING

The criterion used for determining the status of a suspect material as ACM is the USEPA criterion of being "asbestos-containing", which is that the material is determined to contain greater than 1.0% of actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite asbestiform fibers (40 CFR 61, Subpart M).

Analysis of the bulk material samples obtained indicated that the following materials identified at the subject building structure are asbestos-containing:

ACM Confirmed by Sampling:

Ash Brook Golf Course Clubhouse

Homogeneous ID#	***Material Description***
H-09	Brown composite flooring material
H-10	Tan 9”x9” floor tile
H-11	Black asphaltic mastic associated with tan 9”x9” floor tile
H-19	White cementitious window caulking compound

Analyses of Sample Nos. NETA-00120-092816-01, 02 and 03 (the grey cementitious boiler rib paste/packing material) indicated an asbestos content of less than 1.0% asbestos in the material samples represented. In accordance with the USEPA criterion, this material is considered to non-asbestos-containing.

Analysis of the other samples at the Ash Brook Golf Course Clubhouse indicated no detectable asbestos content in the material samples represented.

Golf Cart Garage

Analysis of the samples at the Golf Cart Garage indicated no detectable asbestos content in the material samples represented.

Based on observations, it is considered highly unlikely likely that a limited amount of asbestos-containing pipe fitting insulation exists concealed within pipe chase spaces servicing restrooms, radiators and unit ventilators. Accessing these spaces would require demolition of the existing interior architectural elements.

5.0 CONCLUSIONS

5.1 ACM Identified

Table 1 below catalogs the ACM identified or otherwise presumed to be present (PACM) at the subject Residential Properties with a number of comments following:

TABLE 1:

INVENTORY OF ASBESTOS-CONTAINING MATERIAL (ACM)
IDENTIFIED BY LOCATION

Notes: sf = square feet (of surfacing material)
lf = linear feet
location = each occurrence of pipe fitting insulation
ACM = confirmed asbestos-containing via sampling

Ash Brook Golf Course Clubhouse

HOMOGENEOUS ID #	TYPE OF ACM	LOCATION	APPROXIMATE AMOUNT
H-09	Brown composite flooring material	First Floor; Managers Office (below carpeting)	750 sf
		First Floor; Hallway outside Manager's Office (below carpeting)	60 sf
		First Floor; Large Open Area (below carpet and tan 9"x9" floor tile)	2,100 sf
H-10, H-11	Tan 9"x9" floor tile and associated black asphaltic mastic	First Floor; Large Open Area Kitchen Counter area	420 sf
		First Floor; Kitchen	225 sf
H-19	White cementitious window caulking compound	Basement; associated with three (3) Rear Windows	Not Quantified (associated with three (3) 2'x4' window assemblies)

Comments:

1. All quantities above are estimated.

2. The survey did not address potential underground structures (such as drainage piping, etc.) that could be associated with the building structures.

3. As discussed in the report, and considered highly unlikely, additional suspect material may exist as refractory and/or insulation built into the boiler unit.

4. Although the survey sought to address the potential presence of concealed suspect materials, the survey could not address localized, incidental suspect material (e.g. a patch plaster installed during a repair or renovation) if such material indeed exists.

5. This report has not been prepared for use as a bidding document, nor is the information contained in this report intended for use with specifications for asbestos abatement or as an attachment to other documents.

6. An invasive survey where holes are made into all wall/ceiling cavities was not performed during this investigation due to site conditions and building conditions. Therefore, additional asbestos-containing materials (such as pipe/fitting insulation, foundation mastic, exterior wall mastic, floorings, etc.) may be uncovered during demolition activities which would require removal following the appropriate regulations.

5.2 Assessment

Assessment of the environmental hazard posed by the potential presence of ACM in a building lies in the ACM's fibrogenic potential (i.e., the likelihood that it will release fibers that may become airborne and subsequently be inhaled). Assessment of this fibrogenic potential lies in the consideration of these factors:

1. The type of condition of the ACM [i.e., type of material(s), their asbestos content(s), and their friability];

2. The location and status of the ACM relative to the present building use [i.e. its accessibility, exposed surface area, presence of physical damage, location relative to air streams, etc.]; and

3. The potential for change in the status of the ACM, such as might occur during renovation activity.

The raw edges and surfaces of damaged, friable ACM are far more likely to become sources of active fiber release because of the loss of mechanical stability of the ACM at the damaged surface. Persons occupying the given spaces could be exposed to short duration, yet potentially significant "bursts" of airborne fibers due to contact with the damaged locations. Prolonged environmental exposure to airborne fibers could occur if repeated disturbances occur or if deterioration of the material occurs, which could lead to a build-up of loose, "re-entrainable" asbestos fibers on surfaces in the building spaces involved.

The composite flooring material, floor tile and associated mastic, and the window caulking compound are considered to be durable "non-friable" materials not likely to act as sources of fiber release under normal usage conditions.

5.3 Recommendations

It is recommended that asbestos-containing materials be removed prior to the scheduled demolition of the subject building structures as required by applicable Codes.

5.4 Regarding Demolition Plans

We understand that the building owner is planning demolition of the building structures.

Actions taken in regards to the ACM should be in compliance with any applicable federal, state, and local regulations or codes that may apply to handling, disposal, and contracting. Presently, general renovation and disposal operations at both publicly and privately owned and operated facilities in New Jersey are regulated by the federal USEPA's National Emission Standard for Hazardous Air Pollutants (NESHAP) Asbestos Standard (40 CFR 61, Subpart M) and the New Jersey Department of Environmental Protection (NJDEP) waste hauling and disposal regulations (N.J.A.C. 7:26-1, et. seq.). Furthermore, the New Jersey Administrative Code promulgated pursuant to the New Jersey Asbestos Licenses and Permits regulations (N.J.A.C. 8:60 and 12:120) requires that only contractors licensed by the Department of Labor be retained to perform asbestos abatement work. Private contractors who may be retained by a private building owner and the building owner itself, are under jurisdiction of the Occupational Safety and Health Administration (OSHA) asbestos regulations (29 CFR 1910.1001 and 29 CFR 1926.1101, for the general and construction industries, respectively). New Jersey public employers are subject to substantially the same OSHA standard by virtue of its inclusion and expansion as part of the New Jersey Public Employees Occupational Safety and Health (PEOSH) regulations.

The abovementioned NESHAP asbestos standard excludes management of certain asbestos-containing material of a persistent non-friable nature (e.g., asphaltic roofing materials and asbestos-cement materials that could remain non-friable during demolition activities) from its general renovation and demolition requirements. Present interpretation of the New Jersey Administrative Code cited above is more stringent, however. Therefore, removal of all of the asbestos-containing materials identified herein as regulated waste is indicated.

Because the subject building structures are owned by a New Jersey County government entity, asbestos abatement activities at the site would also usually be regulated by the New Jersey Asbestos Hazard Abatement Subcode of the New Jersey Uniform Construction Code (NJUCC) otherwise referred to as “Subchapter 8” or the “Subcode” (N.J.A.C. 5:23-8). By virtue of New Jersey Department of Community Affairs interpretation of NJUCC requirements, the NJUCC (revisions effective June 3, 1993) exempts asbestos abatement activities conducted in unoccupied buildings to be demolished as long as the subject buildings will not be occupied between the completion of the asbestos abatement activities and the subsequent demolition, and the subject buildings are not connected to occupied building space. It is our understanding that the asbestos abatement would be undertaken under these conditions.

Prior to the demolition of the subject buildings, all ACMs identified must be removed by a licensed asbestos abatement contractor.

APPENDIX A

RESULTS OF ASBESTOS CONTENT ANALYSES INCLUDING LABORATORY CERTIFICATES OF ANALYSIS

Notes:
- "Chrysotile" = chrysotile asbestos
- "Amosite" = amosite asbestos
- "Anthophyllite" = anthophyllite asbestos
- "ND" = no asbestos detected in sample
- "**" = NOB/ceiling tile sample analyzed by TEM
- "NA/PS" = not analyzed/positive stop. Laboratory was instructed to stop analysis after the first positive result in any homogeneous group of samples is recorded. In accordance with USEPA protocol, a positive result indicates that the homogeneous group is considered to be asbestos-containing, and further analysis is not necessary.

(The date of sample collection is indicated as the central group of digits in the Sample Number.)

SAMPLE NO.	HOMOGENOUS MATERIAL ID #	MATERIAL DESCRIPTION	SAMPLE LOCATION	ASBESTOS CONTENT
Ash Brook Golf Course Clubhouse				
NETA-00120-092816-01	H-01	Grey cementitious boiler rib paste/packing material	Basement; Boiler Room off HB Smith Boiler Unit	<1.0% Chrysotile
NETA-00120-092816-02	H-01	Grey cementitious boiler rib paste/packing material	Basement; Boiler Room off HB Smith Boiler Unit	<1.0% Chrysotile
NETA-00120-092816-03	H-01	Grey cementitious boiler rib paste/packing material	Basement; Boiler Room off HB Smith Boiler Unit	<1.0% Chrysotile
NETA-00120-092816-04	H-02	Grey cementitious hot water tank insulation	Basement; Boiler Room	ND
NETA-00120-092816-05	H-02	Grey cementitious hot water tank insulation	Basement; Boiler Room	ND
NETA-00120-092816-06	H-02	Grey cementitious hot water tank insulation	Basement; Boiler Room	ND

SAMPLE NO.	HOMOGENOUS MATERIAL ID #	MATERIAL DESCRIPTION	SAMPLE LOCATION	ASBESTOS CONTENT
NETA-00120-092816-07	H-03	White 2'x2' "pitted and scarred" suspended ceiling tile	Basement; Men's Locker Room	ND
NETA-00120-092816-08	H-03	White 2'x2' "pitted and scarred" suspended ceiling tile	Basement; Women's Locker Room	ND
NETA-00120-092816-09	H-04	White sheetrock wallboard	Basement; Women's Restroom	ND
NETA-00120-092816-10	H-05	White joint compound associated with white sheetrock wallboard	Basement; Women's Restroom	ND
NETA-00120-092816-11	H-06	Grey cementitious pipe fitting insulation associated with fibrous glass pipe insulation	Basement; Men's Locker Room	ND
NETA-00120-092816-12	H-06	Grey cementitious pipe fitting insulation associated with fibrous glass pipe insulation	Basement; Men's Locker Room	ND
NETA-00120-092816-13	H-06	Grey cementitious pipe fitting insulation associated with fibrous glass pipe insulation	Basement; Men's Locker Room	ND
NETA-00120-092816-14	H-04	White sheetrock wallboard	First Floor; Manager's Office	ND
NETA-00120-092816-15	H-05	White joint compound associated with white sheetrock wallboard	First Floor; Manager's Office	ND
NETA-00120-092816-16	H-07	White veneer layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND

SAMPLE NO.	HOMOGENOUS MATERIAL ID #	MATERIAL DESCRIPTION	SAMPLE LOCATION	ASBESTOS CONTENT
NETA-00120-092816-17	H-08	Brown undercoat layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND
NETA-00120-092816-18	H-07	White veneer layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND
NETA-00120-092816-19	H-08	Brown undercoat layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND
NETA-00120-092816-20	H-07	White veneer layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND
NETA-00120-092816-21	H-08	Brown undercoat layer of the plaster wall/ceiling system	First Floor; Manager's Office Shower Room	ND
NETA-00120-092816-22	H-09	Brown composite flooring material	First Floor; Manager's Office (below carpeting)	ND
NETA-00120-092816-23	H-09	Brown composite flooring material	First Floor; Manager's Office (below carpeting)	13.0% Chrysotile**
NETA-00120-092816-24	H-10	Tan 9"x9" floor tile	First Floor; Kitchen	3.0% Chrysotile
NETA-00120-092816-25	H-11	Black asphaltic mastic associated with tan 9"x9" floor tile	First Floor; Kitchen	2.6% Chrysotile**
NETA-00120-092816-26	H-10	Tan 9"x9" floor tile	First Floor; Kitchen, Counter area	NA/PS
NETA-00120-092816-27	H-11	Black asphaltic mastic associated with tan 9"x9" floor tile	First Floor; Kitchen, Counter area	NA/PS

SAMPLE NO.	HOMOGENOUS MATERIAL ID #	MATERIAL DESCRIPTION	SAMPLE LOCATION	ASBESTOS CONTENT
NETA-00120-092816-28	H-12	White veneer layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-29	H-13	Brown undercoat layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-30	H-12	White veneer layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-31	H-13	Brown undercoat layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-32	H-12	White veneer layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-33	H-13	Brown undercoat layer of the plaster wall system	First Floor; Kitchen Storage Room	ND
NETA-00120-092816-34	H-14	Black asphaltic roofing shingle with grey particulates (top layer)	Roof; North end of Building	ND**
NETA-00120-092816-35	H-15	Black asphaltic roofing shingle with brown and white particulates (bottom layer)	Roof; North end of Building	ND**
NETA-00120-092816-36	H-16	Black asphaltic roofing felt paper underlayment	Roof; North end of Building	ND**
NETA-00120-092816-37	H-17	Black asphaltic roofing flashing/sealant compound	Roof; North end of Building	ND**
NETA-00120-092816-38	H-14	Black asphaltic roofing shingle with grey particulates (top layer)	Roof; South end of Building	ND
NETA-00120-092816-39	H-15	Black asphaltic roofing shingle with brown and white particulates (bottom layer)	Roof; South end of Building	ND

SAMPLE NO.	HOMOGENOUS MATERIAL ID #	MATERIAL DESCRIPTION	SAMPLE LOCATION	ASBESTOS CONTENT
NETA-00120-092816-40	H-16	Black asphaltic roofing felt paper underlayment	Roof; South end of Building	ND
NETA-00120-092816-41	H-17	Black asphaltic roofing flashing/sealant compound	Roof; South end of Building	ND
NETA-00120-092816-42	H-18	Grey rubberized door caulking compound	Exterior North side of Building	ND**
NETA-00120-092816-43	H-18	Grey rubberized door caulking compound	Exterior South side of Building	ND
NETA-00120-092816-44	H-19	White cementitious window caulking compound	Exterior Rear of Building (Basement window)	6.9% Chrysotile**
NETA-00120-092816-45	H-19	White cementitious window caulking compound	Exterior Rear of Building (Basement window)	NA/PS
Golf Cart Garage				
NETA-00120-092816-46	H-20	Black asphaltic roofing shingle with grey particulates	Roof; North side	ND**
NETA-00120-092816-47	H-21	Black asphaltic roofing felt paper underlayment	Roof; North side	ND**
NETA-00120-092816-48	H-20	Black asphaltic roofing shingle with grey particulates	Roof; West side	ND
NETA-00120-092816-49	H-21	Black asphaltic roofing felt paper underlayment	Roof; West side	ND

Please Reply To:

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T&M Associates
Fax #: (732) 671-7365

Email: kburns@tandmassociates.com

From: ~~Ella Babayeva~~ P. Marcha
AmeriSci Job #: 216094394E
Subject: PLM 3 day Results
Client Project: NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

Date: Sunday, October 02, 2016
Time: 00:50:35
Comments:

Number of Pages: 18 (including cover sheet)

PLM + TBM

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PLM Bulk Asbestos Report

T&M Associates
Attn: Kevin Burns
11 Tindall Road

Middletown, NJ 07748

Date Received 09/29/16 **AmeriSci Job #** 216094394
Date Examined 10/01/16 **P.O. #**
Page 1 **of** 9

RE: NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-01	216094394-01	***Yes***	Trace (<1 %)
H01 **Location:** Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-02	216094394-02	***Yes***	Trace (<1 %)
H01 **Location:** Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-03	216094394-03	***Yes***	Trace (<1 %)
H01 **Location:** Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-04	216094394-04	***No***	NAD
H02 **Location:** Basement - Boiler Room - Grey Cementitious Water Tank Insulation			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 45 %, Non-fibrous 55 %			
NETA-00120-092816-05	216094394-05	***No***	NAD
H02 **Location:** Basement - Boiler Room - Grey Cementitious Water Tank Insulation			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 35 %, Non-fibrous 65 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-06	216094394-06	***No***	NAD
H02	**Location:** Basement - Boiler Room - Grey Cementitious Water Tank Insulation		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 40 %, Non-fibrous 60 %			
NETA-00120-092816-07	216094394-07	***No***	NAD
H03	**Location:** Basement - Men's Locker Room - White 2 x 2 "Pitted And Scarred" Ceiling Tile		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White/Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 45 %, Non-fibrous 55 %			
NETA-00120-092816-08	216094394-08	***No***	NAD
H03	**Location:** Basement - Women's Locker Room - White 2 x 2 "Pitted And Scarred" Ceiling Tile		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White/Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 40 %, Non-fibrous 60 %			
NETA-00120-092816-09	216094394-09	***No***	NAD
H04	**Location:** Basement - Women's Room - White Sheetrock / Wall Board		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 20 %, Non-fibrous 80 %			
NETA-00120-092816-10	216094394-10	***No***	NAD
H05	**Location:** Basement - Women's Room - White Joint Compound Associated With #09		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-11	216094394-11	***No***	NAD
H06	**Location:** Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 35 %, Non-fibrous 65 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-12	216094394-12	***No***	NAD
H06	**Location:** Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 50 %, Non-fibrous 50 %			
NETA-00120-092816-13	216094394-13	***No***	NAD
H06	**Location:** Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 45 %, Non-fibrous 55 %			
NETA-00120-092816-14	216094394-14	***No***	NAD
H04	**Location:** 1st Floor - Managers Office - White Sheetrock / Wall Board		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 20 %, Non-fibrous 80 %			
NETA-00120-092816-15	216094394-15	***No***	NAD
H05	**Location:** 1st Floor - Managers Office - White Joint Compound Associated With White Sheetrock / Wall Board		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-16	216094394-16	***No***	NAD
H07	**Location:** 1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-17	216094394-17	***No***	NAD
H08	**Location:** 1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-18	216094394-18	***No***	NAD
H07	**Location:** 1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-19	216094394-19	***No***	NAD
H08	**Location:** 1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-20	216094394-20	***No***	NAD
H07	**Location:** 1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-21	216094394-21	***No***	NAD
H08	**Location:** 1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-22	216094394-22	***No***	NAD
H09	**Location:** 1st Floor - Managers Office - Showers - Brown Composite Flooring Material		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-23	216094394-23	***No***	NAD
H09	**Location:** 1st Floor - Managers Office - Showers - Brown Composite Flooring Material		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black/Brown, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-24	216094394-24	***Yes***	3 %
H10	**Location:** 1st Floor - Kitchen - Tan 9 x 9 Floor Tile		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile 3.0 % **Other Material:** Non-fibrous 97 %			
NETA-00120-092816-25	216094394-25	***No***	NAD
H11	**Location:** 1st Floor - Kitchen - Black Asphaltic Mastic Associated With Tan 9 x 9 Floor Tile		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-26	216094394-26		NA/PS
H10	**Location:** 1st Floor - Kitchen - Tan 9 x 9 Floor Tile		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
NETA-00120-092816-27	216094394-27	***No***	NAD
H11	**Location:** 1st Floor - Kitchen - Black Asphaltic Mastic Associated With Tan 9 x 9 Floor Tile		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-28	216094394-28	***No***	NAD
H12	**Location:** 1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-29	216094394-29	***No***	NAD
H13	**Location:** 1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-30 H12	216094394-30 **Location:** 1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 100 %

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-31 H13	216094394-31 **Location:** 1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 100 %

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-32 H12	216094394-32 **Location:** 1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 100 %

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-33 H13	216094394-33 **Location:** 1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: Grey, Homogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Non-fibrous 100 %

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-34 H14	216094394-34 **Location:** Roof - North End Of Building - Black Asphaltic Roofing Shingle With Grey Particulates	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: Black/Grey, Homogeneous, Fibrous, Bulk Material
Asbestos Types:
Other Material: Fibrous glass 15 %, Non-fibrous 85 %

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-35 H15	216094394-35 **Location:** Roof - North End Of Building - Black Asphaltic Roofing Shingle With Brown And White Particulates	***No***	NAD (by CVES) by Ella Babayeva on 10/01/16

Analyst Description: Black/Brown, Homogeneous, Non-Fibrous, Bulk Material
Asbestos Types:
Other Material: Cellulose 5 %, Non-fibrous 95 %

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-36	216094394-36	***No***	NAD
H16	**Location:** Roof - North End Of Building - Black Asphaltic Roofing Felt Underlayment		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 85 %, Non-fibrous 15 %			
NETA-00120-092816-37	216094394-37	***No***	NAD
H17	**Location:** Roof - North End Of Building - Black Asphaltic Roofing Flashing Sealant Compound		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-38	216094394-38	***No***	NAD
H14	**Location:** Roof - South End Of Building - Black Asphaltic Roofing Shingle With Grey Particulates		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black/Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 20 %, Non-fibrous 80 %			
NETA-00120-092816-39	216094394-39	***No***	NAD
H15	**Location:** Roof - South End Of Building - Black Asphaltic Roofing Shingle With Brown And White Particulates		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black/Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
NETA-00120-092816-40	216094394-40	***No***	NAD
H16	**Location:** Roof - South End Of Building - Black Asphaltic Roofing Felt Underlayment		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 80 %, Non-fibrous 20 %			
NETA-00120-092816-41	216094394-41	***No***	NAD
H17	**Location:** Roof - South End Of Building - Black Asphaltic Roofing Flashing Sealant Compound		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-42	216094394-42	***No***	NAD
H18	**Location:** Exterior - North Side Of Building - Grey Rubberized Door Caulk		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey/White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-43	216094394-43	***No***	NAD
H18	**Location:** Exterior - South Side Of Building - Grey Rubberized Door Caulk		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Grey/White, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-44	216094394-44	***Yes***	Trace (<1 %)
H19	**Location:** Exterior - Rear Of Building - White Cementitious Window Caulking Compound		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-45	216094394-45	***Yes***	Trace (<1 %)
H19	**Location:** Exterior - Rear Of Building - White Cementitious Window Caulking Compound		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
NETA-00120-092816-46	216094394-46	***No***	NAD
H20	**Location:** Golf Cart Garage - Black Asphaltic Roofing Shingle With Grey Particulate		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black/Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 20 %, Non-fibrous 80 %			
NETA-00120-092816-47	216094394-47	***No***	NAD
H21	**Location:** Golf Cart Garage - Black Asphaltic Roofing Felt Underlayment		(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 70 %, Non-fibrous 30 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

NETA-00120; Netta Architects; Ash Brook Golf Course
Clubhouse

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NETA-00120-092816-48	216094394-48	***No***	NAD
H20 **Location:** Golf Cart Garage - Black Asphaltic Roofing Shingle With Grey Particulate			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black/Grey, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 15 %, Non-fibrous 85 %			
NETA-00120-092816-49	216094394-49	***No***	NAD
H21 **Location:** Golf Cart Garage - Black Asphaltic Roofing Felt Underlayment			(by CVES) by Ella Babayeva on 10/01/16
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 80 %, Non-fibrous 20 %			

Reporting Notes:
Analyzed by: Ella Babayeva
*NAD/NSD =no asbestos detected; NA =not analyzed; NAPS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM/Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite or 198.6 for NOB samples or EPA 400 pt ct by EPA 600/M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. AIHA-LAP, LLC Lab ID 102843, RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054.

Reviewed By:_____ _____END OF REPORT_____

Table I
Summary of Bulk Asbestos Analysis Results
NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	NETA-00120-092816-01	H01	----	----	----	----	Chrysotile <1.	NA
Location:	Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater							
02	NETA-00120-092816-02	H01	----	----	----	----	Chrysotile <1.	NA
Location:	Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater							
03	NETA-00120-092816-03	H01	----	----	----	----	Chrysotile <1.	NA
Location:	Basement - Boiler Room - Grey Cementitious Boiler Rib Paste / Packing Mater							
04	NETA-00120-092816-04	H02	----	----	----	----	NAD	NA
Location:	Basement - Boiler Room - Grey Cementitious Water Tank Insulation							
05	NETA-00120-092816-05	H02	----	----	----	----	NAD	NA
Location:	Basement - Boiler Room - Grey Cementitious Water Tank Insulation							
06	NETA-00120-092816-06	H02	----	----	----	----	NAD	NA
Location:	Basement - Boiler Room - Grey Cementitious Water Tank Insulation							
07	NETA-00120-092816-07	H03	----	----	----	----	NAD	NA
Location:	Basement - Men's Locker Room - White 2 x 2 "Pitted And Scarred" Ceiling Tile							
08	NETA-00120-092816-08	H03	----	----	----	----	NAD	NA
Location:	Basement - Women's Locker Room - White 2 x 2 "Pitted And Scarred" Ceiling Tile							
09	NETA-00120-092816-09	H04	----	----	----	----	NAD	NA
Location:	Basement - Women's Room - White Sheetrock / Wall Board							
10	NETA-00120-092816-10	H05	----	----	----	----	NAD	NA
Location:	Basement - Women's Room - White Joint Compound Associated With #09							
11	NETA-00120-092816-11	H06	----	----	----	----	NAD	NA
Location:	Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation							
12	NETA-00120-092816-12	H06	----	----	----	----	NAD	NA
Location:	Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation							
13	NETA-00120-092816-13	H06	----	----	----	----	NAD	NA
Location:	Basement - Men's Locker Room - Grey Cementitious Pipe Fitting Insulation Associated With Fibrous Glass Pipe Insulation							
14	NETA-00120-092816-14	H04	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - White Sheetrock / Wall Board							
15	NETA-00120-092816-15	H05	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - White Joint Compound Associated With White Sheetrock / Wall Board							
16	NETA-00120-092816-16	H07	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System							

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results
NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	NETA-00120-092816-17	H08	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System							
18	NETA-00120-092816-18	H07	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System							
19	NETA-00120-092816-19	H08	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System							
20	NETA-00120-092816-20	H07	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - White Vaneer Layer Of Ceiling / Wall Plaster System							
21	NETA-00120-092816-21	H08	----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - Brown Undercoat Layer Of Ceiling / Wall Plaster System							
22	NETA-00120-092816-22		----	----	----	----	NAD	NA
Location:	1st Floor - Managers Office - Showers - Brown Composite Flooring Material							
23	NETA-00120-092816-23	H09	0.254	38.2	19.7	29.1	NAD	Chrysotile 13.0
Location:	1st Floor - Managers Office - Showers - Brown Composite Flooring Material							
24	NETA-00120-092816-24	H10	0.157	77.1	16.6	6.4	Chrysotile 3.0	NA
Location:	1st Floor - Kitchen - Tan 9 x 9 Floor Tile							
25	NETA-00120-092816-25	H11	0.157	77.1	16.6	3.8	NAD	Chrysotile 2.6
Location:	1st Floor - Kitchen - Black Asphaltic Mastic Associated With Tan 9 x 9 Floor Tile							
26	NETA-00120-092816-26	H10	----	----	----	----	NA/PS	NA
Location:	1st Floor - Kitchen - Tan 9 x 9 Floor Tile							
27	NETA-00120-092816-27	H11	----	----	----	----	NAD	NA/PS
Location:	1st Floor - Kitchen - Black Asphaltic Mastic Associated With Tan 9 x 9 Floor Tile							
28	NETA-00120-092816-28	H12	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System							
29	NETA-00120-092816-29	H13	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System							
30	NETA-00120-092816-30	H12	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System							
31	NETA-00120-092816-31	H13	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System							
32	NETA-00120-092816-32	H12	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - White Vaneer Layer Of Wall Plaster System							

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results
NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
33	NETA-00120-092816-33	H13	----	----	----	----	NAD	NA
Location:	1st Floor - Kitchen Storage - Brown Undercoat Layer Of Wall Plaster System							
34	NETA-00120-092816-34	H14	0.258	22.1	49.2	28.7	NAD	NAD
Location:	Roof - North End Of Building - Black Asphaltic Roofing Shingle With Grey Particulates							
35	NETA-00120-092816-35	H15	0.240	46.7	15.4	37.9	NAD	NAD
Location:	Roof - North End Of Building - Black Asphaltic Roofing Shingle With Brown And White Particulates							
36	NETA-00120-092816-36	H16	0.212	91.5	6.6	1.9	NAD	NAD
Location:	Roof - North End Of Building - Black Asphaltic Roofing Felt Underlayment							
37	NETA-00120-092816-37	H17	0.160	80.0	14.4	5.6	NAD	NAD
Location:	Roof - North End Of Building - Black Asphaltic Roofing Flashing Sealant Compound							
38	NETA-00120-092816-38	H14	----	----	----	----	NAD	NA
Location:	Roof - South End Of Building - Black Asphaltic Roofing Shingle With Grey Particulates							
39	NETA-00120-092816-39	H15	----	----	----	----	NAD	NA
Location:	Roof - South End Of Building - Black Asphaltic Roofing Shingle With Brown And White Particulates							
40	NETA-00120-092816-40	H16	----	----	----	----	NAD	NA
Location:	Roof - South End Of Building - Black Asphaltic Roofing Felt Underlayment							
41	NETA-00120-092816-41	H17	----	----	----	----	NAD	NA
Location:	Roof - South End Of Building - Black Asphaltic Roofing Flashing Sealant Compound							
42	NETA-00120-092816-42	H18	0.180	63.9	22.2	13.9	NAD	NAD
Location:	Exterior - North Side Of Building - Grey Rubberized Door Caulk							
43	NETA-00120-092816-43	H18	----	----	----	----	NAD	NA
Location:	Exterior - South Side Of Building - Grey Rubberized Door Caulk							
44	NETA-00120-092816-44	H19	0.193	33.7	38.9	20.6	Chrysotile <1.	Chrysotile 6.9
Location:	Exterior - Rear Of Building - White Cementitious Window Caulking Compound							
45	NETA-00120-092816-45	H19	----	----	----	----	Chrysotile <1.	NA/PS
Location:	Exterior - Rear Of Building - White Cementitious Window Caulking Compound							
46	NETA-00120-092816-46	H20	0.348	18.1	48.6	33.3	NAD	NAD
Location:	Golf Cart Garage - Black Asphaltic Roofing Shingle With Grey Particulate							
47	NETA-00120-092816-47	H21	0.177	88.7	7.3	4.0	NAD	NAD
Location:	Golf Cart Garage - Black Asphaltic Roofing Felt Underlayment							
48	NETA-00120-092816-48	H20	----	----	----	----	NAD	NA
Location:	Golf Cart Garage - Black Asphaltic Roofing Shingle With Grey Particulate							

See Reporting notes on last page

Client Name: T&M Associates

Table I
Summary of Bulk Asbestos Analysis Results
NETA-00120; Netta Architects; Ash Brook Golf Course Clubhouse

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
49	NETA-00120-092816-49	H21	----	----	----	----	NAD	NA

Location: Golf Cart Garage - Black Asphaltic Roofing Felt Underlayment

Analyzed by: Paul J. Mucha_____; Date Analyzed 10/2/2016

**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by EPA 600/M4-82-020 per 40 CFR or ELAP 198.1 for New York friable samples or ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (not covered by NVLAP Bulk accreditation) or ELAP 198.4; for New York samples; NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, AIHA-LAP, LLC (PLM) Lab ID 102843.

Warning Note: PLM limitation- only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

Reviewed By:_____

YOUR GOALS. OUR MISSION.

#216094394

ASBESTOS LABORATORY WORK ORDER/CHAIN OF CUSTODY

DATE: 9/28/16

In accordance with the Subcontractor Analytical Services Agreement between **AmeriSci** (Subcontractor), and T&M Associates, this Work Order describes the Scope of Services, Time Schedule, Charges and Payment Conditions for the Project described below.

CLIENT Netta Architects **PROJECT #** NETA-00120

PROJECT NAME Ash Brook Golf Clubhouse **WORK ORDER #**

HEREIN FIND THE FOLLOWING SAMPLES:

- ☒ Bulk Samples
- ☐ Air Sample Cassettes ☐ PCM ☐ TEM
- ☐ Paint Chip Samples
- ☐ Other

SAMPLE NOS.

NETA-00120-092816-01 THROUGH 49

TURNAROUND TIME:

☐ Rush ☐ 6 Hours ☐ 12 Hours ☐ 24 Hours ☐ 48 Hours ☒ Other 4 DAY

TO BE ANALYZED FOR ASBESTOS CONTENT BY THE FOLLOWING METHOD:

- ☒ Polarized Light Microscopy with Dispersion Staining
- ☐ ELAP Protocol, TEM ☐ Yes ☐ No
- ☐ Lead content analysis (percentage)
- ☐ NYS Stratified Point Count
- ☒ PLM N.O.B. Analysis (EPA)-N.J. Samples
- ☐ Phase Contrast Microscopy
- ☐ Transmission Electron Microscopy
- ☐ Screening Analysis (Fiber Count)
- ☐ Quantative (Local Area Diffraction)
- ☐ AHERA Protocol
- ☒ Other Stop at First Positive of any Homo ID#. TEM one Homo ID# of any <1.0% or ND NOB only. No TEM of ceiling tiles (NJ Samples)

REPORTING:

Report initial results to: KBurns@tandmassociates.com

Send final report to: **Mark Worthington**

TAKE THE FOLLOWING ACTION WITH SAMPLES:

- ☐ Return to T&M – Use Transmittal
- ☐ Retain indefinitely
- ☐ Retain until notified otherwise
- ☐ Dispose of.

CHAIN OF CUSTODY: If enclosures are not as noted, please inform us immediately.

T&M Packaged by:	KB	Date:	9/28/16
Transmitted by:	UPS	Date:	9/28/16
Method of Transmittal:	UPS	Date:	9/28/16

LABORATORY:

Received by Lab: ☐ Sealed Package ☐ Damaged and Inventoried

Handled by:		Date:	9/29/16 1030
Sample Preparation:		Date:	
Sample Analysis:		Date:	10/1/16
Packaged by:		Date:	

https://tandmassociates-my.sharepoint.com/personal/kburns_tandmassociates_com/Documents/NETA-00120-COC-AmeriSci NY-Ash Brook Golf Clubhouse-092816.docx

Date 9/28/16
Client Weta Architects
Project Ash Brook Golf Course Clubhouse
Project # WETA-00120

#216094394

Sample No.	Material Description	HID#	Sample Location	Results
01	Grey cementitious Boiler Rib Paste/Packing material	H01	Basement Boiler Room	
02	Same as #01	H01	" " "	
03	Same as #01	H01	" " "	
04	Grey cementitious water tank insulation	H02	" " "	
05	Same as #04	H02	" " "	
06	Same as #04	H02	" " "	
07	white 2x2 "pitted and scarred" ceiling tile	H03	Basement Men's Locker Room	
08	Same as #07	H03	Basement Women's Locker Room	
09	white sheetrock/wallboard	H04	Basement Women's Room	
10	white joint compound associated with #09	H05	" " "	
11	Grey cementitious Pipe fitting insulation associated with Fibrous glass pipe insulation	H06	Basement Men's Locker Room	
12	Same as #11	H06	" " "	
13	Same as #11	H06	" " "	
14	Same as #09	H04	1st Floor Managers Office	
15	Same as #10	H05	" " "	
16	white Lower layer of ceiling/wall Plaster system	H07	1st Floor Showers ~~Office~~ Managers office	
17	Brown undercoat layer of ceiling/wall Plaster System	H08	" " "	
18	Same as #16	H07	" " "	
19	Same as #17	H08	" " "	

#216094394

Date 7/28/16
Client Neta Architects
Project Ash Brook Golf Course Clubhouse
Project # NETA-0c120

Sample No.	Material Description	HID#	Sample Location	Results
20	Same as # 6	H07	1st Floor ~~mas~~ Office Manager's office Showers	
21	Same as #17	H08	" " " "	
22	Brown composite flooring material	H09	" " "	
23	Same as #22	H09	" " "	
24	Tan 9x9 Floor tile	H10	1st Floor Kitchen	
25	Black asphaltic mastic associated with #24	H11	" " "	
26	Same as #24	H10	" " "	
27	Same as #25	H11	" " "	
28	White veneer layer of ~~Ceiling~~ wall plaster system	H12	1st Floor Kitchen Storage	
29	Brown under-coat layer of wall plaster system	H13	" " " "	
30	Same as #28	H12	" " " "	
31	Same as #29	H13	" " " "	
32	Same as #28	H12	" " " "	
33	Same as #29	H13	" " " "	
34	Black asphaltic Roofing shingle with grey particulates	H14	Roof North End of Building	
35	Black asphaltic Roofing shingle with Brown and white particles	H15	" " "	
36	Black asphaltic Roofing Felt underlayment	H16	" " "	
37	Black asphaltic ~~Roofing~~ Flashing/ Sealant compound	H17	" " "	
38	Same as #34	H14	Roof South End of Building	

Date 9/28/16
Client NETA Architects
Project Ash Brook Golf Course Clubhouse
Project # NETA-00120

Sample No. #2160943 94

Sample No.	Material Description	HID#	Sample Location	Results
39	Same as #35	H15	Roof South End of Building	
40	Same as #36	H16	" " "	
41	Same as #37	H17	" " "	
42	~~black~~ grey rubberized Door caulk	H18	Ext North side of Building	
43	Same as #42	H18	exterior South side of Building	
44	Wht Elastomeric window caulking compound	H19 H20	~~Rear of~~ exterior Rear of Building	
45	Same as #44	H19	" " "	
46	Black asphaltic Roof Shingle with grey Reticulate	H20	Golf Cart Garage	
47	Black asphaltic Roofing Felt underlayment	H21 H20	" " "	
48	Same as #46	H21	" " "	
49	Same as #47	H21	" " "	

YOUR GOALS. OUR MISSION.

REPORT OF LEAD-BASED PAINT INDENTIFICATION SURVEY

RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE
1210 Raritan Road
Scotch Plains, Union County, NJ

Job No. NETA-00120

OCTOBER 5, 2016

PREPARED FOR:

Netta Architects, LLC
25 Route 22 East, Suite 290
Springfield, New Jersey 07081

PREPARED BY:

Kevin Burns
Supervising Environmental Scientist
T&M Associates

Signature

REVIEWED BY:

Mark Worthington
Group Manager
T&M Associates

Signature

REPORT OF LEAD-BASED PAINT IDENTIFICATION SURVEY RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE 1210 RARITAN ROAD SCOTCH PLAINS, UNION COUNTY, NEW JERSEY JOB NO. NETA-00120

TABLE OF CONTENTS

1.0 INTRODUCTION

T&M Associates (T&M) was retained by Netta Architects, LLC (the Client) to perform a number of hazardous material functions for the subject project, including the completion of a lead-based paint (LBP) identification survey of the Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road in Scotch Plains, Union County, New Jersey.

It is our understanding that the subject building structures noted above are scheduled for demolition.

Mandell Lead Inspectors, Inc. was retained as a subcontractor to T&M on this project for the purpose of performing X-ray Fluorescence (XRF) testing of suspect lead-based paint applications at the referenced building. Mandell Lead Inspectors, Inc. and T&M personnel toured the building concurrently, during which time T&M personnel gathered general information to support the discussion presented below.

2.0 REGARDING THE DISTRIBUTION OF LEAD BASED PAINT

It was not the intent of the LBP survey to develop an exhaustive catalog of lead-based paint (LBP) at the subject building structure, but rather to gain an understanding of the overall distribution of LBP at the subject building structure relative to planning for LBP management that may be necessary during any planned demolition at the subject building structure. Consideration of the testing data presented in the attached report, and observations otherwise made on-site, indicate the following surfaces to contain LBP, with LBP defined as a painted surface tested to contain 1.0 milligrams/square centimeter (mg/cm^2) of surface lead-content:

Ash Brook Golf Course Clubhouse

LBP was identified to be associated with the following building elements addressed by this investigation at the Ash Brook Golf Course Clubhouse:

(i) the subject building structure's various metal beam elements; and
(ii) the subject building structure's exterior wooden door molding elements.

No LBP was identified to be associated with the other building elements addressed by this investigation at the Ash Brook Golf Course Clubhouse.

Golf Cart Garage

No LBP was identified to be associated with the building elements addressed by this investigation at the Golf Cart Garage.

3.0 LBP MANAGEMENT ASSOCIATED WITH PLANNED DEMOLITION

Actions taken in regards to all lead-containing materials should be in compliance with any applicable federal, state, and local regulations or codes that may apply to handling, disposal, and contracting. Presently, general renovation and disposal operations that may be undertaken by a privately-owned

contractor at the site are subject to the Occupational Safety and Health Administration's Lead Construction Standard (29 CFR 1926.62). This is a "contractor-burden" regulation which specifically addresses potential exposure to lead as a result of demolition/renovation activities, but otherwise does not promulgate specific LBP-management and abatement criteria, especially for LBP to be maintained in-place.

Incidental handling of LBP as part of a demolition project, when the objective of such handling itself is not meant as "mitigation of permanent elimination" of a LBP hazard, is not considered to constitute "lead abatement" pursuant to the New Jersey Uniform Construction Code (see N.J.A.C. 5:23-1.4). T&M understands that the demolition activities to be undertaken are not subject to the requirements of the promulgated New Jersey Lead Hazard Evaluation and Abatement Code (N.J.A.C. 5:17) and the New Jersey Standards for Lead Certification (N.J.A.C. 8:62).

Rather, given the assumption above, any contractor may undertake LBP-handling activities while undertaking work for which it is otherwise qualified, as long as the contractor acts in a prudent manner. Please note that personnel from each contractor may directly disturb LBP (via cutting into the paint's substrate, changing a component, demolition of paint surfaces, etc.), as long as effective methods are utilized to protect workers from undue exposure to the LBP pursuant to the OSHA Lead Construction Standard.

Concentrated LBP waste that may be generated by stripping or scraping abatement operations would likely be classified as hazardous waste under current federal and state code, requiring its specialized containerization and disposal. LBP associated with plaster wall and ceiling surfaces to be demolished is often not handled as hazardous waste, as mixed waste usually does not "fail" the TCLP (Toxic Characteristic Leachate Procedure) test for classifying characteristic hazardous waste. This being the case, it is our understanding that state and federal agencies currently do not consider the presence of routine LBP applied to general construction waste to classify that waste in a manner to increase its disposal cost [see EPA document 747-R-93-006, Applicability of Federal Resource Conservation and Recovery Act (RCRA) Disposal Requirements to Lead-Based Paint Abatement Wastes].

The United States Environmental Protection Agency (USEPA) has proposed regulations which would eliminate the requirement for the abovementioned TCLP testing and allow for the disposal of LBP debris in construction and demolition (C&D) landfills. Although we expect that demolition debris from the planned demolition activities at the subject building structures would not be classified as hazardous waste under the current regulatory environment, the proposed regulations would ensure this scenario.

Handling of the building components to be demolished as part of any scheduled demolition project would require dust suppression and control relative to OSHA compliance and good industry practice to prevent fugitive dust exposure to personnel in adjacent areas. Specific waste handling is not expected to be necessary on this project.

We are pleased to have been given the opportunity to work with you on this project. Should you have any questions, please contact our office.

Enclosure: (1 testing report)

APPENDIX A

Mandell Lead Inspectors, Inc
MLI
dba

MANDELL ENVIRONMENTAL CONSULTING

409 MINNISINK ROAD • SUITE 102 • TOTOWA, NJ 07512 • (973) 785-7574 • FAX (973) 785-0561

LEAD PAINT INSPECTION REPORT

INSPECTION FOR: T&M Associates
11 Tindall Road
Middletown, NJ 07748

PERFORMED AT: Ashbrook Golf Club
1210 Raritan Road
Scotch Plains, NJ

INSPECTION DATE: 09/28/16

INSTRUMENT TYPE: Niton XLp 300A
XRF Lead-Based Paint Analyzer
Serial Numbers: 89266

ACTION LEVEL: 1.0 mg/cm2

OPERATOR LICENSE: 003783

THIS REPORT IS NON TRANSFERABLE

The measurements contained within are accurate to the best of our knowledge. Mandell Lead Inspectors Inc. does not under any circumstances make any representation guarantee or warranty as to the reported or future condition of the property.

SIGNED: _____ Date: 10-3-16

Stuart Casciano
Mandell Lead Inspectors, Inc.
409 Minnisink Road, Suite 102
Totowa, NJ 07512
(973) 785-7574

Summary

On September 28, 2016, Mandell Lead Inspectors Inc. conducted a limited inspection for the possible presence of Lead-based Paint at the Ashbrook Country Club, 1210 Raritan Road, Scotch Plains, NJ. Sampling of selected areas was performed using a Niton XLp 300A XRF Lead-Based Paint Analyzer. The inspection was conducted by Stuart Casciano NJ/EPA Lead Paint Inspector/ Risk Assessor Certification # 003783. The inspection was limited to the random testing of building components that may be disturbed during renovation activities. The inspection was not intended to be a full survey in accordance with HUD Guidelines.

The enclosed information will primarily assist you in identifying the location(s) of lead-based paint on the exterior and interior painted surfaces tested during the inspection. It should not be used to assess whether an individual has been exposed to harmful levels of lead and/or the future for potential for future exposure. However, this information can provide the basis for a more detailed inspection or risk assessment, which includes an in depth, hazard evaluation as well as soil, and dust wipe sampling.

The XRF results section of this report provides a listing of all the readings collected during the inspection, organized by room and structure type. The positive readings are highlighted and include those readings that were at or above the action level 1.0 mg/cm2. However, some painted surfaces may contain levels of lead below 1.0 mg/cm2 (e.g. inconclusive), which could create dust or lead-contaminated soil hazards if the paint is turned into dust by abrasion, scraping, or sanding. When reviewing the reports please consider that XRF readings were only collected on representative painted surfaces which were visible to the inspector at the time of the inspection, and accessible from ground level. Readings were not collected in areas where the presence or absence of paint could not be determined, or accessed. The overall condition of the painted surfaces at these locations is also provided.

XRF RESULTS

EXPLANATION OF TERMS AND ABBREVIATIONS

The following information has been provided to assist you with the attached Lead-Based Paint Inspection Report.

Action Level – The level at or above which any paint, shellac, varnish, or other coating is considered to be lead-based and, consequently, appropriate abatement and/or interim control measures should be considered. Currently, the action level as outlined in State and Federal guidelines is 1.0 milligrams/square centimeter (1.0 mg/cm2) as measured by X-Ray Fluorescence (XRF) testing, or 0.5% by weight as measured by laboratory analysis.

Reading No. – Corresponds to a specific XRF measurement as taken in a numerical sequence during the inspection.

Surface – The general location of a measurement relative to a wall on the exterior of the house or within a particular room. Wall A corresponds to the front entry wall, while walls B through D are identified proceeding in a clockwise direction.

Structure – A major component such as a window, wall, or staircase located inside or outside of the house, upon which a measurement or set of measurements were collected.

Location – The specific area on a structure where a measurement was collected.

Member – A portion of a structure such as a window jam, door header, or stair riser where a measurement was collected.

Friction Surface – Any interior or exterior surface such as a window, stair tread, or floor subject to friction or abrasion.

Impact Surface – An interior or exterior surface such as surfaces on doors subject to damage by repeated impact or contact.

Paint Condition – A subjective classification of the condition of a painted surface upon which a measurement was collected. Paint is classified into one of two categories that include "sound" or "unsound". A "sound" surface is considered to be completely intact and free from any visible signs of damage or deterioration. All other surfaces are considered "unsound". Regardless of the paint condition at the time of inspection, all friction and impact surfaces are considered "unsound" due to the ongoing generation of dust that is inherent to these surfaces during use. If test results indicate the presence of lead-based paint, particularly on an "unsound" surface, steps should be taken to establish and maintain a lead-safe condition.

I = Intact: Paint surface is smooth, continuous and free of surface defect that would result in the release of paint dust or chips.

F=Fair: Large surfaces – a surface where less than or equal to two square feet of surface are not intact. Areas without large surfaces - surface where less than or equal to 10 percent of the surface is not intact.

P=Poor: Large surfaces – a surface where more than two square feet of surface are not intact. Areas without large surfaces – surface where more than 10 percent of the surface is not intact.

Mandell Lead Inspectors, Inc.

1210 Raritan Road, Scotch Plains, NJ

XRF RESULTS

Index	Reading No	Time	Room	Wall	Component	Substrate	Paint Condition	Results	PbC	Units
1	343	2016-09-28 10:07							1.15 ± 0.00	cps
2	344	2016-09-28 10:23	Calibration	A	Door	Wood	Intact	Negative	0.90 ± 0.10	mg / cm ^2
3	345	2016-09-28 10:24	Calibration	A	Door	Wood	Intact	Null	1.00 ± 0.10	mg / cm ^2
4	346	2016-09-28 10:25	Calibration	A	Door	Wood	Intact	Null	1.00 ± 0.10	mg / cm ^2
5	347	2016-09-28 10:26	Boiler Room	A	Wall	Masonry	Intact	Negative	0.00 ± 0.02	mg / cm ^2
6	348	2016-09-28 10:27	Boiler Room	D	Wall	Masonry	Intact	Negative	0.04 ± 0.12	mg / cm ^2
7	349	2016-09-28 10:28	Boiler Room	B	Column	Metal	Intact	Negative	0.12 ± 0.10	mg / cm ^2
8	350	2016-09-28 10:28	Boiler Room	B	Column	Metal	Intact	Negative	0.28 ± 0.20	mg / cm ^2
9	351	2016-09-28 10:29	Boiler Room	C	Door	Metal	Intact	Negative	0.00 ± 0.02	mg / cm ^2
10	352	2016-09-28 10:29	Boiler Room	C	Door Molding	Metal	Intact	Negative	0.00 ± 0.02	mg / cm ^2
11	353	2016-09-28 10:31	Locker Room	B	Door Molding	Wood	Intact	Negative	0.00 ± 0.02	mg / cm ^2
13	355	2016-09-28 10:32	Locker Room	B	Wall	Paneling	Intact	Negative	0.00 ± 0.03	mg / cm ^2
14	356	2016-09-28 10:32	Locker Room	B	Wall	Masonry	Intact	Negative	0.01 ± 0.04	mg / cm ^2
15	357	2016-09-28 10:32	Locker Room	B	Baseboard	Wood	Intact	Negative	0.00 ± 0.02	mg / cm ^2
16	358	2016-09-28 10:33	Locker Room	C	Window Sash	Wood	Intact	Negative	0.21 ± 0.15	mg / cm ^2
17	359	2016-09-28 10:34	Locker Room	A	Ceiling	Concrete	Intact	Negative	0.00 ± 0.02	mg / cm ^2
18	360	2016-09-28 10:34	Locker Room	A	Ceiling	Concrete	Intact	Negative	0.00 ± 0.02	mg / cm ^2
19	**361**	**2016-09-28 10:35**	**Locker Room**	**A**	**Beam**	**Metal**	**Intact**	**Positive**	**2.10 ± 0.50**	**mg / cm ^2**
20	**362**	**2016-09-28 10:35**	**Locker Room**	**A**	**Beam**	**Metal**	**Intact**	**Positive**	**2.00 ± 0.40**	**mg / cm ^2**
21	363	2016-09-28 10:35	Locker Room	B	Radiator	Metal	Intact	Negative	0.04 ± 0.08	mg / cm ^2
22	364	2016-09-28 10:37	Bathroom	B	Duct	Metal	Intact	Negative	0.00 ± 0.02	mg / cm ^2
25	367	2016-09-28 10:37	Bathroom	B	Duct	Metal	Intact	Negative	0.05 ± 0.12	mg / cm ^2
26	368	2016-09-28 10:38	Bathroom	B	Door	Metal	Intact	Negative	0.08 ± 0.20	mg / cm ^2
27	369	2016-09-28 10:38	Bathroom	A	Door Molding	Metal	Intact	Negative	0.10 ± 0.11	mg / cm ^2
28	**370**	**2016-09-28 10:38**	**Bathroom**	**A**	**Beam**	**Metal**	**Intact**	**Positive**	**1.60 ± 0.40**	**mg / cm ^2**
29	371	2016-09-28 10:40	Bathroom	C	Radiator	Metal	Intact	Negative	0.25 ± 0.72	mg / cm ^2
30	372	2016-09-28 10:40	Bathroom	C	Window Molding	Wood	Intact	Negative	0.25 ± 0.17	mg / cm ^2
31	373	2016-09-28 10:41	Bathroom	A	Floor	Concrete	Intact	Negative	0.00 ± 0.02	mg / cm ^2
32	374	2016-09-28 10:41	Bathroom	A	Floor	Concrete	Intact	Negative	0.00 ± 0.02	mg / cm ^2
33	375	2016-09-28 10:42	Dining Room	A	Ceiling	Concrete	Intact	Negative	0.01 ± 0.02	mg / cm ^2
34	**376**	**2016-09-28 10:43**	**Dining Room**	**A**	**Beam**	**Metal**	**Intact**	**Positive**	**1.20 ± 0.10**	**mg / cm ^2**
35	377	2016-09-28 10:44	Dining Room	B	Wall	Brick	Intact	Negative	0.01 ± 0.02	mg / cm ^2
36	378	2016-09-28 10:44	Dining Room	B	Wall	Brick	Intact	Negative	0.06 ± 0.11	mg / cm ^2
37	379	2016-09-28 10:44	Dining Room	B	Pipe	Metal	Intact	Negative	0.00 ± 0.02	mg / cm ^2
38	380	2016-09-28 10:45	Dining Room	A	Wall	Paneling	Intact	Negative	0.00 ± 0.02	mg / cm ^2

Mandell Lead Inspectors, Inc.

1210 Raritan Road, Scotch Plains, NJ

XRF RESULTS

Index	Reading No	Time	Room	Wall	Component	Substrate	Paint Condition	Results	PbC	Units
40	382	2016-09-28 10:45	Dining Room	C	Closet Wall	Paneling	Intact	Negative	0.00 ± 0.02	mg/cm^2
41	383	2016-09-28 10:46	Dining Room	C	Closet Shelf	Wood	Intact	Negative	0.00 ± 0.02	mg/cm^2
42	384	2016-09-28 10:46	Womens Bathroom	C	Wall	Drywall	Intact	Negative	0.00 ± 0.02	mg/cm^2
43	385	2016-09-28 10:47	Womens Bathroom	D	Wall	Drywall	Intact	Negative	0.00 ± 0.02	mg/cm^2
44	386	2016-09-28 10:47	Womens Bathroom	B	Floor	Concrete	Intact	Negative	0.00 ± 0.02	mg/cm^2
45	387	2016-09-28 10:49	Stairway	B	Stair Stringer	Metal	Intact	Negative	0.16 ± 0.14	mg/cm^2
46	388	2016-09-28 10:49	Stairway	B	Stair Handrail	Metal	Intact	Negative	0.21 ± 0.17	mg/cm^2
47	389	2016-09-28 10:50	Stairway	B	Stair Handrail	Metal	Intact	Negative	0.13 ± 0.10	mg/cm^2
48	390	2016-09-28 10:50	Stairway	A	Column	Metal	Intact	Negative	0.50 ± 0.30	mg/cm^2
50	392	2016-09-28 10:52	1st Floor Main Room	A	Wall	Masonry	Intact	Negative	0.01 ± 0.02	mg/cm^2
52	394	2016-09-28 10:52	1st Floor Main Room	C	Wall	Masonry	Intact	Negative	0.04 ± 0.15	mg/cm^2
53	395	2016-09-28 10:53	1st Floor Main Room	C	Radiator	Metal	Intact	Negative	0.01 ± 0.77	mg/cm^2
54	396	2016-09-28 10:54	1st Floor Main Room	C	Door Molding	Wood	Stain Varnish	Negative	0.00 ± 0.02	mg/cm^2
56	398	2016-09-28 10:55	Foyer	D	Door Molding	Metal	Fair	Negative	0.01 ± 0.04	mg/cm^2
57	399	2016-09-28 10:56	Office	A	Wall	Paneling	Fair	Negative	0.06 ± 0.16	mg/cm^2
58	400	2016-09-28 10:56	Office	B	Wall	Paneling	Fair	Negative	0.01 ± 0.05	mg/cm^2
59	401	2016-09-28 10:56	Office	C	Wall	Drywall	Fair	Negative	0.00 ± 0.02	mg/cm^2
60	402	2016-09-28 10:57	Office	B	Closet Wall	Drywall	Fair	Negative	0.02 ± 0.04	mg/cm^2
61	403	2016-09-28 10:57	Office	B	Closet Wall	Drywall	Fair	Negative	0.03 ± 0.05	mg/cm^2
62	404	2016-09-28 10:58	Office	D	Wall	Drywall	Fair	Negative	0.00 ± 0.02	mg/cm^2
63	405	2016-09-28 10:58	Office	B	Door	Wood	Intact	Negative	0.00 ± 0.02	mg/cm^2
64	406	2016-09-28 10:59	Office	C	Door Molding	Wood	Intact	Negative	0.07 ± 0.11	mg/cm^2
65	407	2016-09-28 10:59	Office	A	Radiator	Metal	Intact	Negative	0.40 ± 0.60	mg/cm^2
66	408	2016-09-28 11:01	Exterior	A	Column	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
67	409	2016-09-28 11:01	Exterior	A	Column	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
69	411	2016-09-28 11:02	Exterior	A	Wall	Masonry	Intact	Negative	0.10 ± 0.12	mg/cm^2
71	413	2016-09-28 11:02	Exterior	A	Soffit	Wood	Poor	Negative	0.80 ± 0.20	mg/cm^2
72	414	2016-09-28 11:03	Exterior	A	Soffit	Wood	Poor	Negative	0.02 ± 0.05	mg/cm^2
73	415	2016-09-28 11:04	Exterior	D	Soffit	Wood	Poor	Negative	0.70 ± 0.20	mg/cm^2
74	**416**	**2016-09-28 11:04**	**Exterior**	**D**	**Door Molding**	**Wood**	**Poor**	**Positive**	**2.00 ± 0.70**	**mg/cm^2**
75	**417**	**2016-09-28 11:04**	**Exterior**	**D**	**Door Molding**	**Wood**	**Poor**	**Positive**	**1.60 ± 0.30**	**mg/cm^2**
76	418	2016-09-28 11:05	Exterior	D	Wall	Masonry	Fair	Negative	0.01 ± 0.02	mg/cm^2
77	419	2016-09-28 11:06	Exterior	D	Wall	Metal	Poor	Negative	0.01 ± 0.03	mg/cm^2
80	422	2016-09-28 11:08	Exterior	C	Wall	Masonry	Intact	Negative	0.00 ± 0.02	mg/cm^2
81	423	2016-09-28 11:08	Exterior	C	Door	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2

Mandell Lead Inspectors, Inc.

1210 Raritan Road, Scotch Plains, NJ

XRF RESULTS

Index	Reading No	Time	Room	Wall	Component	Substrate	Paint Condition	Results	PbC	Units
82	424	2016-09-28 11:09	Garage	C	Door	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
83	425	2016-09-28 11:09	Garage	C	Door	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
84	426	2016-09-28 11:10	Garage	C	Bollard	Metal	Intact	Negative	0.01 ± 0.03	mg/cm^2
85	427	2016-09-28 11:11	Garage	A	Bollard	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
86	428	2016-09-28 11:11	Garage	A	Bollard	Metal	Intact	Negative	0.00 ± 0.02	mg/cm^2
87	429	2016-09-28 11:11	Garage	A	Wall	Masonry	Intact	Negative	0.01 ± 0.03	mg/cm^2
89	431	2016-09-28 11:12	Garage	D	Wall	Masonry	Intact	Negative	0.00 ± 0.02	mg/cm^2
91	433	2016-09-28 11:26	Kitchen	D	Wall	Drywall	Intact	Negative	0.00 ± 0.02	mg/cm^2
92	434	2016-09-28 11:26	Kitchen	C	Wall	Drywall	Intact	Negative	0.05 ± 0.06	mg/cm^2
93	435	2016-09-28 11:27	Kitchen	D	Built In Shelf	Wood	Intact	Negative	0.00 ± 0.02	mg/cm^2
94	436	2016-09-28 11:31	Calibration	D	Built In Shelf	Wood	Intact	Negative	0.90 ± 0.10	mg/cm^2
95	437	2016-09-28 11:31	Calibration	D	Built In Shelf	Wood	Intact	Negative	0.90 ± 0.10	mg/cm^2
96	438	2016-09-28 11:32	Calibration	D	Built In Shelf	Wood	Intact	Negative	0.90 ± 0.10	mg/cm^2

YOUR GOALS. OUR MISSION.

PCB, MERCURY LIQUID & LAMP ("UNIVERSAL WASTE") INVESTIGATION

RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE
1210 Raritan Road
Scotch Plains, Union County, NJ

Job No. NETA-00120

OCTOBER 5, 2016

PREPARED FOR:

Netta Architects, LLC
25 Route 22 East, Suite 290
Springfield, New Jersey 07081

PREPARED BY:

Kevin Burns
Supervising Environmental Scientist
T&M Associates

Signature

REVIEWED BY:

Mark Worthington
Group Manager
T&M Associates

Signature

PCB, MERCURY LIQUID AND LAMP ("UNIVERSAL WASTE") INVESTIGATION RELATED TO THE DEMOLITION OF THE ASH BROOK GOLF COURSE CLUBHOUSE AND GOLF CART GARAGE 1210 RARITAN ROAD SCOTCH PLAINS, UNION COUNTY, NEW JERSEY JOB NO. NETA-00120

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SECTION **PAGE**

1.0 INTRODUCTION

T&M Associates (T&M) was retained by Netta Architects (the Client) to perform a number of hazardous material functions for the subject project including a review of involved components and spaces for equipment that may contain polychlorinated biphenyls (PCBs) or mercury. The handling of equipment, which includes PCBs and/or mercury, is subject to the requirements of the United State Protection Agency's (USEPA's) "Universal Waste" program.

The survey was conducted to address the Ash Brook Golf Course Clubhouse and Golf Cart Garage located at 1210 Raritan Road in Scotch Plains, Union County, New Jersey. It is our understanding that the subject building structures noted above are scheduled for demolition.

The survey was conducted by Mr. Kevin Burns and Mr. Daniel Schaefer of T&M on September 28, 2016.

2.0 REGARDING PCB/MERCURY-CONTAINING EQUIPMENT

The extent of investigation under this task item included visually observing electrical appliances known to typically contain PCB-based dielectric fluid (such as transformers and light ballasts), and/or mercury fluid and mercury-containing bulb treatments and recording product label information concerning the presence of PCBs and/or mercury. These materials must be either disposed of properly or recycled in accordance with the United States Environmental Protection Agency's (USEPA) "Universal Waste" program. The strategy undertaken as part of this investigation was to: (1) assume that electrical appliances such as light ballasts and transformers that were not specifically labeled as "non-PCB containing", or with other similar wording, are indeed PCB-containing; and, (2) to do the same likewise relative to thermostats and fluorescent light tubes in regards to their mercury content.

It is important to note that this investigation was focused on building system components such as switches, thermostats, transformers, light tubes, etc., and did not include review of building materials which may contain PCBs, such as window caulking compound and certain foam insulation applications.

Ash Brook Golf Course Clubhouse and Golf Cart Garage

Visual review of the subject building structures spaces and components to be disturbed as part of the planned building-wide demolitions indicate that the following matters should be addressed as part of the planning process:

(1) Fluorescent light tubes and compact fluorescent light bulbs were observed to exist throughout the subject building structures;
(2) Suspected PCB-containing light fixture ballasts were observed throughout the subject building structures (as classified by absence of labeling); and
(3) Suspected mercury-containing thermostats were observed to exist throughout the subject building structures.

It is important to note, while not considered to be hazardous waste, the fluid contained within non-PCB containing light fixture ballasts and transformers must be disposed of properly.

Please also note, although not specifically identified, certain types of coolants associated with the HVAC units may need to be removed and disposed of properly.

Inventory of Suspected PCB/Mercury-Containing Equipment

Ash Brook Golf Course Clubhouse

TYPE OF MATERIAL/EQUIPMENT	LOCATION	APPROX. AMOUNT
Suspected (likely) PCB-containing light ballasts	Throughout the subject building structure	46 ballasts (estimated)
Fluorescent light tubes	Throughout the subject building structure	122 light tubes (estimated)
Compact Fluorescent light bulbs	Throughout the subject building structure	87 light bulbs (estimated)
Suspected Mercury-containing thermostats	Throughout the subject building structure	2 thermostats

Golf Cart Garage

TYPE OF MATERIAL/EQUIPMENT	LOCATION	APPROX. AMOUNT
Suspected (likely) PCB-containing light ballasts	Throughout the subject building structure	12 ballasts
Fluorescent light tubes	Throughout the subject building structure	24 light tubes

3.0 CONCLUSION

The PCB/Mercury containing equipment as well as the non-PCB containing equipment identified in Section 2.0, if impacted by the anticipated demolition, must be removed and disposed of in accordance with all applicable local, state and federal regulations.

We are pleased to have been given the opportunity to work with you on this project. Should you have any questions, please contact our office.

APPENDIX 2 – GEOTECHNICAL REPORT

ANS Geo, Inc.

4405 South Clinton Avenue, Suite-A
South Plainfield, NJ 07080-1213
Tel. (866) 829-ATUL
Fax (908) 754-1359

June 7, 2016

Netta Architects
1084 Route 22 West
Mountainside, NJ 07092

Attn.: Ms. Maria McKenna

Re: **Subsurface Soil Investigation and Foundation Recommendation Report**
Ash Brook Golf Course
1210 Raritan Road
Scotch Plains, NJ
Union County

Dear Ms. McKenna,

Enclosed please find three (3) copies of the Subsurface Soil Investigation and Foundation Recommendation report for the five (5) soil borings performed on May 31, 2016 and June 1, 2016 at the project referenced above.

Soil samples collected during soil boring program will be discarded after thirty (30) days from the date of this report, if not requested in advance to do otherwise. We thank you very much for providing us an opportunity to service you on this project.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned at (908)754-8383.

Sincerely,
ANS Geo, Inc.

Atul N. Shah, PE
President
NJ PE License #24GE03443900
ANS/PP

Reported: Netta Architects- 3, file-1

File: GET-41_01.SB

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ANS Geo, Inc.

4405 South Clinton Avenue, Suite-A
South Plainfield, NJ 07080-1213
Tel. (866) 829-ATUL
Fax (908) 754-1359

June 7, 2016

Netta Architects
1084 Route 22 West
Mountainside, NJ 07092

Attn.: Ms. Maria McKenna

Re: **Subsurface Soil Investigation and Foundation Recommendation Report**
Ash Brook Golf Course
1210 Raritan Road
Scotch Plains, NJ
Union County

Dear Ms. McKenna,

Enclosed please find three (3) copies of the Subsurface Soil Investigation and Foundation Recommendation report for the five (5) soil borings performed on May 31, 2016 and June 1, 2016 at the project referenced above. The soil boring work was conducted as per our proposal dated April 18, 2016.

Our **Scope of Services** included the following:

1. Drilling and full time inspection of total of five (5) test borings down to maximum 27'-0" depth or to refusal, whichever comes first, recording of groundwater level or depth to bedrock if encountered in the contracted depth.

2. Performance of engineering evaluation to determine the stratification and physical properties of the subsurface materials and to develop and recommend appropriate type of foundation systems for the proposed one story club house building.

3. Preparation of a written report summarizing all findings and recommendations.

PROPOSED CONSTRUCTION:

The project site is located at 1210 Raritan Road, Scotch Plains, New Jersey. The subject site is an existing Golf Course. The work area consists of one clubhouse building and one shed. We understand that a construction of approximately 10,000 to 12,000 SF club house on or near the current clubhouse building is proposed. The proposed building will accommodate the following:

- Approximately 1,000 to 1,200 SF of kitchen, banquet facility and related space to support such food and beverage operations.
- A grillroom with seating for 50 patrons
- Storage of electric golf carts.
- Pro shop

Based upon the construction drawings provided, have estimated traditional foundation loads for the soil bearing capacity recommendations. Please see soil boring location plan in Appendix-A for the exact location of the soil borings.

SITE CONDITIONS:

The subject site is located towards southeast side of Raritan Road. The subject property is Ashbrook Golf Course. The site was noted to be fairly level during the soil boring activities. The subject property is located at approximately Latitude N 40°36'37.01", Longitude W 74°22' 16.68" on the USGS Digital Elevation Model. See the site location plan in Appendix-A for more details.

FIELD INVESTIGATION

The soil boring locations were selected and marked by an ANS field representative as per the site plan provided by the client. Surface utility mark-out was performed by New Jersey One-Call System. Once cleared, the soil boring work began on May 31, 2016.

A total of five (5) soil borings, Borings B-1 to B-5 were drilled and sampled down to 27 feet depth. The soil boring locations are shown in the Soil Boring Location Plan which is included in Appendix-A. Soil boring work was performed under the direction and supervision of field representative Mr. Syed Abbas. The borings were drilled using a 3" diameter hollow stem auger. Soil encountered was sampled continuously down to a depth of 12'-0" and then at a distance of 5'-0" intervals down to the maximum depth of 27 feet in boring B-2 to B-5. Augur refusal was encountered at 22'-8" in boring B-1. Soil samples were extracted using a 2" diameter split spoon sampler as per the procedure specified in ASTM 1586-99.

Samples for all the borings were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2-inch outside-diameter split-spoon sampler into the soil with a 140-pound weight falling freely from a distance of 30 inches. The samplers were driven in four successive 6-inch increments, with the number of blows per increment being recorded. The number of blows required to advance the sampler in the middle 12 inches is termed as the Standard Penetration Resistance (N- value) and is presented on the Field Test Boring Logs in Appendix-A.

During drilling operations, extracted soil samples were visually examined and classified by our Field Engineer. The soil sample description, Standard penetration test (SPT) blow counts and locations, strata changes, groundwater depth and other pertinent information were recorded on a detailed field log. Soil samples obtained from the split spoon sampler were visually classified according to the Unified Soil Classification System (USCS). Samples were later returned to our laboratory for further review and testing.

LABORATORY TESTING:

A total of five (5) soil samples from Borings B-1 to B-5 were laboratory tested to determine in-place moisture content and to classify the soil as per Unified Soil Classification System, ASTM-D2487-93. The findings are summarized below. Laboratory test reports are enclosed in Appendix -B.

Soil Boring Number	Soil Sample Number	Depth Sample collected	% Moisture Content	Fines thru #200 Sieve	USCS Classification Symbol
B-1	S-1	4' – 6'	14.2	54.0	ML
B-2	S-2	6' – 8'	7.7	9.8	SW-SM
B-3	S-3	8' - 10'	5.9	14.3	SM
B-4	S-4	10' – 12'	4.9	12.3	GM
B-5	S-5	15' – 17'	6.4	17.2	GM

SM: Silty Sands ML : Silty Loam
SW-SM : Well graded sand with silt GM : Silty gravels

SUBSURFACE CONDITIONS:

Detailed description of the soil encountered in the test boring is documented in the boring log which is presented in Appendix-A. The following gives a general description of the subsurface conditions encountered at the borings. While the borings may indicate that the subsurface conditions appear to be relatively uniform across the site, it should be recognized that the size of borings were small compared to the size of the site, and that the existence of anomalies cannot be precluded.

According to Rutgers University's, Engineering Soil Survey of New Jersey, Report # 5 for the Union County, the soil at the subject site is mapped as GMM-24ge. Soil is typically glacial marginal and recessional moraine composed of non-residual, usually unstratified, materials deposited during the Wisconsin glaciation. General characteristics are unassorted and heterogeneous, composed of intermixed soil fractions ranging in size from clay to boulders, with sand and silt-sized particles in predominance. Underlying formation is fine red shale occurring at depths usually in excess of 50 feet. Soil type is silts, sands, sandy silts, silty sands and silty gravels, with silty clays and clays occurring in the numerous undrained depressions. Surface drainage conditions are quite variable, but generally fair to good.

The logs of our test borings are provided in Appendix-A. Based on the results of soil borings and our geo-technical laboratory testing, we estimate the general stratigraphy of the site to consist of the following major units, in an increasing order of depth.

Stratum 1: Fill material containing dark gray silt with trace roots and asphalt fragments was noted in top 8 inches to 3 feet in borings B-1, B-2, B-3, and B-5. This stratum was not noted in boring B-4. The relative density of this material varies from loose to medium dense.

Stratum 2 : Reddish brown silt with trace of fine to medium sand and some f/m gravel was noted under this stratum. This stratum was noted down to 12 feet depth in all the borings B-1 to B-5. The relative stiffness of this material varied from medium dense to dense condition.

Stratum 3: This stratum consists of Purple brown f/c sand and f/c gravel with trace silt down to 27 feet depth. The relative density of this material varies from medium dense to dense condition. Augur refusal was encountered only in boring B-1 at 22'-8". The thickness of this stratum in all other borings was unknown as borings ended at 27 feet depth as contracted.

SUMMARY OF FINDINGS:

Boring Number	Depth in feet	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Bearing Capacity (PSF)
B-1	0 - 2	4	FILL	800	500
B-1	2 - 4	13	FILL	2600	2500
B-1	4 - 6	21	CL-ML	4200	3000
B-1	6 - 8	26	CL-ML	+5000	3000
B-1	8 - 10	25	SW-SM	+5000	3000
B-1	10 - 12	13	ML	2600	3000
B-1	15 - 17	18	SM	3600	3500
B-1	20 - 22	22	GM	4400	3500
B-1	@22'-8"	Refusal	Possible rock	5000	5000

Boring Number	Depth in feet	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Bearing Capacity (PSF)
B-2	0 - 2	7	FILL	1400	1000
B-2	2 - 4	4	ML	800	1000
B-2	4 - 6	8	SW-SM	1600	2000
B-2	6 - 8	10	SM	2000	2000
B-2	8 - 10	14	SW-SM	2800	3000
B-2	10 - 12	19	SM	3800	3500
B-2	15 - 17	36	SM	+5000	3500
B-2	20 - 22	26	SM	+5000	3500
B-2	25 - 27	17	SM	3400	3500

Boring Number	Depth in feet	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Bearing Capacity (PSF)
B-3	0 - 2	6	FILL	1200	1000
B-3	2 - 4	9	ML	1800	1500
B-3	4 - 6	8	ML	1600	2000
B-3	6 - 8	12	ML	2400	2500
B-3	8 - 10	22	ML	4400	3500
B-3	10 - 12	35	SW-SM	+5000	3500
B-3	15 - 17	18	GM	3600	3500
B-3	20 - 22	38	GM	+5000	4000
B-3	25 - 27	28	GM	+5000	4000

Boring Number	Depth in feet	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Bearing Capacity (PSF)
B-4	0 - 2	6	CL-ML	1200	1000
B-4	2 - 4	20	CL-ML	4000	3000
B-4	4 - 6	25	SC-SM	5000	3000
B-4	6 - 8	33	GM-SM	+5000	3000
B-4	8 - 10	17	SM	3400	3000
B-4	10 - 12	24	SM	4800	3000
B-4	15 - 17	12	GM-SM	2400	3000
B-4	20 - 22	Refusal	GM	+5000	3500
B-4	25 - 27	25	SM	5000	3500

Boring Number	Depth in feet	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Bearing Capacity (PSF)
B-5	0 - 2	8	FILL	1600	1500
B-5	2 - 4	11	SM	2200	2000
B-5	4 - 6	27	ML	+5000	3000
B-5	6 - 8	18	ML	3600	3000
B-5	8 - 10	16	ML	3200	3000
B-5	10 - 12	34	ML	+5000	3000
B-5	15 - 17	13	SM	2600	3000
B-5	20 - 22	18	GM	3600	3500
B-5	25 - 27	30	GM	+5000	4000

GROUNDWATER:

Groundwater was not encountered in any of the borings B-1 to B-5. However, water was noted at 3'-8" in boring B-2 on next day, which could be possibly surface run off water from sprinkler systems. It should be noted that groundwater level will fluctuate due to variations in rainfall or other factors not evident at the time of our investigation.

CONCLUSIONS:

1. Virgin/undisturbed soil, free of any construction debris and deleterious material was encountered in all the borings past 3 feet depth.

2. Groundwater was not encountered in any of the borings B-1 to B-5. However, water was noted at 3'-8" in boring B-2 on next day, which could be possible surface run off water from sprinkler systems. Consequently, we anticipate that groundwater management during construction will be minimal.

3. The majority of the on-site soils in the top 10' depth consisted of silt with some gravels. The onsite soil will be suitable as structural fill. In-situ moisture content of soil varied between 4% to 14 %, which is generally considered moist. The optimum moisture content of silty/sandy soils is usually 8 to 10%.

4. The following parameters should be used for seismic design of the building in accordance with 2012 IBC:

Description	Parameter	Recommended value
Mapped Spectral Acceleration for short periods:	Ss	0.264
Mapped Spectral Acceleration for 1-sec period:	S_1	0.070
Site Class:	C	Medium dense soil
Site Coefficient:	Fa	1.2
Site Coefficient :	Fv	1.7
5 percent damped Design spectral response acceleration at short periods:	**S_{DS}**	**0.211**
5 percent damped Design spectral response acceleration at 1-sec periods:	**S_{D1}**	**0.079**

5. Any fill used as backfill material within the building and pavement areas should consist of approved portions of the on-site granular soils, which have been maintained at moisture contents suitable for compaction, or select fill should be imported. All fill should be placed in lift in the order of twelve (12) inches in loose thickness and be uniformly compacted to at least 95% of its maximum dry density as determined by the modified proctor density values derived based upon ASTM D-1557-98 test procedure.

In addition, we recommend that backfill soil placed in confined areas, such as foundation or utility excavations, should be spread in lifts in the order of six (6) to eight (8) inches in loose thickens and it should be compacted to the same degree using manually operated vibratory compaction equipment. We recommend that temporary construction slopes be established at one vertical to two horizontal, or flatter, or as required by the governing safety codes.

FOUNDATION DESIGN CRITERIA:

Undisturbed soil with Standard Penetration Resistance "N" values in the order of 6 to 17 were noted down to 20' depth. Medium dense to dense soil was encountered past 8' depth.

We recommend that the foundation for the proposed one story clubhouse building may be supported by conventional shallow foundations established on the medium dense soil noted at 4' below grade. Foundation should be designed to impose maximum allowable net bearing pressure of up to 2,000 pounds per square foot. Over excavation and backfilling using ¾" clean crushed stones will be required if any soft areas are encountered. Any pockets of localized unsuitable soil encountered during foundation excavation should be completely removed. The over excavated area should be backfilled utilizing either controlled compacted fill or ¾" size clean gravels. Any footing or slab placed in this area will require over excavation, removal of unsuitable material and backfilling with ¾" size stones or controlled compacted fill. Placing additional reinforcing steel to strength the footing over soft soil may be required.

We recommend that exterior foundations be established at least three feet six inches below the adjacent exterior grade, or as required by local ordinance, to provide protection from frost penetration. The maximum post-construction settlements of foundations designed and constructed in accordance with our recommendations will be in the order of ¾" or less.

FLOOR SLAB DESIGN CRITERIA:

The floor slab may be supported directly on the compacted sub-grade of onsite material or controlled compacted structural fill. Due to the loose soil noted in most of the borings, compaction of the sands below the floor slab sub-grade to 95% of its optimum density will be required. We recommend performing compaction test at the rate of one test per 200-sq.ft area.

To minimize dampness, we recommend that the floor should be underlain by a six (6) mil polyethylene moisture barrier and six (6) inch thick layer of clean ¾ inch crushed stone to provide a stable working area during construction and serve as a capillary break between the base of the slab and the underlying silty sub-grade soils. It may be desirable to install footing drains so that any water which accumulates in the stone drainage layer could be removed by pumping.

Any back fill required for the structural area to be off site or ¾" clean crushed stones may be utilized to minimize the influence of moisture on the first fill layer. All off-site fill should composed of relatively well graded sand and gravel containing less than 15% by weight passing U.S. Standard #200 sieve and having a maximum particle size of six inches.

Soil Strata	Suggested Gravel Bed	Off-Site Granular fill	Medium Dense Soil (6' to 27')
Density -Compacted	135 to 140	120 to 125	125 to 128
Density - Submerged	71 to 76	56 to 61	61 to 64
Cohesion -Drained (psf)	0	0	150
Cohesion -Undrained (psf)	0	0	300
Angle of Internal Friction in Degrees (drained)	40	27	32
Angle of Internal Friction in Degrees (undrained)	40	27	32
Permeability (cm/sec)	10 to 100	10^{-4} to 10^{-2}	10^{-4} to 10^{-2}
Young Modulus (ksf)	600	300	200

Acceptable soil materials for backfill and fill should be free of clay, rock or gravel larger than six (6) inches in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter and it should comply with ASTM D-2487-91 soil classification groups GW, GP, SM, SW and SP.

All fill should be placed in lifts in the order of twelve (12) inches in loose thickness and it should be uniformly compacted to at least 95% of its maximum dry density as determined by the modified proctor density values derived based upon ASTM D-1557-93 test procedure. In addition, we recommend that backfill soils placed in confined areas, such as foundation or utility excavations, should be spread in lifts in the order of six to eight inches in loose thickness and be compacted to the same degree using manually operated vibratory compaction equipment.

BELOW GRADE WALLS:

We recommend that the exterior building walls should be constructed with a continuous perimeter foundation drain to convey localized groundwater seepage away from the building and prevent the hydrostatic pressures built-up against the walls. The drain could consist of a 6 to 8 inch diameter PVC pipe surrounded on all sides by a minimum of six (6) inches of clean 3/8" crushed gravel. The pipe should drain by gravity to the site storm water system, if feasible, or should be connected to a sump pit where any water could be removed by pumping.

We recommend that the excavated area adjacent to the exterior load bearing walls be backfilled with imported granular materials as previously specified. The backfill should be compacted to at least 95% maximum dry density in structural areas to 90% maximum dry density in landscaped areas.

Soil Unit weight (total):	120 pcf
Angle of Internal Friction:	27 degrees
Coefficient of sliding friction:	0.4
Coefficient of active earth pressure:	0.28
Coefficient of passive earth pressure:	3.57

An additional seismic lateral active earth pressure coefficient of .09 should be considered for seismic stability analysis giving a maximum seismic active pressure diagram is inverted with the maximum equivalent pressure at the top of the foundation and resultant at 2/3 of the height above the base.

RECOMMENDATIONS FOR THE EARTHWORK FOUNDATION CONSTRUCTION:

Clearing and Stripping: Clearing and stripping would include removing vegetation and any boulders or any loose or unsuitable soil at the distance of 5 feet beyond the limits of the proposed building excavation, structure and paved areas. Limits of stripping should conform to construction permit limitations.

Soil Erosion and Sediment Control: Clearing and stripping should be performed in accordance with the requirements of the soil erosion and sediment control plan and environment permits.

Drainage and Dewatering: Site runoff during construction should be controlled in accordance with the soil erosion and sediment control plan. Interim grading during earthwork should be planned to prevent ponding of water in the prepared subgrade.

Protection of Utilities: Existing utilities, in the area of construction should be marked to protect from damage during excavation and foundation construction. Excavations should be stopped if they could potentially undermine existing utilities.

Excavation & side slope: An unbraced excavation slope of 2.0 horizontal to 1 vertical or flatter may be considered in the planning for construction. Sheeting and bracing, and or slope stabilization systems should be used wherever the unbraced sloped pass beneath utilities or structures, the active roadway arrears and/or where it is found to be necessary or more cost effective to use sheeting in order to limit the size of the excavations and maintain traffic. Sheeting and bracing systems and excavation slopes may be designed using the soil properties presented in summary table provided earlier.

Proof rolling and compaction of Pavement and Fill Subgrades: Following stripping or excavation to plan elevations, all subgrades for placement of new foundation or parking lot pavement should be proof rolled using a vibratory roller with minimum 1 ton static weight in confined areas along side walls and 10 tons static weight in the footprint of the building and general roadway paved areas. Footing subgrades should be compacted with small area vibratory plate compactors. Proof rolling should be observed and evaluated by a qualified Geotechnical engineer or technician familiar with site conditions.

MINIMUM PAVEMENT DESIGN SECTIONS:

ACCESS ROAD AND TRUCK TRAFFIC AREAS

Bituminous Concrete Surface Course (NJDOT I-5)	2 inches
Bituminous Concrete Base Course (NJDOT I-2)	4 inches
Quarry Process Sub-Base Course (NJ DOT DGA)	7 inches
TOTAL SECTION THICKNESS	**13 inches**

AUTOMOBILE PARKING AREAS

Bituminous Concrete Surface Course (NJDOT I-5)	2 inches
Bituminous Concrete Base Course (NJDOT I-2)	3 inches
Quarry Process Sub-Base Course (NJ DOT DGA)	4 inches
TOTAL SECTION THICKNESS	**9 inches**

As previously discussed, it is recommended that the loose soils at the surface should be proof rolled and densified with a heavy vibratory compactor. With this recommended compaction, a CBR value of seven(7) would be appropriate for use in the design of flexible pavements over site soils with imported granular fill, the CBR could be about fifteen(15).

RECOMMENDED SERVICES:

It is recommended that we should be retained to provide continuous observation and Soil engineering services during the excavation and foundation construction phases of the work. This is to observe compliance with the design concepts, specifications and recommendations, and to allow design charges in the event that subsurface conditions differ from those anticipated prior to start of construction.

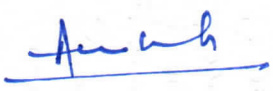
LIMITATIONS:

The recommendations contained in this report are our best professional judgment as to be followed in the design and construction of the proposed project. There may be subsurface conditions not disclosed by the explorations adequately identify subsurface conditions for the purpose of this study. If during construction any differences are found between the report of the explorations and the actual subsurface conditions, they should be brought to our attention immediately so that the effect in our recommendations can be evaluated.

This report has been prepared in accordance with generally accepted Geo-technical Engineering practices for the exclusive use of our client, Netta Architects, and their designated representative(s). No other warranty, express or implied is made. Contractors wishes to use the soil boring information may do at their own risk. Unless specifically indicated to the contrary in this report, this report does not address environmental considerations, which may affect the site development. The conclusions and recommendations of this report are not intended to supersede or overlook any N.J.D.E.P. Environmental conditions, which should be reflected in the site planning.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned at (908)754-8383.

Sincerely,
ANS Geo, Inc.



Atul N. Shah, PE
President
NJ PE License #24GE03443900
ANS/pp

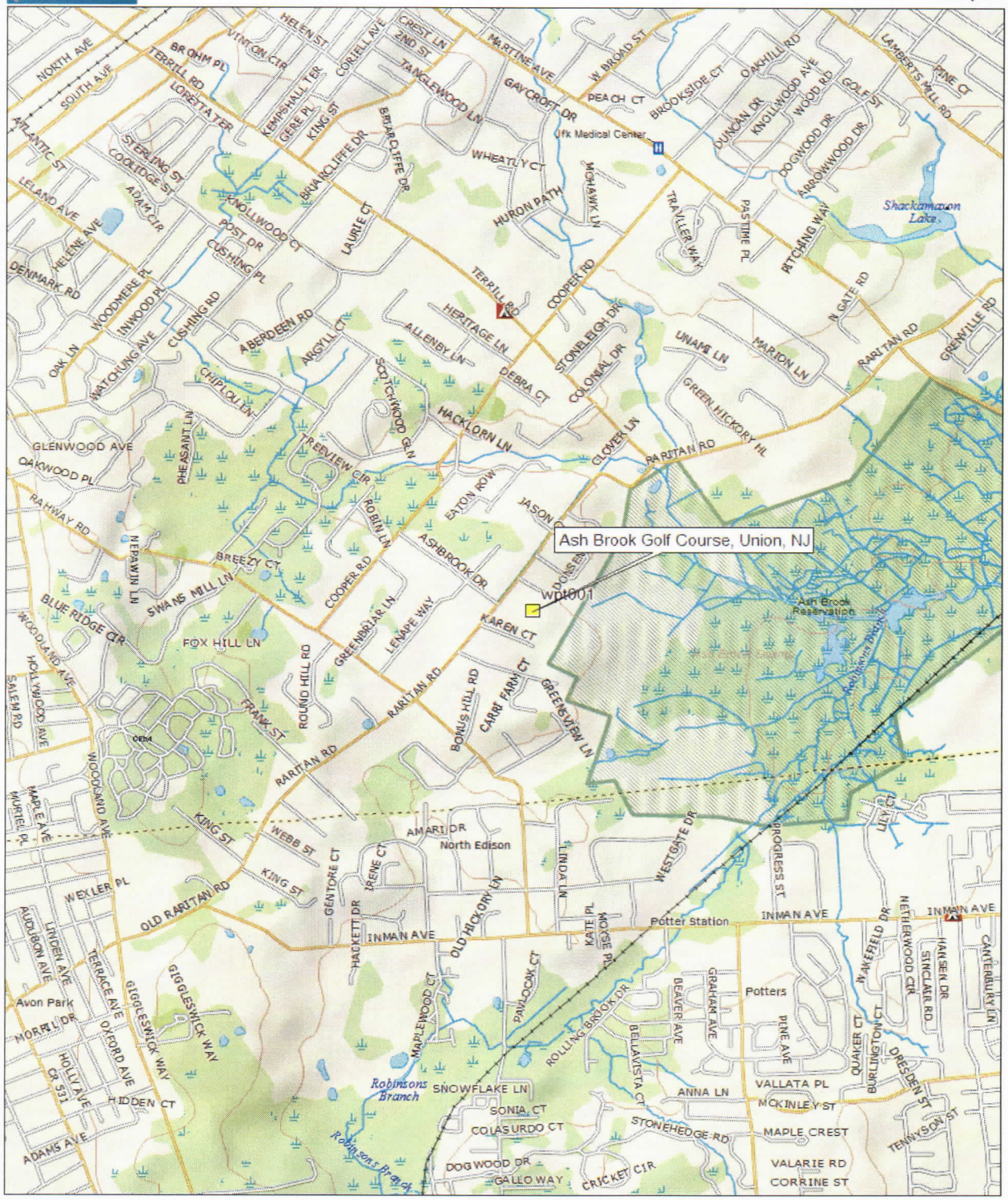
Reported: Netta Architects-3, file-1

APPENDIX - A

GOOGLE MAP

Client: Netta Architects
Project: Ash Brook Golf Course
Union County, NJ

ANS Geo, Inc.
4405 South Clinton Avenue, Suite-A
South Plainfield, NJ 07080-1213

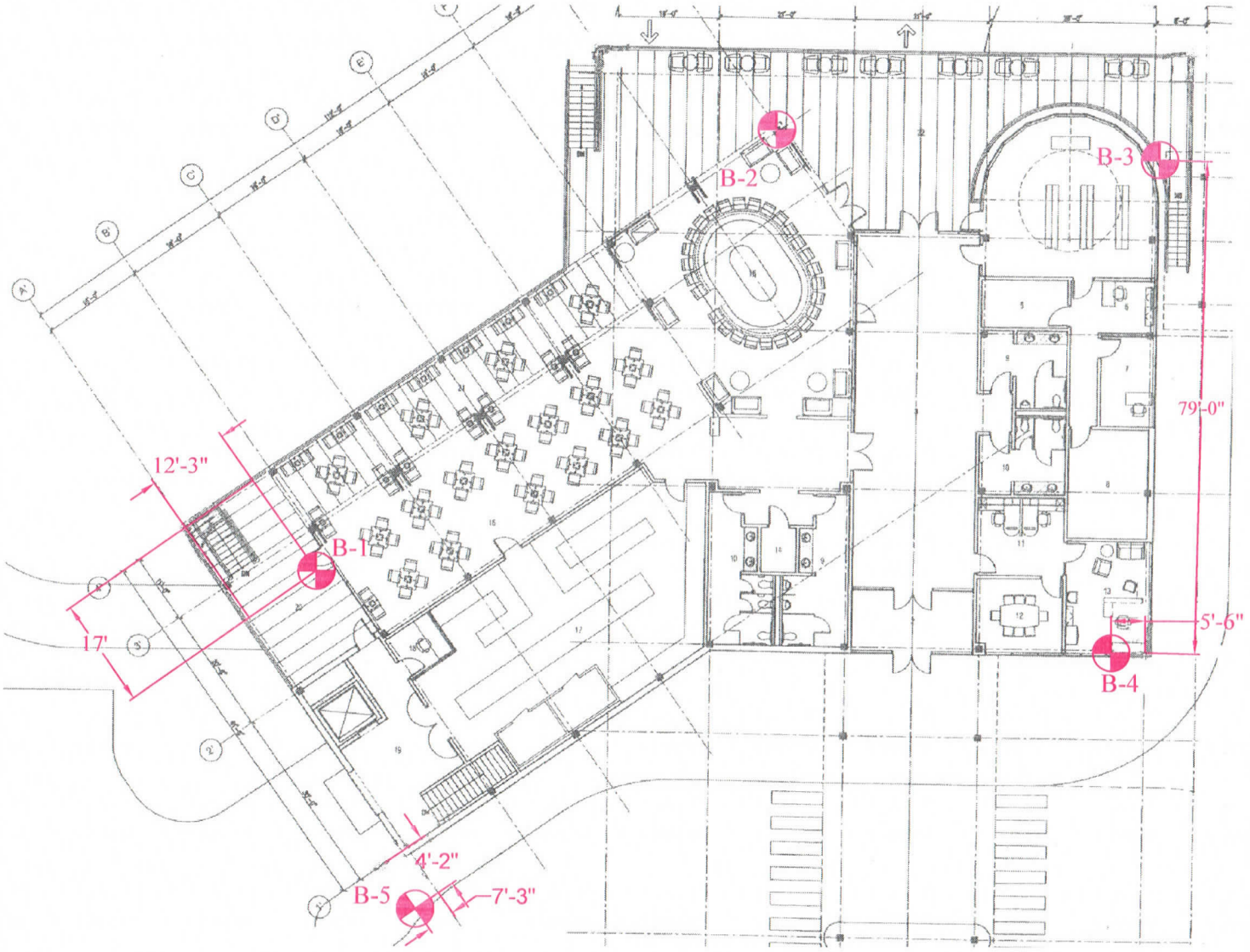


SITE LOCATION MAP

Ash Brook Golf Course, Union County, NJ

ANS Geo, Inc.
4405 South Clinton Avenue, Suite
South Plainfield, NJ 07080-121

ANS Geo, Inc.



SOIL BORING LOCATION PLAN

SCALE: N.T.S.

LEGEND:

Soil Boring Location

Client: Netta Architects	
Project: Ash Brook Golf Course, Union County, NJ	
ANS CONSULTANTS INC 4405 SO. CLINTON AVE, SOUTH PLAINFIELD, NJ, 07080 PHONE: (908)754-8383 FAX:(908)754-8633	
BY: Kevin Patel	Date: 06/07/2016
	Project No: GET-41

ANS CONSULTANTS, INC.

LOG OF BORING
No. B-1

PROJECT: Ash brook Golf Course
CLIENT: Netta Architects
PROJECT NO.: GET-41 **ELEVATION :** N/A
LOCATION: 1210 Raritan Rd, Scotch Plains, NJ
DRILLER: JESUS, EDWIN & A. SHAH **LOGGED BY:** PPP
DRILLING METHOD: Acker Track Rig XLS with 3" Hollow Stem Auger & 2" Split Spoon Sampler.
DEPTH TO - WATER: ▽ Not Encountered **DATE:** 6-1-2016

Depth (feet)	Sample No.	Blow Counts	N VALUE	RECOVERY (in.)	Soil Classification (USCS)	Description
0						
	S-1	1 2 2	4	13	FILL	Grass - 3" Thick Top Soil. Fill material containing very dark gray silt, trace fine roots, moist, very soft.
4	S-2	2 3 4	13	23	FILL	Fill material containing very dark gray silt, trace fine roots, moist, very soft, medium stiff. @3'-0" Dark gray and reddish brown silty clay and clayey silt, trace fine gravel, moist.
	S-3	9 8 10	21	16	CL-ML	Reddish brown clayey silt, trace f/c gravel, moist, stiff.
8	S-4	11 10 10	26	13.5	CL-ML	Reddish brown clayey silt, trace f/c gravel, moist, stiff.
	S-5	10 16 17	25	14	SW-SM	Purple brown f/c sand and f/c gravel, some silt, moist, medium dense.
12	S-6	12 12 13	13	18	ML	Reddish brown silt, little fine sand, some f/c gravel, wet, medium stiff.
		13 7 6 7 7				Augured down to 15 feet.
16	S-7	10 10 8 8	18	15	SM	Purple brown silty f/c sand, some f/c gravel, moist, medium dense.
20						Augured down to 20 feet.
	S-8	8 11 11 13	22	19	GM	Purple-brown f/c sand and f/c gravel, trace silt, moist, medium dense.
24						Augred down. Augur refusal at 22'-8". Boring End @ 22.66ft.
28						
32						

Notes:

ANS CONSULTANTS, INC.

LOG OF BORING No. B-2

PROJECT: Ash brook Golf Course
CLIENT: Netta Architects
PROJECT NO.: GET-41 **ELEVATION :** N/A
LOCATION: 1210 Raritan Rd, Scotch Plains, NJ
DRILLER: JESUS, EDWIN & A. SHAH **LOGGED BY:** PPP
DRILLING METHOD: Acker Track Rig XLS with 3" Hollow Stem Auger & 2" Split Spoon Sampler.
DEPTH TO - WATER: ▽ NOt Encountered **DATE:** 5-31-2016

Depth (feet)	Sample No.	Blow Counts	N VALUE	RECOVERY (in.)	Soil Classification (USCS)	Description
0						
	S-1	2 3 4 3	7	12	FILL	Fill material containing dark gray silt, trace f/c sand, trace f/c gravel, trace fine roots and asphalt fragments, moist. @0'-8" Reddish brown silty f/c sand, trace f/c gravel, moist.
4	S-2	2 2 2 3	4	10	ML	Reddish brown silt, trace fine sand, some f/c gravel, wet to moist, very soft.
	S-3	2 4 4 6	8	14	SW-SM	Purple brown f/m sand, little silt, some f/m gravel, moist, loose.
8	S-4	5 5 5 5	10	24	SM	Purple brown f/c sand, trace silt, little fine gravel, wet, loose.
	S-5	7 7 7 9	14	8	SW-SM	Purple brown silty f/m sand, trace fine gravel, moist, s/compact.
12	S-6	8 9 10 11	19	10.5	SM	Purple brown silty f/m sand, trace f/m gravel, medium dense.
						Augured down to 15 feet.
16	S-7	10 17 19 19	36	9	SM	Purple brown f/m sand, little silt, little fine gravel, moist, dense.
20						Augured down to 20 feet.
	S-8	7 12 14 18	26	9	SM	Purple and reddish brown silt, trace f/m sand, trace fine gravel, moist, stiff.
24						Augured down to 25 feet.
	S-9	6 8 9 12	17	24	SM	Purple brown f/c sand, trace silt, little f/c gravel, moist.
28						Boring End @ 27ft.
32						

Notes: *Water was noted in borehole next day @ 3'-8".*

ANS CONSULTANTS, INC.

LOG OF BORING
No. B-3

PROJECT: Ash brook Golf Course
CLIENT: Netta Architects
PROJECT NO.: GET-41 **ELEVATION :** N/A
LOCATION: 1210 Raritan Rd, Scotch Plains, NJ
DRILLER: JESUS, EDWIN & A. SHAH **LOGGED BY:** PPP
DRILLING METHOD: Acker Track Rig XLS with 3" Hollow Stem Auger & 2" Split Spoon Sampler.
DEPTH TO - WATER: ▽ Not Encountered **DATE:** 5-31-2016

Depth (feet)	Sample No.	Blow Counts	N VALUE	RECOVERY (in.)	Soil Classification (USCS)	Description
0						
	S-1	2 3 3	6	22	FILL	Grass. Fill material containing dark gray silt, trace f/c sand, trace fine gravel, moist.
	S-2	2 3 3	9	24	ML	@1'-0" Grayish brown silt, trace fine gravel, moist, soft. Grayish and reddish brown silt, trace f/m sand, trace fine gravel, moist, soft.
4	S-3	6 4 3	8	17	ML	Grayish and reddish brown silt, some f/m sand, trace fine gravel, moist, soft.
	S-4	4 4 5	12	13	ML	Grayish and reddish brown silt, little silt, little f/c gravel, s/compact.
8	S-5	5 5 7 8	22	11	ML	Grayish and reddish brown silt, little silt, some f/c gravel, medium dense.
	S-6	8 12 10 13	35	12.5	SW-SM	Purple brown f/c sand and f/c gravel, little silt, moist, dense.
		15 19 16 9				Augured down to 15 feet.
16	S-7	8 8 10 10	18	NR	GM	Purple brown f/c sand and f/c gravel, little silt, moist, medium dense.
20						Augured down to 20 feet.
	S-8	13 18 20 13	38	11	GM	Purple brown and green f/c sand, little silt, some f/c gravel, moist, dense.
24						Augured down to 25 feet.
	S-9	7 10 18 16	28	19	GM	Purple brown f/c sand and f/c gravel, little silt, moist, medium dense.
28						Boring End @ 27ft.
32						

Notes:

ANS CONSULTANTS, INC.

LOG OF BORING
No. B-4

PROJECT: Ash brook Golf Course
CLIENT: Netta Architects
PROJECT NO.: GET-41 **ELEVATION :** N/A
LOCATION: 1210 Raritan Rd, Scotch Plains, NJ
DRILLER: JESUS, EDWIN & A. SHAH **LOGGED BY:** PPP
DRILLING METHOD: Acker Track Rig XLS with 3" Hollow Stem Auger & 2" Split Spoon Sampler.
DEPTH TO - WATER: ▽ Not Encountered **DATE:** 5-31-2016

Depth (feet)	Sample No.	Blow Counts	N VALUE	RECOVERY (in.)	Soil Classification (USCS)	Description
0						
	S-1	5 1 5	6	13	CL-ML	6.5" Thick Asphalt Pavement and 3" thick DGA. Reddish brown clayey silt, trace f/c gravel, moist, soft.
4	S-2	7 6 10	20	14	CL-ML	Reddish brown clayey silt, trace fine gravel, stiff.
	S-3	10 7 8	25	24	SC-SM	Reddish brown silty clay, some f/c sand, some f/c gravel, moist, stiff/ medium dense.
8	S-4	11 14 15	33	24	GM-SM	Reddish brown silty f/c sand and f/c gravel, moist, dense. @7'-2" Reddish brown silt, trace fine sand, trace fine gravel, moist.
	S-5	22 23 10	17	23.5	SM	Purple brown silty fine sand, little f/c gravel, moist, medium dense.
12	S-6	9 10 8 9	24	16	SM	Purple brown silty f/m sand, some f/c gravel, moist, medium dense.
		14 12 12 12 12				Augured down to 15 feet.
16	S-7	2 6 6	12	20	GM-SM	Purple brown f/c sand, trace silt, little f/c gravel, s/moist, s/compact.
20		12				Augured down to 20 feet.
	S-8	32 54 30/2	84/8	2	GM	Purple brown f/c gravel, trace f/c sand, s/moist, very dense.
24		0				Augured down to 25 feet.
	S-9	14 12 13	25	4	SM	Purple brown silty f/c sand, some f/c gravel, moist, medium dense.
28		15				Boring End @ 27ft.
32						

Notes:

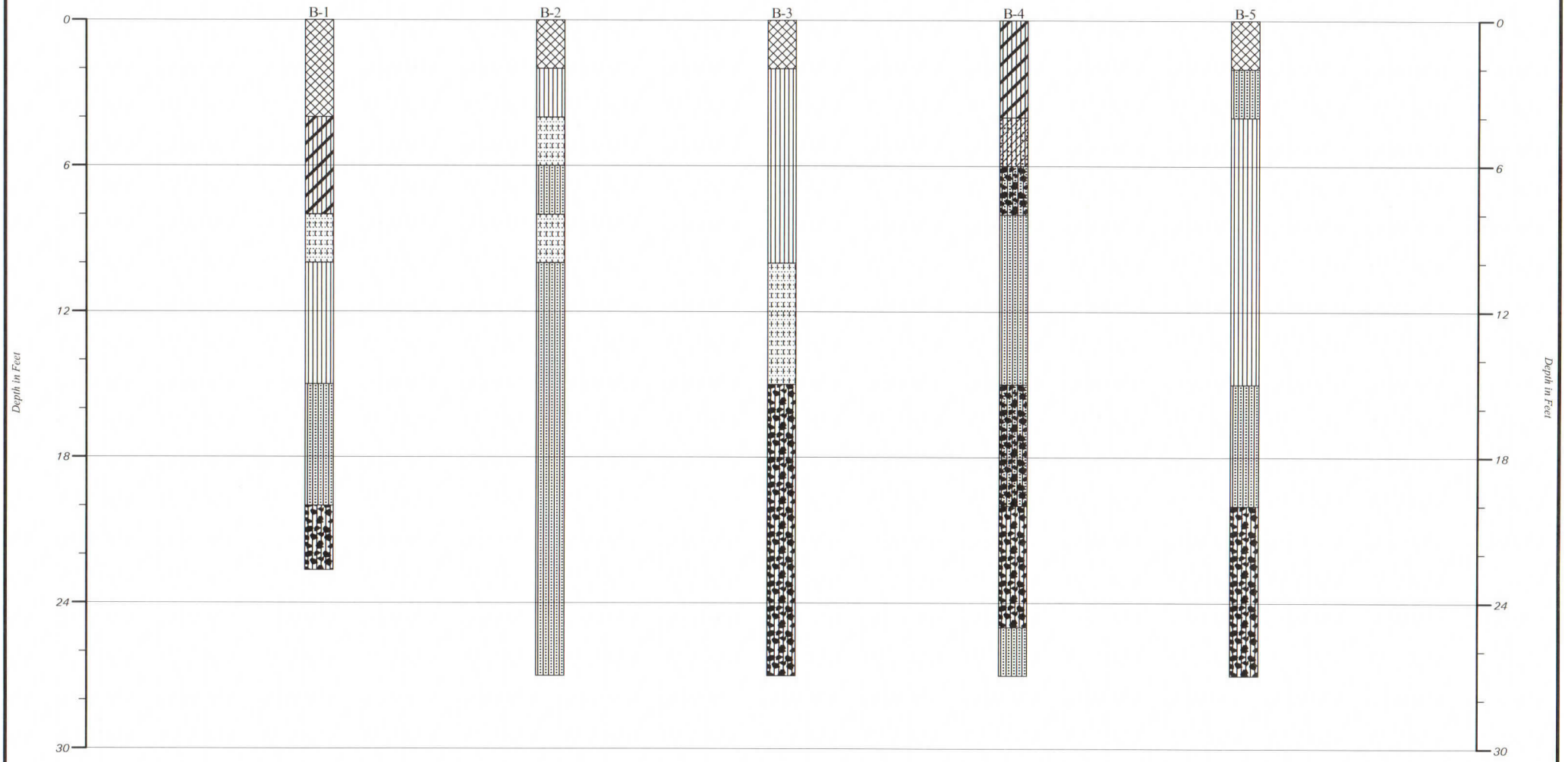
ANS CONSULTANTS, INC.

LOG OF BORING No. B-5

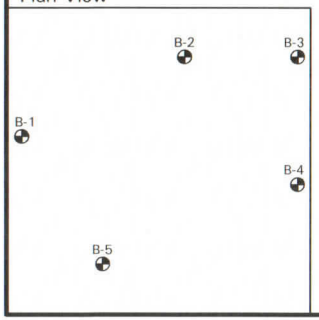
PROJECT: Ash brook Golf Course
CLIENT: Netta Architects
PROJECT NO.: GET-41 **ELEVATION :** N/A
LOCATION: 1210 Raritan Rd, Scotch Plains, NJ
DRILLER: JESUS, EDWIN & A. SHAH **LOGGED BY:** PPP
DRILLING METHOD: Acker Track Rig XLS with 3" Hollow Stem Auger & 2" Split Spoon Sampler.
DEPTH TO - WATER: ▽ Not Encountered **DATE:** 6-1-2016

Depth (feet)	Sample No.	Blow Counts	N VALUE	RECOVERY (in.)	Soil Classification (USCS)	Description
0						
	S-1	12 5 3	8	21	FILL	Asphalt Pavement. Asphalt: Black f/c sand, some fine gray stones, trace silt, s/moist. @0'-9" Dark gray and reddish brown silty clay, trace fine gravel, moist. soft.
4	S-2	3 4 5	11	21	SM	Black f/c sand, some fine gray stones, trace silt, s/moist, medium stiff.
	S-3	6 7 8	27	22	ML	Reddish brown silt, trace purple fine sand, some purple f/c gravel, moist, stiff.
8	S-4	9 18 15	18	22	ML	Reddish and purple brown silt, trace purple f/c gravel, s/wet, stiff. @7'-8" Purple brown silty clay, trace fine gravel, moist.
	S-5	12 9 9	16	20.5	ML	Reddish and purple brown silt, trace f/m gravel, medium stiff.
12	S-6	7 5 7	34	20	ML	Purple brown silt, trace f/c sand, some f/m gravel, moist, very stiff/ dense. @11'-0" Purple brown f/c sand, little silt, some f/c gravel, moist.
		9 16 18 18				Augured down to 15 feet.
16	S-7	16 13 6	13	15	SM	Purple brown f/c sand, trace silt, s/compact.
		6 7 8				Augured down to 20 feet.
20	S-8	5 8 10	18	16	GM	Purple-brown silty f/c sand and f/c gravel, moist, medium dense.
		12				Augured down to 25 feet.
24	S-9	10 15 15	30	14	GM	Purple-brown silty f/c sand and some f/c gravel, moist, medium dense.
28		14				Boring End @ 27ft.
32						

Notes:



Plan View



Strata symbols

- Fill
- Silty low plasticity clay
- Well graded sand with silt
- Silt
- Silty sand
- Silty gravel
- Blank
- Poorly graded clayey silty sand
- Silty sand and gravel

ANS CONSULTANTS, INC.

ANS CONSULTANTS, INC. GENERALIZED SOIL PROFILE		
HORIZONTAL SCALE: VERTICAL SCALE: 1"=6'	DRAWN BY/APPROVED BY PPP	DATE DRAWN 6/8/2016
Ash brook Golf Course		
PROJECT NO. GET-41		FIGURE NUMBER

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Fill
	Silty low plasticity clay
	Well graded sand with silt
	Silt
	Silty sand
	Silty gravel
	Blank
	Poorly graded clayey silty sand
	Silty sand and gravel

Notes:

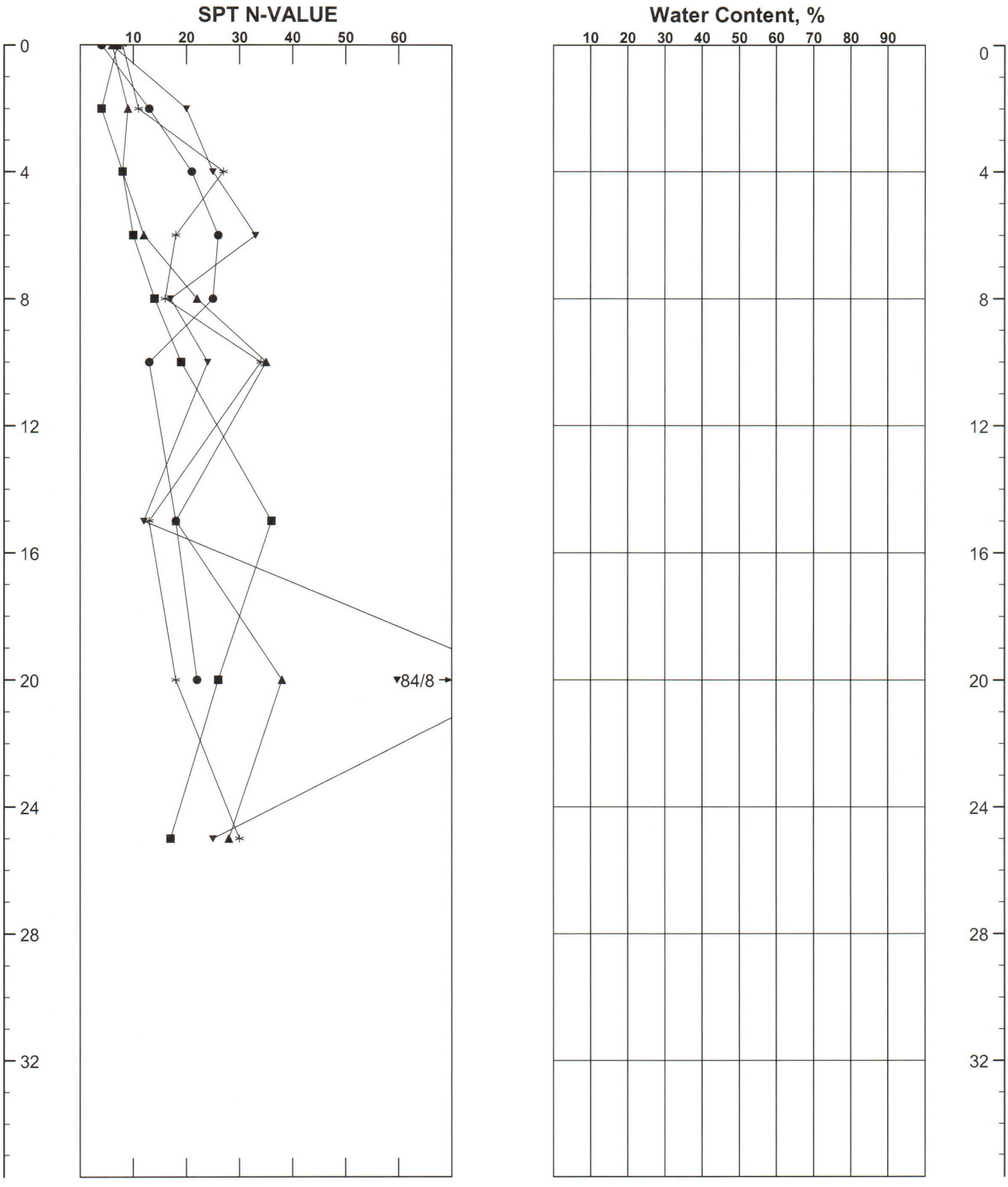
1. Exploratory borings were drilled on 6-1-2016 using a 4-inch diameter continuous flight power auger.

2. No free water was encountered at the time of drilling or when re-checked the following day.

3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.



Key to Borings

- ● B-1
- ■ B-2
- ▲ B-3
- ▼ B-4
- ✳ B-5

ANS CONSULTANTS, INC.

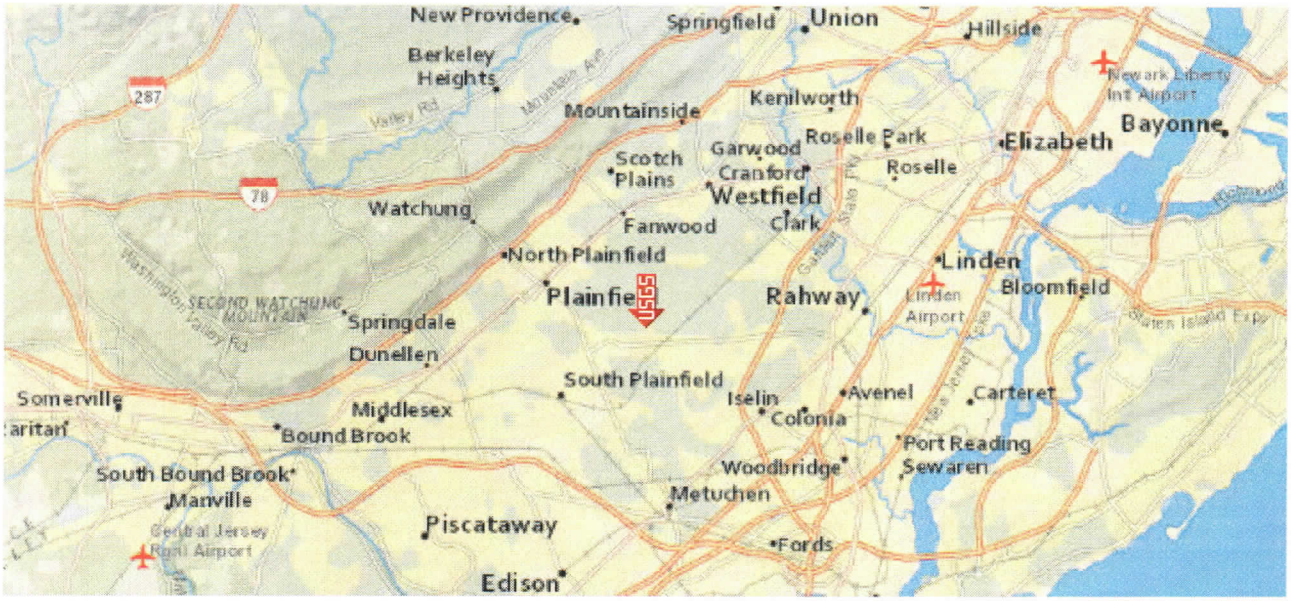
Ash brook Golf Course

Vertical Scale: 1 to 4	Figure:

USGS Design Maps Summary Report

User–Specified Input

Report Title	Ash Brook Golf Course, Union County, NJ Tue June 7, 2016 17:24:12 UTC
Building Code Reference Document	2012 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	40.61134°N, 74.37368°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

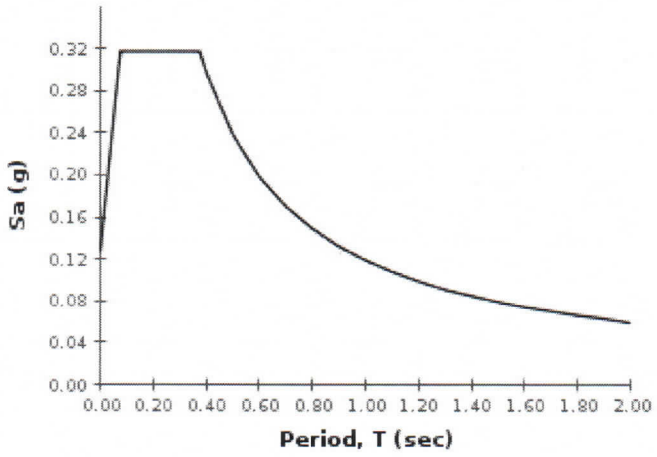


USGS–Provided Output

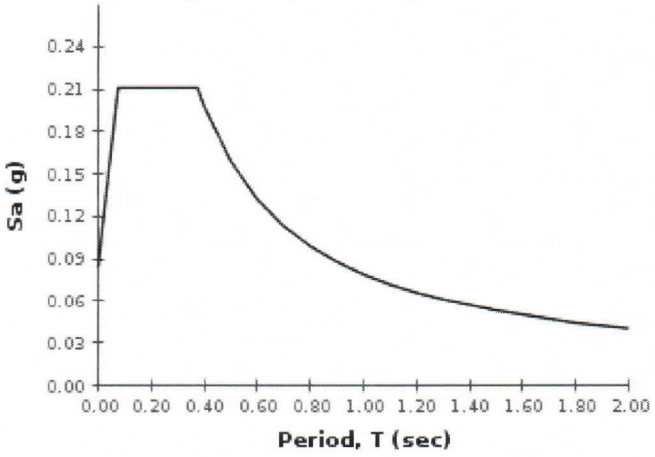
S_S =	0.264 g	S_{MS} =	0.317 g	S_{DS} =	0.211 g
S_1 =	0.070 g	S_{M1} =	0.119 g	S_{D1} =	0.079 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



USGS Design Maps Detailed Report

2012 International Building Code (40.61134°N, 74.37368°W)

Site Class C – "Very Dense Soil and Soft Rock", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2012 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1]	S_S = 0.264 g
From Figure 1613.3.1(2) [2]	S_1 = 0.070 g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = C and S_S = 0.264 g, F_a = 1.200

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.070 g, F_v = 1.700

Equation (16-37): $S_{MS} = F_a S_S = 1.200 \times 0.264 = 0.317$ g

Equation (16-38): $S_{M1} = F_v S_1 = 1.700 \times 0.070 = 0.119$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 0.317 = 0.211$ g

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.119 = 0.079$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.211 g, Seismic Design Category = B

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.079 g, Seismic Design Category = B

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = B

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(1)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

FIELD SOIL CLASSIFICATION SYSTEM

PARTICLE SIZE IDENTIFICATION

Boulders..... 8 inch diameter or greater
Cobbles..... 3 to 8 inch diameter
Gravel ..... Coarse -- 1 to 3 inch
Medium -- 1/2 to 1 inch
Fine -- 4.75 mm to 1/2 inch
Sand..... Coarse -- 2.0 mm to 4.75 mm
(dia. of pencil lead)
Medium -- 0.425 mm to 2.0 mm
(dia. of broom straw)
Fine -- 0.075 mm to 0.425 mm
(dia. of human hair)
Silt & Clay. . . Smaller than 0.075 mm

RELATIVE PORTIONS

Descriptive Term	Percent
Trace - tr	1 - 10
Some - sm	11 - 20
Adjective - ly	21 - 35
And - &	36 - 50

ABBREVIATIONS

Bn - Brown
Gy - Gray
Blk - Black
Rd - Red
Or - Orange
Bl - Blue
Lt - Light
Dk - Dark
Multi - Multi colored

Coarse grained - c
Medium grained - m
Fine grained- f

COHESIONLESS SOIL

(Gravel, Sand, Silt and Combinations)

DENSITY

Very Loose ..... 05 blows I ft or less
Loose .....06 to 10 blows / ft
Medium Dense .....11 to 30 blows / ft
Dense ..... 31 to 50 blows / ft
Very Dense .....51 blows / ft or more

COHESIVE SOIL

(Clay Silt and Combinations)

CONSISTENCY

Very Soft ..... 01 blow / ft or less
Soft..... 02 to 4 blows / ft
Medium Stiff .....05 to 8 blows / ft
Stiff..... 09 to 15 blows / ft
Very Stiff ..... 16 to 30 blows / ft
Hard .....31 blows / ft or greater

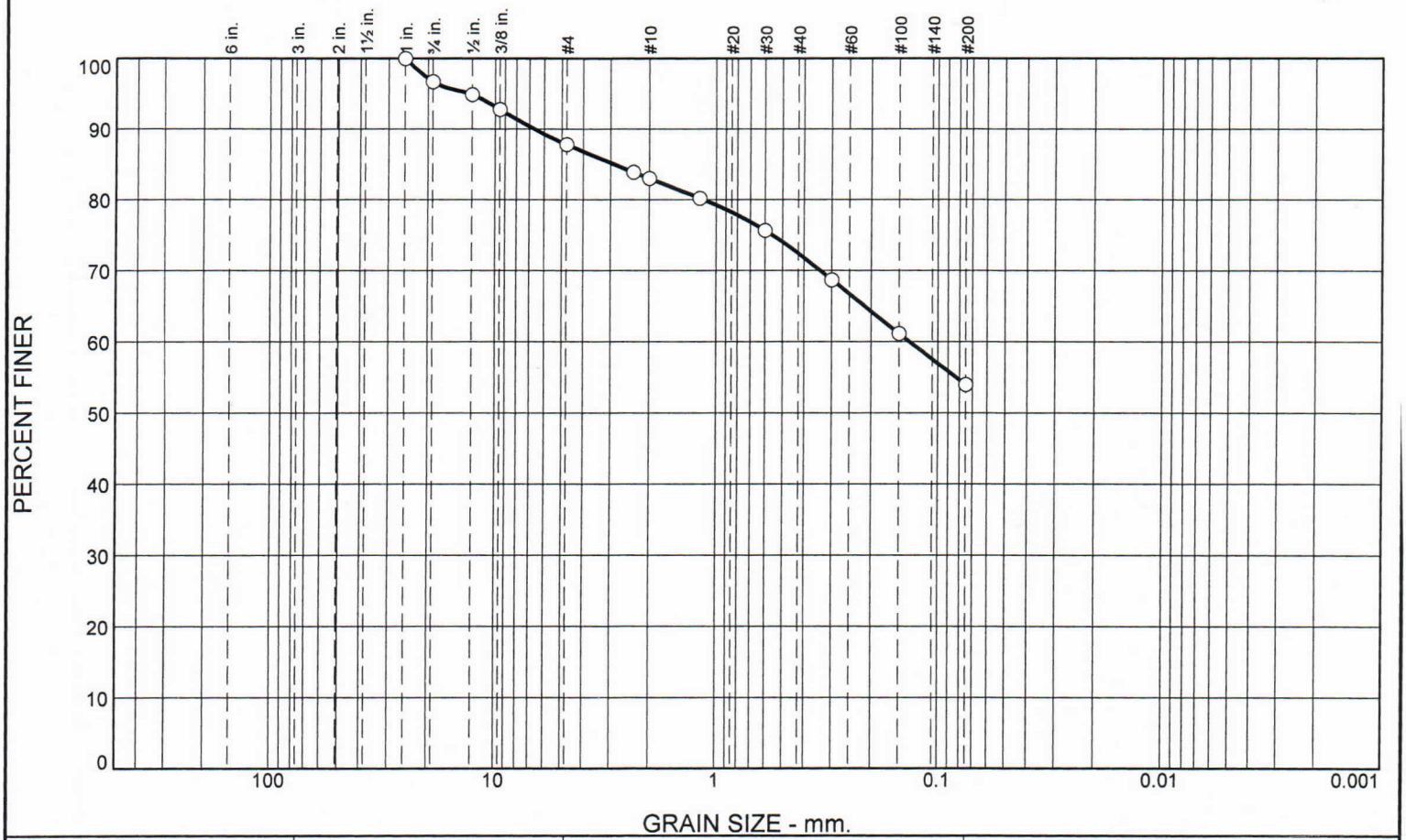
ROCK

R.Q.D.	Rock Quality
00 – 25.....	Very Poor
25 - 50%	Poor
50 - 75%	Fair
75 - 90%.....	Good
90 - 100%.....	Excellent

HSA - Hollow Stem Auger
SS- Split Spoon Sampler
WOR - Weight of Rods
WOH - Weight of Hammer
NR - No Recovery of Sample

APPENDIX - B

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	8.9	4.8	10.6	18.4	54.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	96.7		
1/2	94.9		
3/8	92.7		
#4	87.8		
#8	83.9		
#10	83.0		
#16	80.2		
#30	75.7		
#50	68.7		
#100	61.1		
#200	54.0		

* (no specification provided)

Material Description

Brown in color. sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 6.6440 D_{85}= 2.8971 D_{60}= 0.1347
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sample was collected by Mr. Syed Abbas on 06/01/16 and tested on 06/02/16. In-Situ %MC=14.2
F.M.=1.53

Location: B-1, 4'-6'
Sample Number: S-1 **Depth:** 4'-6' **Date:** 06/03/2016

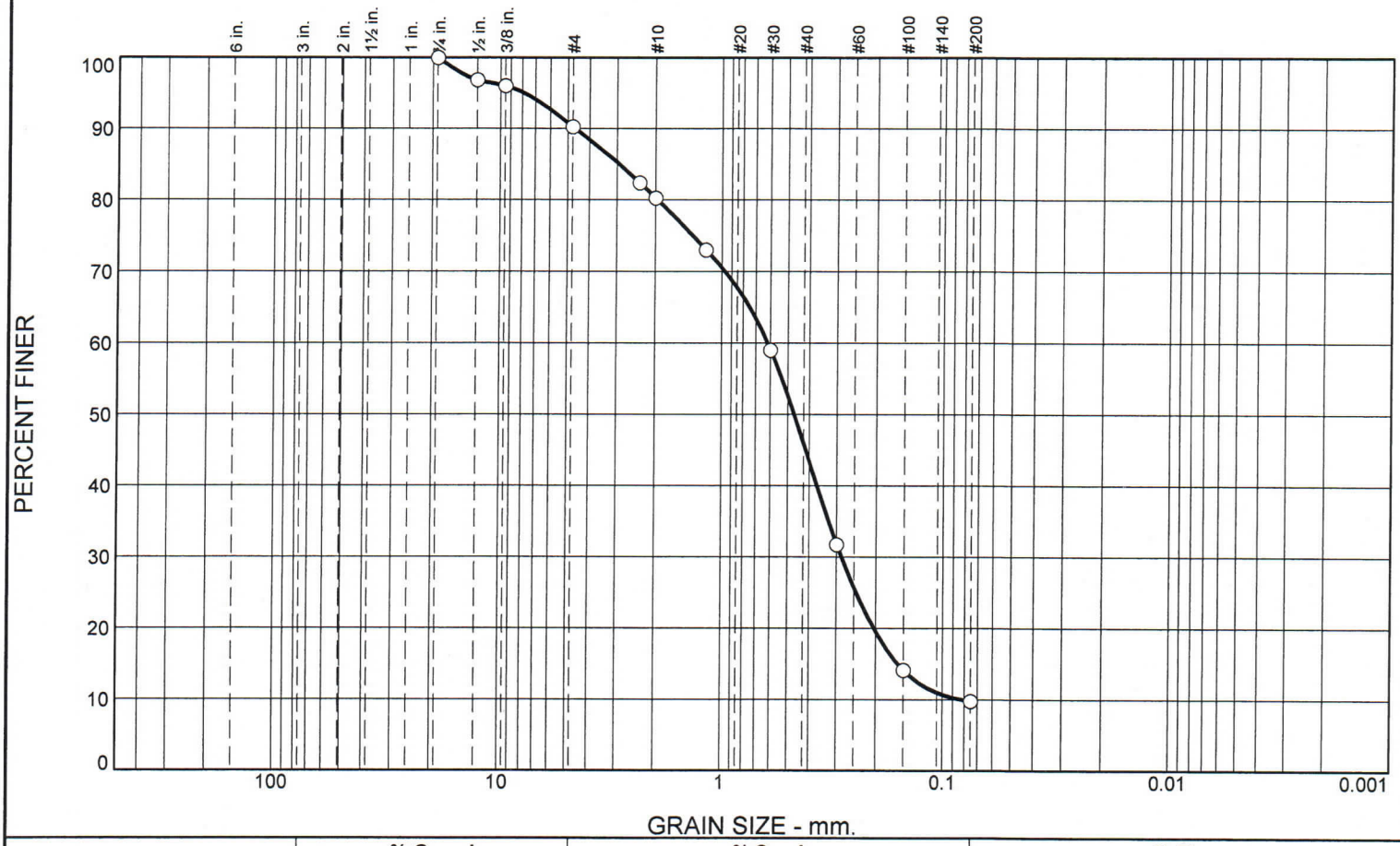
ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Netta Architects
Project: Ash Brook Golf Course, Union County, NJ

Project No: GET-41 **Figure 1 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.8	9.9	34.4	36.1	9.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	96.8		
3/8	96.0		
#4	90.2		
#8	82.4		
#10	80.3		
#16	73.0		
#30	59.0		
#50	31.7		
#100	14.1		
#200	9.8		

* (no specification provided)

Material Description

Brown in color. well-graded sand with silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 4.6462 D_{85}= 2.9410 D_{60}= 0.6191
D_{50}= 0.4697 D_{30}= 0.2860 D_{15}= 0.1590
D_{10}= 0.0816 C_u= 7.58 C_c= 1.62

Classification

USCS= SW-SM AASHTO= A-1-b

Remarks

Sample was collected by Mr. Syed Abbas on 05/31/16 and tested on 06/02/16. In-Situ %MC=7.7
F.M.=2.53

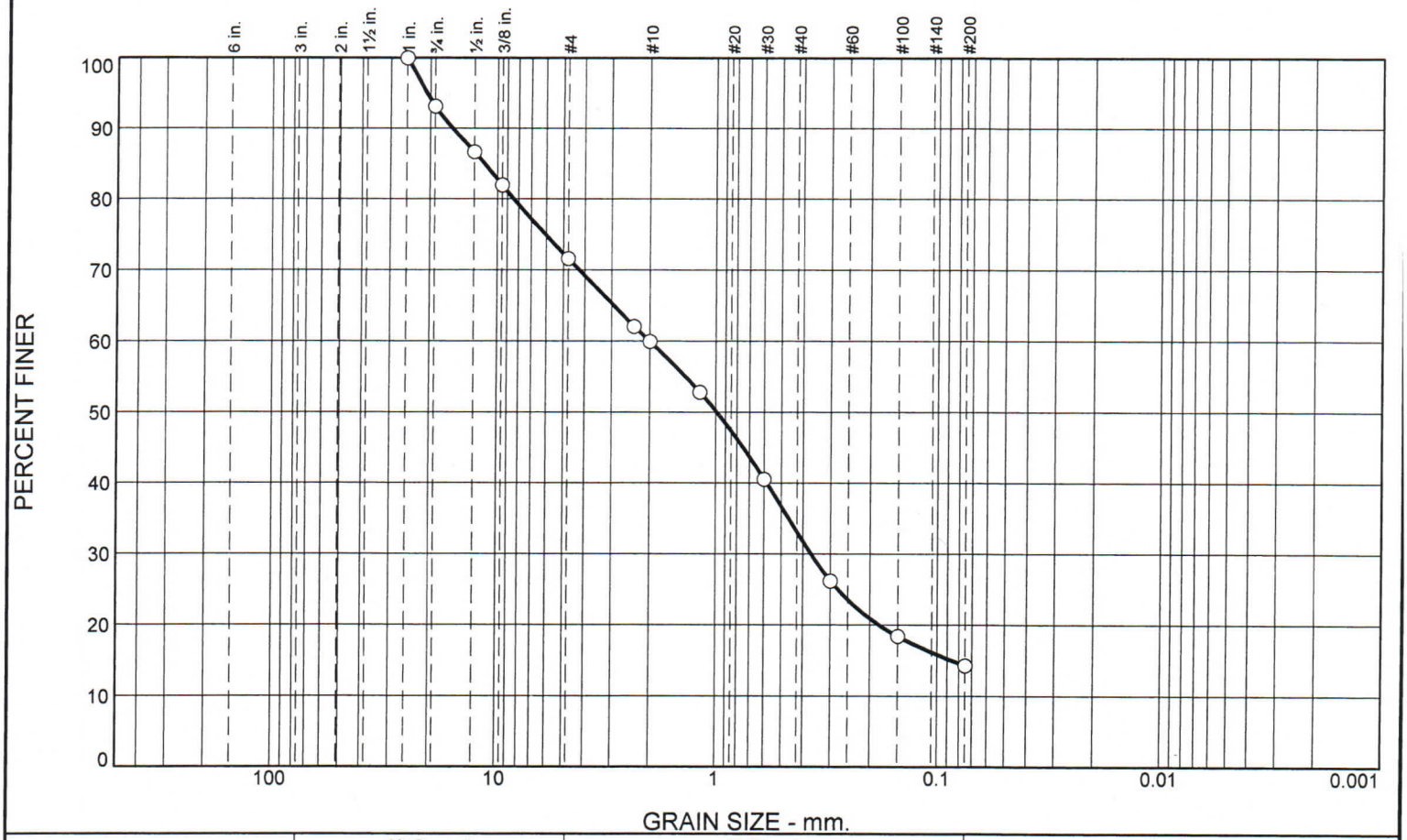
Location: B-2, 6'-8'
Sample Number: S-2 **Depth:** 6'-8' **Date:** 06/03/2016

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Netta Architects
Project: Ash Brook Golf Course, Union County, NJ
Project No: GET-41 **Figure 2 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.9	21.5	11.7	26.9	18.7	14.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	93.1		
1/2	86.6		
3/8	81.9		
#4	71.6		
#8	62.1		
#10	59.9		
#16	52.8		
#30	40.5		
#50	26.2		
#100	18.4		
#200	14.3		

* (no specification provided)

Material Description

Brown in color. silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 15.9353 D_{85}= 11.4516 D_{60}= 2.0101
D_{50}= 0.9897 D_{30}= 0.3675 D_{15}= 0.0859
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Sample was collected by Mr. Syed Abbas on 05/31/16 and tested on 06/02/16. In-Situ %MC=5.9
F.M.=3.53

Location: B-3, 8'-10'
Sample Number: S-3 **Depth:** 8'-10' **Date:** 06/03/2016

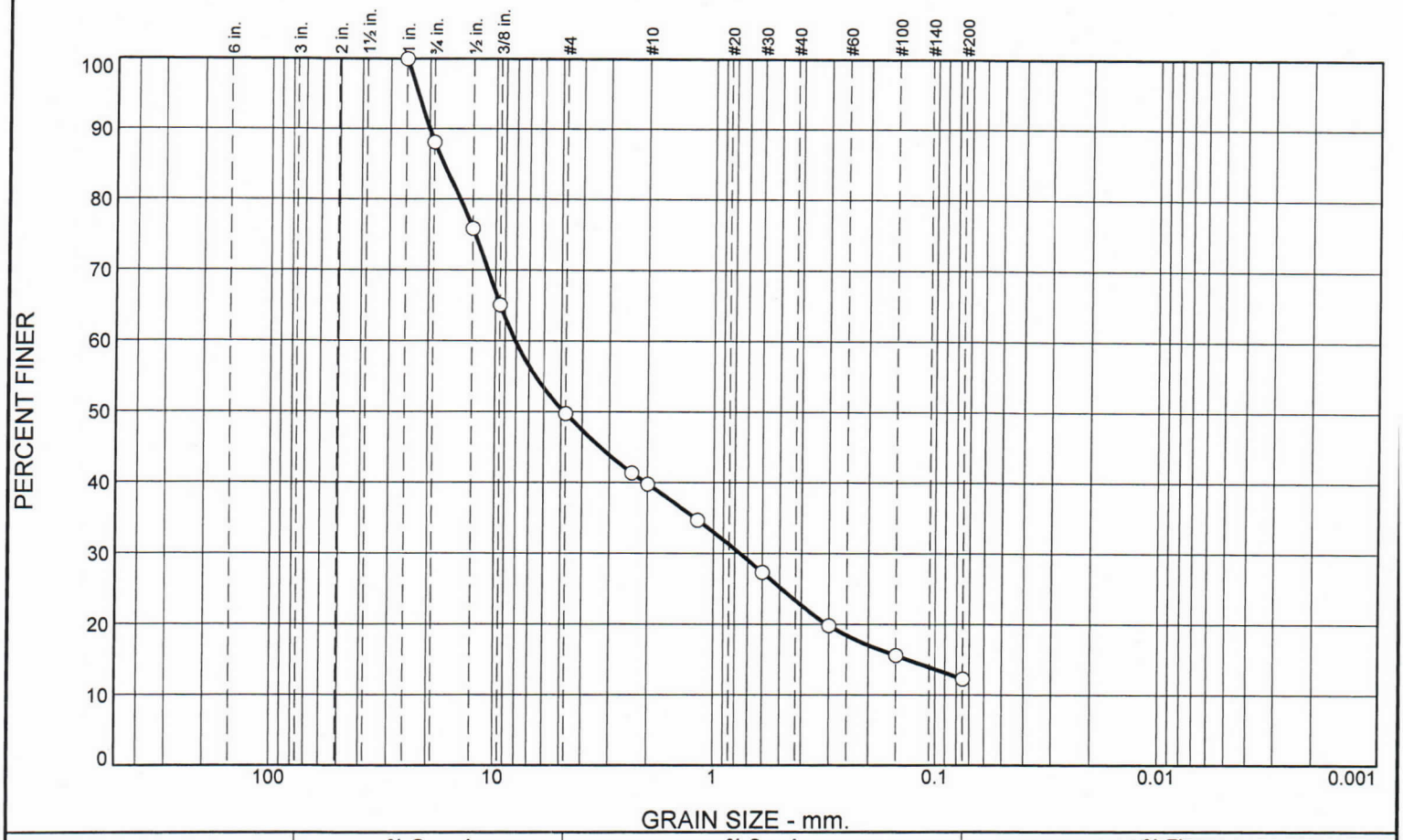
ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Netta Architects
Project: Ash Brook Golf Course, Union County, NJ

Project No: GET-41 **Figure 3 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.9	38.4	9.9	16.4	11.1	12.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	88.1		
1/2	75.9		
3/8	65.1		
#4	49.7		
#8	41.4		
#10	39.8		
#16	34.7		
#30	27.3		
#50	19.8		
#100	15.6		
#200	12.3		

* (no specification provided)

Material Description

Brown in color. silty gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 20.0667 D_{85}= 17.3021 D_{60}= 8.1040
D_{50}= 4.8461 D_{30}= 0.7570 D_{15}= 0.1323
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-a

Remarks

Sample was collected by Mr. Syed Abbas on 05/31/16 and tested on 06/02/16. In-Situ %MC=4.9
F.M.=4.58

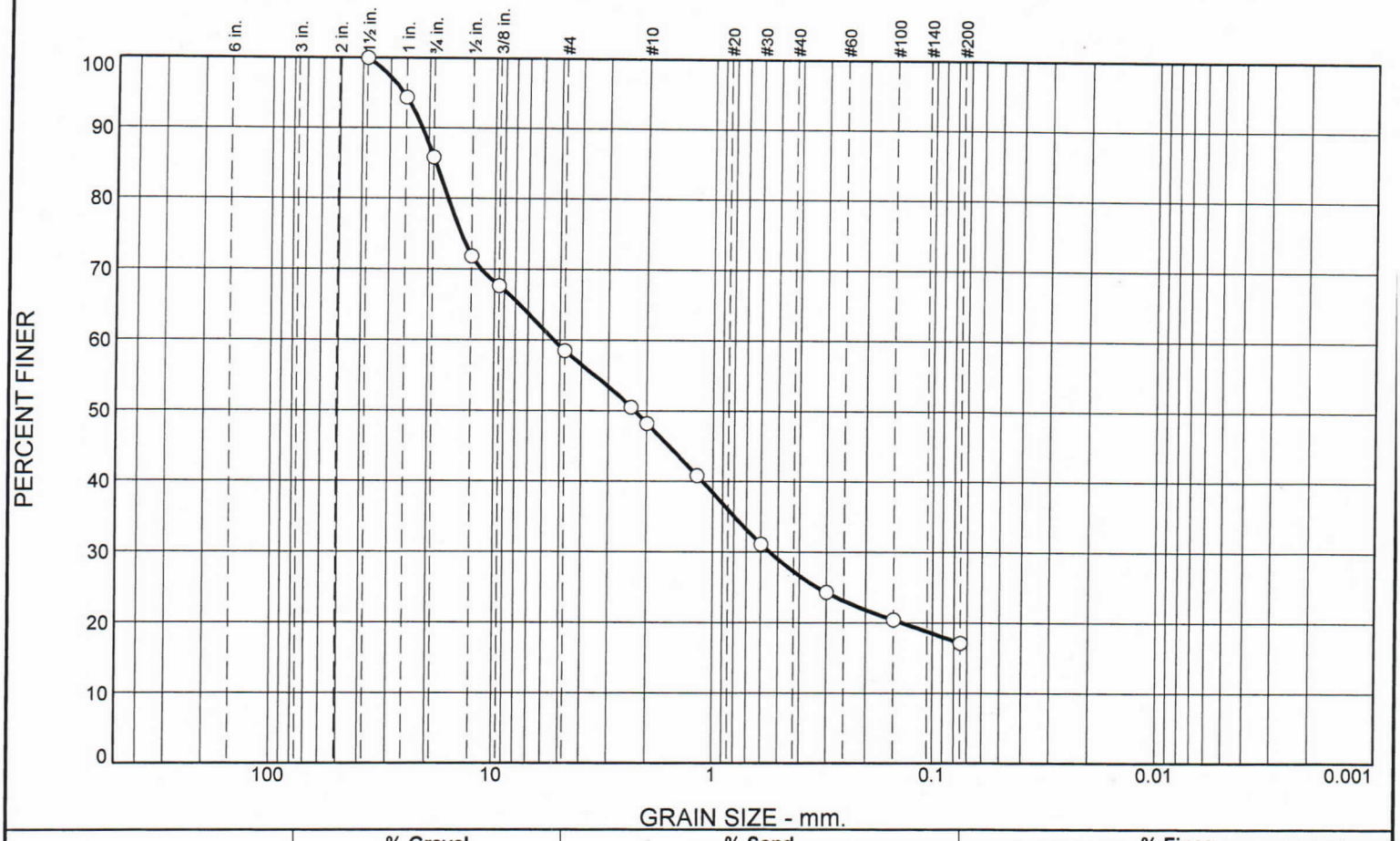
Location: B-4, 10'-12'
Sample Number: S-4 **Depth:** 10'-12' **Date:** 06/03/2016

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Netta Architects
Project: Ash Brook Golf Course, Union County, NJ
Project No: GET-41 **Figure 4 F 1**

Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.1	27.4	10.3	20.9	10.1	17.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.4		
3/4	85.9		
1/2	71.9		
3/8	67.7		
#4	58.5		
#8	50.5		
#10	48.2		
#16	40.8		
#30	31.1		
#50	24.3		
#100	20.4		
#200	17.2		

* (no specification provided)

Material Description

Brown in color. silty gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.5562 D_{85}= 18.6085 D_{60}= 5.3310
D_{50}= 2.2692 D_{30}= 0.5473 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GM AASHTO= A-1-b

Remarks

Sample was collected by Mr. Syed Abbas on 06/01/16 and tested on 06/02/16. In-Situ %MC=6.4
F.M.=4.21

Location: B-5, 15'-17'
Sample Number: S-5 **Depth:** 15'-17' **Date:** 06/03/2016

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Netta Architects
Project: Ash Brook Golf Course, Union County, NJ

Project No: GET-41 **Figure 5 F 1**

APPENDIX - C

ANS Geo, Inc.

Client: Netta Architects

Project: Ash Brook Golf Course, Union County, NJ

Sample procurement using split spoon samplers and augurs

Sample recovery from split spoon samplers

Sample procurement using split spoon samplers and augurs

Sample recovery from split spoon samplers

Bore hole

Sample procurement using split spoon samplers and augurs

Sample procurement using split spoon samplers and augurs

Repatched bore hole

COUNTY OF UNION
BOARD OF CHOSEN FREEHOLDERS
PLANS FOR

NEW CLUB HOUSE AT ASH BROOK GOLF COURSE

LOCATED AT
1210 RARITAN ROAD
(TAX BLOCK 14201, LOT 1)
TOWNSHIP OF SCOTCH PLAINS
UNION COUNTY, NEW JERSEY
FEBRUARY 22, 2017

UNION COUNTY FREEHOLDERS

Bruce H. Bergen
CHAIRMAN

Sergio Granados
VICE CHAIRMAN

Mohamed S. Jalloh
FREEHOLDER

Linda Carter
FREEHOLDER

Bette Jane Kowalski
FREEHOLDER

Angel G. Estrada
FREEHOLDER

Alexander Mirabella
FREEHOLDER

Christopher Hudak
FREEHOLDER

Vernell Wright
FREEHOLDER

PUBLIC UTILITY CONTACTS

SERVICE	COMPANY	ADDRESS
GAS	ELIZABETH TOWN GAS	520 GREEN LANE UNION, N.J. TEL: (908) 662-8321
ELECTRIC	PUBLIC SERVICE ELECTRIC AND GAS (PSE&G)-ELECTRIC	80 PARK PLAZA, T-12 NEWARK, N.J. TEL: (973) 297-2128
WATER	NEW JERSEY AMERICAN WATER	1341 NORTH AVE. PLAINFIELD, N.J. TEL: (973) 564-5701
SEWER	TOWNSHIP OF SCOTCH PLAINS ENGINEERING DEPARTMENT	430 PARK AVENUE SCOTCH PLAINS, N.J. 07076 TEL: (908) 322-6700x306
TELECOM	VERIZON	175 WEST MAIN STREET FREEHOLD, N.J. TEL: (732) 357-2313

CONSULTING ENGINEERS

Site Engineers:
NEGLIA ENGINEERING ASSOCIATES — Tel: 201.939.8805
34 Park Avenue — Fax: 201.939.0846
Lyndhurst, NJ 07071

Structural Engineers:
REUTHER + BOWEN — Tel: 570.496.7020
326 Ward Street — Fax: 570.496.7021
Scranton, PA 18512

Mechanical-Electrical-Plumbing Engineers:
DLB ASSOCIATES — Tel: 646.381.6721
One Penn Plaza — Fax:
New York, NY 10119

BID SET - 2.22.17

EXTERIOR RENDERING

NETTAARCHITECTS
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

CUMMING
Building Value Through Expertise

DRAWING INDEX
GENERAL PROJECT, CODE, & SITE INFORMATION

GENERAL NOTES

1. ALL WORK PERFORMED BY THE CONTRACTOR SHALL BE IN STRICT CONFORMANCE WITH THE PROVISIONS OF THE LATEST EDITION OF THE NEW JERSEY STATE UNIFORM CONSTRUCTION CODE AND INTERNATIONAL BUILDING CODE OF NEW JERSEY AND ALL ITS SUB CODES, OSHA AND ADA REQUIREMENTS AND ANY OTHER LOCAL, REGIONAL OR FEDERAL REGULATIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL VERIFY EXISTING CONDITIONS AND REVIEW THESE CONDITIONS WITH THE PLANS BEFORE, DURING AND AFTER CONSTRUCTION, AND ANY DISCREPANCIES BETWEEN THE ACTUAL CONDITIONS AND THE PLANS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IN WRITING IMMEDIATELY.
3. ALL WALL THICKNESS ARE NOMINAL DIMENSIONS ONLY ROUNDED TO THE NEAREST WHOLE INCH, REFER TO WALL SECTIONS AND DETAILS FOR THEIR ACTUAL THICKNESS.
4. ALL DIMENSIONS ARE FROM THE FACE OF MASONRY, FACE OF GYPSUM BOARD BOARD OR FROM THE COLUMN CENTER LINES UNLESS OTHERWISE NOTED.
5. EXCEPT WHERE OTHERWISE INDICATED, ALL WALLS AND PARTITION ARE DIMENSIONED TO THEIR "NOMINAL" SIZES. WHERE DIMENSIONS ARE NOTED AS "MIN.", PROVIDE MIN. CLEAR TO FINISH SURFACES.
6. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL PROPERLY INDENTIFY AND MARK-UP ALL EXISTING UTILITIES.
7. DO NOT SCALE DRAWINGS.
8. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED BUT NECESSARY FOR PROPER EXECUTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS IF THEY WERE INDICATED IN THE DRAWINGS.
9. REFER TO STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL GENERAL NOTES, ABBREVIATIONS , SYMBOLS AND LEGENDS. ALL NOTES ARE TO BE REVIEWED AND APPLIED TO RELATED BUILDING COMPONENTS.
10. WHERE PIPING IS TO BE CONCEALED, THE HUNG OR FURRED CEILING IN THIS AREAS ARE NOT TO BE INSTALLED UNTIL THOSE PIPES HAVE BEEN PROPERLY TESTED.
11. INTERIOR PARTITIONS SHALL NOT BE BUILT TO FULL HEIGHT UNLESS ALL DUCTS, PIPES, ETC. ARE IN PLACE.
12. ALL SPACES WITH FLOOR DRAIN (INCLUDING AREAWAYS) SHALL HAVE THEIR FLOORS PITCHED TO THOSE FLOOR DRAINS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
13. ALL ITEMS RECESSED INTO RATED PARTITIONS (SUCH AS OUTLET BOXES, PANEL BOXES, ETC) SHALL HAVE THOSE OPENINGS PROTECTED WITH BACK-UP MATERIALS SO AS TO RETAIN THE INTEGRITY OF THE PARTITION RATING THROUGHOUT.
14. NOT USED.
15. EXCEPT AS OTHERWISE INDICATED, DOOR SADDLES OR DIVIDING STRIPS ARE REQUIRED AT INTERIOR DOOR OPENINGS WHERE DIFFERENT TYPES OF FLOOR FINISHES OCCUR IN IMMEDIATELY ADJOINING ROOMS. POSITION ON LINE OF CENTER DOOR WHEN DOOR IS CLOSED.
16. THE GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL LINTELS, STRUTS, BRACKETS, HANGERS, ETC. WHEREVER NECESSARY TO SUPPORT OR BRACE ALL FINISHES, EQUIPMENT RECESSES, HEADS OVER OPENINGS, FURNITURE, ETC.
17. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UNDERGROUND UTILITIES AND ELECTRICAL CONDUITS PRIOR TO STARTING ANY EXCAVATION OPERATIONS. SHOULD ANY CONDUITS BE ENCOUNTERED WHICH WERE NOT KNOWN TO EXIST, THE CONTRACTOR SHALL STOP WORK IN THAT AREA AND IMMEDIATELY NOTIFY THE ARCHITECT.
18. SWEEPING, BRUSHING, AND OTHER GENERAL CLEANING OF COMPLETED WORK AND THE REMOVAL OF DEBRIS, SURPLUS MATERIALS, TOOLS NOT IN ACTIVE USE, SCAFFOLDING AND OTHER EQUIPMENT NO LONGER NEEDED SHALL BE CARRIED OUT ON AN ONGOING BASIS. IN ADDITION, REMOVE STAINS, SPOTS, MARKS, AND DIRT FROM FINISH WORK. THE JOB IS TO BE MAINTAINED FREE OF RUBBISH. DISPOSE OF ALL RUBBISH IN ACCORDANCE WITH LOCAL ORDINANCES.
19. ALL HEIGHTS INDICATED ON REFLECTED CEILING PLANS ARE FROM TOP OF FINISHED FLOOR TO BOTTOM OF CEILING / FIXTURE SPECIFIED, U.O.N..
20. THE CONTRACTOR SHALL FURNISH & INSTALL ALL CLIPS, ANGLES AND MISC. STEEL TO SECURE FRAMING TO STRUCTURE
21. HINGE SIDE OF DOOR TO BE 4" FROM ADJACENT WALL OR AS OTHERWISE MENTIONED.
22. MASONRY OPENING ARE NOMINAL DIMENSIONS, CONTRACTOR TO ALLOW CLEARANCE AT OPENING TO INSTALL WINDOW SYSTEM, DOOR SYTEM OR OTHER ITEMS INSTALLED IN MASONRY.
23. ALL METAL FLASHING SHALL BE STAINLESS STEEL, UNLESS NOTED OTHERWISE.
24. AT LOCATION WHERE SHELF ANGLES ARE INSTALLED, INSTALL STAINLESS STEEL FLASHING, WEEPHOLES AND MORTAR NET.
25. ALL EXPOSED INTERIOR/EXTERIOR METAL ITEMS TO BE PRIMED AND PAINTED (INCLUDING GALVANIZED METALS) UNLESS OTHERWISE NOTED.
26. ALL STEEL LINTELS TO BE GALVANIZED AND PAINTED INCLUDING ALL EXTRA STEELS SPECIFIED HEREIN.

ABBREVIATIONS

ALUM.	ALUMINUM	M.O.H.	MIRROR OPPOSITE HAND
A.F.F.	ABOVE FINISH FLOOR	MTD.	MOUNTED
ALT.	ALTERNATE	MTL.	METAL
APPROX.	APPROXIMATE	MFD.	METAL FLOOR DECK
ARCH.	ARCHITECT	MDF.	MEDIUM DENSITY FIBERBOARD
ARCH'L.	ARCHITECTURAL	MRD.	METAL ROOF DECK
BD.	BOARD	MULL.	MULLION
BLDG.	BUILDING	N	NORTH
BOT.	BOTTOM	NAT.	NATURAL
C.J.	CONTROL JOINT	N.I.C.	NOT IN CONTRACT
CLG.	CEILING	NO.	NUMBER
CU	CONDENSING UNIT	N.T.S.	NOT TO SCALE
CLO.	CLOSET	O.A.	OVERALL
C.T.	CERAMIC TILE	O.A.I.	OUTSIDE AIR INTAKE
COL.	COLUMN	O.C.	ON CENTER
C.M.U.	CONCRETE MASONRY UNIT	OPNG.	OPENING
CONC.	CONCRETE	OPP.	OPPOSITE
CONST.	CONSTRUCTION	ORIG.	ORIGINAL
CONT.	CONTINUOUS	O.H.	OVERHEAD
DET.	DETAIL	O.D.	OVERFLOW DRAIN
DIA.	DIAMETER	PART.	PARTITION
DIM.	DIMENSION	PTN.	PARTITION
DN.	DOWN	PASS.	PASSENGER
DR.	DOOR	PLAS.	PLASTIC
DWG.	DRAWING	PL. LAM.	PLASTIC LAMINATE
EA.	EACH	PL.	PLATE
ELEC.	ELECTRIC	PLYWD.	PLYWOOD
ELECT'L.	ELECTRICAL	PANL.	PANEL
ENCL.	ENCLOSURE	PR.	PAIR
EL.	ELEVATION	PTD.	PAINTED
ELEV.	ELEVATOR	P.V.C.	POLYVINYL CHLORIDE
EQUIP.	EQUIPMENT	P.S.I.	POUNDS PER SQUARE INCH
EQ.	EQUAL	P.S.F.	POUNDS PER SQUARE FOOT
E.W.C.	ELECTRIC WATER COOLER	R.	RISER
EXIST.	EXISTING	RAD.	RADIUS
E.T.R.	EXISTING TO REMAIN	RB	RUBBER BASE
EXP.	EXPANSION	RCP	REFLECTED CEILING PLAN
EXT.	EXTERIOR	R.D.	ROOF DRAIN
E.J.	EXPANSION JOINT	RE.	REFERENCE
F.D.	FLOOR DRAIN	REF.	REFRIGERATOR
F.E.	FREIGHT ELEVATOR	REFL.	REFLECTED
FDN.	FOUNDATION	REQ'D.	REQUIRED
FIN.	FINISH	REINF.	REINFORCING
FL.	FLOOR	REV.	REVISION
FLR.	FLOOR	R.H.	RIGHT HAND
FLUOR.	FLUORESCENT	RM.	ROOM
FT.	FOOT / FEET	R.O.	ROUGH OPENING
FTG.	FOOTING	R.O.D.	ROOF OVERFLOW DRAIN
GA.	GAUGE	SECT.	SECTION
GALV.	GALVANIZED	SHO.	SHOWER
GL.	GLASS	SIM.	SIMILAR
GWB	GYPSUM WALL BOARD	SK	SKETCH
GYP. BD.	GYPSUM BOARD	SPECS.	SPECIFICATIONS
H.C.	HANDICAPPED	SQ.	SQUARE
HDWR.	HARDWARE	S/STL.	STAINLESS STEEL
HDWD.	HARDWOOD	STL.	STEEL
H.M.	HOLLOW METAL	STD.	STANDARD
H.P.	HIGH POINT	STRUCT.	STRUCTURE
HT.	HEIGHT	STRUCT'L	STRUCTURAL
H.V.A.C.	HEATING, VENTILATION, & AIR CONDITIONING	SUSP.	SUSPENDED
HORIZ.	HORIZONTAL	T/	TOP OF
HR.	HOUR	T.O.	TOP OF
I.D.	INSIDE DIAMETER	TEL.	TELEPHONE
IN.	INCH / INCHES	TERR.	TERRAZZO
INCL.	INCLUDING	TRANS.	TRANSFORMER
INFO.	INFORMATION	TYP.	TYPICAL
INSUL.	INSULATION	TBD.	TO BE DETERMINED
INV.	INVERT	U.L.	UNDERWRITER'S LABORATORY
JT.	JOINT	UNFIN.	UNFINISHED
LAM.	LAMINATE	U.O.N.	UNLESS OTHERWISE NOTED
LAV.	LAVATORY	UTIL.	UTILITY
LG.	LONG	V.B.	VINYL BASE
L.P.	LOW POINT	V.C.T.	VINYL COMPOSITION TILE
LT.	LIGHT	VERT.	VERTICAL
LT. WT.	LIGHT WEIGHT	VEST.	VESTIBULE
MACH.	MACHINE	V.I.F.	VERIFY IN FIELD
M.H.	MANHOLE	VOL.	VOLUME
MAT'L	MATERIAL	VTR	VENT THRU ROOF
MAX.	MAXIMUM	W/	WITH
MECH.	MECHANICAL	W.C.	WATER CLOSET
MEMB.	MEMBRANE	WDW.	WINDOW
MIN.	MINIMUM	W.F.	WIDE FLANGE
MIR.	MIRROR	W.O.	WINDOW OPENING
MISC.	MISCELLANEOUS	W.P.	WORKING POINT
M.O.	MASONRY OPENING	W.W.F.	WELDED WIRE FABRIC
MLDG.	MOLDING		

SYMBOLS

- PARTITON TYPE
- WINDOW TYPE
- KEYNOTES
- DEMOLITION KEYNOTES
- REVISION TAG
- DOOR NUMBER
- ELEVATION POINTER / WORK POINT

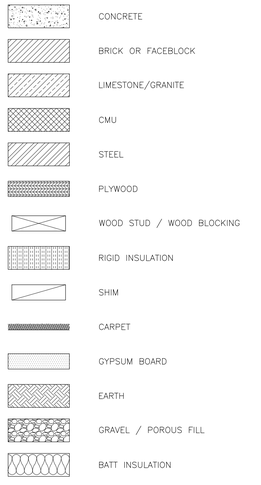
Drawing Title / Drawing No. / Sheet No. / Drawing Scale — PLAN SCALE (1 / A.100)

Drawing Title / Drawing No. / Sheet No. / Drawing Scale — ELEVATION SCALE (1 / A.200)

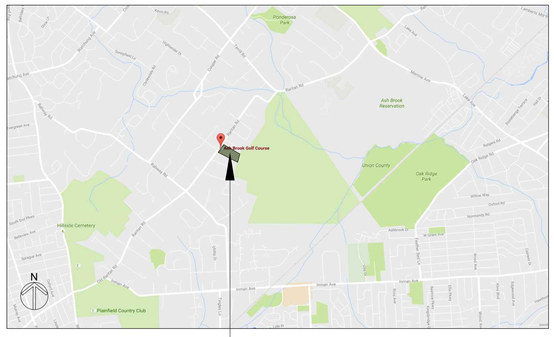
Drawing Title / Drawing No. / Sheet No. / Drawing Scale — SECTION SCALE (1 / A.200)

Drawing Title / Drawing No. / Sheet No. / Drawing Scale — DETAIL SCALE (1 / A.200)

MATERIALS LEGEND

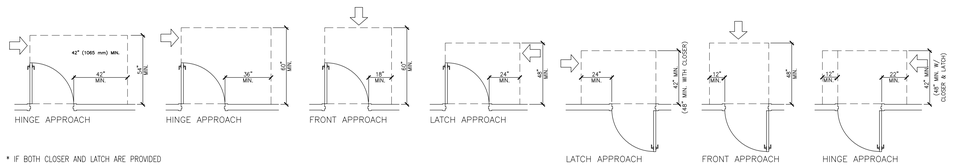


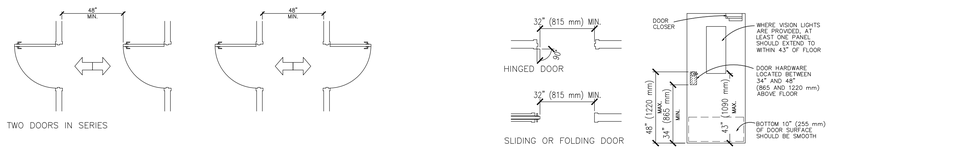
PROJECT KEY PLAN



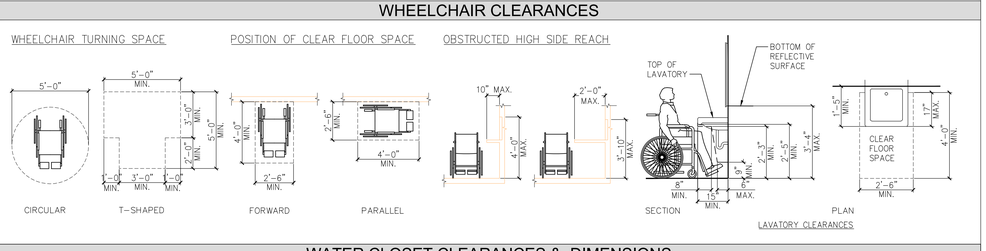
PROJECT LOCATION

ACCESSIBLE CLEARANCES AT SWINGING DOORS

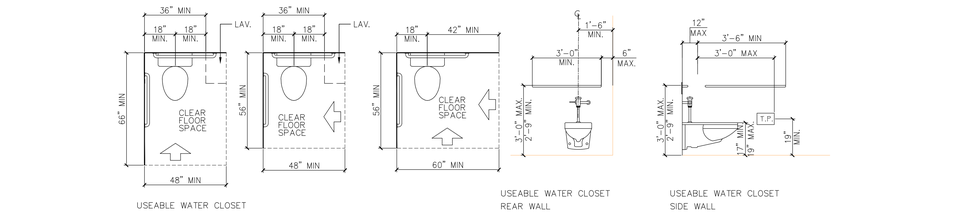




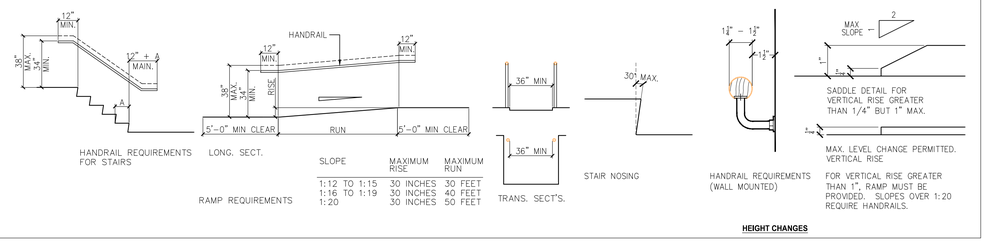
WHEELCHAIR CLEARANCES



WATER CLOSET CLEARANCES & DIMENSIONS



STAIR/RAMP CLEARANCES & DIMENSIONS



BUILDING CODE INFORMATION

PROJECT NAME:	NEW CLUB HOUSE - ASH BROOK GOLF COURSE
LOCATION:	1210 RARITAN, SCOTCH PLAINS, NEW JERSEY 07076

THE PRIMARY CODE REFERENCE WILL BE THE NEW JERSEY UNIFORM CONSTRUCTION CODE (N.J.A.C. 5:23 ET SEQ). THE UNIFORM CONSTRUCTION CODE ADOPTS SEVERAL MODEL CODES THAT ARE REFERENCED AS SUBCODES. THESE SUBCODES ARE AN INTEGRAL PART OF THE UNIFORM CONSTRUCTION CODE AND ARE AS FOLLOWS:

SUBCODE	NATIONAL MODEL CODE	UCC REFERENCE
BUILDING	IBC/2015 NEW JERSEY EDITION	N.J.A.C. 5:23-3.14
ACCESSIBILITY	ANSI-A117.1 2009	NJAC 5.23-6
PLUMBING	NATIONAL STANDARD PLUMBING CODE 2015	N.J.A.C. 5:23-3.15
ELECTRICAL	NATIONAL ELECTRICAL CODE 2014	N.J.A.C 5:23-3.16
ENERGY	ASHRAE 90.1-2013	N.J.A.C. 5:23-3.18
MECHANICAL	INTERNATIONAL MECHANICAL CODE 2015	N.J.A.C. 5.23-3.20

GENERAL BUILDING INFORMATION CLUBHOUSE PROJECT ONLY

	CRITERION / DESIGNATION	IBC PREFERENCE
USE AND OCCUPANCY CLASSIFICATION	MAIN USE: A-2 – ASSEMBLY ACCESSORY USES: M – MERCANTILE B – BUSINESS	SECTION 303
OCCUPANCY	MIXED USE NON SEPARATED	SECTION 508.3
CONSTRUCTION CLASSIFICATION	V-B (5B)	TABLE 601
FIRE SUPPRESSION	YES	SEC. 903.1

GENERAL BUILDING HEIGHTS & AREAS

ALLOWABLE BUILDING HEIGHT AND AREA (TABLE 503)
TYPE: V-B CONSTRUCTION
GROUP: A-2
ALLOWABLE:
S= 2-STORY (46'-9"H)
A= LOWER LEVEL: 10,987 S.F. AND MAIN LEVEL: 9,303 S.F

BUILDING AREA MODIFICATIONS (SEC. 506)
Aa={At + [At X If] + [At X If]}
Aa={18,000 + [NOT USED] X [6,000 X .75]}
Aa={18,000 + [4,500]}
Aa=22,500 S.F.

BUILDING HEIGHT MODIFICATIONS (SEC. 504.2)
ALLOWABLE: 40' HIGH
SEC. 504.02: ADD 20' FOR SPRINKLER
TOTAL ALLOWABLE: 60' HIGH

PROPOSED BUILDING:
PROPOSED BUILDING AREA: 10,987 S.F. < 22,500 S.F. ALLOWABLE = OK
PROPOSED BUILDING HEIGHT: 55'-9" H < 75' H = OK

FIRE RESISTANT RATING REQUIREMENTS FOR BUILDING ELEMENTS (TABLE 601)

CONSTRUCTION CLASSIFICATION 5B

	CRITERION / DESIGNATION		IBC REFERENCE
	ALLOWABLE	ACTUAL	
STRUCTURAL FRAME – INCLUDING GIRDERS, BEAMS, TRUSSES	0-HR	0-HR	TABLE 601
BEARING WALLS – EXTERIOR – INTERIOR	0-HR 0-HR	0-HR 0-HR	TABLE 601
NON-BEARING WALLS & PARTITION – EXTERIOR	TABLE 602		
FLOOR CONSTRUCTION – INCLUDING SUPPORTING BEAMS AND JOISTS	0-HR	0-HR	TABLE 602
ROOF CONSTRUCTION – INCLUDING SUPPORTING BEAMS AND JOISTS	0-HR	0-HR	TABLE 601 EXCEPTION B – F.O. NOT REQ'D. INCLUDING 20 FEET ABOVE

FIRE RESISTANT RATING REQUIREMENTS FOR BUILDING ELEMENTS (TABLE 602)

FIRE SEPARATION	TYPE OF CONSTRUCTION	OCCUPANCY B	ACTUAL	IBC PREFERENCE
< 5'	ALL	1	N/A	TABLE 602
5' < OR = X < 10'	1A, IIB OTHERS	1 1	N/A	
10' < OR = X < 30'	1A, IIB IIB, VB OTHERS	1-D 0 1-D	0-HR	
X > OR = 30'	ALL	0-HR	0-HR	

CONT. ON NEXT PAGE

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
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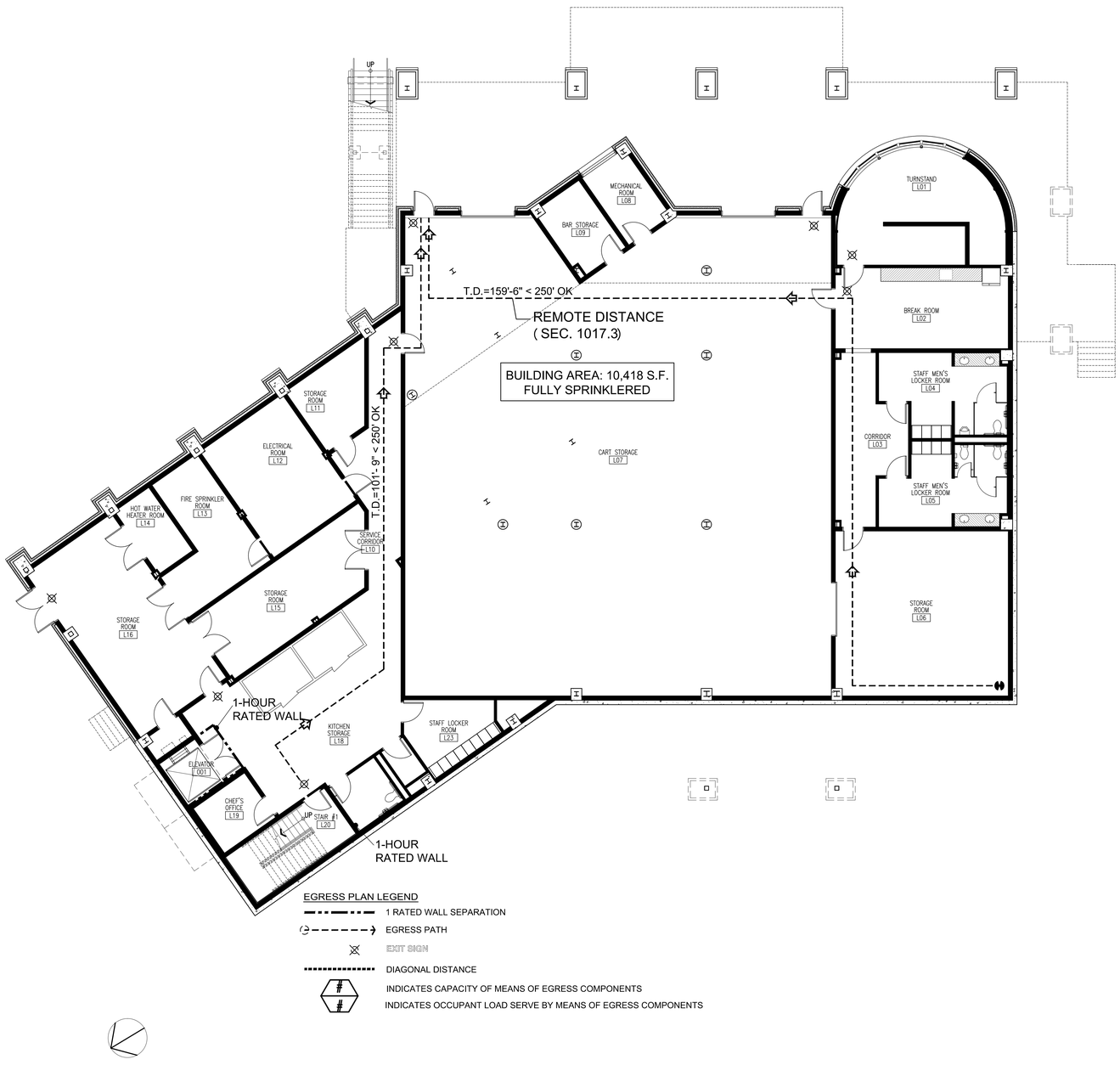
SHEET CONTENTS:
GENERAL NOTES & BUILDING CODE DATA

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	DV
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	T-001



EGRESS PLAN LEGEND

- 1 RATED WALL SEPARATION
- EGRESS PATH
- EXIT SIGN
- DIAGONAL DISTANCE
- INDICATES CAPACITY OF MEANS OF EGRESS COMPONENTS
- INDICATES OCCUPANT LOAD SERVE BY MEANS OF EGRESS COMPONENTS

1 T-002 LOWER LEVEL EGRESS PLAN
SCALE: 1/8"=1'-0"

MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES TABLE 7.21.1
NATIONAL STANDARD PLUMBING CODE (2009)

CLASSIFICATION	NUMBER OF PERSONS OF EACH SEX	WATER CLOSETS (URINALS)				LAVATORIES				DRINKING WATER FACILITIES		BATH OR SHOWER		OTHER
		MALE		FEMALE		MALE		FEMALE						
		REQD	PROVD	REQD	PROVD	REQD	PROVD	REQD	PROVD	REQD	PROVD	REQD	PROVD	1 SERVICE SINK PER FLOOR
ASSEMBLY (1C) (RESTAURANT, BAR/LOUNGE)	147 OCCUPANTS 147x.50=74 M 74 F	3	5	4	5	3	3	4	5	1	1	0	0	1
BUSINESS (2) (COUNTY OFFICES–MAIN LEVEL)	8 OCCUPANTS 8x.50=4 M 4 F	1	1	1	1	1	1	1	1	1	1	0	0	1
MERCANTILE (7) (PRO SHOP)	25 OCCUPANTS 25x.50=13 M 13 F	1	1	1	1	1	1	1	1	1	0	0	0	1
BUSINESS (2) (COUNTY OFFICES/BREAK ROOM–LOWER LEVEL)	16 OCCUPANTS 16x.50=8 M 8 F	1	1	1	1	1	1	1	1	1	0	0	0	1
STORAGE (9) (STORAGE ROOM, KITCHEN)	32 OCCUPANTS 32x.50=16 M 16 F	1	1	1	1	1	1	1	1	0	0	0	0	1
TOTAL PROVIDED:		7		8		7		8		1		0		1

NOTE:
1) ASSEMBLY USE IN MAIN LOBBY IS TRANSIENT IN NATURE AND IS NOT INCLUDED IN THE OCCUPANCY COUNT FOR PLUMBING FIXTURES.
2) UNISEX TOILET WITH 1 TOILET AND 1 LAVATORY

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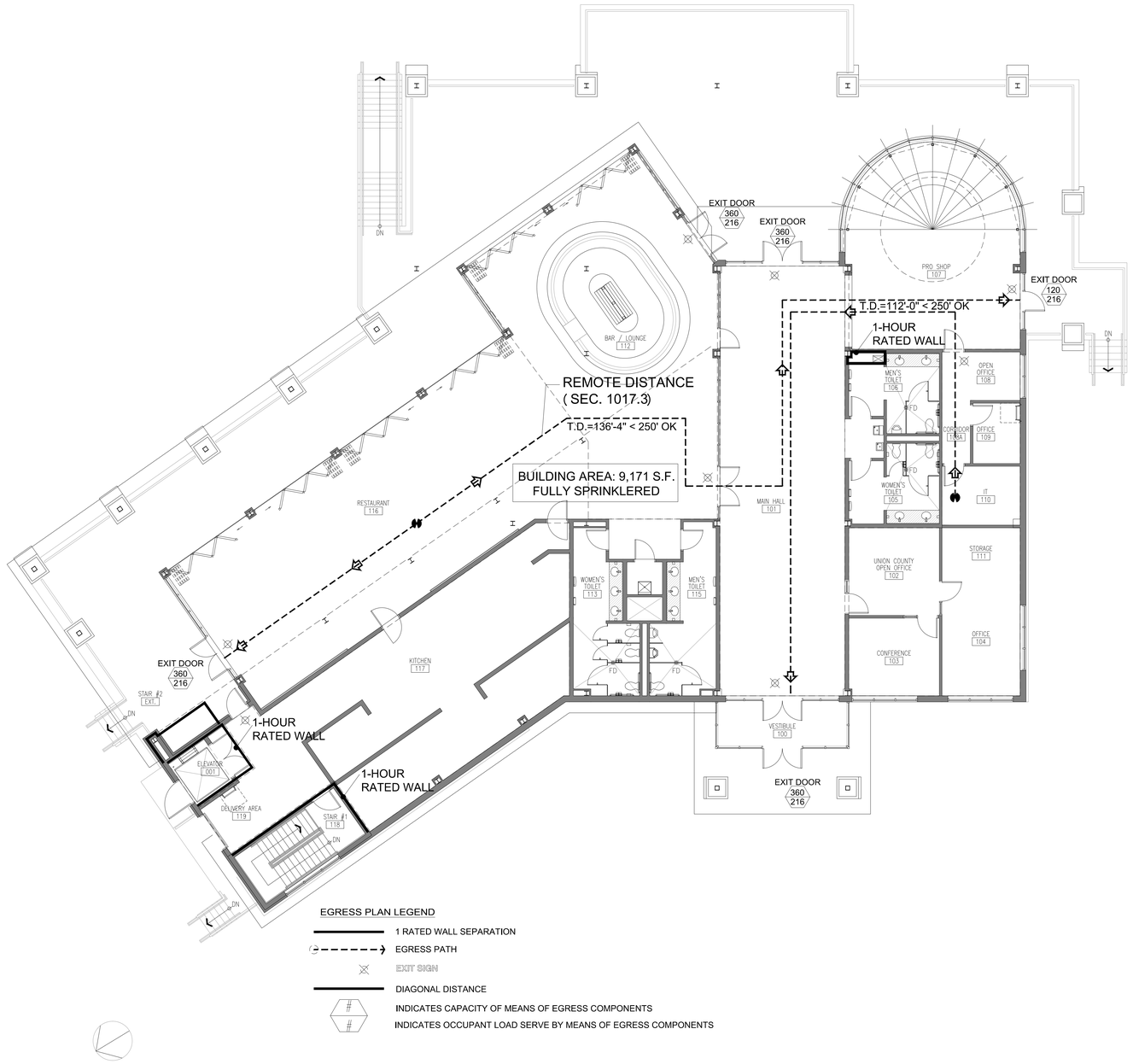
SHEET CONTENTS:

LOWER LEVEL EGRESS PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	DV
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	T-002



EGRESS PLAN LEGEND

- 1 RATED WALL SEPARATION
- EGRESS PATH
- EXIT SIGN
- DIAGONAL DISTANCE
- INDICATES CAPACITY OF MEANS OF EGRESS COMPONENTS
- INDICATES OCCUPANT LOAD SERVE BY MEANS OF EGRESS COMPONENTS

1 T-003 MAIN LEVEL EGRESS PLAN
SCALE: 1/8"=1'-0"

MAXIMUM FLOOR AREA PER OCCUPANT (TABLE 1004.1.2)

FUNCTION OF SPACE	FLOOR AREA PER OCCUPENT
BUSINESS	100 GROSS S.F.
STORAGE	300 GROSS S.F.
ASSEMBLY – UNCONCENTRATED	15 NET S.F.
MERCANTILE	30 GROSS S.F.
KITCHEN – COMMERCIAL	200 GROSS S.F.

OCCUPANT LOAD (SEC. 1004)

ROOM #	ROOM NAME	FLOOR AREA IN SQ. FT. PER OCCUPANT	AREA	OCCUPANT LOAD
LOWER–L01	TURNSTAND	200 NET	395 NET S.F.	2
L02	BREAK ROOM	50 NET	327 NET S.F.	7
L06/L11/L15 /L16/L18	STORAGES	300 GROSS	2,000 S.F.	7
L07	CART STORAGE	200 GROSS	1656 S.F.	8
L02/L03	MECHANICAL/FIRE SPRKLR	300 NET	614 NET S.F.	2
MAIN LEVEL–101	MAIN LOBBY	–	1253 S.F	–
105/106/113 /115	TOILET SUITE	–	1,789 S.F.	–
117	KITCHEN SUITE	200 GROSS	848 S.F.	4
116	RESTAURANT–DINING	15 NET	1,667 NET S.F.	111
112	BAR/LOUNGE	15 NET	1,055 NET S.F.	70
NO.	OUTDOOR TERRACE	15 NET	3,793 NET SF.	–
122	PRO SHOP	60 GROSS	760 S.F.	13
			TOTAL:	224

MEANS OF EGRESS FROM BUILDING (TABLE 1021.1)

OCCUPANT LOAD	NO. OF EXIT REQUIRED	NO. OF EXIT PROVIDED
433	2	3

MEANS OF EGRESS WIDTH (SEC.1005)

OCCUPANT LOAD	MIN. WIDTH	REQUIRED WIDTH	PROVIDED WIDTH
433	0.2" PER OCCUPANT	86.6"	132"

EXIT TRAVEL DISTANCE

OCCUPANCY	EXIT ACCESS TRAVEL DISTANCE	ACTUAL MAX. TRAVEL DISTANCE
A	250' W/SPRINKLER	207'–5"

INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY (TABLE 803.9)

SPRINKLERED			
GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS	CORRIDORS	ROOMS AND ENCLOSED SPACE
A–2	B	B	C
B	B	C	C
M	B	C	C

FIRE PROTECTION SYSTEMS (CHAPTER 9)

SYSTEM TYPE	REQUIREMENT	ACTUAL	PROVIDED
AUTOMATIC SPRINKLER SYSTEMS (SEC.903)	A–2: –FIRE AREA EXCEEDING 5,000 S.F. –OCCUPANT LOAD OF 100 OR MORE –FIRE AREA LOCATION ON A LEVEL OTHER THAN THE EXIT DISCHARGE	A–3: –FIRE AREA: 11,323 S.F. –OCCUPANT LOAD: 433 –ONE LEVEL	YES
STANDPIPE SYSTEMS (SEC. 905)	–HIGHEST FLOOR LEVEL: 30' – CLASS III –BUILDING AREA: 10,000 S.F. – CLASS I GROUP A – OCCUPANT LOAD GREATER THAN 1,000 – CLASS 1	–HIGHEST FLOOR LEVEL: 12' –BUILDING AREA: 10,418 S.F. –OCCUPANT LOAD: 319	NO
PORTABLE FIRE EXTINGUISHERS (SEC. 906)	GROUP A – REQUIRED GROUP B – REQUIRED GROUP M – REQUIRED	–GROUP A –GROUP B –GROUP M	YES
FIRE ALARM AND DETECTION SYSTEMS (SEC. 907)	GROUP A: –OCCUPANT LOAD: 300 OR MORE	–OCCUPANT LOAD: 319	YES

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PROJECT:

NEW CLUB HOUSE
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SHEET CONTENTS:

MAIN LEVEL EGRESS PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	DV
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	T-003

NORTH

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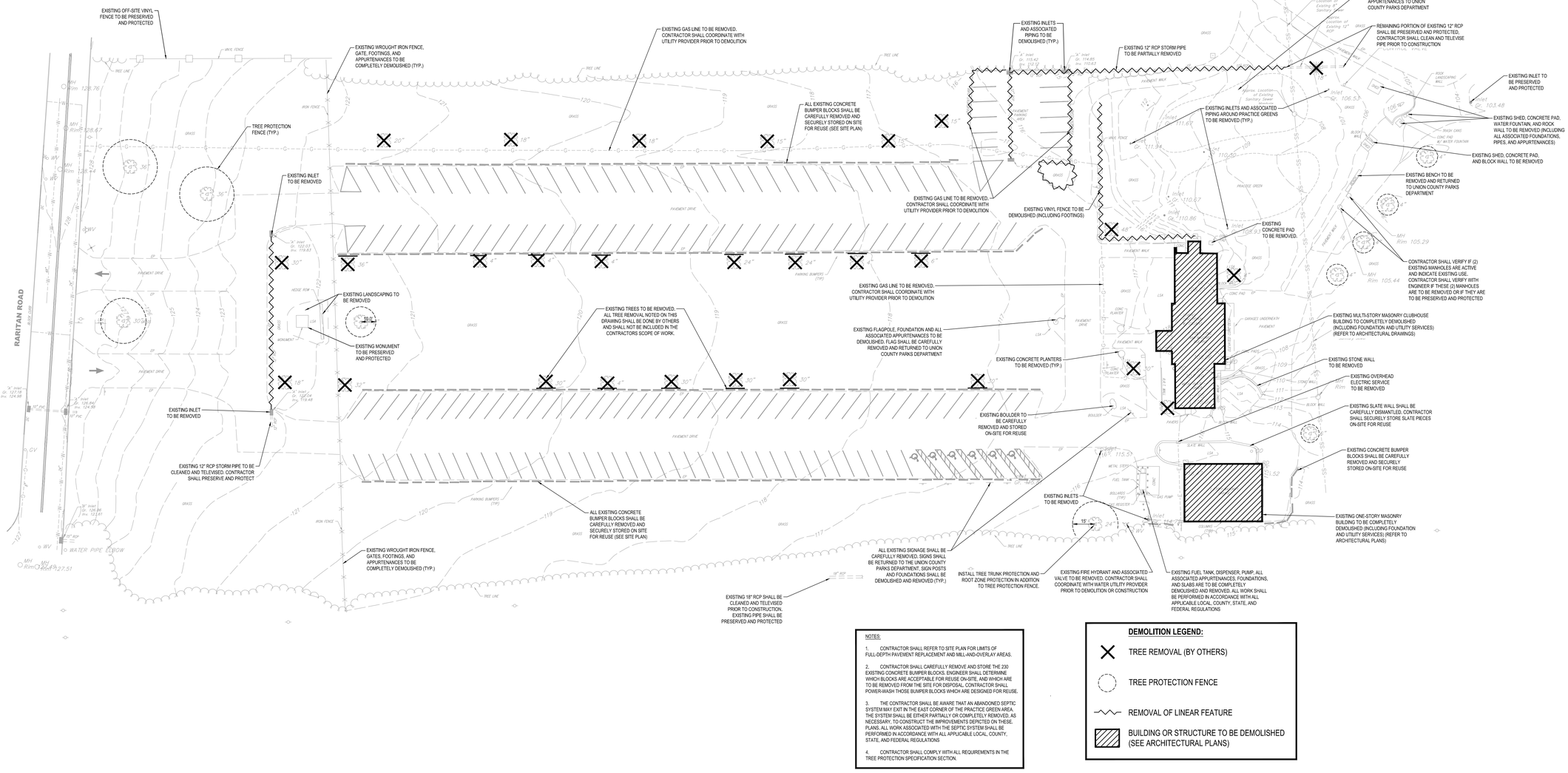
GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.



NOTES:

1. CONTRACTOR SHALL REFER TO SITE PLAN FOR LIMITS OF FULL-DEPTH PAVEMENT REPLACEMENT AND MILL-AND-OVERLAY AREAS.

2. CONTRACTOR SHALL CAREFULLY REMOVE AND STORE THE 230 EXISTING CONCRETE BUMPER BLOCKS. ENGINEER SHALL DETERMINE WHICH BLOCKS ARE ACCEPTABLE FOR REUSE ON-SITE, AND WHICH ARE TO BE REMOVED FROM THE SITE FOR DISPOSAL. CONTRACTOR SHALL POWER-WASH THOSE BUMPER BLOCKS WHICH ARE DESIGNED FOR REUSE.

3. THE CONTRACTOR SHALL BE AWARE THAT AN ABANDONED SEPTIC SYSTEM MAY EXIT IN THE EAST CORNER OF THE PRACTICE GREEN AREA. THE SYSTEM SHALL BE EITHER PARTIALLY OR COMPLETELY REMOVED, AS NECESSARY, TO CONSTRUCT THE IMPROVEMENTS DEPICTED ON THESE PLANS. ALL WORK ASSOCIATED WITH THE SEPTIC SYSTEM SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS

4. CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS IN THE TREE PROTECTION SPECIFICATION SECTION.

DEMOLITION LEGEND:

- TREE REMOVAL (BY OTHERS)
- TREE PROTECTION FENCE
- REMOVAL OF LINEAR FEATURE
- BUILDING OR STRUCTURE TO BE DEMOLISHED (SEE ARCHITECTURAL PLANS)

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PROJECT:

NEW CLUB HOUSE
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SHEET CONTENTS:

EXISTING CONDITIONS & DEMOLITION PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	2 OF 22
DRWG NO	C-02.00

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GRAPHIC SCALE

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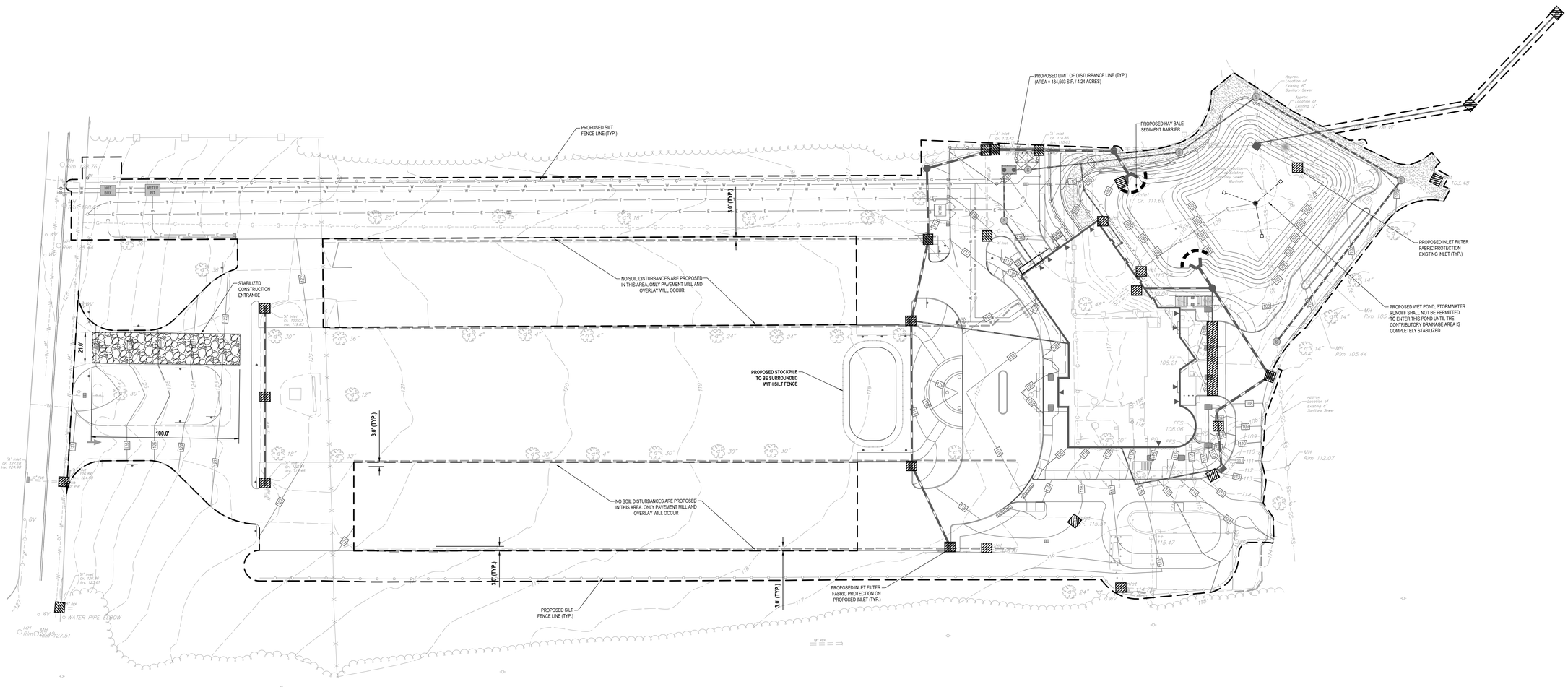
(IN FEET)
1 inch = 30 ft.



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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

SOIL EROSION & SEDIMENT CONTROL PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	3 OF 22
DRWG NO	C-02.01

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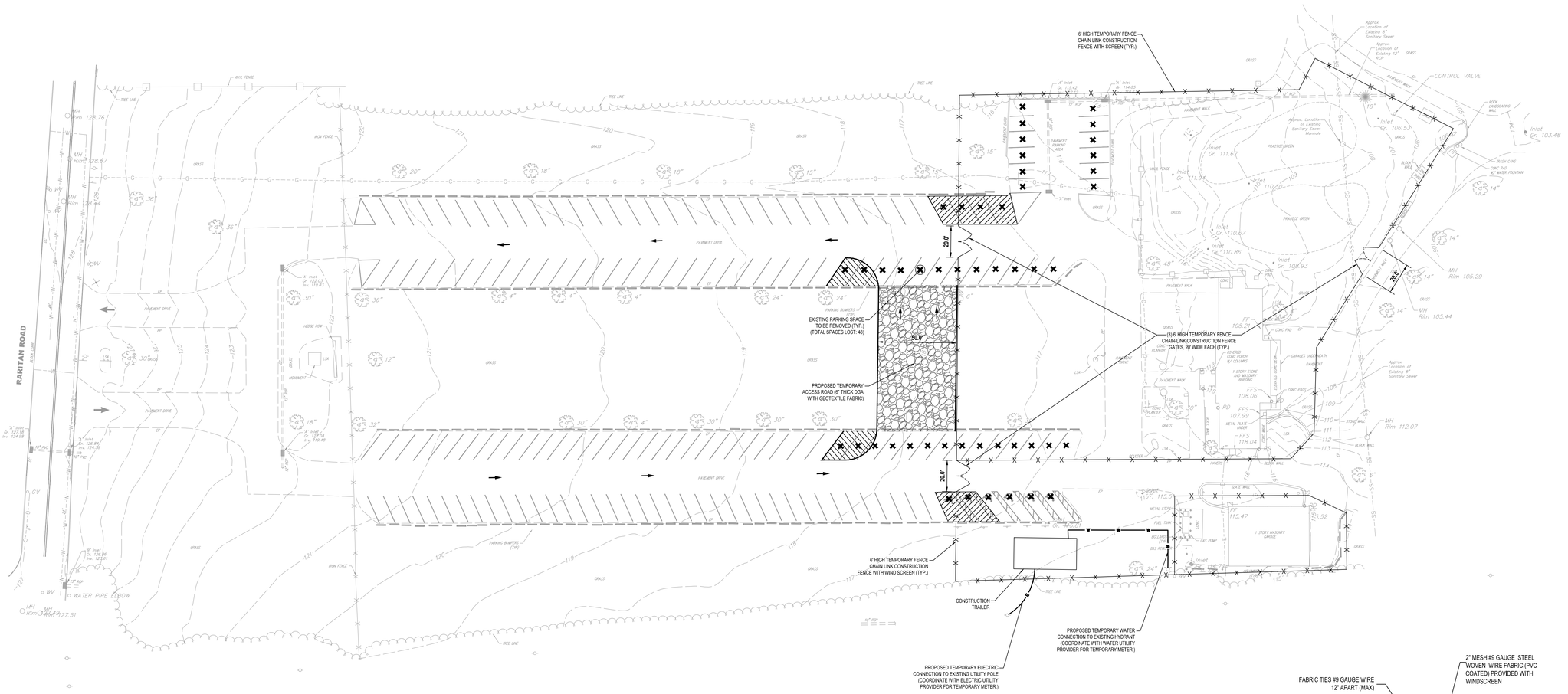
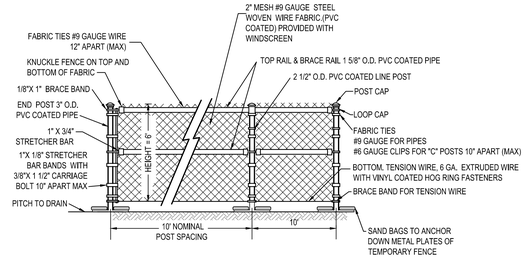


TOTAL LF OF FENCE: 1,552 LF

TOTAL FENCED IN AREA: 66,830 SF



TEMPORARY CHAIN LINK FENCE

NOT TO SCALE

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PROJECT:

NEW CLUB HOUSE
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SHEET CONTENTS:

CONSTRUCTION STAGING PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	4 OF 22
DRWG NO	C-03.00

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GRAPHIC SCALE

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(IN FEET)
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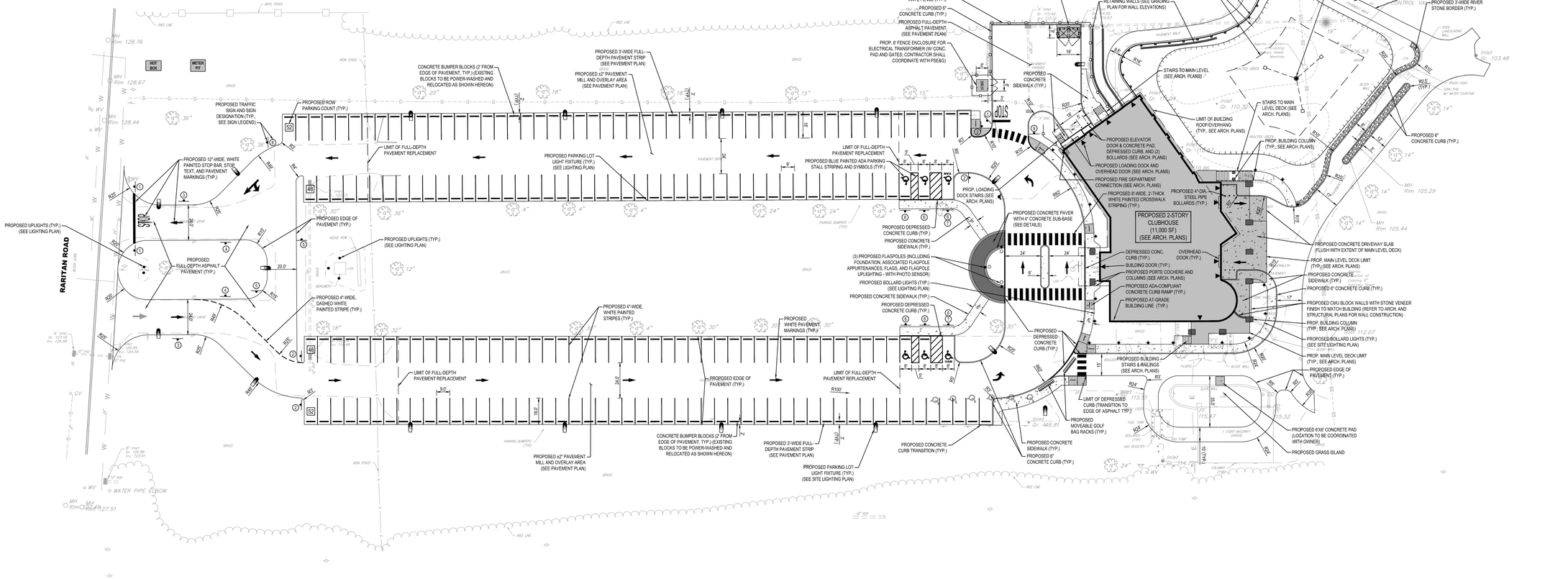
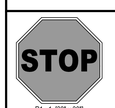
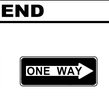
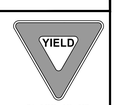


SIGN LEGEND

				
R1 - 1 [30" x 30"] (5.5 S.F.)	R5 - 1 [30" x 30"] (6.3 S.F.)	W6 - 1L [36" x 12"] (3 S.F.)	W6 - 1R [36" x 12"] (3 S.F.)	R1 - 2 [36" x 36" x 36"] (4.5 S.F.)
1	2	3	4	5
ADA PARKING SPACE SIGNAGE (SEE DETAILS)				
6	CUSTOM [18" x 12"] (1.5 S.F.)	CUSTOM [18" x 12"] (1.5 S.F.)		
7	8	9		

GENERAL NOTES:

1. DIMENSIONS, COLORS, AND DETAILS OF VARIOUS SIZE SIGNS, SHIELDS AND ACCESSORY PANELS TO FOLLOW STANDARDS IN THE CURRENT "STANDARD HIGHWAY SIGNS PUBLICATION" AND THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
2. ALL SIGNS SHALL BE ASTM D 4956 TYPE III SHEETING.
3. CUSTOM SIGN SHALL BE WHITE LEGEND WITH BLACK LETTERING (CONTRACTOR SHALL SUBMIT SHOP DRAWING PRIOR TO FABRICATION)

SITE PLAN LEGEND

- CURB LINE
- DEPRESSED CURB LINE
- RETAINING WALL (SEE PLAN FOR TYPE)
- TIMBER GUIDE RAIL
- FENCE LINE (SEE PLAN FOR TYPE & HEIGHT)
- CONCRETE BUMPER BLOCK (SEE NOTE 1)
- BOLLARD
- TRAFFIC SIGN (# - SEE SIGN LEGEND)
- PARKING COUNT (ROW)
- CONCRETE SIDEWALK
- REINFORCED CONCRETE SIDEWALK / PAD
- PAVERS WITH CONCRETE BASE
- FDC — FIRE DEPT. CONNECTION (SEE MEP PLANS)
- FIRE HYDRANT (SEE UTILITY PLAN)

GENERAL NOTES:

1. THERE ARE APPROXIMATELY 230 EXISTING CONCRETE BUMPER BLOCKS (WHEEL STOPS ON-SITE). CONTRACTOR SHALL CAREFULLY REMOVE AND STORE ALL EXISTING BUMPER BLOCKS. ENGINEER WILL DETERMINE WHICH BUMPER BLOCKS ARE ACCEPTABLE FOR REUSE AND WHICH BUMPER BLOCKS ARE TO BE DEMOLISHED AND REMOVED. ALL BUMPER BLOCKS DETERMINED TO BE REUSED SHALL BE THOROUGHLY POWER-WASHED PRIOR TO REUSE (SEE CONSTRUCTION DETAILS).

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2-22-2017

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NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

SITE PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	5 OF 22
DRWG NO	C-04.00

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\04.00 - SITE PLAN.DWG Plotted: Tuesday, February 21, 2017 2:31:02 PM

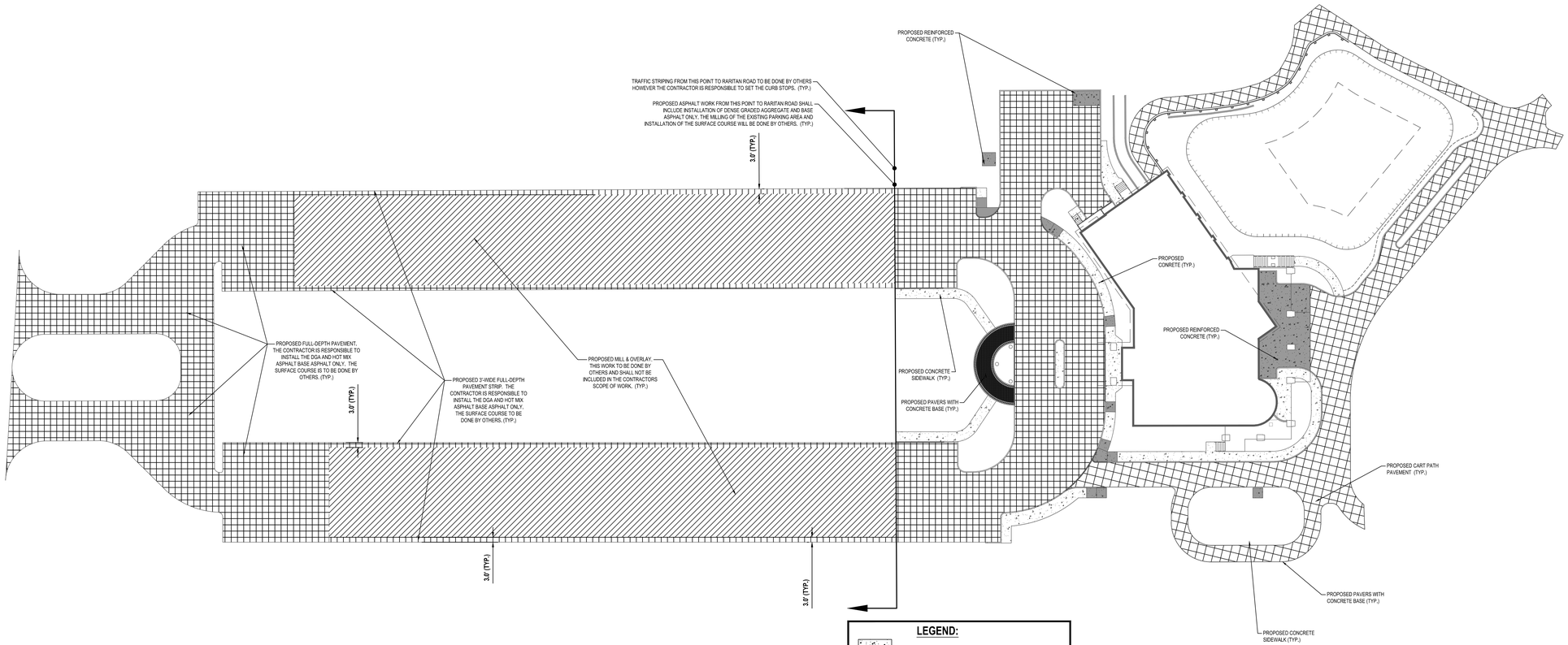
NORTH

N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.



LEGEND:

- CONCRETE
- REINFORCED CONCRETE
- PAVERS WITH CONCRETE BASE
- FULL-DEPTH PAVEMENT
- MILL & OVERLAY
- CART PATH

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
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TEL: (201) 939-8805
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

PAVEMENT PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	6 OF 22
DRWG NO	C-04.01

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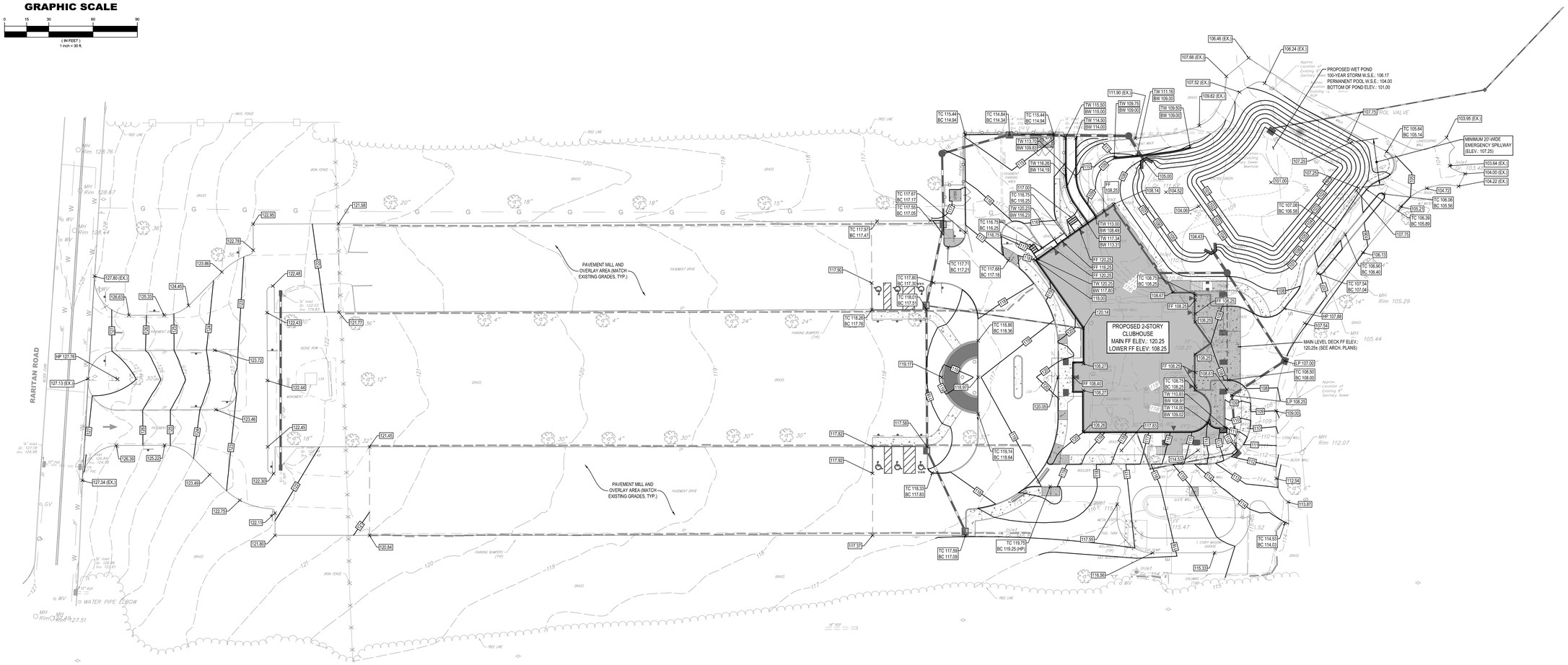
NORTH

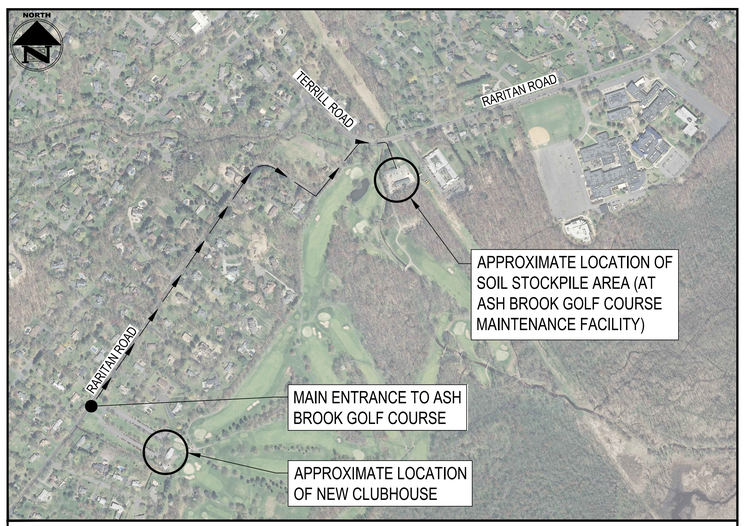
N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.





SOIL STOCKPILE LOCATION PLAN
SCALE: 1" = 500'

GRADING LEGEND

—117—	PROPOSED CONTOUR LINE
× TC 123.50 / BC 123.00	TOP / BOTTOM OF CURB ELEVATION
× TW 127.50 / BW 123.00	TOP / BOTTOM OF WALL ELEVATION
× HP 127.50	SPOT ELEVATION - HIGH POINT
× LP 127.50	SPOT ELEVATION - LOW POINT
× FF 127.50	SPOT ELEVATION - FINISHED FLOOR (AT DOOR)
× 127.50	SPOT ELEVATION

EARTHWORK NOTES

1. ALL SOILS EXCAVATED FROM THE SITE SHALL REMAIN ON THE ASH BROOK GOLF COURSE PROPERTY.
2. ALL SPOILS GENERATED BY THE DEMOLITION OR CONSTRUCTION OF THE IMPROVEMENTS SHOWN IN THESE DOCUMENTS SHALL BE HAULED TO THE DESIGNATED ON-SITE STOCKPILE LOCATION (SEE STOCKPILE LOCATION PLAN, THIS SHEET).
3. CONTRACTOR SHALL COORDINATE WITH THE UNION COUNTY DEPARTMENT OF PARKS WITH REGARDS TO THE SPECIFIC LOCATION OF THE SOIL STOCKPILE.

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

GRADING PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	7 OF 22
DRWG NO	C-05.00

M:\SCOTCH PLAINS\SCOTPRV16.010 NEW ASH BROOK CLUB HOUSE\CAD_FINAL SHEETS\05.00 - GRADING PLAN.DWG Plotted: Tuesday, February 21, 2017 2:41:40 PM

NORTH

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GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.

CONSTRUCT: OUTLET STRUCTURE-2
GR.: 99.95 (24" SQ. INLET GRATE W/ OPEN BOTTOM)
INV. IN (8" W): 98.68

CONSTRUCT: OUTLET CONTROL STRUCTURE-1
GR: 105.10 (TYPE 'E' GRATE)
(DOGHOUSE INLET ON EXIST. 12" RCP - TO BE FIELD-VERIFIED)
3"X3.8" RECT. ORIFICE ELEV.: 104.15
INV. OUT (12" SE): 104.0± (VERIFY IN FIELD)
INV. OUT (6" E): 101.00 (BASIN DRAIN LINE - CLOSED VALVE)

PROPOSED WET POND
100-YEAR STORM W.S.E.: 106.17
PERMANENT POOL W.S.E.: 104.00
BOTTOM OF POND ELEV.: 101.00

88 LF 6" HDPE @ 1.00% (BASIN DRAIN LINE)

148 LF 6" HDPE @ 1.00% (BASIN DRAIN LINE)

CONSTRUCT: MANHOLE-4
GR.: 103.00 (24" SQ. W/ SOLID COVER)
INV. IN (8" W): 99.54
INV. OUT (8" E): 99.54

MINIMUM 20'-WIDE EMERGENCY SPILLWAY (ELEV.: 107.25)

CONSTRUCT: MANHOLE-1
GR.: 112.10 (4' DIA. MH)
INV. IN (15" NW): 105.22
INV. OUT (15" S): 105.19

19 LF 15" RCP @ 1.00%

CONSTRUCT: HEADWALL-1
GR.: 105.00 (FOR 15" PIPE)
INV. IN (15" N): 105.00

81 LF 15" RCP @ 4.00%

CONSTRUCT: INLET-1
GR.: 114.34 (TYPE 'B')
INV. IN (12" W): 108.45
INV. OUT (15" SE): 108.45

47 LF 12" HDPE @ 1.00%

CONSTRUCT: MANHOLE-2
GR.: 116.12 (4' DIA. MH)
INV. IN (12" SW): 108.92
INV. OUT (12" E): 108.92

43 LF 12" HDPE @ 1.00%

CONSTRUCT: INLET-2
GR.: 116.63 (TYPE 'B')
INV. IN (12" SW): 111.62
INV. OUT (12" NE): 109.40

56 LF 12" HDPE @ 1.00%

CONSTRUCT: INLET-3
GR.: 117.49 (TYPE 'B')
INV. IN (12" SW): 112.39
INV. IN (8" SE): 115.00
INV. OUT (12" NE): 112.39

98 LF 12" HDPE @ 1.00%

CONSTRUCT: INLET-11
GR.: 122.03 (TYPE 'A')
INV. OUT (12" SW): 120.07

CONSTRUCT: INLET-10
GR.: 122.54 (TYPE 'A')
INV. IN (12" NE): 119.77
INV. OUT (12" SW): 119.77

60 LF 12" CL V RCP @ 0.50%

56 LF 12" RCP @ 0.50%

CONSTRUCT: INLET-9
GR.: 122.05 (TYPE 'A')
INV. IN (12" NE): 119.48
INV. OUT (12" SW): 119.48 (EXISTING)

CONSTRUCT: INLET-4
GR.: 117.61 (TYPE 'B')
INV. IN (12" S): 113.37
INV. OUT (12" NE): 113.37

61 LF 12" HDPE @ 1.00%

CONSTRUCT: INLET-5
GR.: 117.11 (TYPE 'B')
INV. OUT (12" N): 113.98

CONSTRUCT: ROOF DRAIN-2
GR.: 117.54 (SEE MEP PLANS)
INV. OUT (6" S): 114.54

26 LF 6" HDPE @ 3.53%

CONSTRUCT: CLEANOUT-3
GR.: 116.12 (SEE MEP PLANS)
INV. IN (6" N): 113.61
INV. OUT (6" E): 113.61

107 LF 6" HDPE @ 2.00%

46 LF 12" HDPE @ 1.00%

CONSTRUCT: ROOF DRAIN-1
GR.: 108.25 (SEE MEP PLANS)
INV. OUT (12" SE): 105.59

23 LF 4" SOLID WALL HDPE @ 2.00%

CONSTRUCT: TRENCH DRAIN-1 (END)
GR.: 107.97 (PROVIDE END COUPLER)
INV. IN (4" SW): 106.98
INV. OUT (4" NE): 106.98

PROPOSED 2-STORY CLUBHOUSE
MAIN FF ELEV.: 120.25
LOWER FF ELEV: 108.25

CONSTRUCT: ROOF DRAIN-5
GR.: 120.00 (SEE MEP PLANS)
INV. OUT (6" NW): 117.14

25 LF 4" HDPE SLOT DRAIN @ 0.50%

CONSTRUCT: TRENCH DRAIN-1 (LOW POINT)
GR.: 107.92 (MIDPOINT OF SLOT DRAIN)
INV. IN (4" SW): 107.11
INV. OUT (4" NE): 107.11

25 LF 4" HDPE SLOT DRAIN @ 0.50%

CONSTRUCT: TRENCH DRAIN-1
GR.: 107.56 (25 LF 4" SLOT DRAIN)
INV. OUT (4" NE): 107.23

CONSTRUCT: HEADWALL-2
GR.: 104.43 (FOR 15" PIPE)
INV. IN (15" S): 104.43

17 LF 15" RCP @ 1.00%

CONSTRUCT: MANHOLE-3
GR.: 107.93 (4' DIA. MH)
INV. IN (4" SW): 106.53
INV. IN (12" S): 104.60
INV. IN (12" NW): 105.13
INV. OUT (15" N): 104.60

71 LF 12" CL V RCP @ 0.50%

MAIN LEVEL DECK FF ELEV.: 120.25± (SEE ARCH. PLANS)

CONSTRUCT: INLET-6
GR.: 107.00 (TYPE 'E')
INV. IN (12" W): 104.95
INV. OUT (12" N): 104.95

43 LF 12" CL V RCP @ 1.13%

CONSTRUCT: INLET-7
GR.: 108.25 (24" SQ. YARD INLET)
INV. IN (12" SW): 105.44
INV. OUT (12" E): 105.44

39 LF 12" HDPE @ 8.42%

CONSTRUCT: INLET-8
GR.: 111.63 (TYPE 'B')
INV. IN (6" W): 108.73
INV. OUT (12" NE): 108.73

59 LF 6" HDPE @ 8.23%

RARITAN ROAD

POOL COVER

POOL

WATER JUMP ELBOW

DRAINAGE PLAN LEGEND

- TYPE 'A' INLET
- TYPE 'B' INLET
- TYPE 'E' INLET
- YARD INLET
- DRAINAGE MANHOLE
- DRAINAGE CLEANOUT / ROOF DRAIN CONNECTION
- DRAINAGE PIPE
- CONCRETE HEADWALL

NOT FOR CONSTRUCTION
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2-22-2017

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PROJECT:

NEW CLUB HOUSE
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SHEET CONTENTS:

DRAINAGE PLAN

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DATE	02.22.2017
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CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	8 OF 22
DRWG NO	C-06.00

M:\SCOTCH PLAINS\SCOTPRV16.010\NEW ASH BROOK CLUB HOUSE\CAD_FINAL SHEETS\06.00 - DRAINAGE PLAN.DWG Plotted: Tuesday, February 21, 2017 2:49:34 PM

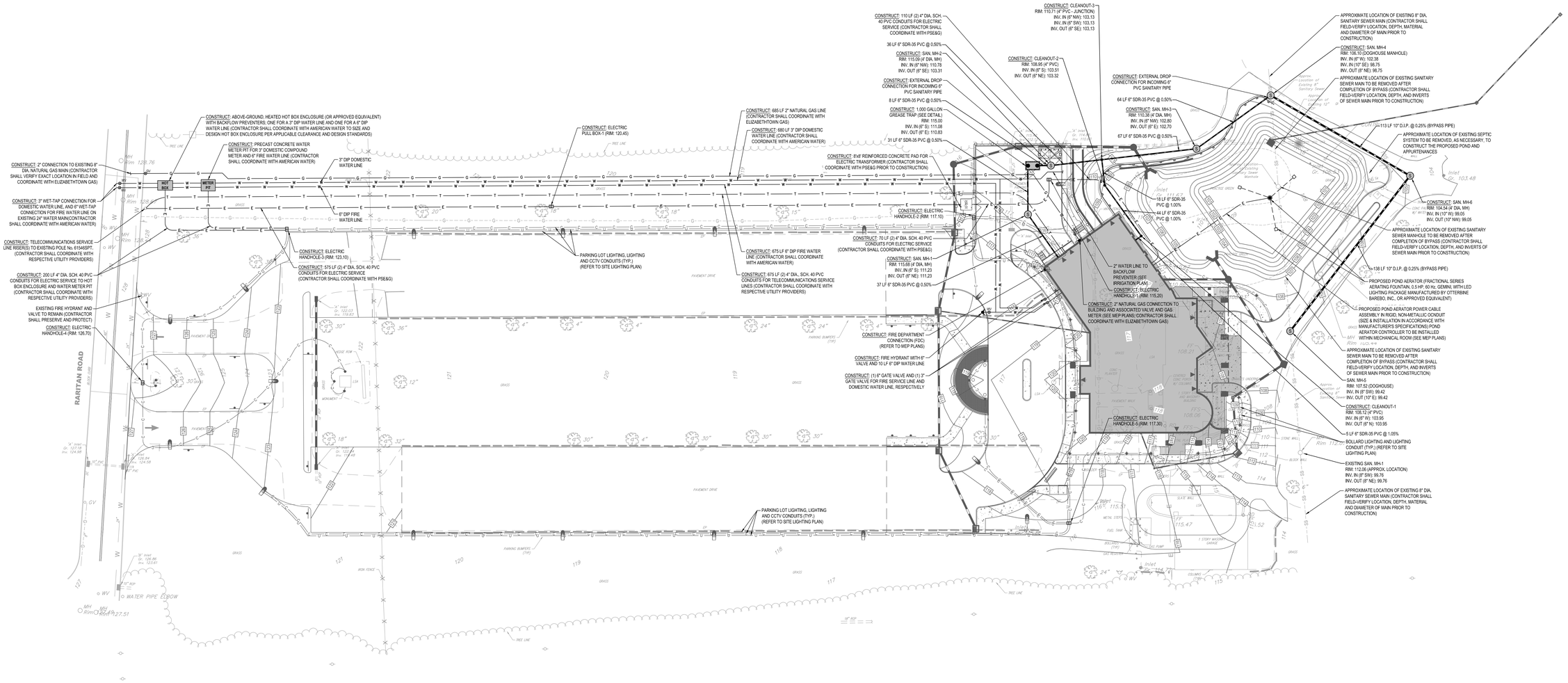
NORTH

N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.



GENERAL UTILITY NOTES:

1. REFER TO LIGHTING PLAN FOR SCHEMATIC CONDUIT AND HANDHOLE LAYOUT FOR SITE LIGHTING AND SECURITY CAMERA CONDUIT (CCTV).
2. SECURITY CAMERA (CCTV) LAYOUT AND CONSTRUCTION IS NOT INCLUDED IN THIS CONTRACT (BY OTHERS).
3. CONTRACTOR SHALL SIZE AND DESIGN ABOVE-GROUND HEATED ENCLOSURE FOR BACKFLOW PREVENTERS, AND BELOW-GROUND ENCLOSURE FOR METER PIT, IN ACCORDANCE WITH ALL APPLICABLE PLUMBING, CONSTRUCTION, AND OSHA REGULATIONS AND GUIDELINES. CONTRACTOR SHALL COORDINATE DESIGN OF THESE ENCLOSURES WITH RESPECTIVE UTILITY PROVIDERS. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENCLOSURES AND ALL ASSOCIATED APPURTENANCES PRIOR TO FABRICATION.

UTILITY PLAN LEGEND

- NATURAL GAS LINE
- ELECTRIC LINE (UNDERGROUND)
- WATER LINE
- CCTV LINE FOR SECURITY CAMERAS (BY OTHERS)
- SITE LIGHTING CONDUIT
- SANITARY SEWER PIPE
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- ELECTRIC / CCTV / LIGHTING HANDHOLE
- NATURAL GAS LINE VALVE
- WATER LINE VALVE
- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

UTILITY PLAN

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DATE	02.22.2017
SCALE	1" = 30'
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CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	9 OF 22
DRWG NO	C-07.00

M:\SCOTCH PLAINS\SCOTPRV16.010\NEW ASH BROOK CLUB HOUSE\CAD_FINAL SHEETS\07.00 - UTILITY PLAN.DWG Plotted: Tuesday, February 21, 2017 2:56:47 PM

NORTH

N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
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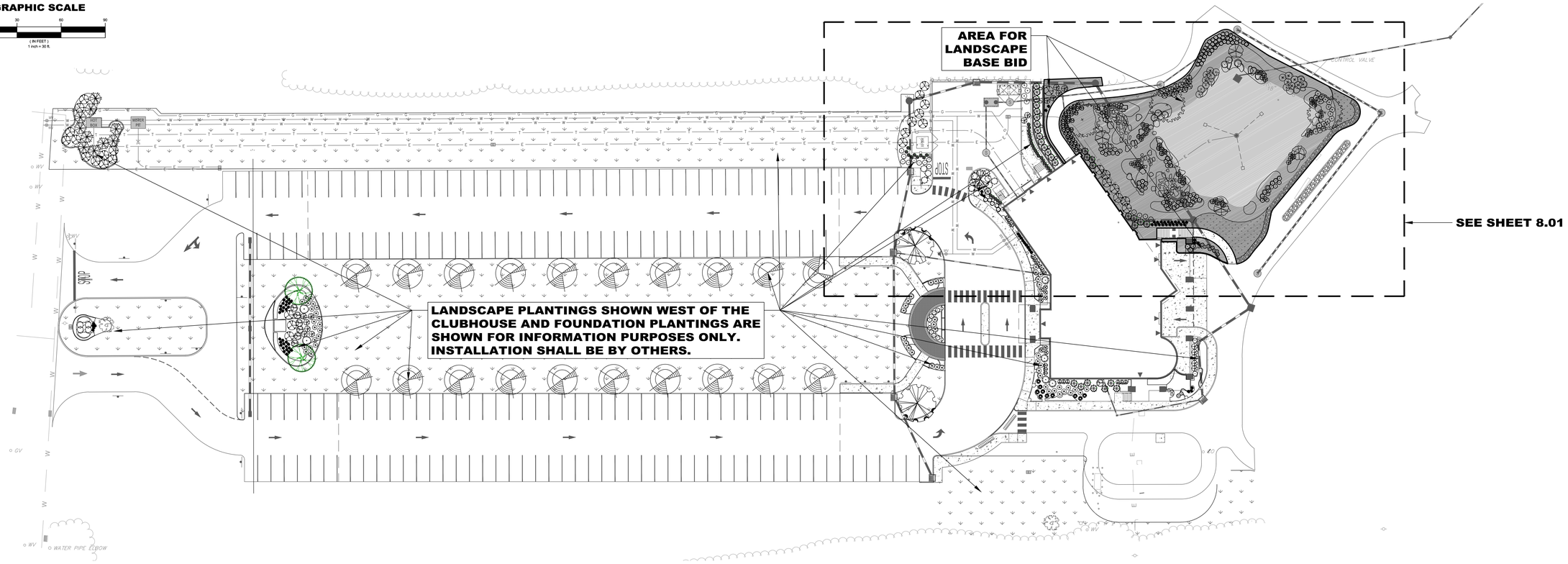

LANDSCAPE NOTES:

1. THE LANDSCAPING WITHIN THE RETENTION BASIN SHALL BE AN ALTERNATE BID.
2. THE LANDSCAPING OUTSIDE OF THE BASIN SHALL BE DONE BY OTHERS. THE CONTRACTOR SHALL ENSURE THOSE AREAS ARE LEFT FREE FROM CONSTRUCTION DEBRIS AND HAVE A MINIMUM OF 6" OF TOPSOIL INSTALLED. THE CONTRACTOR IS RESPONSIBLE TO BRING THE AREA TO FINISHED GRADE.

ALTERNATE BID

LANDSCAPE PLANTING SCHEDULE - RETENTION BASIN

Key	Quan.	Unit	Botanical Name	Common Name	Size	Spacing	Root	Remarks
Deciduous Trees								
AMCA	2	Unit	Amelanchier canadensis	Shadblow Servicebery	7'-8' ht.	as shown	B&B	
BEND	1	Unit	Betual nigra "Dura Heat'	Dura Heat River Birch	6'-8" ht.	as shown	B&B	
CECA	2	Unit	Cercis canadensis	Eastern Redbud	1.75"-2" cal.	as shown	B&B	Single stem
QUPA	2	Unit	Quercus palustrus	Pin Oak	2"-2.5" cal.	as shown	B&B	
Shrubs								
COSB	7	Unit	Cornus amomum	Silky Dogwwd	18"-24" ht.	2' o.c.	3 gal.	
SPTO	48	Unit	Spirea tomentosa	Steeplebush	18"-24" ht.	2.5' o.c.	3 gal.	
LIBE	24	Unit	Lindera benzoin	Spicebush	18"-24" ht.	2' o.c.	3 gal.	
COSK	63	Unit	Cornus sericea 'Kelsy's Dwarf'	Kelsey's Dwarf Redtwig Dogwood	15"-18"	2' o.c.	2 gal.	
FOSU	20	Unit	Forsythia suspensa	Weeping Forsythia	4'-5' ht.	as shown	5 gal.	
ILGS	27	Unit	Ilex glabra 'Shamrock'	Shamrock Inkberry Holly	18"-24" spr.	3' o.c.	B&B	Dense full to ground
ILVJ	3	Unit	Ilex virticillata 'Jim Dandy'	Jim Danady Winterberry	3-4' ht.	4.5' o.c.	B&B or cont.	
ILVR	8	Unit	Ilex virticillata 'Red Sprite'	Red Sprite Winterberry	24"-36" ht.	3' o.c.	B&B or cont.	
SPJL	40	Unit	Spriaea japoinica 'Little Princess'	Little Princess Spirea	15"-18" ht.	3' o.c.	2 gal.	
FOGM	14	Unit	Fothergilla gargenii 'Mount Airy'	Mount Airy Dwarf Fothergilla	18"-24" ht.	4' o.c.	3 gal.	
Grasses / Herbaceous Material								
ASCL	46	Unit	Asclepias incarnata	Swamp Milkweed	5' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
CACA	65	Unit	Calamagrostis canadensis	Bluejoint Grass	2' ht.	2' o.c.	1 gal.	
ELRI	71	Unit	Elmus riparius	Riverank Wild-rye	2' ht.	2' o.c.	1 gal.	
ERSP	221	Unit	Ergrostis spectabolis	Purple Love Grass	1' ht.	2' o.c.	1 gal.	Above elevation 106
EUCO	182	Unit	Eupatorium coelestinum	Blue Mistflower	1' ht.	2' o.c.	1 gal.	
EUMA	76	Unit	Eupatorium maculatum	Joe-Pye Weed	2' ht.	2' o.c.	1 gal.	
JUCA	41	Unit	Juncus canaadensis	Canada Rush	3' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
JUEF	11	Unit	Juncus effusus	Soft rush	3' ht.	2' o.c.	1 gal.	
LOCA	33	Unit	Lobelia cardinalis	Cardinal flower	1' ht.	2' o.c.	1 gal.	
POCO	30	Unit	Pontederia cordata	Pickerelweed	3' ht.	2' o.c.	1 gal.	Between elevations 103 and 104
RUFL	87	Unit	Rudbeckia fulgida	Orange Coneflower	2' ht.	2' o.c.	1 gal.	Above elevation 105
RULA	87	Unit	Rudbeckia lacinata	Cutleaf coneflower	4' ht.	2' o.c.	1 gal.	
SOCA	11	Unit	Solidago canadensis	Canada Goldenrod	3' ht.	2' o.c.	1 gal.	Above elevation 105
VEHA	53	Unit	Verbena Hastata	Blue Vervain	5' ht.	2' o.c.	1 gal.	Above elevation 104

NOTE:
SEE SHEET 10.08 FOR LANDSCAPE DETAILS AND LANDSCAPE NOTES.

RETENTION BASIN SEED MIXES

BASIN SLOPE MIX

Species	WIC	Percent of Mix
Andropogon virginicus	FACU	5.00%
Andropogon gerardii	FAC	8.00%
Asclepias syriaca	UPL	1.00%
Coreopsis lanceolata	FACU	1.00%
Echinacea purpurea	FACU	9.00%
Elymus virginicus	FACW	10.00%
Eupatorium purpureum	FAC	2.00%
Eupatorium coelestinum	FAC	1.00%
Euthamia graminifolia	FAC	1.00%
Heliopsis helianthoides	NI	8.00%
Monarda punctata	UPL	8.00%
Panicum virgatum	FAC	10.00%
Penstemon digitalis	FAC	2.00%
Rudbeckia hirta	FACU	15.00%
Schizachyrium scoparium	FACU	13.00%
Sorghastrum nutans	UPL	6.00%
		100%

RETENTION BASIN SEED MIXES SHALL BE AS SUPPLIED BY PINELANDS NURSERY & SUPPLY, 323 ISLAND ROAD, COLUMBUS, NJ 08022, (800) 667-2729, OR APPROVED EQUAL

WET SITE POLLINATOR MIX (BASIN FOREBAY FLOOR)

Species	WIC	Percent of Mix
Asclepias syriaca	UPL	2.00%
Carex crinita	OBL	2.00%
Carex lurida	OBL	6.00%
Carex stricta	OBL	3.00%
Carex vulpinoidea	OBL	4.00%
Echinacea purpurea	FACU	8.00%
Elymus virginicus	FACW	5.00%
Eupatorium purpureum	FAC	3.00%
Eupatorium coelestinum	FAC	3.00%
Heliopsis helianthoides	NI	9.00%
Iris veriscolor	OBL	1.00%
Juncus effusus	FACW	4.00%
Lobelia siphilitica	FACW	8.00%
Panicum virgatum	FAC	5.00%
Penstemon digitalis	FAC	4.00%
Rudbeckia hirta	FACU	9.00%
Schizachyrium scoparium	FACU	2.00%
Schoenoplectus atrovirens	OBL	1.00%
Schoenoplectus cyperinus	FACW	1.00%
Symphyotrichum novae-angliae	FACW	4.00%
Verbena hastata	FACW	8.00%
Vernonia noveboracensis	FACW	8.00%
		100%

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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(N.J.S.A. 45:8-56) GA 276890

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LICENSED LANDSCAPE ARCHITECT
N.J. LICENSE NO. 21AS00076500

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ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

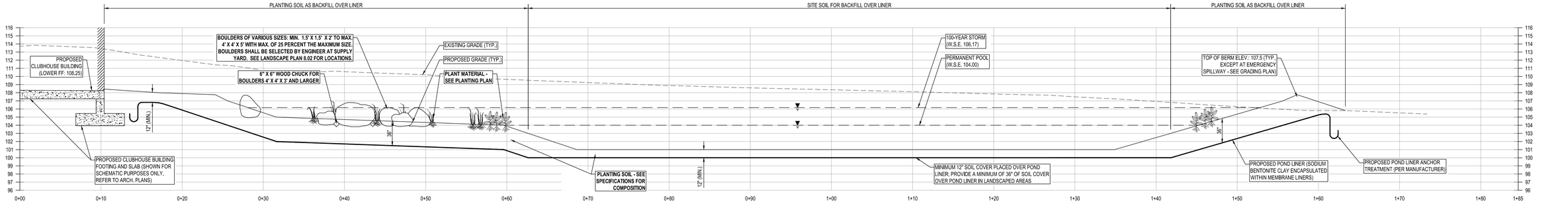
SHEET CONTENTS:

LANDSCAPE PLAN - OVERALL

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	10 OF 22
DRWG NO	**C-08.00**

M:\SCOTCH PLAINS\SCOTPRV16.010 \NEW ASH BROOK CLUB HOUSE\CADD_FINAL SHEETS\08.00 - LANDSCAPE PLAN - OVERALL.DWG Plotted: Tuesday, February 21, 2017 3:56:58 PM



TYPICAL POND CROSS-SECTION

SCALE: 1" = 5'

GRAPHIC SCALE

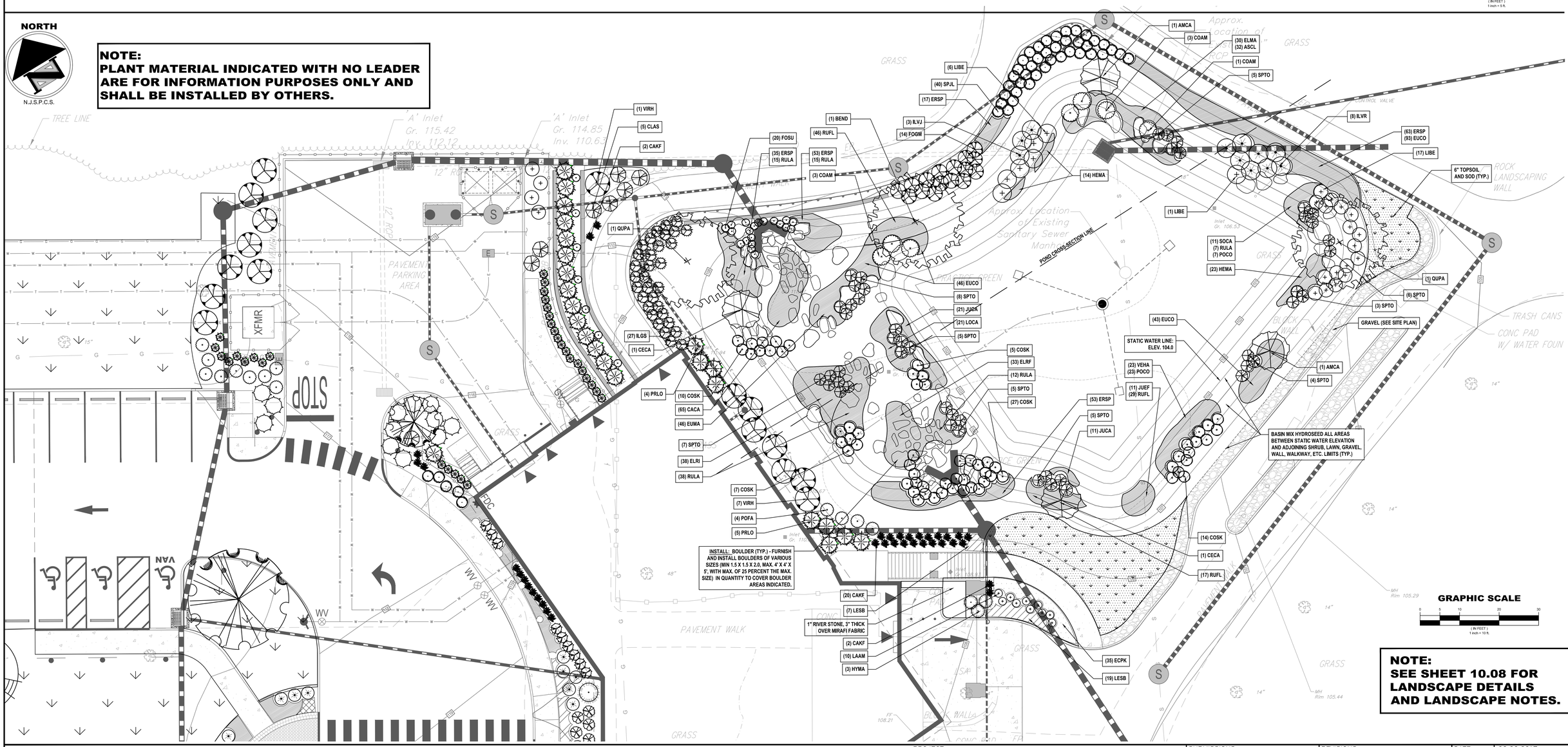
0 2.5 5 10 15

(IN FEET)
1 inch = 5 ft.

NORTH

N.J.S.P.C.S.

NOTE:
PLANT MATERIAL INDICATED WITH NO LEADER ARE FOR INFORMATION PURPOSES ONLY AND SHALL BE INSTALLED BY OTHERS.



GRAPHIC SCALE

0 5 10 20 30

(IN FEET)
1 inch = 10 ft.

NOTE:
SEE SHEET 10.08 FOR LANDSCAPE DETAILS AND LANDSCAPE NOTES.

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LANDSCAPE PLAN - POND ENLARGEMENT

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	11 OF 22
DRWG NO	C-08.01

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\08.01 - LANDSCAPE PLAN - ENLARGEMENTS.DWG Plotted: Tuesday, February 21, 2017 3:09:54 PM

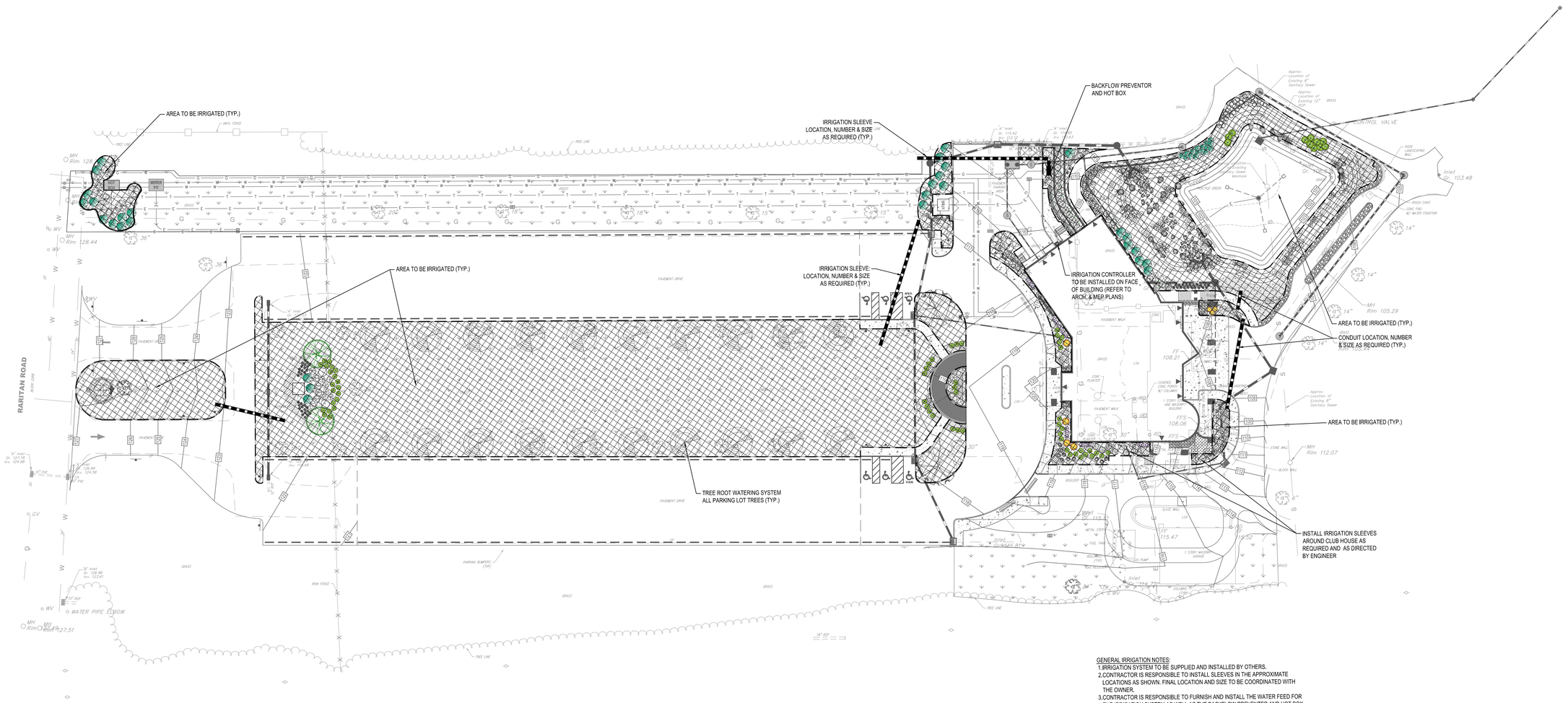
NORTH

N.J.S.P.C.S.

GRAPHIC SCALE

0 15 30 60 90

(IN FEET)
1 inch = 30 ft.



GENERAL IRRIGATION NOTES:

1. IRRIGATION SYSTEM TO BE SUPPLIED AND INSTALLED BY OTHERS.
2. CONTRACTOR IS RESPONSIBLE TO INSTALL SLEEVES IN THE APPROXIMATE LOCATIONS AS SHOWN. FINAL LOCATION AND SIZE TO BE COORDINATED WITH THE OWNER.
3. CONTRACTOR IS RESPONSIBLE TO FURNISH AND INSTALL THE WATER FEED FOR THE IRRIGATION SYSTEM AS WELL AS THE BACKFLOW PREVENTER AND HOT BOX.
4. SCHEMATIC IRRIGATION PLAN IS PROVIDED TO SHOW THE APPROXIMATE LOCATION OF SLEEVES AS WELL AS PROVIDE THE CONTRACTOR WITH GENERAL KNOWLEDGE OF COORDINATION WORK.

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

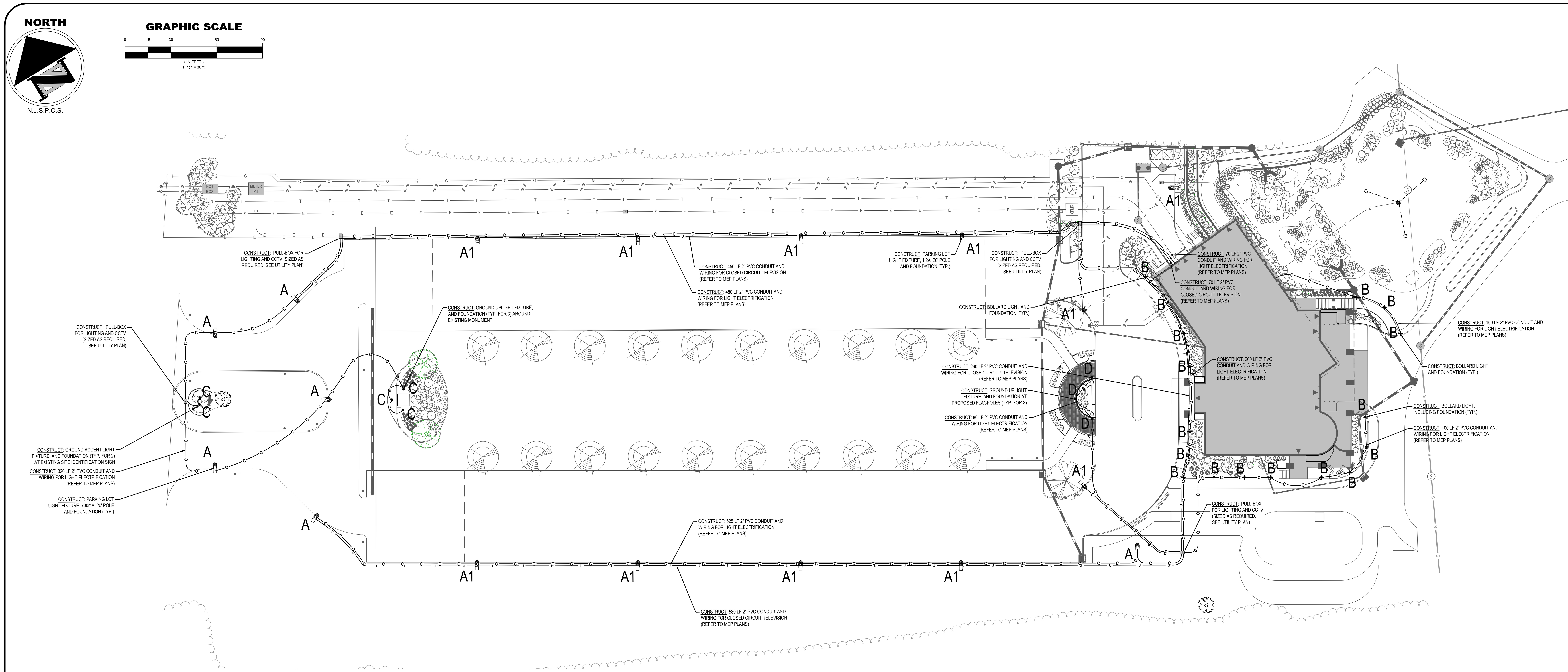
SHEET CONTENTS:

SCHEMATIC IRRIGATION PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	12 OF 22
DRWG NO	C-08.10

M:\SCOTCH PLAINS\SCOTPRV16.010\NEW ASH BROOK CLUB HOUSE\CAD_FINAL SHEETS\08.10 - SCHEMATIC IRRIGATION PLAN.DWG Plotted: Tuesday, February 21, 2017 4:01:54 PM



LIGHTING LEGEND

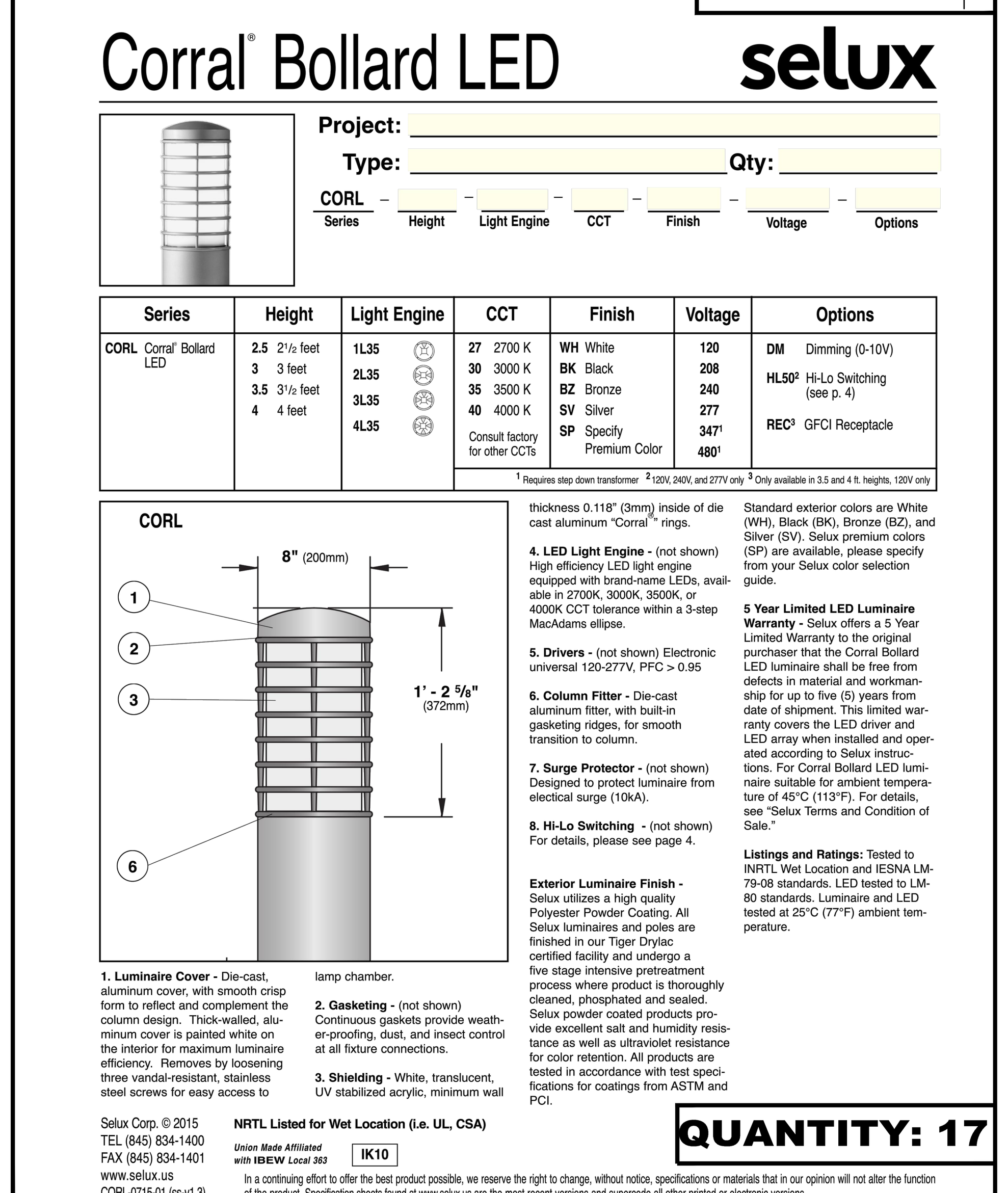
- PARKING LOT LIGHT POLE AND FIXTURE
- BOLLARD LIGHT
- UPLIGHT (GROUND-MOUNTED)
- LIGHTING CONDUIT (SEE MEP PLANS)
- CAMERA / CCTV CONDUIT (SEE MEP PLANS)

SYMBOL: A & A1

QUANTITY: 6 A & 11 A1

PARKING LOT LIGHT FIXTURE

SYMBOL: B



QUANTITY: 17

BOLLARD LIGHT FIXTURE

SYMBOL: C

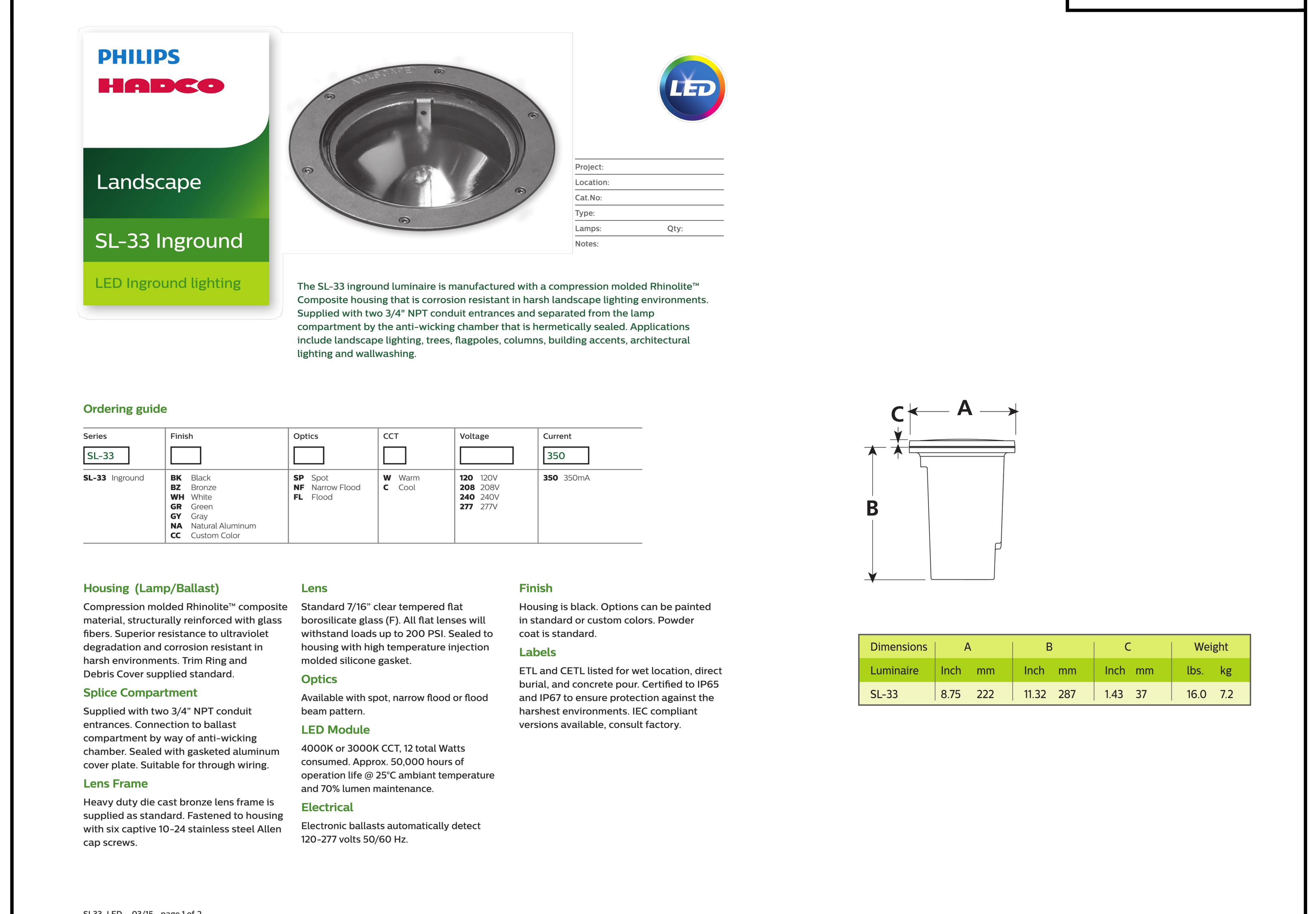
NOTES:

1. THIS UPLIGHT SHALL BE GROUND/SURFACE-MOUNTED AT THE EXISTING ASH BROOK GOLF COURSE MONUMENT ONLY - SEE FLAGPOLE UPLIGHT INFORMATION FOR UPLIGHTS AT PROPOSED FLAGPOLE ARRAY.
2. 120 VOLT, 12 WATT INTEGRATED LED CAST ALUMINUM DIRECTIONAL SPOT LIGHT, MANUFACTURED BY DABMAR (MODEL No. DPR-LED18), OR APPROVED EQUIVALENT
3. VOLTAGE: 120 - 277 V
4. BULB TYPE: INTEGRATED CHIP ON BOARD PANEL
5. POWER DRAW: 12 W
6. LIGHT OUTPUT: 1814 LUMENS
7. COLOR TEMP.: COOL WHITE 5000K
8. BEAM ANGLE: 120 DEGREES
9. WIRING: 6" LEAD
10. LENS: CLEAR TEMPERED GLASS
11. DIMENSIONS: 8.25" x 4" x 8"
12. UL APPROVED

QUANTITY: 5

MONUMENT UPLIGHT FIXTURE

SYMBOL: D



QUANTITY: 3

IN-GROUND FLAGPOLE UPLIGHT FIXTURE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

SITE LIGHTING PLAN

SUBMISSIONS	
DATE	DESCRIPTION
10.03.16	100% ISSUE
10.17.16	BID SET
02.22.17	REBID SET

REVISIONS	
DATE	DESCRIPTION

DATE	02.22.2017
SCALE	1" = 30'
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	13 OF 22
DRWG NO	C-09.00

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)

DUST CONTROL NOTES

DEFINITION
THE CONTROL OF DUST ON CONSTRUCTION SITES AND ROADS.

PURPOSE
TO PREVENT BLOWING AND MOVEMENT OF DUST FROM EXPOSED SOIL SURFACES, REDUCE ON- AND OFF-SITE DAMAGE AND HEALTH HAZARDS, AND IMPROVE TRAFFIC SAFETY.

WHERE APPLICABLE
THIS PRACTICE IS APPLICABLE TO AREAS SUBJECT TO DUST BLOWING AND MOVEMENT WHERE ON- AND OFF-SITE DAMAGE IS LIKELY WITHOUT TREATMENT. CONSULT WITH LOCAL MUNICIPAL ORDINANCES ON ANY RESTRICTIONS.

WATER QUALITY ENHANCEMENT
SEDIMENTS DEPOSITED AS "DUST" ARE OFTEN FINE COLLOIDAL MATERIAL WHICH IS EXTREMELY DIFFICULT TO REMOVE FROM WATER ONCE IT BECOMES SUSPENDED. USE OF THIS STANDARD WILL HELP TO CONTROL THE GENERATION OF DUST FROM CONSTRUCTION SITES AND SUBSEQUENT BLOWING AND DEPOSITION INTO LOCAL SURFACE WATER RESOURCES.

PLANNING CRITERIA
THE FOLLOWING METHODS SHOULD BE CONSIDERED FOR CONTROLLING DUST.
MULCHES - SEE STANDARDS FOR STABILIZATION WITH MULCHES ONLY (p. 5-1).
VEGETATIVE COVER - SEE STANDARDS FOR: TEMPORARY VEGETATIVE COVER (p. 7-1), PERMANENT VEGETATIVE COVER (p. 4-1), AND PERMANENT STABILIZATION WITH SOD (p. 6-1).
SPRAY-ON ADHESIVES - ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS), KEEP TRAFFIC OFF THESE AREAS.

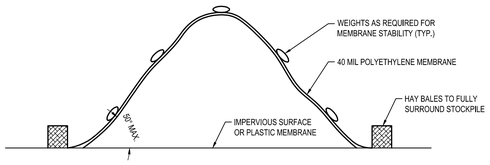
DUST CONTROL MATERIALS

	WATER DILUTION	TYPE OF NOZZLE	APPLY GALLON/ACRE
ANIONIC ASPHALT EMULSION	7:1	COARSE SPRAY	1,200
LATEX EMULSION	12.5:1	FINE SPRAY	235
RESIN IN WATER	4:1	FINE SPRAY	300
POLYACRYLAMIDE (PAM) - SPRAY ON POLYACRYLAMIDE (PAM) - DRY SPREAD	APPLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS. MAY ALSO BE USED AS AN ADDITIVE TO SEDIMENT BASINS TO FLOCCULATE AND PRECIPITATE SUSPENDED COLLOIDS. SEE SEDIMENT BASIN STANDARD, p. 26-1		
ACIDULATED SOY BEAN SOAP STICK	NONE	COARSE SPRAY	1,200

TILLAGE - TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART, AND SPRING-TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
SPRINKLING - SITE IS SPRINKLED UNTIL THE SURFACE IS WET.
BARRIERS - SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.
CALCIUM CHLORIDE - SHALL BE IN THE FORM OF LOOSE, DRY GRANULES OR FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS OR ACCUMULATION AROUND PLANTS.
STONE - COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

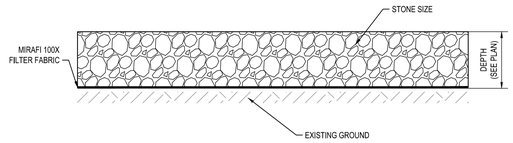
SOMERSET-UNION COUNTY SOIL CONSERVATION DISTRICT
SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN 30 DAYS AND NOT SUBJECT TO CONSTRUCTION TRAFFIC WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
3. PERMANENT VEGETATION SHALL BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. MULCH WILL BE USED FOR PROTECTION UNTIL SEEDING IS ESTABLISHED.
4. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STATE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY.
5. A SUB-BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS IN ORDER TO STABILIZE STREETS, ROADS, DRIVEWAYS AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB-BASE SHALL BE INSTALLED WITHIN 15 DAYS OF PRELIMINARY GRADING.
6. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES, ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF TWO (20) TONS PER ACRE, ACCORDING TO THE STATE STANDARDS.
7. ANY STEEP SLOPES RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION PROCEEDS (I.E. SLOPES GREATER THAN 3:1).
8. TRAFFIC CONTROL STANDARDS REQUIRE THE INSTALLATION OF A 100'X30'X1' PAD OF 1 1/2" OR 2" STONE, AT ALL CONSTRUCTION DRIVEWAYS, IMMEDIATELY AFTER INITIAL SITE DISTURBANCE.
9. THE SOMERSET-UNION SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED IN WRITING 48 HOURS IN ADVANCE OF ANY LAND DISTURBING ACTIVITY.
10. AT THE TIME WHEN THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER, SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON-VEGETATIVE MEANS OR PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
11. IN THAT NJSA 4:24-39 ET SEQ., REQUIRES THAT NO CERTIFICATE OF OCCUPANCY BE ISSUED BEFORE THE PROVISIONS OF THE CERTIFIED PLAN FOR SOIL EROSION AND SEDIMENT CONTROL HAVE BEEN COMPLIED WITH FOR PERMANENT MEASURES, ALL SITE WORK FOR SITE PLANS AND ALL WORK AROUND INDIVIDUAL LOTS IN SUBDIVISIONS, WILL HAVE TO BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
12. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONS.
13. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLAN WILL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RECERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
14. THE SOMERSET-UNION SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED OF ANY CHANGES IN OWNERSHIP.
15. MULCHING IN THE STANDARDS IS REQUIRED FOR OBTAINING A CONDITIONAL REPORT OF COMPLIANCE. CONDITIONS ARE ONLY ISSUED WHEN THE SEASON PROHIBITS SEEDING.
16. THE CONTRACTOR IS RESPONSIBLE FOR KEEPING ALL ADJACENT ROADS CLEAN DURING THE LIFE OF THE CONSTRUCTION PROJECT.
17. THE DEVELOPER SHALL BE RESPONSIBLE FOR REMEDIATING ANY EROSION OR SEDIMENT PROBLEMS THAT ARISE AS A RESULT OF ONGOING CONSTRUCTION AT THE REQUEST OF THE SOMERSET-UNION SOIL CONSERVATION DISTRICT.
18. HYDROSEEDING IS A TWO-STEP PROCESS. THE FIRST STEP INCLUDES SEED, FERTILIZER, LIME, ETC., ALONG WITH MINIMAL AMOUNTS OF MULCH TO PROMOTE CONSISTENCY, GOOD SEED TO SOIL CONTACT, AND GIVE A VISUAL INDICATION OF COVERAGE. UPON COMPLETION OF THE SEEDING OPERATION, HYDRO-MULCH SHOULD BE APPLIED AT A RATE OF 1500 LBS. PER ACRE IN THE SECOND STEP. THE USE OF HYDRO-MULCH AS OPPOSED TO STRAW, IS LIMITED TO OPTIMUM SEEDING DATES AS LISTED IN THE STANDARDS.



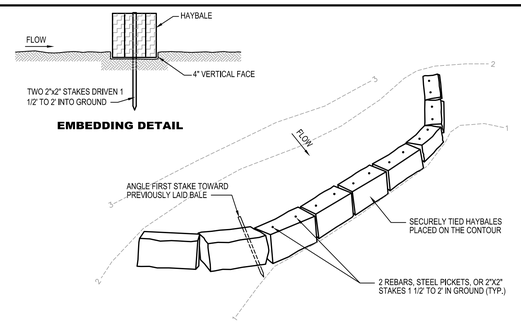
NOTES:
1. FOR NON-CONTAMINATED SOIL, SURROUND STOCKPILE WITH SILT FENCE. NO COVER REQUIRED

SOIL STOCKPILE
NOT TO SCALE

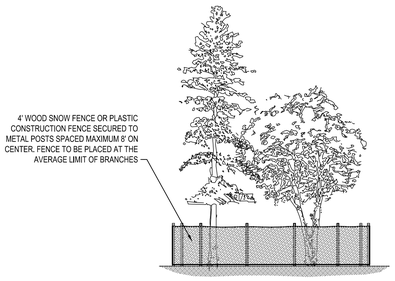


NOTES:
1. APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION. ENTRANCE AND PUBLIC R.O.W. MUST BE PROVIDED.
2. THE RATIO OF STONE SIZE TO WIDTH MUST BE 9:27.

STABILIZED CONSTRUCTION ACCESS
NOT TO SCALE

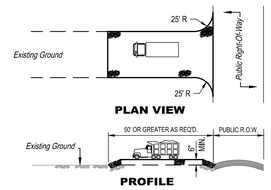


BALE SEDIMENT BARRIER
NOT TO SCALE



NOTES:
1. CONSTRUCTION EQUIPMENT OF ANY KIND IS TO BE PROHIBITED FROM DRIVING AND/OR PARKING UNDER TREES. THE STOCKPILE OF CONSTRUCTION MATERIAL SHALL BE PROHIBITED FROM BEING STORED UNDER ANY TREES.

TREE PROTECTION
NOT TO SCALE

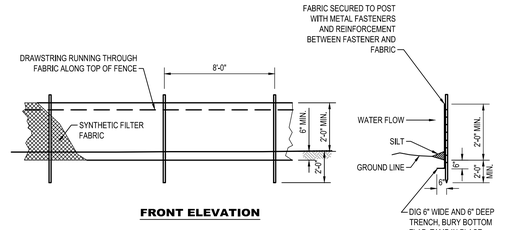


NOTES:
1. PLACE STABILIZED CONSTRUCTION ENTRANCE AT LOCATION(S) AS SHOWN ON THE SOIL EROSION AND SEDIMENT CONTROL PLAN.
2. STONE SIZE SHALL BE ASTM C-33, SIZE NO.2 OR 3, CRUSHED STONE.
3. THE THICKNESS OF THE STABILIZED CONSTRUCTION ENTRANCE SHALL NOT BE LESS THAN 6".
4. THE WIDTH AT THE EXIST. PAVEMENT SHALL NOT BE LESS THAN THE FULL WIDTH OF POINTS OF INGRESS AND EGRESS.
5. THE STAB. CONST. ENT. SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE R.O.W./PAVEMENT. THIS REQUIRES PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT.
6. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY.
7. APPROPRIATE TRANSITION BETWEEN STAB. CONST. ENT. & PUBLIC R.O.W. MUST BE PROVIDED.
8. THE RATIO OF STONE SIZE TO WIDTH MUST BE 9:27.

PERCENT SLOPE OF ROADWAY	LENGTH OF STONE REQUIRED	
	COARSE GRAINED SOILS	FINED GRAINED SOILS
0 TO 2%	50 FT.	100 FT.
2 TO 5%	100 FT.	200 FT.
>5%	ENTIRE SURFACE STABILIZED WITH FABC BASE COURSE*	

* AS PRESCIBED BY LOCAL ORDINANCE OR OTHER GOVERNING AUTHORITY.

STABILIZED CONSTRUCTION ACCESS
NOT TO SCALE



FILTER FENCE
NOT TO SCALE

INLET PROTECTION STANDARDS

DEFINITION
A TEMPORARY BARRIER AND SETTLING FACILITY INSTALLED AT A STORM SEWER INLET.

PURPOSE
THE PURPOSE OF STORM SEWER INLET PROTECTION IS TO INTERCEPT AND RETAIN SEDIMENT, THUS PREVENTING THE ENTRANCE OF SEDIMENT INTO THE STORM SEWER SYSTEM.

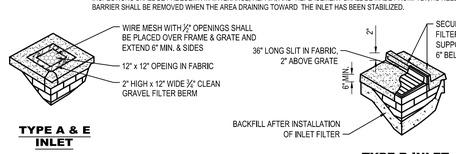
CONDITIONS WHERE PRACTICE APPLIES
1. CONTRIBUTING DRAINAGE AREA IS 3 ACRES OR LESS.
2. A STORM SEWER OR THE OUTLET CHANNEL OF A STORM SEWER NEEDS PROTECTION FROM SEDIMENT.
3. TRAFFIC WILL NOT DESTROY OR CAUSE CONSTANT MAINTENANCE OF THE STORM SEWER INLET PROTECTION.
4. A TRAFFIC HAZARD WILL NOT BE CREATED.
5. A FLOODING PROBLEM WILL NOT BE CREATED.

WATER QUALITY ENHANCEMENT
THE PRIMARY BENEFITT TO WATER QUALITY IS REMOVAL OF SEDIMENT FROM STORMWATER RUNOFF PRIOR TO ENTERING THE STORM SEWER SYSTEM. AS AN ADDED BENEFIT, OTHER FLOATABLE DEBRIS, SUCH AS VEGETATIVE MATTER AND LITTER MAY ALSO BE FILTERED OUT OF THE RUNOFF.

DESIGN CRITERIA
THE FOLLOWING APPLIES TO ALL METHODS OF STORM SEWER INLET PROTECTION:
1. MUST SLOW THE STORM WATER, PROVIDE THE COARSE SEDIMENT PARTICLES A CHANCE TO SETTLE, AND PROVIDE AN AREA TO RETAIN THE PARTICLES THAT HAVE SETTLED.
2. IN ALL CASES, THE INLET PROTECTION SHOULD NOT COMPLETELY CLOSE OFF THE INLET.
3. THE PROTECTION DEVICE WILL BE DESIGNED TO CAPTURE OR FILTER RUNOFF FROM THE 1 YEAR, 24 HOUR STORM EVENT AND SHALL SAFELY CONVEY HIGHER FLOWS DIRECTLY INTO THE STORM SEWER SYSTEM.

OTHER METHODS THAT ACCOMPLISH THE PURPOSE OF STORM SEWER INLET PROTECTION MAY BE USED IF APPROVED BY THE SOIL CONSERVATION DISTRICT.

INSPECTIONS SHALL BE FREQUENT. MAINTENANCE, REPAIR, AND REPLACEMENT SHALL BE MADE PROMPTLY, AS NEEDED. THE BARRIER SHALL BE REMOVED WHEN THE AREA DRAINING TOWARD THE INLET HAS BEEN STABILIZED.



NOTES:
1. CONTRACTOR IS TO INSPECT INLET FILTER AFTER EVERY STORM, AND CLEAN OR REPLACE AS REQUIRED
2. CONTRACTOR IS TO REMOVE FABRIC AND MESH JUST PRIOR TO PAVING
3. FILTER FABRIC SHALL BE "MIRAFI 700X" TYPE OR APPROVED EQUAL
4. INLET FILTER SHALL FILTER RUNOFF FROM THE 1 YEAR 24 HOUR STORM EVENT AND SHALL SAFELY CONVEY HIGHER FLOWS DIRECTLY INTO STORM SEWER SYSTEM.

INLET FILTER & PROTECTION
NOT TO SCALE

SEEDING SPECIFICATIONS

A. SELECT A MIXTURE FROM TABLE 4-3 (PG. 4-7) OR USE MIXTURE RECOMMENDED BY RUTGERS COOPERATIVE EXTENSION OR NATURAL RESOURCES CONSERVATION SERVICE WHICH IS APPROVED BY THE SOIL CONSERVATION DISTRICT. SEED GERMINATION SHALL HAVE BEEN TESTED WITHIN 12 MONTHS OF THE PLANTING DATE. NO SEED SHALL BE ACCEPTED WITH A GERMINATION TEST DATE MORE THAN 12 MONTHS OLD UNLESS RETESTED.
1. SEEDING RATES SPECIFIED ARE REQUIRED WHEN A REPORT OF COMPLIANCE IS REQUESTED PRIOR TO ACTUAL ESTABLISHMENT OF PERMANENT VEGETATION. UP TO 50% REDUCTION IN RATES MAY BE USED WHEN PERMANENT VEGETATION IS ESTABLISHED PRIOR TO A REPORT OF COMPLIANCE INSPECTION. THESE RATES APPLY TO ALL METHODS OF SEEDING. ESTABLISHING PERMANENT VEGETATION MEANS 80% VEGETATIVE COVERAGE WITH THE SPECIFIED SEED MIXTURE FOR THE SEEDED AREA AND MOWED ONCE.
2. WARM SEASON MIXTURES ARE GRASSES AND LEGUMES WHICH MAXIMIZE GROWTH AT HIGH TEMPERATURES, GENERALLY 850 F AND ABOVE. SEE TABLE 4-3 (PG.4-7). MIXTURES I TO 7. PLANTING RATES FOR WARM SEASON GRASSES SHALL BE THE AMOUNT OF PURE LIVE SEED (PLS) AS DETERMINED BY GERMINATION TESTING RESULTS.
3. COOL SEASON MIXTURES ARE GRASSES AND LEGUMES WHICH MAXIMIZE GROWTH AT TEMPERATURES BELOW 85?F. MANY GRASSES BECOME ACTIVE AT 65?F. SEE TABLE 3, MIXTURES 8-20, ADJUSTMENT OF PLANTING RATES TO COMPENSATE FOR THE AMOUNT OF PURE LIVE SEED IS NOT REQUIRED FOR COOL SEASON GRASSES.

B. CONVENTIONAL SEEDING IS PERFORMED BY APPLYING SEED UNIFORMLY BY HAND, CYCLONE (CENTRIFUGAL) SEEDER, DROP SEEDER, DRILL OR CULTIPACKER SEEDER. EXCEPT FOR DRILLED, HYDROSEEDED OR CULTIPACKED SEEDINGS, SEED SHALL BE INCORPORATED INTO THE SOIL WITHIN 24 HOURS OF SEEDBED PREPARATION TO A DEPTH OF 1/4 TO 1/2 INCH, BY RAKING OR DRAGGING. DEPTH OF SEED PLACEMENT MAY BE 1/4 INCH DEEPER ON COARSE TEXTURED SOIL.

C. HYDROSEEDING IS A BROADCAST SEEDING METHOD USUALLY INVOLVING A TRUCK OR TRAILER MOUNTED TANK, WITH AN AGITATION SYSTEM AND HYDRAULIC PUMP FOR MIXING SEED, WATER AND FERTILIZER AND SPRAYING THE MIX ONTO THE PREPARED SEEDBED. MULCH SHALL NOT BE INCLUDED IN THE TANK WITH SEED. SHORT FIBERED MULCH MAY BE APPLIED WITH A HYDROSEEDER FOLLOWING SEEDING. (ALSO SEE SECTION IV MULCHING BELOW) HYDROSEEDING IS NOT A PREFERRED SEEDING METHOD BECAUSE SEED AND FERTILIZER ARE APPLIED TO THE SURFACE AND NOT INCORPORATED INTO THE SOIL. POOR SEED TO SOIL CONTACT OCCURS REDUCING SEED GERMINATION AND GROWTH. HYDOSEEDING MAY BE USED FOR AREAS TOO STEEP FOR CONVENTIONAL EQUIPMENT TO TRAVERSE OR TOO OBSTRUCTED WITH ROCKS, STUMPS, ETC.

D. AFTER SEEDING, FIRMING THE SOIL WITH A CORRUGATED ROLLER WILL ASSURE GOOD SEED-TO-SOIL CONTACT, RESTORE CAPILLARITY, AND IMPROVE SEEDLING EMERGENCE. THIS IS THE PREFERRED METHOD. WHEN PERFORMED ON THE CONTOUR, SHEET EROSION WILL BE MINIMIZED AND WATER CONVERSATION ON SITE WILL BE MAXIMIZED.

E. TEMPORARY SEEDING: TEMPORARY VEGETATIVE COVER SHALL CONSIST OF PERENNIAL RYEGRASS APPLIED UNIFORMLY AT A RATE OF 1.0 POUND PER 1,000 SQ. FT. (40 lbs/Ac.). IN ACCORDANCE WITH TABLE 7-2, PAGE 7-3, LIMESTONE (PULVERIZED DOLOMITIC EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDES) SHALL BE APPLIED AT THE RATE OF 45 LBS./1,000 SQ. FT. (1 TON/ACRE) IN ACCORDANCE WITH TABLE 7-1, PAGE 7.2. FERTILIZER (10-20-10 OR EQUIVALENT) AT THE RATE OF 11 lbs/1,000 SQ. FT. (500 lbs./Ac.) OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN, IN ACCORDANCE WITH PARAGRAPH 2A, PAGE 7-1.

F. MULCHING IS REQUIRED ON ALL SEEDING SHALL BE ACCOMPLISHED AS FOLLOWS:
1. MULCH MATERIALS SHOULD BE UNROTTED SALT HAY, HAY, OR SMALL GRAIN STRAW AT A RATE OF 1.5 TO 2.0 TONS PER ACRE, OR 70 TO 90 POUNDS PER 1,000 SQUARE FEET. MULCH BLOWERS SHOULD NOT GRIND OR CHOP THE MATERIAL.
2. SPREAD UNIFORMLY BY HAND OR MECHANICALLY SO THAT APPROXIMATELY 85% OF THE SOIL SURFACE WILL BE COVERED. FOR UNIFORM DISTRIBUTION OF HAND-SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1,000-SQUARE-FOOT SECTIONS AND DISTRIBUTE 70 TO 90 LBS. WITHIN EACH SECTION.
3. MULCH ANCHORING SHALL BE ACCOMPLISHED USING EITHER PEG AND TWINE, MULCH NETTING, MULCH-ANCHORING COULTER TOOL OR LIQUID MULCH BINDERS, PER THE ACCOMPANYING "STABILIZATION WITH MULCH ONLY" SPECIFICATION. * OPTIMUM SEEDING DATES: 03/01 - 05/15 AND 08/15 - 10/01

G. PERMANENT SEEDING
1. TOPSOIL TO BE PLACED TO A DEPTH OF 4 INCHES ON EXPOSED SOILS UPON COMPLETION OF FINAL GRADING.
2. SEED IS TO BE UNIFORMLY APPLIED TO THE NORMAL DEPTH OF 1/4-INCH TO 1/2-INCH (EXCEPT HYDROSEEDING). ZONE 6b SEED MIXTURE 17, AS SHOWN ON PAGE 4-12 IN THE SOIL EROSION STANDARDS. THE SEEDING RATE SHALL BE:

SEED MIXTURE	PLANTING RATE LBS PER ACRE	PLANTING RATE LBS PER 1,000 SF
HARD FESCUE	120	2.7
CREEPING FESCUE	30	0.7
PERENIAL RYEGRASS	10	0.25

*OPTIMAL SEEDING DATES: 3/1 - 4/30 AND 8/15 - 10/15

3. MULCHING WILL BE ACCOMPLISHED PER THE BELOW TEMPORARY SEEDING SPECIFICATION (MAY BE PLANTED THROUGHOUT SUMMER IF SOIL MOISTURE IS ADEQUATE OR SOIL CAN BE IRRIGATED).

H. SOIL PREPARATION
1. SUITABLE EQUIPMENT WILL BE USED TO PREPARE A REASONABLE, UNIFORM, FINE SEED BED TO A MINIMUM DEPTH OF 4 INCHES.
2. APPLY GROUND LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS. FERTILIZER SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE OR 11 POUNDS PER 1,000 SQUARE FEET USING 10-20-10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN UNLESS A SOIL TEST INDICATES OTHERWISE. LIME SHALL BE PULVERIZED DOLOMITIC LIMESTONE. CALCIUM CARBONATE IS THE EQUIVALENT AND STANDARD FOR MEASURING THE ABILITY OF LIMING MATERIALS TO NEUTRALIZE SOIL ACIDITY AND SUPPLY CALCIUM AND MAGNESIUM TO GRASSES AND LEGUMES. THE FOLLOWING TABLE IS A GENERAL GUIDELINE FOR LIMESTONE APPLICATION RATES:

SOIL TEXTURE	TONS/ACRE	LBS./1000 SQ. FT.
CLAY, CLAY LOAM, & HIGHLY ORGANIC SOIL	3	135
SANDY LOAM, LOAM, SILT LOAM	2	90
LOAMY SAND, SAND	1	45

3. WORK LIME AND FERTILIZER INTO THE TOPSOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH A DISC, SPRINGTOOTH HARROW, OR OTHER SUITABLE EQUIPMENT.

SEQUENCE OF CONSTRUCTION

ACTIVITY		APPROXIMATE DURATION, (days)
1.	INSTALL CONSTRUCTION ENTRANCE.	1
2.	INSTALL SEDIMENT CONTROL MEASURES AND TREE PROTECTION FENCE.	5
3.	CONSTRUCT TEMPORARY ACCESS DRIVEWAY CONNECTION	5
4.	DEMOLISH EXISTING BUILDING, CART BARN & SITE FEATURES.	20
5.	EXCAVATE & STABILIZE POND WITH LINER & HAYBALES.	10
6.	INSTALL STORM & UTILITY INFRASTRUCTURES (INCLUDING FABC AS-BUILTS).	30
7.	ROUGH GRADING OF BUILDING & SITE AREA.	10
8.	CONSTRUCT BUILDING.	270
9.	BEGIN FINAL GRADING.	20
10.	INSTALL CURBS AFTER UNDERGROUND UTILITIES.	10
11.	MILL & RESURFACE EXISTING PARKING LOT.	5
12.	INSTALL LIGHTING & LANDSCAPE IMPROVEMENTS.	20
13.	TOPSOIL, SEED & MULCH AS SITE AREAS COMPLETED.	5
14.	REMOVE SOIL EROSION & SEDIMENT CONTROL MEASURES.	2
	TOTAL:	413

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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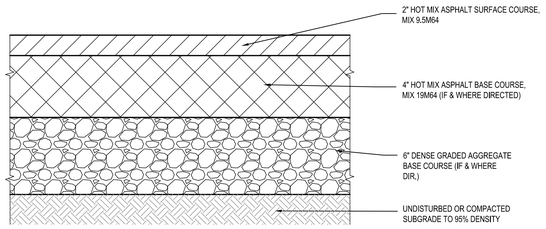
PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

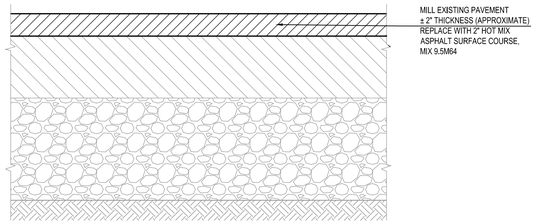
SHEET CONTENTS:
SOIL EROSION & SEDIMENT CONTROL DETAILS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE	12.01.16	REV'D PER SUSCD LTR.	SCALE	N.T.S.
10.17.16	BID SET			DRWN BY	EMJ
02.22.17	REBID SET			CHKD BY	DRA/TRS
				JOB NO	SCOTPRV16.010
				SHEET:	14 OF 22
				DRWG NO	C-10.00

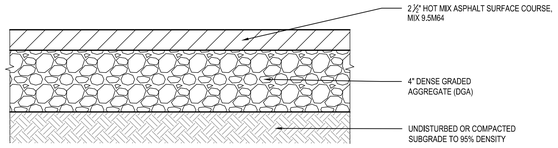
M:\SCOTCH PLAINS\SCOTPRV16.010\NEW ASH BROOK CLUB HOUSE\CAD_FINAL SHEETS\10.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:12:28 PM



FULL-DEPTH PAVEMENT SECTION



PAVEMENT MILL & OVERLAY SECTION

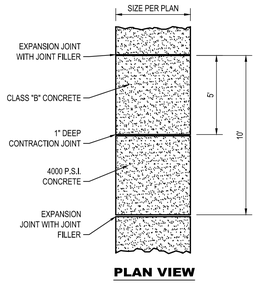


CART PATH PAVEMENT SECTION

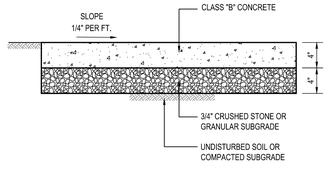
NOTES:
1. REFER TO PAVEMENT PLAN FOR SPECIFIC LOCATIONS OF EACH PAVEMENT TYPE.
2. REFER TO PAVEMENT PLAN FOR LIMITS OF PAVEMENT MILL & OVERLAY AREAS.

PAVEMENT SECTIONS

NOT TO SCALE



PLAN VIEW

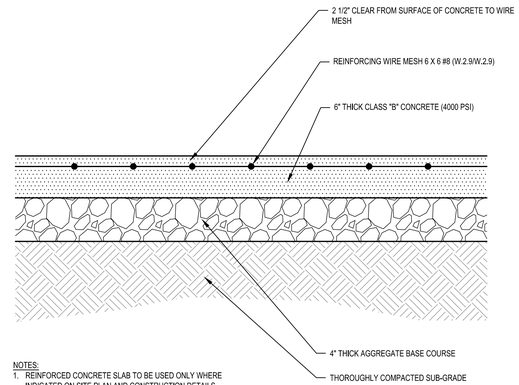


SECTION VIEW

NOTES:
1. UNIT PRICE FOR SIDEWALK INCLUDES EXCAVATION, GRADING, CONCRETE REMOVAL,CONC. SAWCUTTING AND DISPOSAL, AND D.G.A.
2. PAY LIMIT FOR TOPSOIL, SEED, & MULCHING IS AS SHOWN ON PLAN OR AS DIRECTED BY THE ENGINEER.

4" THICK CONCRETE SIDEWALK

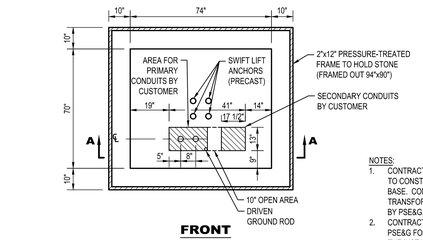
NOT TO SCALE



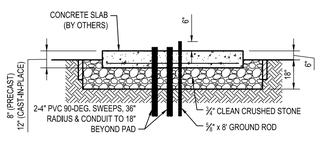
NOTES:
1. REINFORCED CONCRETE SLAB TO BE USED ONLY WHERE INDICATED ON SITE PLAN AND CONSTRUCTION DETAILS.

REINFORCED CONCRETE SLAB

NOT TO SCALE



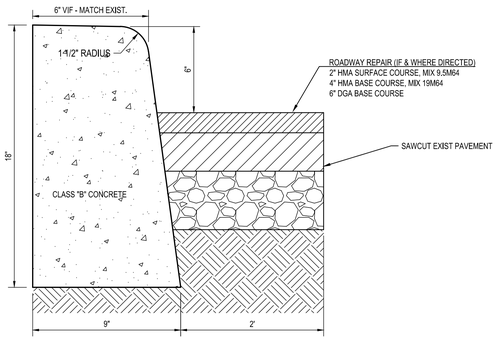
FRONT



NOTES:
1. CONTRACTOR IS ONLY RESPONSIBLE TO CONSTRUCT THE CRUSHED STONE BASE. CONCRETE WORK FOR ACTUAL TRANSFORMER BASE TO BE PROVIDED BY PSE&G.
2. CONTRACTOR SHALL COORDINATE WITH PSE&G FOR ELECTRIC SERVICE AND THE INSTALLATION OF THE TRANSFORMER.
3. CONCRETE PAD SHOWN IS FOR A THREE-PHASE, PADMOUNTED TRANSFORMER TYPE II-A (CONCRETE).
4. DETAIL OBTAINED FROM A MANUAL TITLED "INFORMATION & REQUIREMENTS FOR ELECTRIC SERVICE," BY PSE&G, DATED MAY 31, 2014 (REFER TO THIS MANUAL FOR ADDITIONAL INFORMATION).
5. CONCRETE TRANSFORMER PAD AND ALL ASSOCIATED CONSTRUCTION SHALL COMPLY WITH THE REQUIREMENTS OF PSE&G.

PSE&G CONCRETE TRANSFORMER PAD BASE

NOT TO SCALE



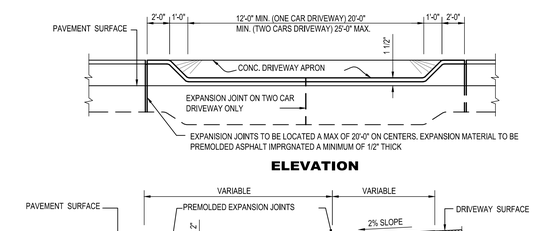
NOTES:

TRANSVERSE JOINTS 1/2" WIDE SHALL BE INSTALLED IN THE CURB 20 FT. APART AND SHALL BE FILLED WITH PREFORMED BITUMINOUS-IMPREGNATED FIBER JOINT FILLER RECESSED 1/4" IN FROM FRONT FACE AND TOP OF CURB.

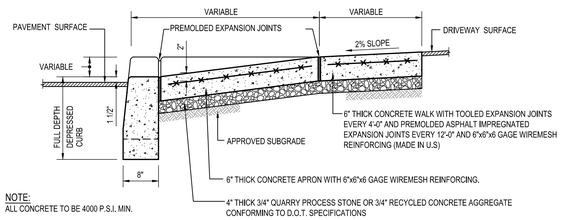
EXPANSION JOINTS THRU AND ADJACENT TO THE CURB SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CURB.

9" X 18" CONCRETE VERTICAL CURB

NOT TO SCALE



ELEVATION

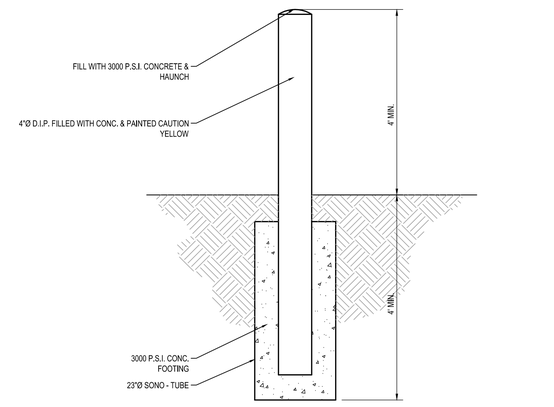


NOTE:
ALL CONCRETE TO BE 4000 P.S.I. MIN.

SECTION

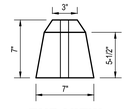
CONCRETE DRIVEWAY APRON & DEPRESSED CURB

NOT TO SCALE



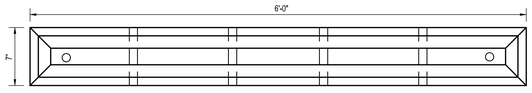
CONCRETE BOLLARD

NOT TO SCALE

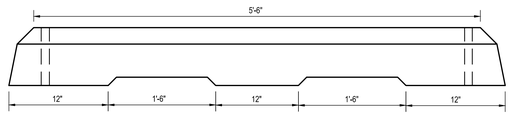


END VIEW

NOTES:
1. EXISTING CONCRETE BUMPER BLOCKS INDICATED TO BE RE-USED SHALL BE THOROUGHLY POWER-WASHED & INSTALLED PER THIS DETAIL.
2. IF DIRECTED BY THE ENGINEER, NEW BUMPER BLOCKS SHALL CONFORM WITH THIS DETAIL.
3. CONCRETE 5000 PSI MIN. 28 DAY STRENGTH
4. REINFORCEMENT-2 #4 DEFORMED BARS
5. ANCHORAGE-2 5/8"Ø STEEL BARS
6. FINISH- SMOOTH, STEEL FORM WITH ALL FLASHING REMOVED.



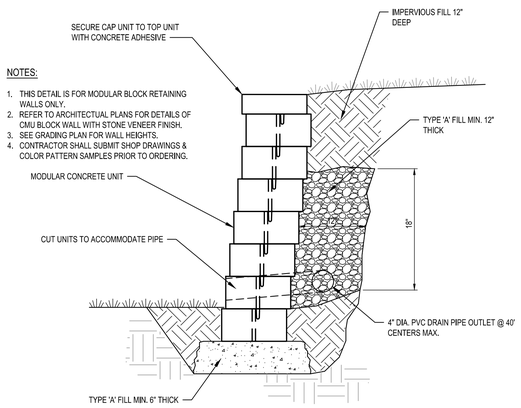
TOP VIEW



ELEVATION

PRECAST CONCRETE WHEEL STOP

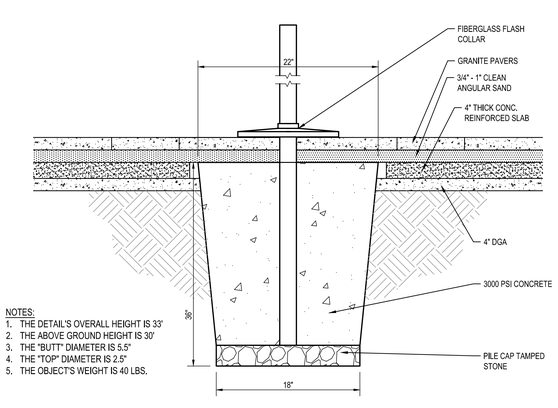
NOT TO SCALE



NOTES:
1. THIS DETAIL IS FOR MODULAR BLOCK RETAINING WALLS ONLY.
2. REFER TO ARCHITECTUAL PLANS FOR DETAILS OF CMU BLOCK WALL WITH STONE VENEER FINISH.
3. SEE GRADING PLAN FOR WALL HEIGHTS.
4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS & COLOR PATTERN SAMPLES PRIOR TO ORDERING.

MODULAR BLOCK WALL SECTION

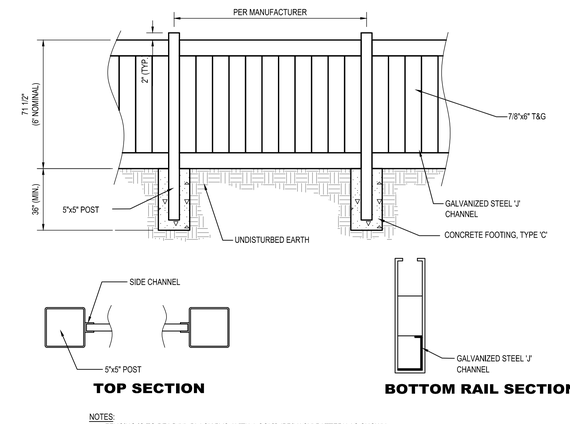
NOT TO SCALE



NOTES:
1. THE DETAIL'S OVERALL HEIGHT IS 33'
2. THE ABOVE GROUND HEIGHT IS 30'
3. THE "BUTT" DIAMETER IS 5.5"
4. THE "TOP" DIAMETER IS 2.5"
5. THE OBJECT'S WEIGHT IS 40 LBS.

FLAGPOLE FOUNDATION

NOT TO SCALE



TOP SECTION

BOTTOM RAIL SECTION

NOTES:
1. FENCING IS TO BE VINYL, BLACK PVC, WITH A SOLID 'PRIVACY' PATTERN AS SHOWN.
2. CONTRACTOR SHALL SUBMIT COLOR SAMPLE & SHOP DRAWING PRIOR TO ORDERING

SOLID VINYL BLACK FENCE

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS I

SUBMISSIONS	
DATE	DESCRIPTION
10.03.16	100% ISSUE
10.17.16	BID SET
02.22.17	REBID SET

REVISIONS	
DATE	DESCRIPTION

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	15 OF 22
DRWG NO	C-10.01

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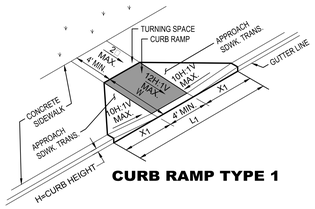
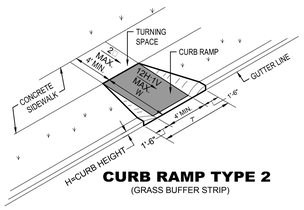
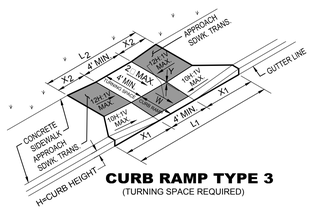


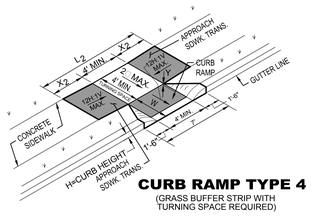
CURB RAMP TYPE 1



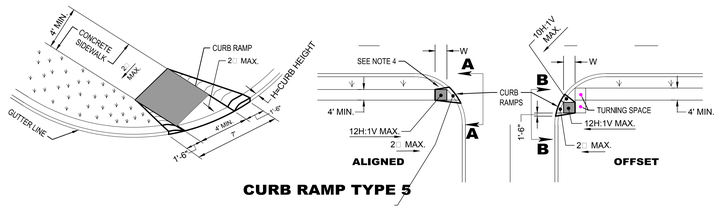
CURB RAMP TYPE 2
(GRASS BUFFER STRIP)



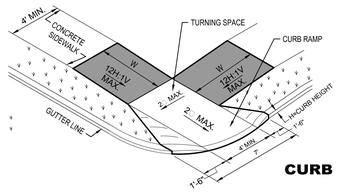
CURB RAMP TYPE 3
(TURNING SPACE REQUIRED)

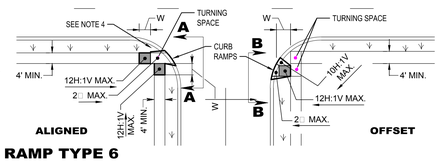


CURB RAMP TYPE 4
(GRASS BUFFER STRIP WITH TURNING SPACE REQUIRED)

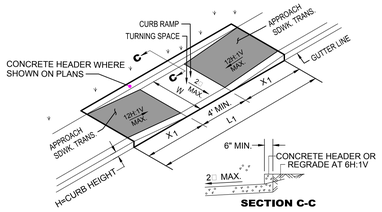


CURB RAMP TYPE 5



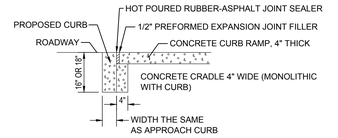


CURB RAMP TYPE 6

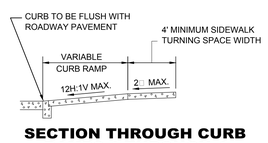


SECTION C-C

CURB RAMP TYPE 7
(LIMITED ROW)
(SEE NOTE 7)

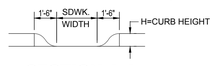


DROPPED CURB AND CRADLE

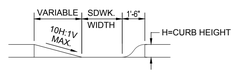


SECTION THROUGH CURB RAMPS 1 THROUGH 4

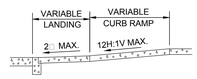
NOTE:
CURB RAMP OPENING TO BE FLUSH WITH ROADWAY PAVEMENT (CURB RAMP TYPES 5 & 6).



SECTION A-A



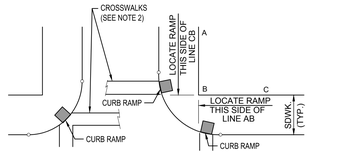
SECTION B-B



SECTION THROUGH CURB RAMPS 5 AND 6

NOTES:

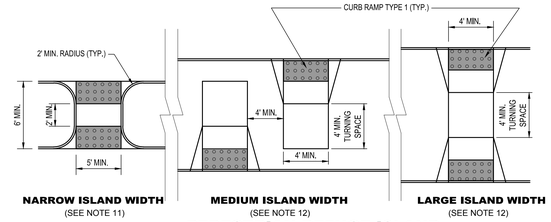
1. KEEP TURNING SPACE, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP CLEAR OF OBSTRUCTIONS THAT PROTRUDE ABOVE THE SIDEWALK.
2. FOR DIMENSIONS SEE CD-606-1B AND CD-606-1C.
3. CURB (DROPPED CURB) GUTTERLINE TO BE FLUSH WITH ROADWAY PAVEMENT A MINIMUM OF 4 FEET AT ALL CURB RAMPS.
4. FOR CURB RAMP TYPES 5 AND 6, IF A GRASS BUFFER DOES NOT EXIST, SLOPE CURB TO EQUAL SLOPE OF ADJACENT CURB RAMP.
5. SIDEWALK AND CURB RAMP WITHIN AREA ENCLOSED BY HEAVY LINES INDICATES THE PAY LIMIT FOR CONCRETE SIDEWALK OF THE APPROPRIATE ADJACENT THICKNESS.
6. CURB AND HEADER WITHIN AREA ENCLOSED BY HEAVY LINES INDICATES THE PAY LIMIT FOR VERTICAL CURB OR SLOPING CURB OF THE APPROPRIATE ADJACENT SIZE AND KIND.
7. WHERE THE DISTANCE FROM THE GUTTER LINE TO THE OUTSIDE EDGE OF SIDEWALK IS 6 FEET OR LESS, USE CURB RAMP TYPE 7, INSTEAD OF CURB RAMP TYPE 1 THROUGH 4.
8. CROSSWALKS AND STOP LINES MAY BE MARKED OR UNMARKED. SEE PLANS.
9. DIMENSIONS SHOWN IN TABLES ARE FOR 3 INCH TO 9 INCH CURB HEIGHTS. WHERE THE CURB HEIGHTS ARE OTHER THAN WHAT IS PROVIDED IN THE TABLES, THE DIMENSIONS OF THE RAMPS WILL HAVE TO BE CALCULATED BASED ON CROSS SLOPES SHOWN.
10. THE 12H:1V MAX SLOPE IS THE RUNNING SLOPE FOR CURB RAMPS, BUT ONLY THE 12H:1V SLOPE MEASURED AS X1IS THE RUNNING SLOPE FOR TYPE 3 AND TYPE 4 CURB RAMPS. ENSURE THE RUNNING SLOPE OF CURB RAMPS DOES NOT REQUIRE ITS LENGTH TO EXCEED 15 FEET. THE RUNNING SLOPE MAY EXCEED THE 12H:1V MAX SLOPE SO AS NOT TO EXCEED THE 15 FEET MAXIMUM LENGTH.
11. FOR NARROW ISLAND WIDTH, SEE PEDESTRIAN REFUGE ISLAND WALKWAY OPENING AT INTERSECTIONS DETAIL.
12. FOR MEDIUM AND LARGE ISLAND WIDTH, SEE CURB RAMP TYPE 1 ON CD-606-1.
13. CONSTRUCT CURB RAMP TYPES 1, 2, 3, 4 & 7 PERPENDICULAR TO CURBLINE, AS SHOWN.
14. IF A CURB RAMP IS REQUIRED, THE LOCATION OF THE DETECTABLE WARNING SURFACE MUST BE AT THE BOTTOM OF THE RAMP AND WITHIN THE REQUIRED DISTANCE FROM THE RAIL.



ALTERNATE TREATMENT
(SEE NOTE 13)

PREFERRED TREATMENT
(SEE NOTE 13)

LOCATION OF CURB RAMP TYPES 1, 2, 3, 4 & 7 FOR CROSSING PARALLEL AND PERPENDICULAR TO HIGHWAY

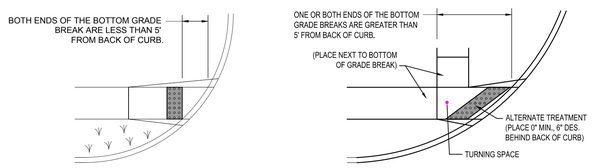


NARROW ISLAND WIDTH
(SEE NOTE 11)

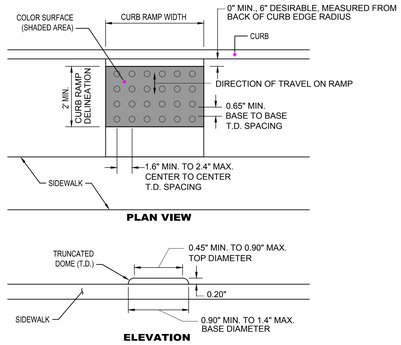
MEDIUM ISLAND WIDTH
(SEE NOTE 12)

LARGE ISLAND WIDTH
(SEE NOTE 12)

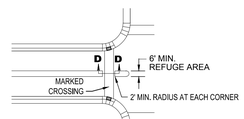
PEDESTRIAN REFUGE ISLAND



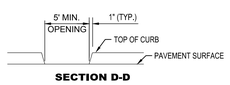
PLACEMENT OF DETECTABLE WARNING SURFACE FOR CURB RAMP TYPE 5 AND 6



DETECTABLE WARNING SURFACE



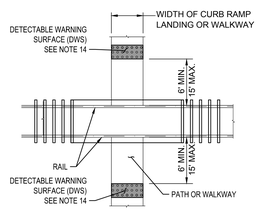
NOTE:
WHERE PRACTICAL, END LEFT TURN ISLAND OR DIVISIONAL ISLAND BEFORE CROSSWALK TO ELIMINATE CUT-THROUGH



SECTION D-D

NOTE:
5'MIN. WIDE OPENING TO BE FLUSH WITH ROADWAY PAVEMENT

PEDESTRIAN REFUGE ISLAND WALKWAY OPENING AT INTERSECTIONS



PEDESTRIAN RAILROAD CROSSING

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE
LYNDHURST, NEW JERSEY 07071
TEL: (201) 939-8805
FAX: (201) 939-0846
N.J. CERTIFICATE OF AUTHORIZATION
(N.J.S.A. 45:8-56) GA 276890

THOMAS R. SOLFARO, P.E., C.M.E.
N.J. PROFESSIONAL ENGINEER
LICENSE No. 41635

NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

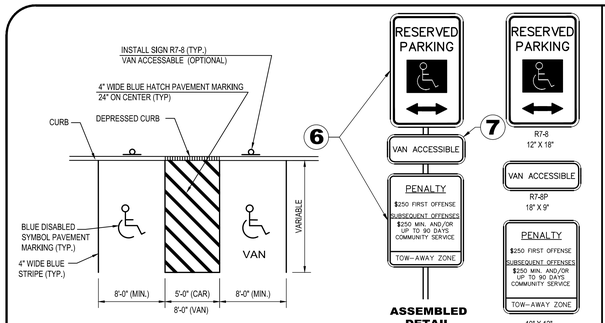
CONSTRUCTION DETAILS II

SUBMISSIONS	
DATE	DESCRIPTION
10.03.16	100% ISSUE
10.17.16	BID SET
02.22.17	REBID SET

REVISIONS	
DATE	DESCRIPTION

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	16 OF 22
DRWG NO	C-10.02

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\10.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:27:22 PM



ASSEMBLED DETAIL

NOTES:

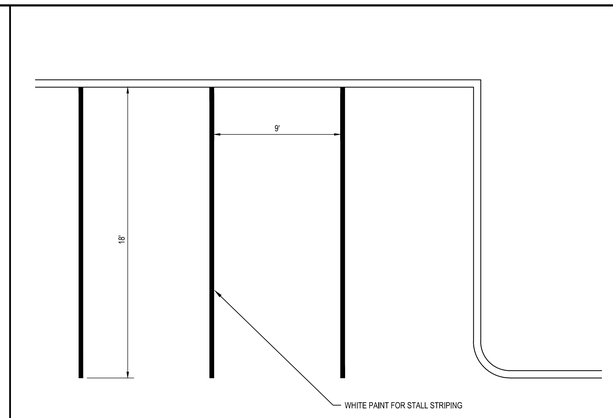
1. ALL STRIPES TO BE 4" WIDE BLUE PAVEMENT PAINT.
2. DISABLED PARKING SYMBOL TO BE BLUE PAVEMENT PAINT.
3. ONE 8' DISABLED PARKING SPACE FOR VAN PLUS ONE 8' VAN ACCESSIBLE AISLE REQUIRED PER 8 DISABLED SPACES

NOTES:

1. THE PARKING SPACE SHALL BE MARKED WITH AN R7-8 SIGN FROM THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES DISPLAYING THE INTERNATIONAL SYMBOL OF ACCESSIBILITY.
2. BENEATH THE R7-8 SIGN, THE PARKING SPACE SHALL ALSO BE MARKED WITH AN R7-8P SIGN, AS REQUIRED BY N.J.S.A. 39:4-197.3c.
3. THE BOTTOM EDGE OF THE R7-8 SIGN SHALL BE MOUNTED APPROXIMATELY 60 INCHES ABOVE THE PARKING LOT SURFACE.

ADA COMPLIANT STALL MARKINGS & SIGNAGE

NOT TO SCALE

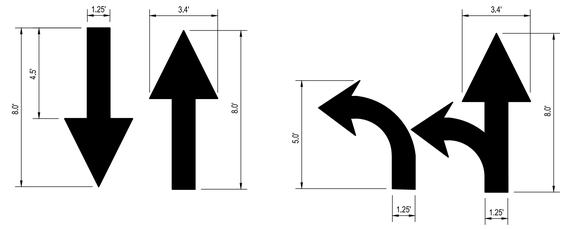


NOTES:

ALL STRIPES TO BE 4" WIDE LONG LIFE WHITE PAVEMENT PAINT.

PARKING STALL STRIPING

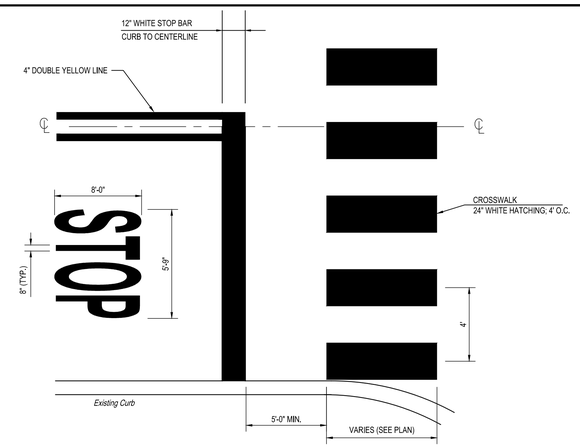
NOT TO SCALE



NOTE.
ALL MARKINGS TO BE LONG LIFE WHITE PAVEMENT PAINT.

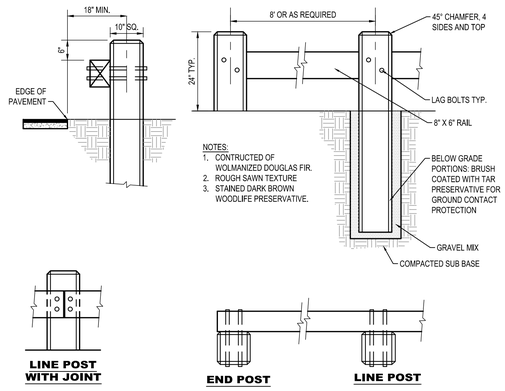
PAVEMENT MARKINGS: DIRECTIONAL ARROWS

NOT TO SCALE



PAVEMENT MARKINGS: CROSSWALK & STOP BAR

NOT TO SCALE

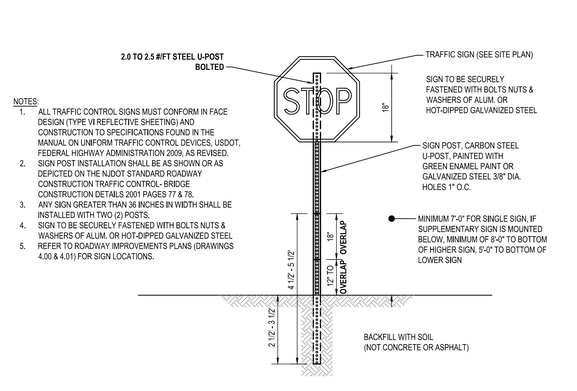


NOTES:

1. CONTRUCTED OF WOLMANIZED DOUGLAS FIR.
2. ROUGH SAWN TEXTURE
3. STAINED DARK BROWN WOODLIFE PRESERVATIVE.

TIMBER GUIDE RAIL

NOT TO SCALE

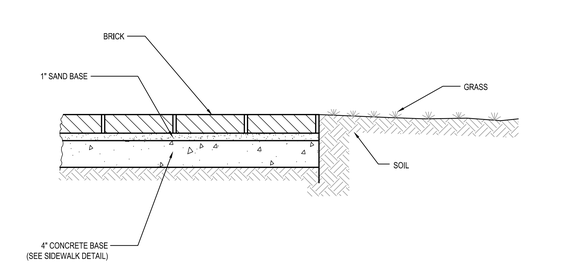


NOTES:

1. ALL TRAFFIC CONTROL SIGNS MUST CONFORM IN FACE DESIGN (TYPE VI REFLECTIVE SHEETING) AND CONSTRUCTION TO SPECIFICATIONS FOUND IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, USDOT, FEDERAL HIGHWAY ADMINISTRATION 2009, AS REVISED.
2. SIGN POST INSTALLATION SHALL BE AS SHOWN OR AS DEPICTED ON THE NJDOT STANDARD ROADWAY CONSTRUCTION TRAFFIC CONTROL- BRIDGE CONSTRUCTION DETAILS 2001 PAGES 77 & 78.
3. ANY SIGN GREATER THAN 36 INCHES IN WIDTH SHALL BE INSTALLED WITH TWO (2) POSTS.
4. SIGN TO BE SECURELY FASTENED WITH BOLTS NUTS & WASHERS OF ALUM. OR HOT-DIPPED GALVANIZED STEEL
5. REFER TO ROADWAY IMPROVEMENTS PLANS (DRAWINGS 4.00 & 4.01) FOR SIGN LOCATIONS.

SITE SIGNAGE

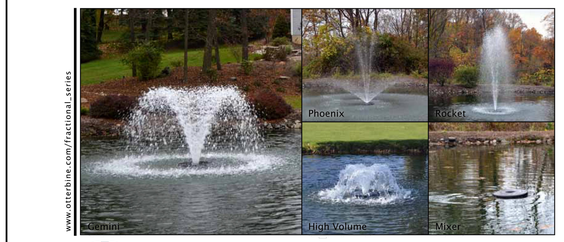
NOT TO SCALE



NOTE:
1. SEE PAVER LAYOUT DETAIL FOR PLAN VIEW INFORMATION.

BRICK PAVERS ON CONCRETE BASE

NOT TO SCALE



www.otterbine.com/fractional_series

OTTERBINE BAREBO, INC.

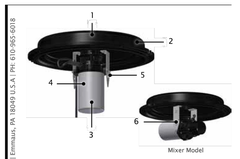
1/2HP FRACTIONAL SERIES

AERATING FOUNTAIN & MIXER SERIES

- Fractional Series comes standard with 5 systems in 1; 4 Aerating Fountain patterns & horizontal Mixer.
- 2 year all-inclusive warranty.
- Operates in 16in or 41cm of water.
- Complete package includes assembled unit, power control center with timer & gfci, and cable. (Power control center optional on 50Hz units.)
- Safety tested and listed with ETL, ETL-C, conforming to UL standards, and carries a 3rd party listing with CE.
- Oxygen Transfer Rate of 2.2lbs/HP/hr with a Pumping Rate of 506GPM - Highest Performance Rate of any Fractional Aerator in the Industry.
- Effectively controls algae, aquatic weeds, and foul odors; as well as create horizontal currents - deterring insects and insect breeding.

1/2HP 60Hz	GEMINI	HIGH VOLUME	PHOENIX	ROCKET	MIXER
Spray Height (ft)	4	2	UPPER 10.6 LOWER 3.8	10.6	n/a
Spray Diam. (ft)	4.5	2.5	UPPER 4 LOWER 10.6	3	n/a
GPM	506	435	195	179	n/a*
Oxygen Transfer (lb/HP/hr)	2.2	2.0	0.8	0.8	n/a
Volt/Ph/Amp 3250@60hz	115/1/5.6 230/1/2.8	115/1/5.2 230/1/2.6	115/1/6.4 230/1/3.2	115/1/6.4 230/1/3.2	115/1/1.6 230/1/0.8

*1/2HP Mixer volume influenced is 245,000ft³ and effectively moves water 115 linear feet.



Mixer Model

PRODUCT ILLUSTRATION

1. Includes corrosion resistant adjustable spray impellers/ patterns to produce 4 spray patterns, and a horizontal mixer. *(Comes Assembled as Gemini)*
2. Rugged low visibility foam filled polyethylene float with recessed light pockets.
3. Oil cooled, efficient 3250RPM custom built motor incorporates a silicon carbide single seal to ensure dependability and long life.
4. Corrosion resistant, durable 18 gauge/316 grade stainless steel motor housing.
5. 5/5 brackets allow for easy conversion between aerating fountain patterns and mixer model.
6. Adjustable discharge angle +/- 8 degrees. *(Mixer Model only.)*

The Fractional Series Deluxe features a 2-light LED 6.5W low voltage light set and quick disconnect cable on unit and lights.

Product specifications and CADs can be found online through www.otterbine.com or www.caddetails.com.

Manufactured by: Otterbine® Barebo, Inc., 3840 Main Road East Emmaus, PA 18049 U.S.A. PH: 610-965-6018

OTTERBINE BAREBO, INC.

OTTERBINE-BAREBO, INC.
3840 MAIN ROAD EAST
EMMAUS, PA 18049
TOLL FREE: 1-800-237-8837
PHONE: (610) 965-6018
FAX: (610) 965-6050
(OR APPROVED EQUIVALENT)

FRACTIONAL SERIES GEMINI

FRACTIONAL SERIES MIXER NOT SHOWN: FLOATING HORIZONTAL MIXER

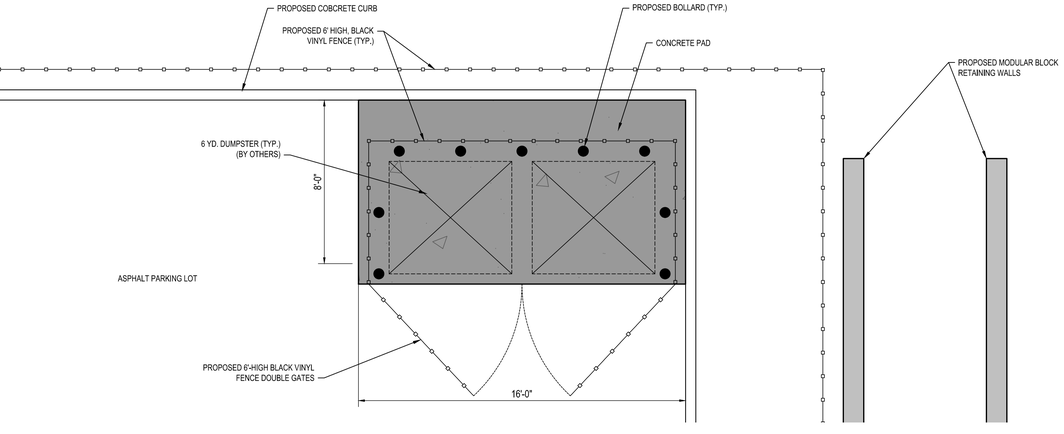
1/2HP 60HZ	GEMINI	HIGH VOLUME	PHOENIX	ROCKET	MIXER
SPRAY HEIGHT(FT)	4	2	UPPER 10.6 LOWER 3.8	10.6	N/A
SPRAY DIAMETER(FT)	4.5	2.5	UPPER 4 LOWER 10.6	3	N/A
GPM	506	435	195	179	N/A*
VOLTAGE/PH/AMP 3250@60HZ	115/1/5.6 230/1/2.8	115/1/5.2 230/1/2.6	115/1/6.4 230/1/3.2	115/1/6.4 230/1/3.2	115/1/1.6 230/1/0.8

*1/2HP MIXER VOLUME INFLUENCED IS 245,000 FT³ (6938 M³) EFFECTIVELY MOVES WATER 115 LINEAR FEET (35 LINEAR METERS)

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWING.
3. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY. THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION.
4. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.
5. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info AND ENTER REFERENCE NUMBER 377-021.

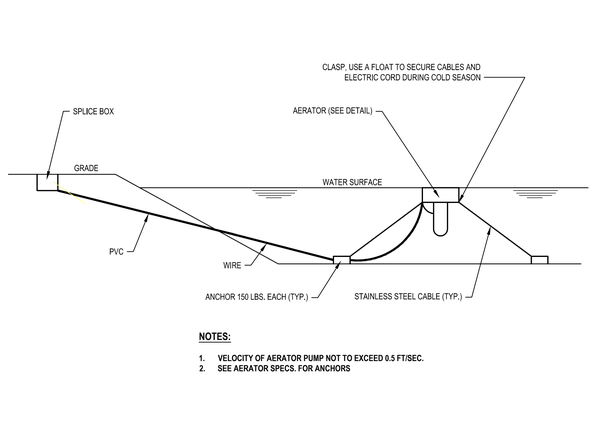
POND AERATOR

NOT TO SCALE



DUMPSTER ENCLOSURE

NOT TO SCALE



NOTES:

1. **VELOCITY OF AERATOR PUMP NOT TO EXCEED 0.5 FT/SEC.**
2. **SEE AERATOR SPECS. FOR ANCHORS**

POND AERATOR ANCHOR

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE
LYNDHURST, NEW JERSEY 07071
TEL: (201) 939-8805
FAX: (201) 939-0846
N.J. CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) GA 276890

THOMAS R. SOLFARO, P.E., C.M.E.
N.J. PROFESSIONAL ENGINEER
LICENSE No. 41635

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ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

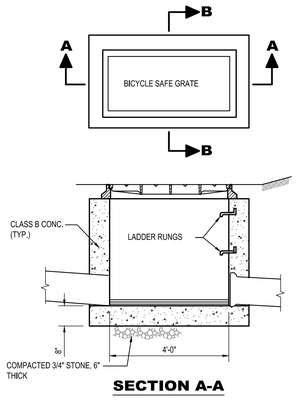
SHEET CONTENTS:

CONSTRUCTION DETAILS III

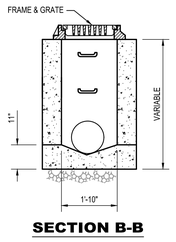
SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	17 OF 22
DRWG NO	**C-10.03**

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\10.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:26:13 PM



NOTES:
1. INVERTS TO BE ELIMINATED IN BOTTOM OF TERMINAL INLETS. BOTTOMS SHALL BE DISHED AND SLOPED TOWARDS THE OUTLET PIPE AT A RATE OF GRADE OF 2 INCHES PER FOOT.
2. THIS INLET MAY BE CONSTRUCTED OF BRICK, CONCRETE, OR CONCRETE BLOCK. IF BRICK OR CONCRETE BLOCK IS USED, THE BOTTOM SHALL BE AS SHOWN FOR CONCRETE & THE OUTSIDE OF THE WALLS SHALL BE PLASTERED WITH ½" COAT OF 1:2 CEMENT SAND MORTAR.
3. INLET FRAME AND GRATES TO BE CAMPBELL FOUNDRY PATTERN NON. 2824 OR APPROVED EQUAL.

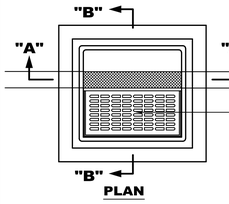


SECTION A-A

SECTION B-B

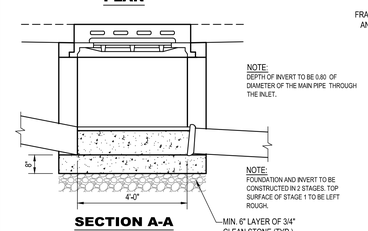
INLET TYPE "A"

NOT TO SCALE

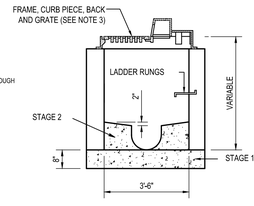


PLAN

NOTES:
1. ALL STRUCTURES SHALL BE MORTARED INSIDE AND OUT. IN ADDITION, ALL STRUCTURES SHALL BE WATERPROOFED ON THE OUTSIDE.
2. THE BICYCLE SAFE GRATES SHALL BE CAMBELL FOUNDRY PATTERN NUMBER 2618 OR APPROVED EQUAL. ALL CASTINGS SHALL BE MADE IN THE U.S.A. AS PER LOCAL, STATE, AND FEDERAL REQUIREMENTS.
3. ALL INLETS INSTALLED EITHER PARTIALLY OR WHOLLY WITHIN AN ADA PARKING STALL SHALL BE EQUIPPED WITH A HEAVY-DUTY, ADA-COMPLIANT INLET GRATE.



SECTION A-A

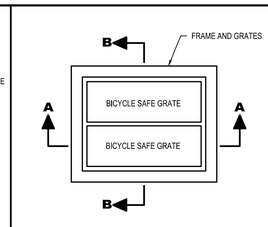


SECTION B-B

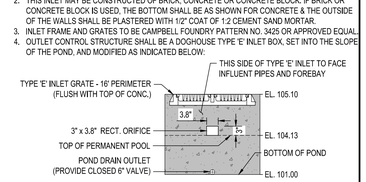
INLET TYPE "B"

NOT TO SCALE

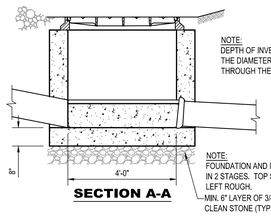
CD-602-2.6



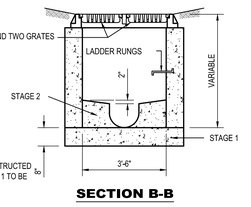
NOTES:
1. INVERTS TO BE ELIMINATED IN BOTTOM OF TERMINAL INLETS. BOTTOMS SHALL BE DISHED AND SLOPED TOWARDS THE OUTLET PIPE AT A RATE OF GRADE OF 2 INCHES PER FOOT.
2. THIS INLET MAY BE CONSTRUCTED OF BRICK, CONCRETE OR CONCRETE BLOCK. IF BRICK OR CONCRETE BLOCK IS USED, THE BOTTOM SHALL BE AS SHOWN FOR CONCRETE & THE OUTSIDE OF THE WALLS SHALL BE PLASTERED WITH 1/2" COAT OF 1:2 CEMENT SAND MORTAR.
3. INLET FRAME AND GRATES TO BE CAMPBELL FOUNDRY PATTERN NO. 3425 OR APPROVED EQUAL.
4. OUTLET CONTROL STRUCTURE SHALL BE A DOGHOUSE TYPE 'E' INLET BOX, SET INTO THE SLOPE OF THE POND, AND MODIFIED AS INDICATED BELOW:



OUTLET CONTROL STRUCTURE MODIFICATION



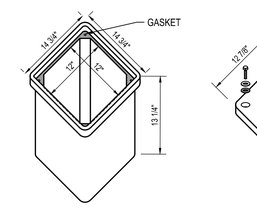
SECTION A-A



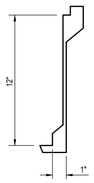
SECTION B-B

INLET TYPE "E"

NOT TO SCALE



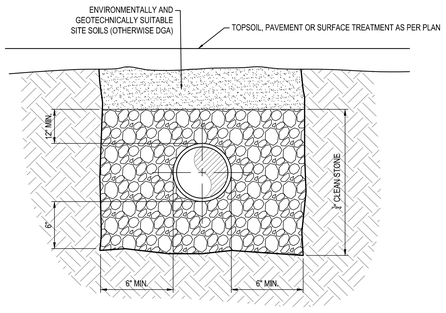
ISOMETRIC VIEW



NOTES
1. BOX EQUIVALENT TO QUAZITE #PC1212BG12
2. BOX EQUIVALENT TO QUAZITE #PC1212DG12
3. H.D. COVER EQUIVALENT TO QUAZITE #PC1212HG0046 ("TRAFFIC SIGNAL" LOGO)
4. CONDUIT ENTRIES OR OTHER HOLES IN THESE BOXES ARE TO BE MADE USING HYDRAULIC PUNCH WITH STANDARD, NOT "SLUG SPLITTER" DIES, CARBIDE TIPPED HOLE SAWS AND / OR DRILLS.
5. PULL-BOX / HANDHOLE SHOWN FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR SHALL SIZE BOX ACCORDINGLY & SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO ORDERING.

HANDHOLE

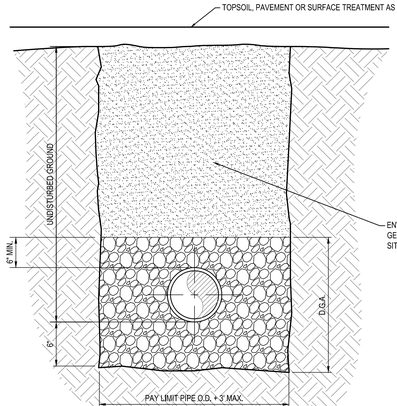
NOT TO SCALE



NOTE:
1. ALL EXCAVATED MATERIAL AND TRENCH SPOIL MUST BE DISPOSED OF OFF SITE AT NO ADDITIONAL COST TO THE OWNER AND MUST BE INCLUDED IN THE VARIOUS BID ITEMS.
2. THE CLEAN STONE USED IN THE TRENCH SHALL BE INCLUDED IN THE PRICE OF THE PIPE.

TRENCH FOR H.D.P.E. STORM SEWER

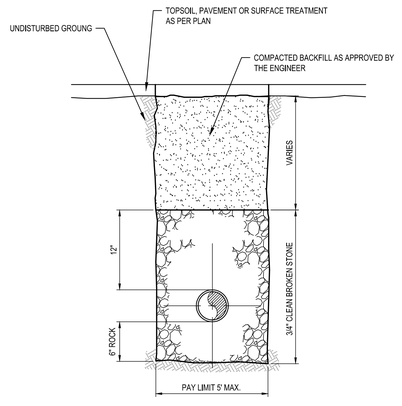
NOT TO SCALE



NOTE:
1. ALL EXCAVATED MATERIAL AND TRENCH SPOIL MUST BE DISPOSED OF OFF SITE AT NO ADDITIONAL COST TO THE OWNER AND MUST BE INCLUDED IN THE VARIOUS BID ITEMS.
2. THE D.G.A. USED IN THE TRENCH SHALL BE INCLUDED IN THE PRICE OF THE PIPE.

TRENCH FOR RCP STORM SEWER

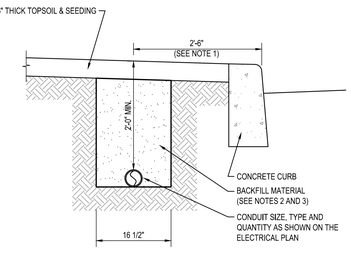
NOT TO SCALE



NOTE:
1. TO BE USED WHEN IN BAD FILL AREA.

SANITARY SEWER TRENCH

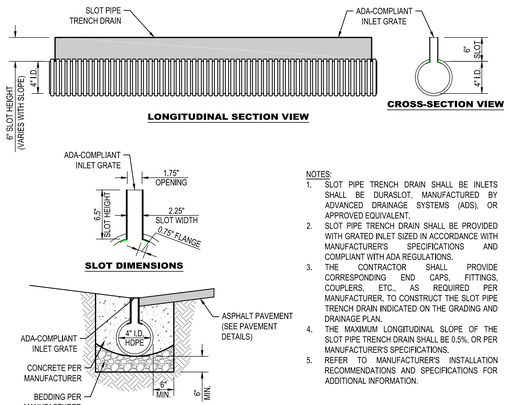
NOT TO SCALE



NOTES:
1. WHERE TREE EXISTS ALONG THE CURB LINE THE OFFSET DIMENSION SHALL BE MODIFIED TO AVOID DISTURBING THE TREE ROOT.
2. BACKFILL SHALL BE SELECT MATERIAL FREE OF LARGE STONE, FROZEN MATERIAL, CINDERS AND ASHES. THE BACKFILL MATERIAL SHALL BE PLACED IN TWO EQUAL LIFTS. EACH LIFT SHALL BE THOROUGHLY COMPACTED WITH A MODIFIED VIBRATORY PLATE COMPACTOR.
3. FOR 2" CONDUIT TYPE CUR, THE TRENCH SHALL BE BACKFILLED WITH NJDOT CLASS C CONCRETE TO WITHIN 2" OF FINAL GRADE.

CONDUIT TRENCH

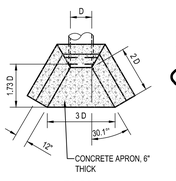
NOT TO SCALE



NOTES:
1. SLOT PIPE TRENCH DRAIN SHALL BE INLETS SHALL BE DURASLOT, MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS (ADS), OR APPROVED EQUIVALENT.
2. SLOT PIPE TRENCH DRAIN SHALL BE PROVIDED WITH GRATED INLET SIZED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND COMPLIANT WITH ADA REGULATIONS.
3. THE CONTRACTOR SHALL PROVIDE CORRESPONDING END CAPS, FITTINGS, COUPLERS, ETC., AS REQUIRED PER MANUFACTURER, TO CONSTRUCT THE SLOT PIPE TRENCH DRAIN INDICATED ON THE GRADING AND DRAINAGE PLAN.
4. THE MAXIMUM LONGITUDINAL SLOPE OF THE SLOT PIPE TRENCH DRAIN SHALL BE 0.5%, OR PER MANUFACTURER'S SPECIFICATIONS.
5. REFER TO MANUFACTURER'S INSTALLATION RECOMMENDATIONS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

SLOT PIPE TRENCH DRAIN

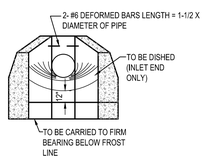
NOT TO SCALE



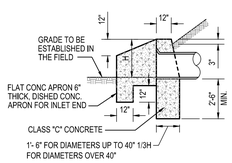
PLAN

HEADWALL IN CUBIC YARDS			APRONS IN CUBIC YARDS
PIPE SIZE	COR.METAL	REIN. CONC.	
15"	1.7	1.7	0.2
18"	2.2	2.2	0.3
21"	2.5	2.5	0.4
24"	2.9	2.9	0.5
27"	3.3	3.4	0.6
30"	3.7	3.8	0.7
36"	4.7	4.8	0.9
42"	5.8	6.3	1.2
48"	7.6	8.4	1.5
54"	9.7	10.7	1.8
60"	12.2	13.4	2.1
66"	15.0	16.4	2.5
72"	18.1	19.9	3.0

NOTES:
1. ALL EDGES TO BE CHAMFERED 1".
2. CONCRETE TO BE N.J.D.O.T., CLASS "C"
3. APRONS TO BE 6" THICK CONCRETE, FLAT AT OUTLET END, DISHED AT INLET END.
4. EXPOSED PORTIONS OF WALL TO BE RUBBED AND FLOATED.
5. FOR ARCH PIPE, THE SPAN SHALL BE SUBSTITUTED FOR D.



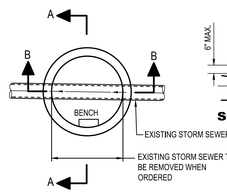
END VIEW OF INLET END ONLY



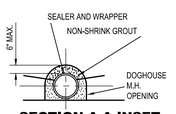
OUTLET END

CONCRETE HEADWALL

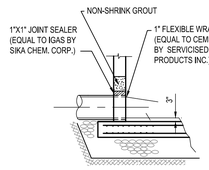
NOT TO SCALE



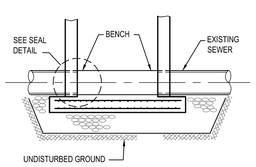
PLAN



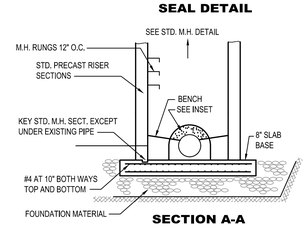
SECTION A-A INSET



SEAL DETAIL



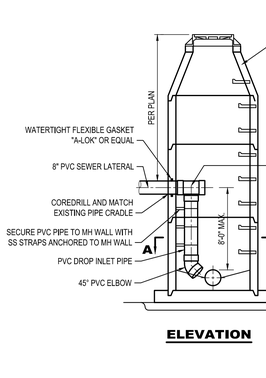
SECTION B-B



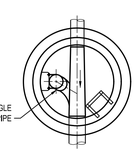
SECTION A-A

DOGHOUSE MANHOLE

NOT TO SCALE



ELEVATION

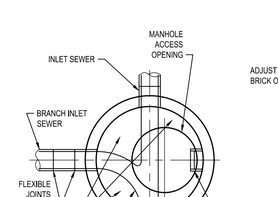


SECTION A-A

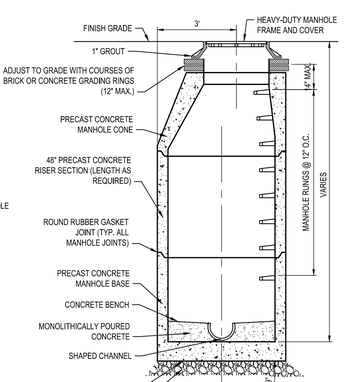
NOTES:
1. INSIDE DROP CONNECTION ONLY ALLOWED WITH MUNICIPAL ENGINEER'S APPROVAL.
2. DROP INLET PIPE TO BE THE SAME SIZE & MATERIAL AS SEWER LINE.
3. ALIGNMENT OF TEE: DROP INLET MAY BE ADJUSTED TO A MAXIMUM OF 5% DEFLECTION.
4. ANNULAR SPACE AROUND NEW PIPE TO BE SEALED WITH NON-SHRINK GROUT, LINK SEAL, OR WATERTIGHT & FLEXIBLE GASKET.
5. EXISTING SEWER MAIN, STRUCTURES AND APPURTENANCES SHALL BE STABILIZED BY CONTRACTOR DURING CONSTRUCTION.

INSIDE DROP MANHOLE CONNECTION

NOT TO SCALE



PLAN



SECTION

SANITARY MANHOLE

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE
LYNDHURST, NEW JERSEY 07071
TEL: (201) 939-8805
FAX: (201) 939-0846
N.J. CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) GA 276890

THOMAS R. SOLFARO, P.E., C.M.E.
N.J. PROFESSIONAL ENGINEER
LICENSE No. 41635

NETTAARCHITECTS
ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

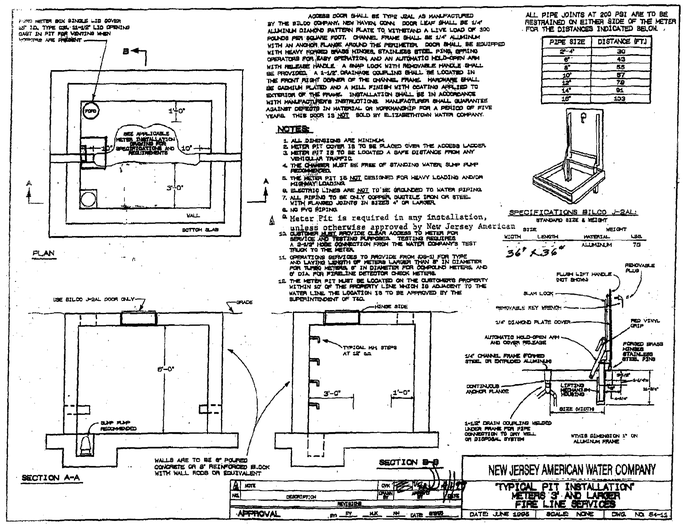
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS IV

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE	11.11.16	REV'D OUTLET CONTROL STRC.	SCALE	N.T.S.
10.17.16	BID SET			DRWN BY	EMJ
02.22.17	REBID SET			CHKD BY	DRA/TRS
				JOB NO	SCOTPRV16.010
				SHEET:	18 OF 22
				DRWG NO	C-10.04

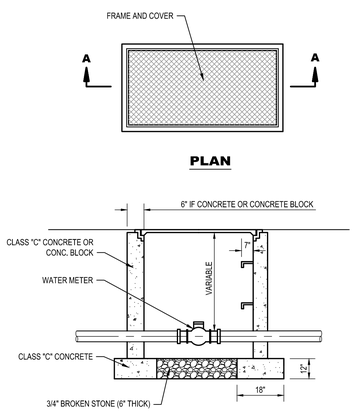
M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\16.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:29:09 PM



WATER METER INSTALLATION NOTES:
1. METER PIT INSTALLATION SHALL BE AS SHOWN OR APPROVED EQUAL TO ACCOMODATE A 4" COMPOUND DOMESTIC METER AND 8" FIRE METER.
2. NJ AMERICAN WATER SHALL SUPPLY AND INSTALL THE COMPOUND DOMESTIC METER.
3. FIRE METER TO BE SUPPLIED BY NJ AMERICAN WATER AND INSTALLED BY CONTRACTOR.
4. SEE NJ AMERICAN WATER STANDARD COMPOUND METER DETAILS AND FIRE SERVICE DETAILS FOR ALL REQUIRED CLEARANCES AND SPECIFICATIONS.
5. METER PIT INSTALLATION TO BE COORDINATED/APPROVED BY NJAW PRIOR TO CONSTRUCTION

WATER METER PIT INSTALLATION

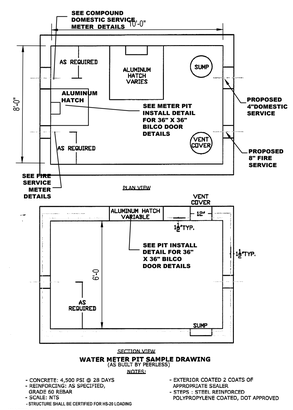
NOT TO SCALE



NOTES:
1. MANHOLE FRAME AND COVER TO BE CAMPBELL FOUNDRY PATTERN NO. 3356 OR APPROVED EQUAL.
2. THIS MANHOLE MAY BE CONSTRUCTED OF BRICK, CONCRETE OR CONCRETE BLOCK. IF BRICK OR CONCRETE BLOCK IS USED, THE BOTTOM SHALL BE AS SHOWN FOR CONCRETE & THE OUTSIDE OF THE WALLS SHALL BE PLASTERED WITH 1/2" COAT OF 1:2 CEMENT SAND MORTAR.
3. REFER TO UTILITY PLAN FOR WATER MAIN SIZING AND CONFIGURATION.
4. BOTH THE DOMESTIC AND FIRE WATER LINES SHALL BE ADEQUATELY ACCOMMODATED WITHIN THE METER PIT; CONTRACTOR SHALL SIZE ACCORDINGLY.

WATER METER MANHOLE

NOT TO SCALE



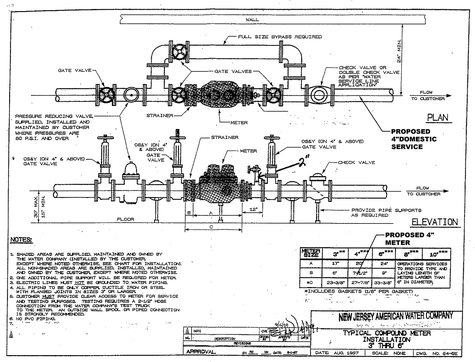
WATER METER PIT SAMPLE DRAWING
(AS BUILT BY HERKLESS)

NOTES:
- CONCRETE: 4,500 PSI @ 28 DAYS
- REINFORCING: AS SPECIFIED; GRADE 60 REBAR
- SCALE: NTS
- STRUCTURE SHALL BE CERTIFIED FOR H5-20 LOADING
- EXTERIOR COATED 2 COATS OF APPROPRIATE SEALER
- STEPS - STEEL REINFORCED POLYPROPYLENE COATED, DOT APPROVED

WATER METER NOTES:
1. METER PIT SHALL BE AS SHOWN OR APPROVED EQUAL TO ACCOMODATE A 4" COMPOUND DOMESTIC METER AND 8" FIRE METER.
2. NJ AMERICAN WATER SHALL SUPPLY AND INSTALL THE COMPOUND DOMESTIC METER.
3. FIRE METER TO BE SUPPLIED BY NJ AMERICAN WATER AND INSTALLED BY CONTRACTOR.
4. SEE NJ AMERICAN WATER STANDARD COMPOUND METER DETAILS AND FIRE SERVICE DETAILS FOR ALL REQUIRED CLEARANCES AND SPECIFICATIONS.
5. METER PIT INSTALLATION TO BE COORDINATED/APPROVED BY NJAW PRIOR TO CONSTRUCTION

WATER METER PIT

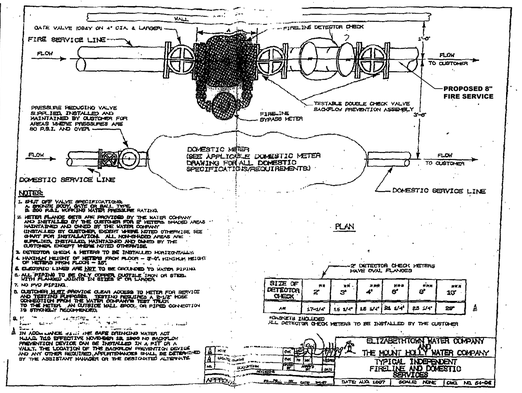
NOT TO SCALE



NOTES:
1. NJ AMERICAN WATER SHALL SUPPLY AND INSTALL THE COMPOUND DOMESTIC METER IN THE METER PIT.
2. METER PIT INSTALLATION TO BE COORDINATED/APPROVED BY NJAW PRIOR TO CONSTRUCTION

NJAW STANDARD COMPOUND DOMESTIC METERING

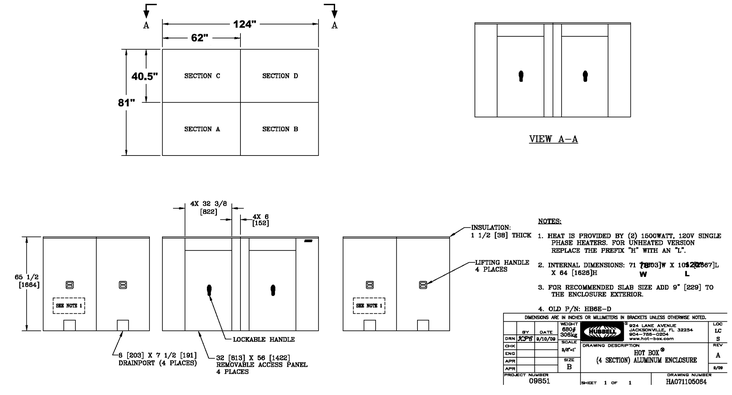
NOT TO SCALE



NOTES:
1. INSTALLATION OF FIRELINE AND METER TO BE COORDINATED WITH NJ AMERICAN WATER.
2. FIRELINE INSTALLATION SHALL BE IN ACCORDANCE WITH ALL BUILDING CODE AND PLUMBING CODE REGULATIONS, AND APPLICABLE LOCAL, COUNTY, AND STATE STANDARDS.

NJAW TYPICAL FIRELINE SERVICE

NOT TO SCALE



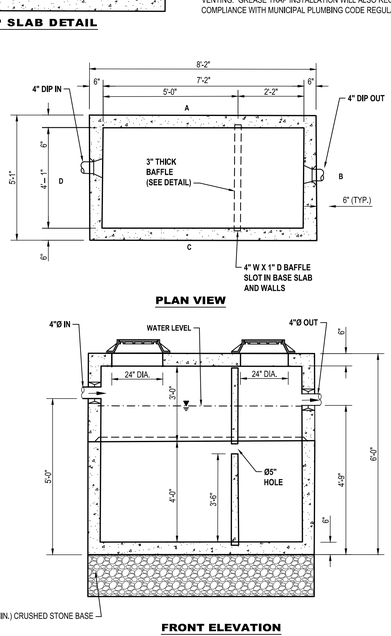
NOTES:
1. HEAT IS PROVIDED BY (2) 1500WATT, 120V SINGLE PHASE HEATERS. FOR UNHEATED VERSION REPLACE THE PREFIX "H" WITH AN "L".
2. INTERNAL DIMENSIONS: 71 7/8 [1826] W X 105 2/8 [2667] L X 64 [1626] H
3. FOR RECOMMENDED SLAB SIZE ADD 9" [229] TO THE ENCLOSURE EXTERIOR.
4. OLD P/N: HBSE-D

DIMENSIONS ARE IN INCHES OR MILLIMETERS IN BRACKETS UNLESS OTHERWISE NOTED.
BY | DATE | SCALE: NONE | DRAWING DESCRIPTION: HOT BOX (4 SECTION) ALUMINUM ENCLOSURE | SIZE: B | PROJECT NUMBER: 09651 | DRAWING NUMBER: HA071105064 | SHEET 1 OF 1

BACKFLOW ENCLOSURE NOTES:
1. SEPARATE FIRE SERVICE METER, DOMESTIC SERVICE METER AND BACKFLOW PREVENTERS SHALL INSTALLED IN PROPOSED ABOVE GROUND HEATED/INSULATED ENCLOSURE WITH INTERNAL DIMENSIONS OF 120L" X 78W" X 64"H BY HOTBOX OR APPROVED EQUAL.
2. ALL CLEARANCES SHALL BE IN ACCORDANCE WITH NEW JERSEY AMERICAN WATER (NJAW) AND PLUMBING CODE REQUIREMENTS.
3. CONTRACTOR SHALL COORDINATE ELECTRICAL SUPPLY FOR HEATING OF UNIT WITH ELECTRICAL DESIGN PLANS/SPECIFICATIONS BY OTHERS.
4. HOT BOX SHALL BE AS SHOWN OR APPROVED EQUAL, TO HOUSE PROPOSED SEPARATE 3" DOMESTIC METER AND 6" FIRE METER AND BACKFLOW PREVENTERS IN ACCORDANCE WITH ALL PLUMBING CODE AND CLEARANCE REQUIREMENTS AS REQUIRED BY NJAW AND AS PER PLUMBING DESIGN AND FIRE SUPPRESSION DESIGN BY OTHERS.
5. HOT BOX SHALL BE INSTALLED ON 5" CONCRETE PAD, LEVEL, IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DIMENSIONS.
6. CONTRACTOR SHALL COORDINATE SEPARATE DOMESTIC AND FIRE WATER SERVICE FOR NEW BUILDING WITH NJAW AND MEP/FIRE SUPPRESSION DESIGN BY OTHERS.
7. CONTRACTOR SHALL PROVIDE ENGINEER CERTIFIED SHOP DRAWING ILLUSTRATING ENCLOSURE WITH ALL VALVES, BACKFLOW PREVENTERS, AND METERS WITH REQUIRED CLEARANCES PRIOR TO ORDERING HOT BOX.
8. LOCATION OF PROPOSED WATER SERVICE CONNECTIONS AND LOCATION OF PROPOSED HOT BOX IS APPROXIMATE. CONTRACTOR SHALL FIELD COORDINATE LOCATION OF PROPOSED WATER SERVICE CONNECTION AND PROPOSED HOT BOX WITH NJAW.
9. HOT BOX HEATER SHALL BE 277 V. CONTRACTOR SHALL COORDINATE WITH MEP PLANS. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL ENCLOSURE APPURTENANCES & ACCESSORIES.

HOT BOX ENCLOSURE

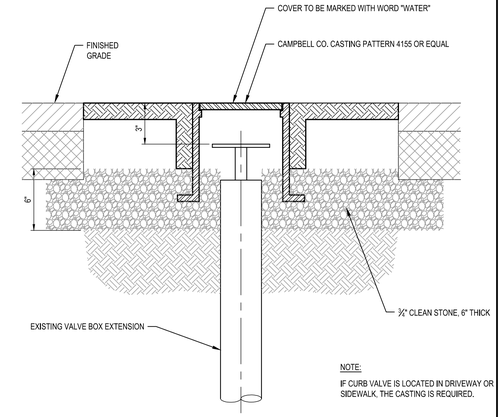
NOT TO SCALE



NOTES:
1. PRECAST CONCRETE 28-DAY COMPRESSIVE STRENGTH (F'c) = 4,000 PSI.
2. PRECAST STRUCTURES SHALL BE PRODUCED TO MEET OR EXCEED ASTM SPECIFICATIONS.
3. PRECAST CONCRETE STRUCTURE, AND ALL ASSOCIATED FRAMES, GRATES, COVERS, ETC., SHALL BE DESIGNED AND CONSTRUCTED TO SUPPORT H-20 LOADING.
4. CONTRACTOR TO VERIFY SIZE AND LOCATION OF ALL OPENINGS.
5. CONTRACTOR SHALL APPLY A BITUMASTIC COATING ON BOTTOM AND ALL SIDES.
6. PRECAST CONCRETE GREASE TRAP CHAMBER SHALL BE CONSTRUCTED OF NON-CORROSIVE MATERIALS. THE INTERNAL BAFFLES AND FITTINGS SHALL ALSO BE MADE OF NON-CORROSIVE MATERIALS AS WELL. ACCESS SHALL BE PROVIDED VIA TWO (2) 24-INCH DIAMETER MANHOLE OPENINGS, EQUIPPED WITH HEAVY-DUTY CAST IRON FRAMES AND COVERS.
7. THE PROPOSED GREASE TRAP WILL BE LOCATED WITHIN A FLOOD ZONE. THE MANHOLE FRAMES AND COVERS SHALL BE LOCKING AND WATER-TIGHT.
8. INSTALLATION OF THE GREASE TRAP SHALL MEET THE REQUIREMENTS OF BOTH THE LOCAL AND UNIFORM PLUMBING CODES, INCLUDING LOCATION, FLOW CONTROL AND VENTING. GREASE TRAP INSTALLATION WILL ALSO REQUIRE A PLUMBING PERMIT AND COMPLIANCE WITH MUNICIPAL PLUMBING CODE REGULATIONS

1,000-GAL. PRECAST CONCRETE GREASE TRAP

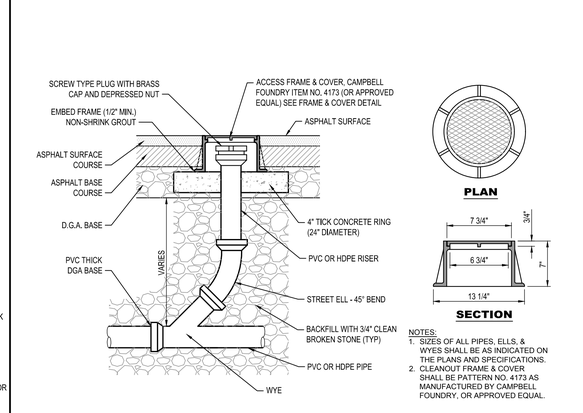
NOT TO SCALE



NOTE:
IF CURB VALVE IS LOCATED IN DRIVEWAY OR SIDEWALK, THE CASTING IS REQUIRED.

WATER CURB VALVE BOX WITH CASTING

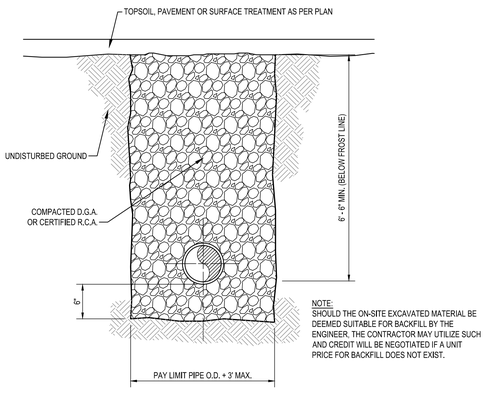
NOT TO SCALE



NOTES:
1. SIZES OF ALL PIPES, ELLS, & WYES SHALL BE AS INDICATED ON THE PLANS AND SPECIFICATIONS.
2. CLEANOUT FRAME & COVER SHALL BE PATTERN NO. 4173 AS MANUFACTURED BY CAMPBELL FOUNDRY, OR APPROVED EQUAL.

CLEANOUT WITH ACCESS FRAME

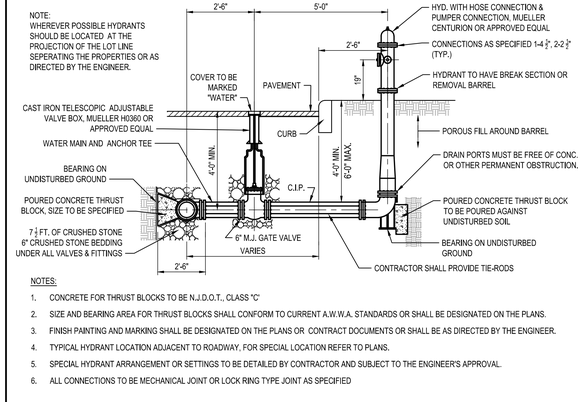
NOT TO SCALE



NOTE:
SHOULD THE ON-SITE EXCAVATED MATERIAL BE DEEMED SUITABLE FOR BACKFILL BY THE ENGINEER, THE CONTRACTOR MAY UTILIZE SUCH AND CREDIT WILL BE NEGOTIATED IF A UNIT PRICE FOR BACKFILL DOES NOT EXIST.

TRENCH FOR DIP WATER MAIN

NOT TO SCALE



NOTES:
1. CONCRETE FOR THRUST BLOCKS TO BE N.J.D.O.T., CLASS "C"
2. SIZE AND BEARING AREA FOR THRUST BLOCKS SHALL CONFORM TO CURRENT A.W.W.A. STANDARDS OR SHALL BE DESIGNATED ON THE PLANS.
3. FINISH PAINTING AND MARKING SHALL BE DESIGNATED ON THE PLANS OR CONTRACT DOCUMENTS OR SHALL BE AS DIRECTED BY THE ENGINEER.
4. TYPICAL HYDRANT LOCATION ADJACENT TO ROADWAY, FOR SPECIAL LOCATION REFER TO PLANS.
5. SPECIAL HYDRANT ARRANGEMENT OR SETTINGS TO BE DETAILED BY CONTRACTOR AND SUBJECT TO THE ENGINEER'S APPROVAL.
6. ALL CONNECTIONS TO BE MECHANICAL JOINT OR LOCK RING TYPE JOINT AS SPECIFIED

FIRE HYDRANT ASSEMBLY

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

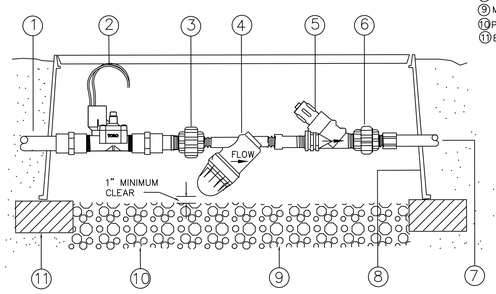
PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:
CONSTRUCTION DETAILS V

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	19 OF 22
DRWG NO	C-10.05

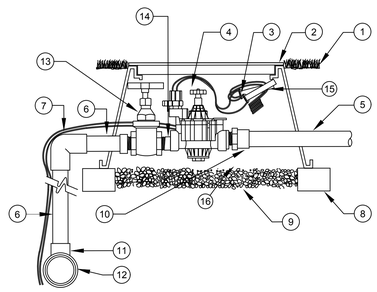
M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\10.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:30:09 PM



1. PVC MAINLINE
2. TORO 264-06-03
3. 3/4" SCH 80 UNION
4. 3/4" DISC FILTER
5. 3/4" PRV
6. 3/4" SCH 80 UNION
7. PVC OR POLY LATERAL LINE
8. 12" STANDARD VALVE BOX
9. MxF IPS COUPLING
10. PEA GRAVEL SUMP (18")
11. BRICK SUPPORTS

IRRIGATION: REMOTE CONTROLLED VALVE WITH ¾" PRV

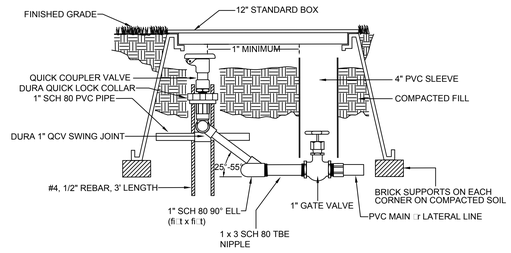
NOT TO SCALE



1. FINISHED GRADE
2. VALVE BOX & COVER
3. CONTROL WIRES WITH 18" MIN. SERVICE COIL AND WATERPROOF WIRE SPLICE CONNECTORS
4. REMOTE CONTROL VALVE RAIN BIRD PGA SERIES VALVE
5. POLY LATERAL LINE
6. PVC MAIN LINE
7. PVC ELBOW
8. CONTINUOUS BRICK SUPPORTS
9. GRAVEL (1 CU. FT.)
10. PVC MALE ADAPTER (TYP.)
11. PVC TEE OR ELBOW (TYP.)
12. PVC MAIN LINE (TYPE.) SEE SPECS. FOR DEPTH
13. 1" ISOLATION VALVE
14. 1" TBE SCH 80 NIPPLE
15. DRY □r DBR 6 □□lc□3M

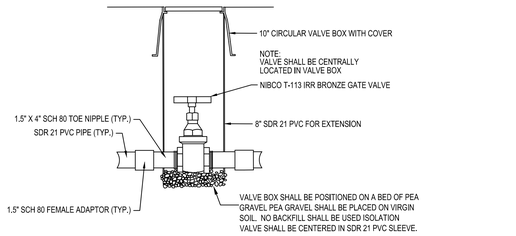
IRRIGATION: ELECTRIC VALVE

NOT TO SCALE



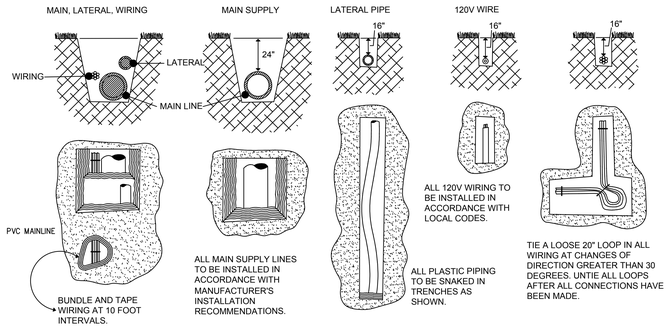
IRRIGATION: 1" QUICK COUPLER VALVE WITH ISOLATION VALVE

NOT TO SCALE



IRRIGATION: LINE ISOLATION VALVE

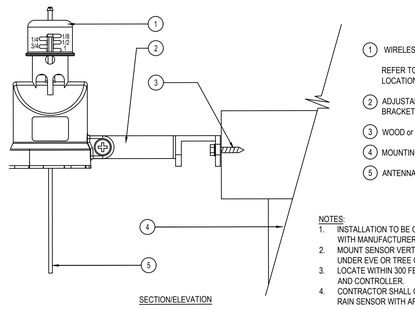
NOT TO SCALE



NOTE: ALL BURIAL DEPTHS AS PER WRITTEN SPECIFICATIONS AND ALL CODES.

IRRIGATION: TYPICAL TRENCHES

NOT TO SCALE



SECTION/ELEVATION

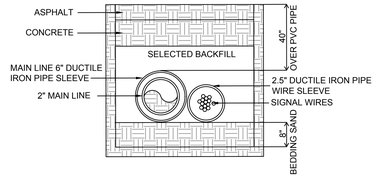
NOT TO SCALE

1. WIRELESS RAIN SENSOR
   REFER TO PLAN FOR SENSOR LOCATION
2. ADJUSTABLE MOUNTING BRACKET
3. WOOD or METAL SCREW
4. MOUNTING SURFACE (see notes)
5. ANTENNA

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
2. MOUNT SENSOR VERTICALLY. AVOID PLACEMENT UNDER EVE OR TREE CANOPY.
3. LOCATE WITHIN 300 FEET OF SENSOR RECEIVER AND CONTROLLER.
4. CONTRACTOR SHALL COORDINATE LOCATION OF RAIN SENSOR WITH APPLICANT & OWNER.

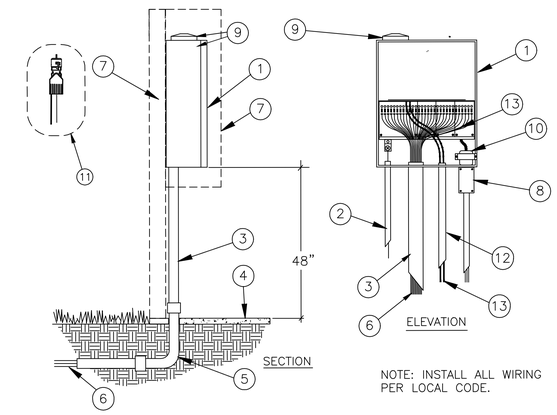
IRRIGATION: WIRELESS RAIN SENSOR

NOT TO SCALE



IRRIGATION: PIPE SLEEVE FOR PIPE & WIRE

NOT TO SCALE

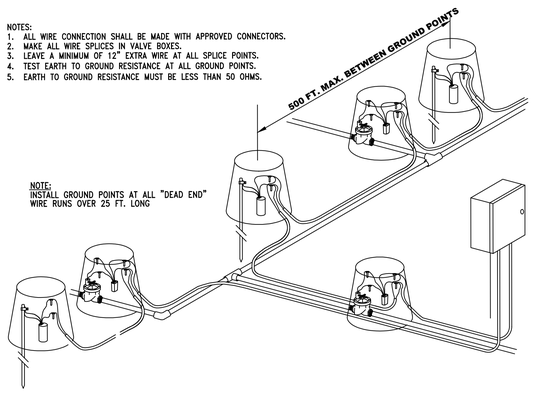


NOTE: INSTALL ALL WIRING PER LOCAL CODE.

1. WEATHERTRAK ET PRO3 SERIES CONTROLLER WITHIN VANDAL RESISTANT POWDER COATED COLD ROLLED STEEL WALL MOUNT ENCLOSURE ASSEMBLY WITH KEY-LOCK. SEE SPECIFICATIONS FOR SIZE AND FINISH.
2. #6 COPPER GROUND WIRE IN CONDUIT. CONNECT TO BUILDING GROUND AS REQUIRED BY NATIONAL AND LOCAL ELECTRICAL CODES.
3. 1-1/2" PVC SCH. 40 CONTROL WIRE CONDUIT.
4. FLOOR WITHIN CONTROLLER EQUIPMENT ROOM.
5. 1-1/2" PVC LONG SWEEP ELL AND CONDUIT. EXTEND UNDER FLOOR TO PLANTING AREA - SIZE AS REQUIRED.
6. LOW VOLTAGE DECODER WIRE FROM AUTOMATIC CONTROLLER TO ELECTRICAL CONTROL VALVES.
7. ELECTRICAL CONTRACTOR SHALL SPECIFY & PROVIDE A NEMA-APPROVED, WEATHER-PROOF CABINET TO INSTALL CONTROLLER WITHIN.
8. "J" BOX FOR 120 VOLT CONNECTION TO CONTROLLER TRANSFORMER.
9. LOW PROFILE ANTENNA.
10. CONTROLLER TRANSFORMER.
11. WIRED OR WIRELESS RAIN SENSOR PER SPECS. LOCATE SENSOR OUTSIDE PER MANUFACTURER'S RECOMMENDATION. FOR WIRED SENSOR, WIRE BACK TO CONTROLLER.
12. 3/4" PVC SWEEP ELL AND CONDUIT FOR FLOW SENSOR CABLE AND MASTER VALVE WIRES.
13. FLOW SENSOR CABLE AND MASTER VALVE WIRES PER SPECIFICATIONS.

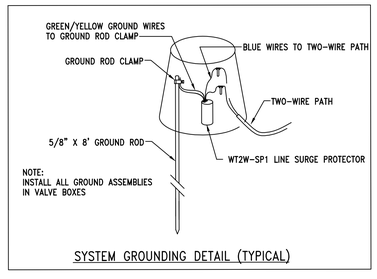
IRRIGATION: CONTROLLER

NOT TO SCALE

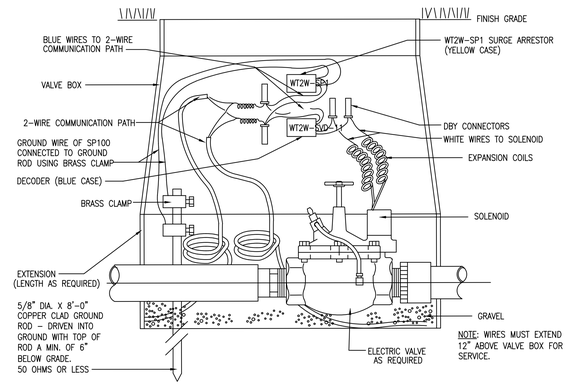


IRRIGATION: TYPICAL 2-WIRE SYSTEM GROUNDING

NOT TO SCALE



SYSTEM GROUNDING DETAIL (TYPICAL)



IRRIGATION: 2-WIRE VALVE, DECODER & SURGE ARRESTOR

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS VI

SUBMISSIONS	
DATE	DESCRIPTION
10.03.16	100% ISSUE
10.17.16	BID SET
02.22.17	REBID SET

REVISIONS	
DATE	DESCRIPTION

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	20 OF 22
DRWG NO	C-10.06

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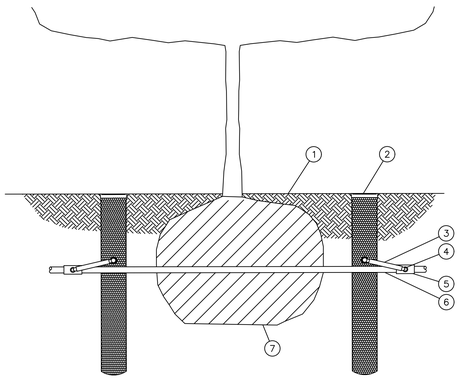
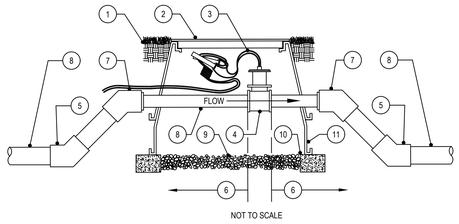


1. FINISH GRADE/TOP OF MULCH
2. ROOT WATERING SERIES: RAIN BIRD RWS SERIES (1 OF 2 SHOWN, MORE POSSIBLE)
3. SWING ASSEMBLY (INCLUDED) (1 OF 2 SHOWN, MORE POSSIBLE)
4. 1/2-INCH MALE NPT INLET (INCLUDED) (1 OF 2 SHOWN, MORE POSSIBLE)
5. PVC SCH 40 TEE OR EL (1 OF 2 SHOWN, MORE POSSIBLE)
6. POLYETHYLENE LATERAL PIPE
7. PLANT ROOT BALL

NOTES:
1. POSITION 2-3 UNITS (OR MORE) EVENLY SPACED AROUND PLANT. FOR NEW TREES PLACE NEAR ROOT BALL. FOR EXISTING TREES PLACE HALF THE DISTANCE BETWEEN CANOPY EDGE AND TREE TRUNK.
2. INSTALL PRODUCT WITH TOP EVEN WITH GROUND SURFACE.
3. RWS SERIES AVAILABLE IN THE FOLLOWING MODELS: RWS-B-1401 (0.25 GPM)
4. WHEN INSTALLING IN EXTREMELY HARD OR CLAY SOILS, ADD ¾" GRAVEL UNDER AND AROUND THE UNIT TO ALLOW FASTER WATER INFILTRATION AND ROOT PENETRATION.
5. ONCE RWS HAS BEEN INSTALLED FILL THE BASKET WITH PEA GRAVEL BEFORE LOCKING LID.

IRRIGATION: TREE ROOT WATERING SYSTEM

NOT TO SCALE



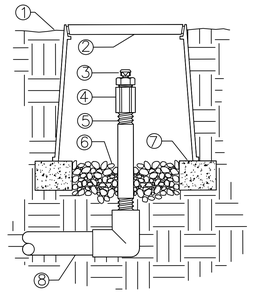
NOT TO SCALE

1. FINISH GRADE
2. JUMBO VALVE BOX & COVER
3. CONTROL WIRES WITH 12" MIN. SERVICE COIL AND WATERPROOF WIRE SPLICE CONNECTORS - WIRE COLORS PER SPECIFICATIONS
4. FLOW SENSOR
5. PVC 45 DEGREE ELL (TYP.)
6. MINIMUM 10x PIPE DIAMETER UPSTREAM & MINIMUM 5x PIPE DIAMETER DOWNSTREAM OF STRAIGHT PIPE
7. PVC 45 DEGREE ELL (TYP.) BUSH DOWN TO FLOW METER SIZE AS NECESSARY
8. PVC MAINLINE - LENGTH AS REQUIRED - SEE SPECIFICATIONS FOR TYPE AND DEPTH
9. GRAVEL (1 CU. FT.)
10. CONTINUOUS BRICK SUPPORTS
11. VALVE BOX EXTENSIONS AS REQUIRED

NOTE:
SEE PLANS, LEGEND AND SPECIFICATIONS FOR ADDITIONAL INSTALLATION NOTES.

IRRIGATION: FLOW SENSOR

NOT TO SCALE

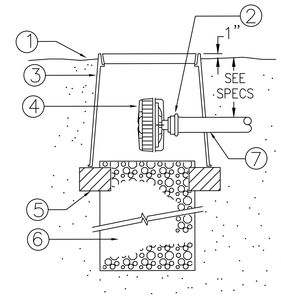


1. FINISHED GRADE
2. 6" ROUND VALVE BOX
3. AIR/VACUUM RELIEF VALVE
4. 1/2" PVC COUPLING (TxT)
5. 1/2" SCH. 80 NIPPLE (LENGTH AS REQUIRED)
6. PEA GRAVEL SUMP (6")
7. BRICK SUPPORTS
8. PVC PIPING AND FITTING

NOTES:
1. AIR/VACUUM RELIEF CANNOT BE CONNECTED LOWER THAN DRIPLINE LATERALS
2. USE ONE FOR EACH INCREMENT OF 7GPM

IRRIGATION: AIR/VACUUM RELIEF VALVE

NOT TO SCALE

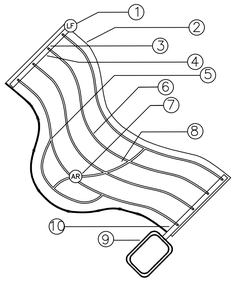


1. FINISHED GRADE
2. COMPRESSION RING (PROVIDED)
3. 6" VALVE BOX
4. LINE FLUSHING VALVE F-TLFV
5. BRICK SUPPORTS
6. PEA GRAVEL SUMP (18")
7. TUBING

NOTE: IF MORE THAN ONE BED IS INCLUDED IN ONE ZONE, THEN A FLUSH DRAIN IS REQUIRED FOR EACH BED.

IRRIGATION: LINE FLUSHING VALVE

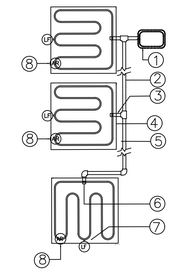
NOT TO SCALE



1. LINE FLUSHING VALVE PLUMBED TO PVC
2. AREA PERIMETER
3. TECHLINE START CONNECTION
4. EXHAUST HEADER
5. TECHLINE TEE
6. TECHLINE LATERAL TUBING
7. AIR / VACUUM RELIEF VALVE (PLUMBED TO Techline ONE AT EACH HIGH POINT)
8. BLANK TUBING CENTERED ON BERM OR MOUND
9. SUPPLY HEADER
10. REMOTE CONTROL VALVE WITH DISC FILTER AND PRV

IRRIGATION: IRREGULAR AREA LAYOUT

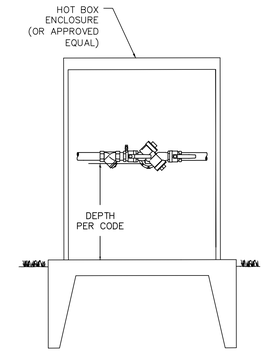
NOT TO SCALE



1. REMOTE CTRL. VALVE W/ DISC FILTER & PRV
2. SUPPLY HEADER
3. Techline START CONNECTION MALE ADAPTER
4. Techline TUBING
5. ISLAND PERIMETER
6. Techline TEE
7. LINE FLUSHING VALVE PLUMBED TO Techline
8. AIR/VACUUM RELIEF VALVE

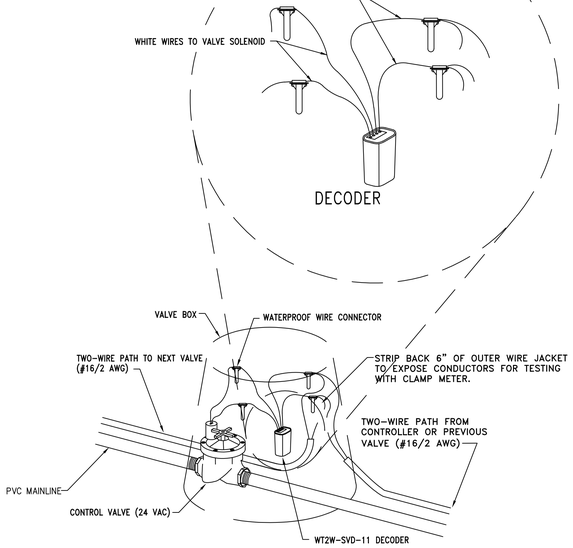
IRRIGATION: ISLAND BED LAYOUT

NOT TO SCALE



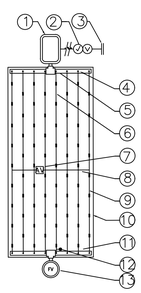
IRRIGATION: BACKFLOW PREVENTER

NOT TO SCALE



IRRIGATION: 2-WIRE DECODER WIRING

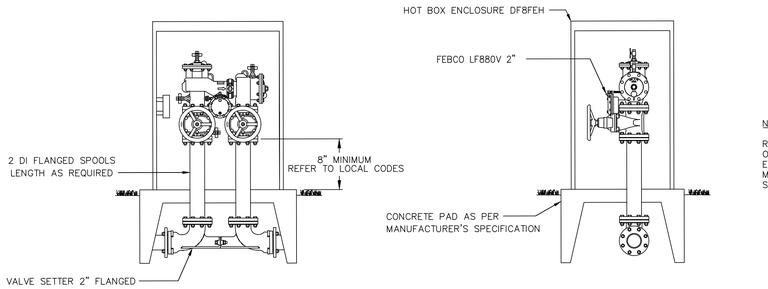
NOT TO SCALE



1. REMOTE CONTROL VALVE WITH FILTER AND
2. PRESSURE REGULATOR ISOLATION VALVE
3. POINT OF CONNECTION
4. MANIFOLD TO ELBOW CONNECTION
5. PVC SUPPLY MANIFOLD
6. DRIPLINE TUBE
7. AIR/VACUUM RELIEF VALVE PLUMB TO DRIPLINE TUBE EACH HIGH POINT (TYP.)
8. AIR/VACUUM RELIEF LATERAL BLANK TUBING CENTERED ON MOUND OR BERM
9. PERIMETER LATERALS 2" TO 4" FROM EDGE
10. AREA PERIMETER
11. PVC FLUSH MANIFOLD
12. OPERATION INDICATOR
13. AUTOMATIC FLUSH VALVE

IRRIGATION: DRIP ZONE END FEED

NOT TO SCALE



NOTES:

REDUCED PRESSURE ASSEMBLY – NRS GATES
OUTDOOR FREEZE PROTECTION INSTALLATION
ELECTRIC REQUIREMENTS 120V 1500W SERVICE FROM MAIN DISCONNECT PROVIDE ELECTRICAL DISCONNECT IN SIDE HOT BOX ENCLOSURE

IRRIGATION: REDUCED PRESSURE ZONE

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NEGLIA ENGINEERING ASSOCIATES
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS VII

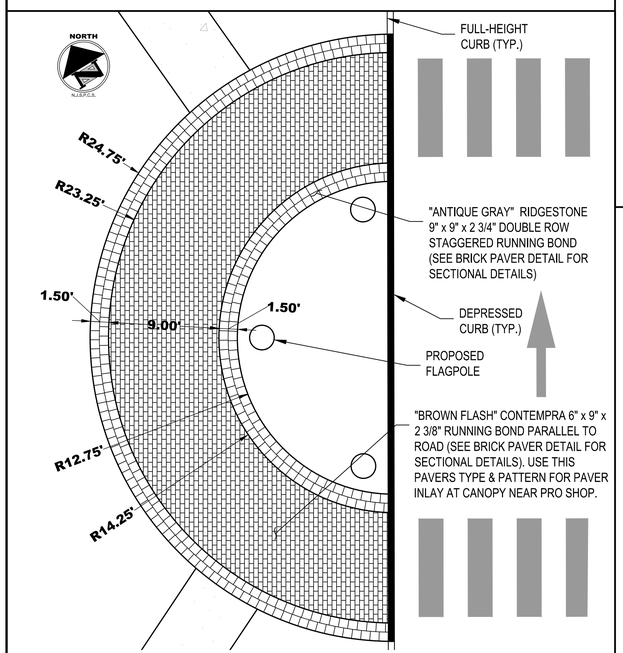
SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	N.T.S.
DRWN BY	EMJ
CHKD BY	DRA/TRS
JOB NO	SCOTPRV16.010
SHEET:	21 OF 22
DRWG NO	C-10.07

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_ FINAL SHEETS\16.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:32:23 PM

LANDSCAPE NOTES

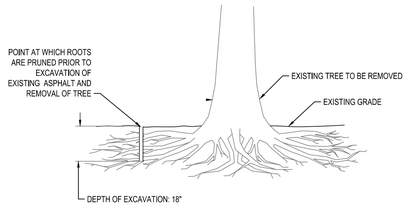
1. ALL PLANT MATERIAL SHALL CONFORM TO STANDARDS SET BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
2. ALL PLANT MATERIAL SHALL BE REVIEWED AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. THE LANDSCAPE ARCHITECT RETAINS THE RIGHT TO FURTHER INSPECT PLANT MATERIALS FOR CONDITION AND DAMAGE AT ANY TIME DURING THE PROGRESS OF WORK. ANY AND ALL UNSATISFACTORY PLANT MATERIALS SHALL BE REMOVED IMMEDIATELY FROM THE PROJECT SITE.
3. ALL B & B MATERIAL SHALL BE FRESHLY DUG THE CURRENT GROWING SEASON. MATERIALS SHALL NOT BE PRUNED PRIOR TO DELIVERY UNLESS OTHERWISE DIRECTED. DO NOT BEND OR BIND/TIE TREES OR SHRUBS IN SUCH A MANNER AS TO DAMAGE BARK, BREAK BRANCHES, OR DESTROY THE NATURAL SHAPE.
4. ANY DISCREPANCIES BETWEEN PLANS, NOTES, DETAILS AND EXISTING CONDITIONS SHALL BE IMMEDIATELY REPORTED TO THE LANDSCAPE ARCHITECT PRIOR TO RESUMING WORK. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL REVISIONS DUE TO FAILURE TO GIVE SUCH NOTICE.
5. ALL PLANTING, SODDING AND SEEDING SHALL BE PERFORMED IN A WORKMANLIKE MANNER USING ACCEPTED NURSERY PRACTICES AND STANDARDS. PAVED SURFACES TO BE KEPT BROOM-CLEAN AND ALL DEBRIS GENERATED BY THIS WORK IS TO BE PROMPTLY REMOVED BY THE CONTRACTOR.
6. PERSONNEL SHALL BE FAMILIAR WITH PLANTING PROCEDURES AND BE SUPERVISED BY A QUALIFIED FOREMAN. ALL EQUIPMENT NECESSARY TO COMPLETE THE LANDSCAPING WORK SHALL BE SUPPLIED BY THE CONTRACTOR.
7. CONTRACTOR SHALL FIELD LOCATE PLANT MATERIAL FOR LANDSCAPE ARCHITECT APPROVAL PRIOR TO INSTALLATION.
8. ALL PLANTS AND ENTIRE SHRUB BEDS SHALL RECEIVE MULCH AS INDICATED ON THE DRAWINGS.
9. SOIL SHALL BE PREPARED AS SPECIFIED IN THE SOIL PREPARATION TECHNICAL SPECIFICATION PRIOR TO PLANT MATERIAL INSTALLATION. SHOULD PLANT MATERIAL BE INSTALLED PRIOR TO ACCEPTANCE OF THE SOIL PREPARATION THE CONTRACTOR, AT HIS EXPENSE, SHALL REMOVE THE PLANT MATERIAL, CORRECT THE SOIL, AND REPLANT AT THE DIRECTION OF THE LANDSCAPE ARCHITECT. THE LANDSCAPE ARCHITECT MAY, AT HIS DISCRETION, AND AT THE CONTRACTOR'S COST, REQUIRE THE REMOVED PLANT MATERIAL BE REPLACED IN LIEU OF BEING REPLANTED.
10. TREES SHALL BE PLANTED SUCH THAT THE ROOT FLAIR IS FULLY EXPOSED AT GRADE. SHRUBS SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS THEY BORE TO EXISTING GRADE IN THE NURSERY.
11. CUT AND REMOVE BURLAP AND WIRE BASKET FROM THE TOP ⅓ OF THE ROOT BALL. NYLON ROPE AND/OR NYLON BALLING MATERIAL SHALL NOT BE USED.
12. UPON COMPLETION OF THE TWO YEAR PLANT GUARANTEE PERIOD, THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR REMOVING PLANTING SAUCERS AND ALL STAKES FROM TREES. THIS SHALL BE DONE IN CONSULTATION WITH THE LANDSCAPE ARCHITECT.
13. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT QUANTITIES. IF THERE IS A DISCREPANCY BETWEEN THE PLANT COUNT SHOWN IN THE PLANT LIST AND THE PLANTING GRAPHIC, THE GRAPHIC SHALL TAKE PRECEDENCE.
14. SOIL IN ALL AREAS UTILIZED FOR CONSTRUCTION STAGING OR GOLF COURSE OPERATIONS WEST OF THE CLUB HOUSE, SHALL BE THOROUGHLY UNCOMPACTED PRIOR TO INSTALLATION OF TOPSOIL AND PLANTING SOIL.
15. IF THE CONTRACTOR DETERMINES THE SUB-GRADE SOIL CONDITIONS ARE DELETERIOUS TO PLANT GROWTH OR WILL INHIBIT DRAINAGE, THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY AND PRIOR TO INSTALLATION OF ANY PLANT MATERIAL.
16. TOPSOIL AND SEED ALL AREAS DISTURBED AS A RESULT OF ANY AND ALL DISTURBANCES, CONSTRUCTION OR STORAGE EQUIPMENT, WHETHER SUCH AREAS ARE SHOWN ON THE PLANS OR NOT. CONTRACTOR TO FIELD VERIFY AREAS OF SEED PRIOR TO SUBMITTING A BID. SEE SPECIFICATIONS FOR SEED MIX.
17. CONTRACTOR SHALL NOT DEVIATE FROM THE APPROVED PLAN AND IT'S CONTENTS WITHOUT THE PRIOR WRITTEN CONSENT BY THE LANDSCAPE ARCHITECT.
18. CONTRACTOR IS RESPONSIBLE TO MAINTAIN EXISTING STRUCTURES, FACILITIES AND MATERIALS TO REMAIN. CONTRACTOR SHALL REPAIR AND OR REPLACE ANY DAMAGE CAUSED BY ANY EQUIPMENT, VEHICLE OR PERSON RELATED TO THE COMPLETION OF THIS WORK AT NO EXPENSE TO THE OWNER. THIS INCLUDES, BUT IS NOT LIMITED TO, ALL SURVEY BOUNDARY MARKERS AND BENCH MARKS. IF DISTURBED OR LOST, IT SHALL BE THE CONTRACTORS RESPONSIBILITY FOR CONTRACTING TO HAVE THE SAME RESET.
19. ALL TREES AND STUMPS TO BE REMOVED SHALL BE REMOVED TO A CLEAR DEPTH OF NOT LESS THAN TWO FEET BELOW SUBGRADE LEVEL. CONTRACTOR SHALL DISPOSE OF OFF SITE IN ACCORDANCE WITH ALL LAWS.
20. ACTUAL UTILITY LOCATIONS MAY VARY FROM PLANS. CONTRACTOR SHALL VERIFY FIELD LOCATIONS PRIOR TO PLANTING.
21. ALL PLANT MATERIAL SHALL BE GUARANTEED TO BE ALIVE AND IN VIGOROUS GROWING CONDITION FOR A PERIOD OF TWO YEARS AFTER ACCEPTANCE BY THE OWNER.
22. ALL PLANT MEAREIAL SHALL HAVE ROOT BALLS THAT ARE NOT CRACKED, LOOSE OR BROKEN. IF TEH ROOT BALL IS CRACKED, LOOSE OR BORKEN IT WILL BE REJECTED. PLANT MATERIALS THAT ARE STORED ON SITE FOR LONGER THAN THREE DAYS SHALL BE KEPT IN THE SHADE, PROTECTED FROM WEATHER AND MECHANICAL INJURY AND HAVE THE ROOT BALLS HEALED IN AND KEPT WELL WATERED.



PAVER LAYOUT

SCALE: 1" = 5'

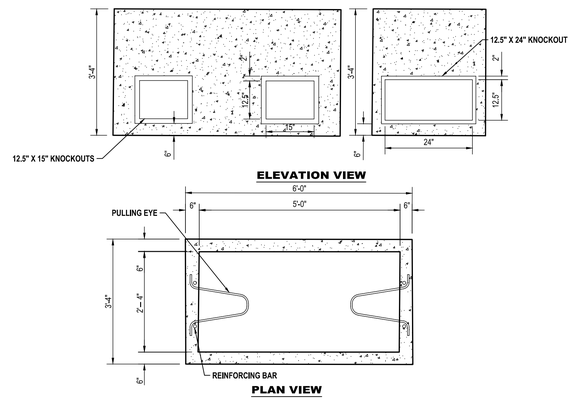
THIS PAVER TYPE & PATTERN SHALL BE USED FOR THE PAVER INLAY AT THE CANOPY NEAR THE PRO SHOP



NOTES:
1. CUTS ARE TO BE MADE CLEANLY WITH A SHARP ROOT PRUNING TOOL SUCH AS DOSCO OR VERMEER ROOT PRUNER.

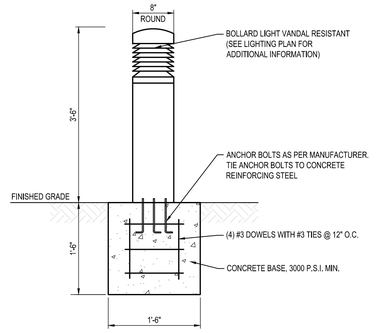
ROOT PRUNING DETAIL

NOT TO SCALE



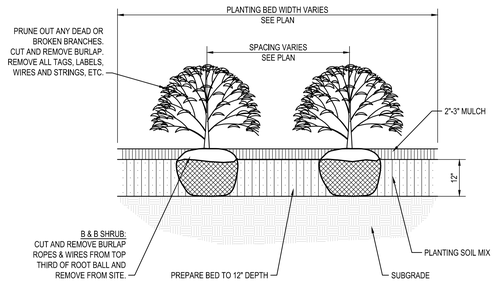
PULL BOX

NOT TO SCALE



BOLLARD LIGHT AND FOOTING

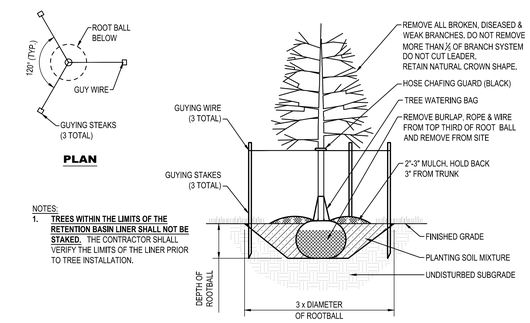
NOT TO SCALE



NOTES:
1. WHEN PLANTING CONTAINER, MAKE 4 TO 5 VERTICAL CUT TO THE ROOT BALL BEFORE SETTING IN PLACE

SHRUB PLANTING

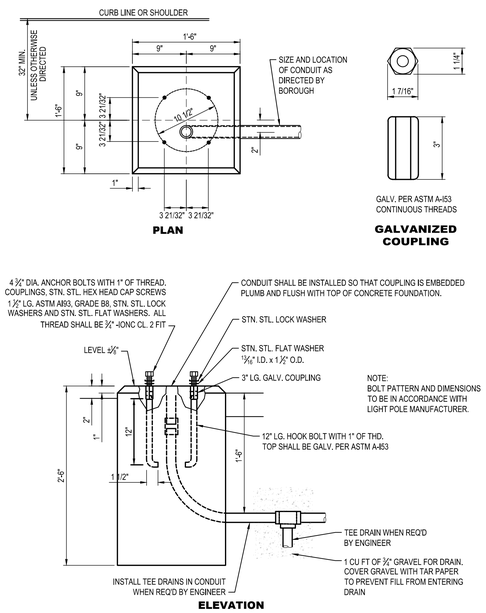
NOT TO SCALE



NOTES:
1. **TREES WITHIN THE LIMITS OF THE RETENTION BASIN LINER SHALL NOT BE STAKED.** THE CONTRACTOR SHALL VERIFY THE LIMITS OF THE LINER PRIOR TO TREE INSTALLATION.

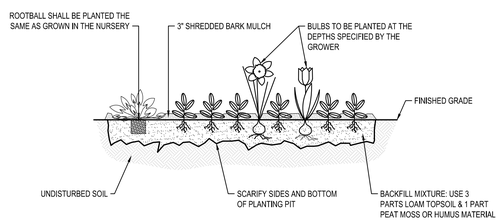
DECIDUOUS TREE PLANTING

NOT TO SCALE



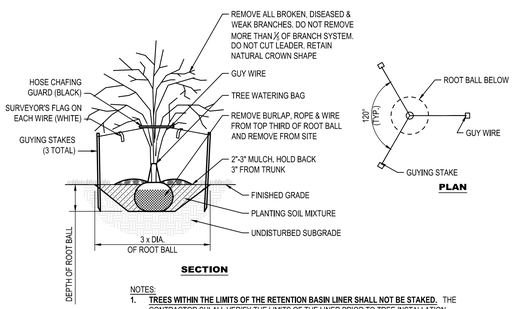
LIGHT POLE FOUNDATION

NOT TO SCALE



PERENIALS, BULBS & GROUND COVER PLANTING DETAIL

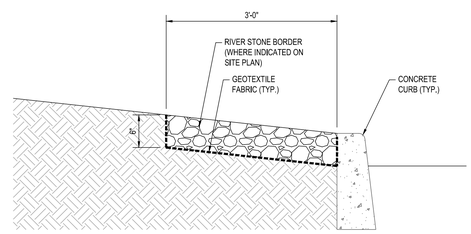
NOT TO SCALE



NOTES:
1. **TREES WITHIN THE LIMITS OF THE RETENTION BASIN LINER SHALL NOT BE STAKED.** THE CONTRACTOR SHLALL VERIFY THE LIMITS OF THE LINER PRIOR TO TREE INSTALLATION.
2. GUY TRUNKS TOGETHER PRIOR TO GUYING TO STAKES. MAINTAIN TRUNK SEPARATION.
3. PLACE TWO GUY STAKES ON UPHILL SIDE OF TREES PLANTED ON SLOPES

MULTI-STEM TREE PLANTING

NOT TO SCALE



RIVER STONE BORDER

NOT TO SCALE

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

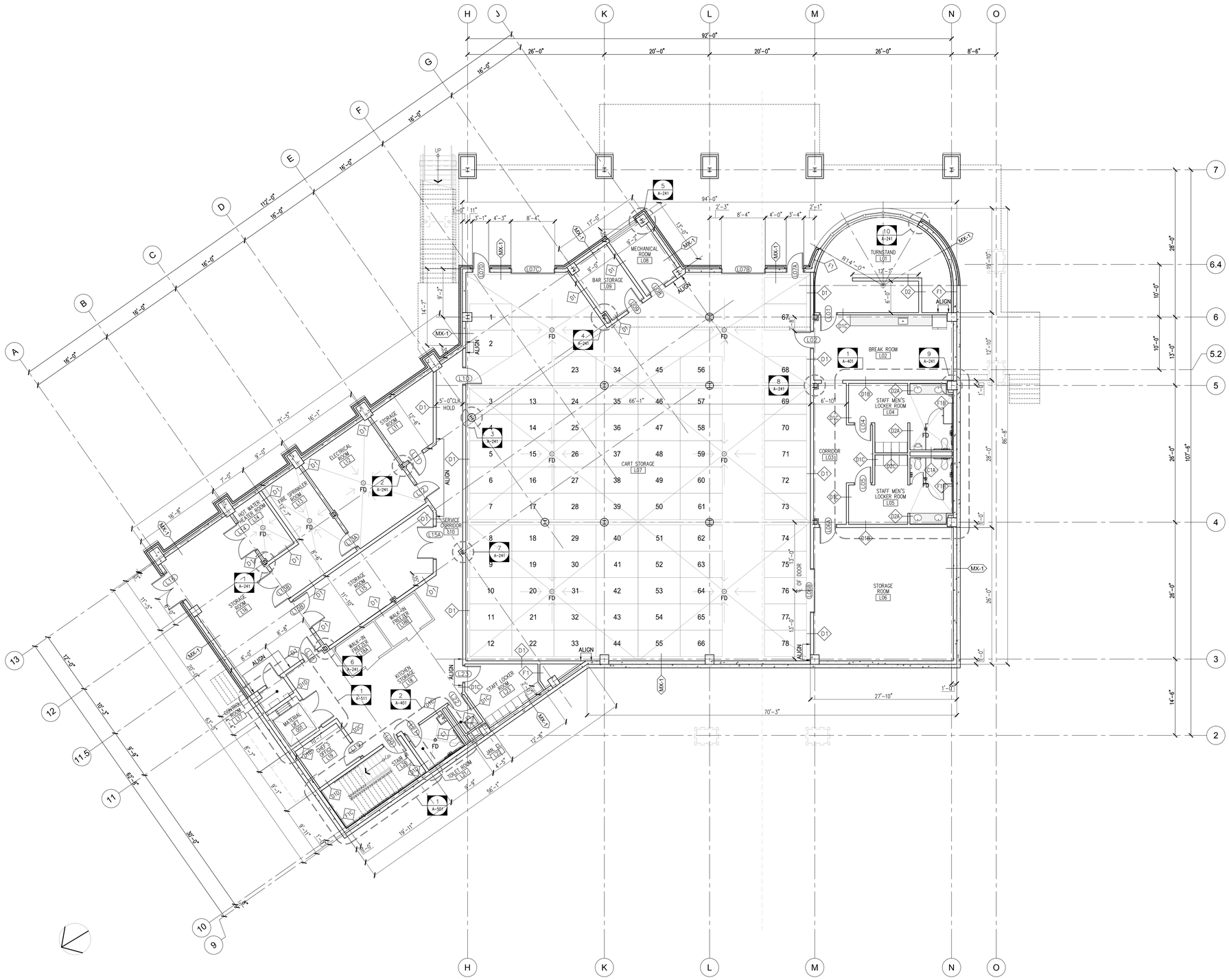
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CONSTRUCTION DETAILS VIII

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	EMJ
02.22.17	REBID SET			CHKD BY	DRA/TRS
				JOB NO	SCOTPRV16.010
				SHEET:	22 OF 22
				DRWG NO	10.08

M:\SCOTCH PLAINS\SCOTPRV16.010 (NEW ASH BROOK CLUB HOUSE)\CAD_FINAL SHEETS\16.00 - DETAILS.DWG Plotted: Tuesday, February 21, 2017 4:35:00 PM



1 A-101 LOWER LEVEL PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
NJ License No. AI 12118

MARK E. BESS, AIA, NCARB
NJ License No. AI 16160

LAURENCE K. UHER, AIA, LEED, AP
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

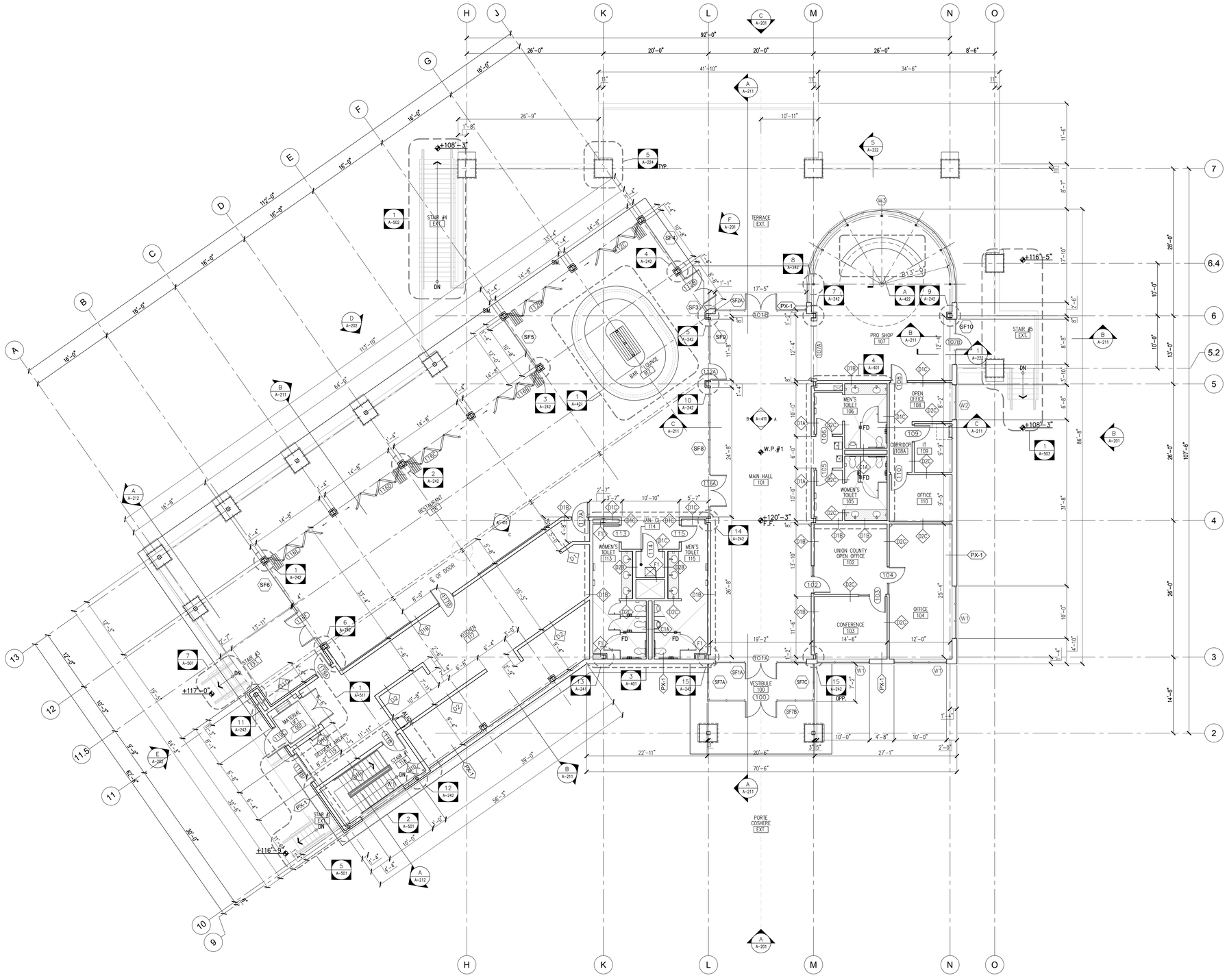
LOWER LEVEL PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:

DRWG NO

A-101



1 A-102 MAIN LEVEL PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NICHOLAS J. NETTA, AIA, NCARB
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PROJECT:

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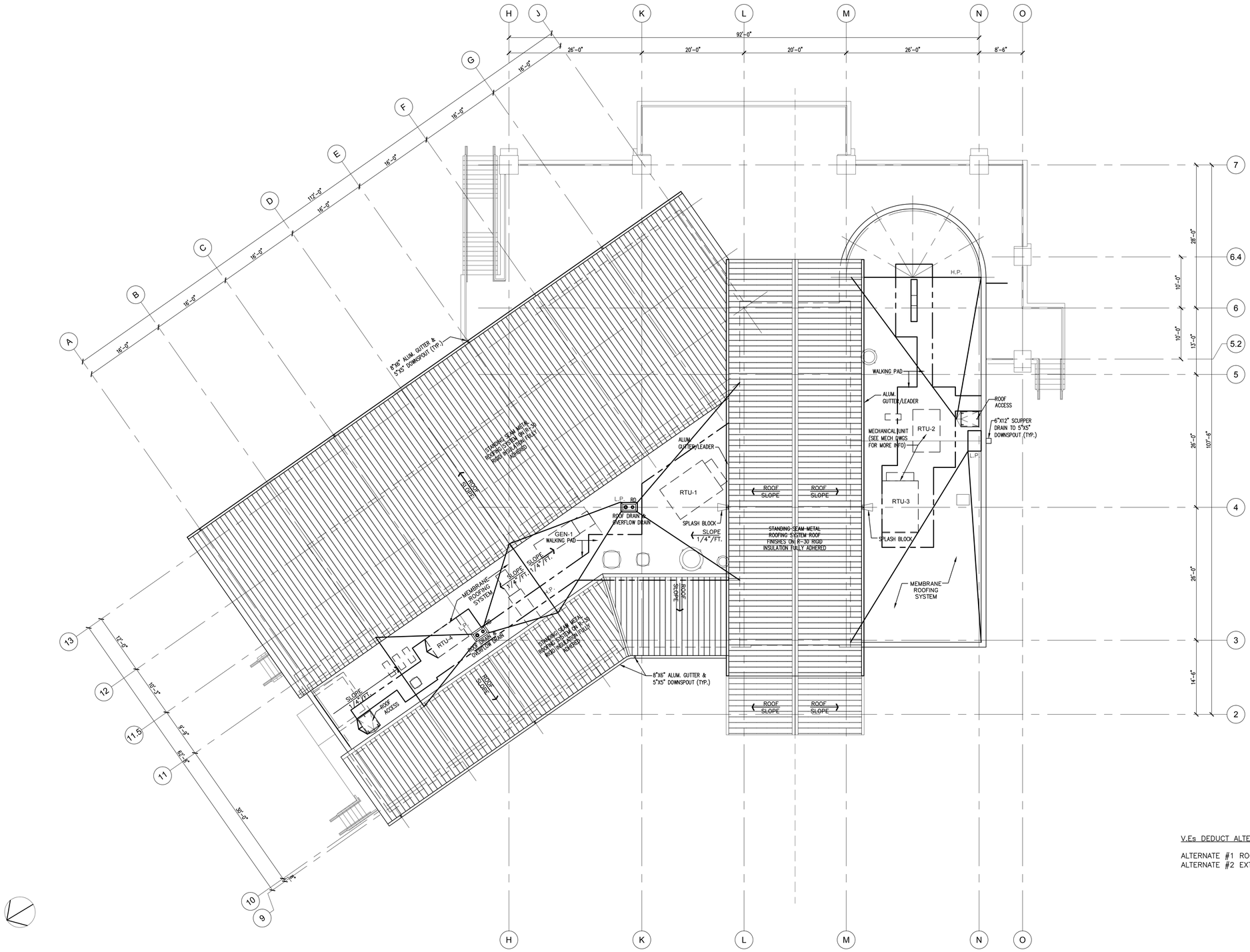
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

MAIN LEVEL PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-102



V.Es DEDUCT ALTERNATE ITEMS

ALTERNATE #1 ROOFING
ALTERNATE #2 EXTERIOR SIDINGS

1 / A-103 ROOF PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

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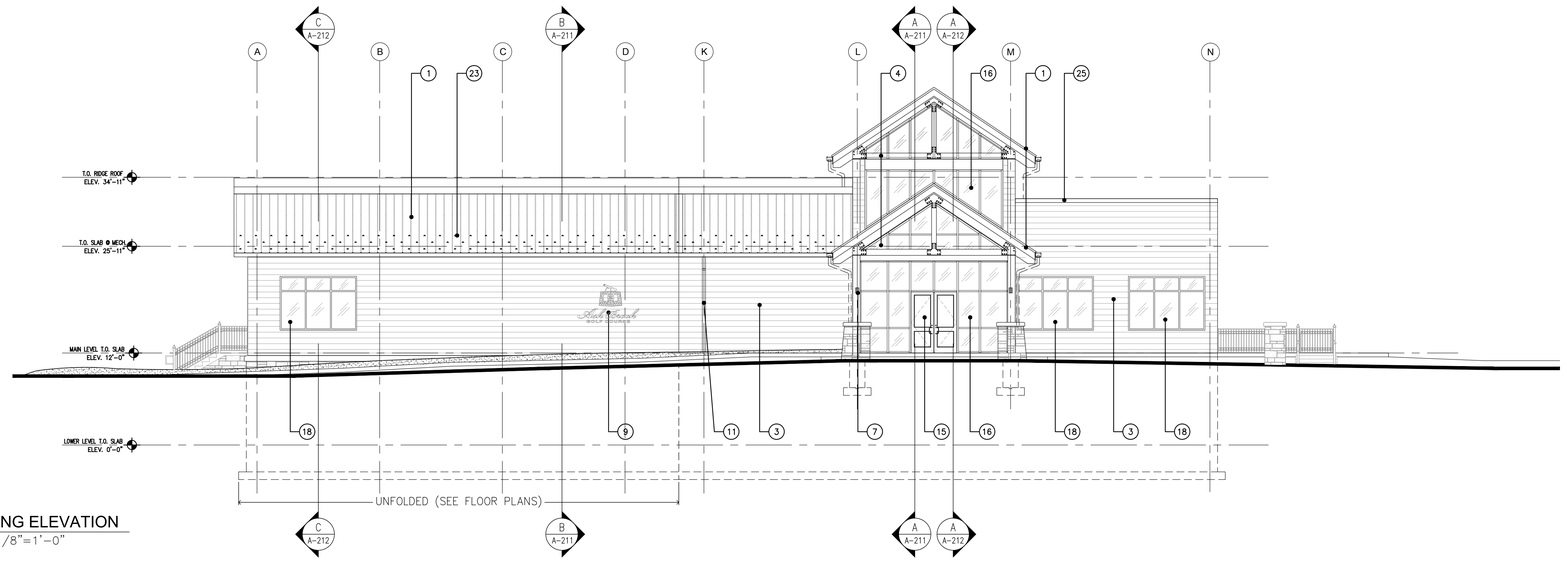
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

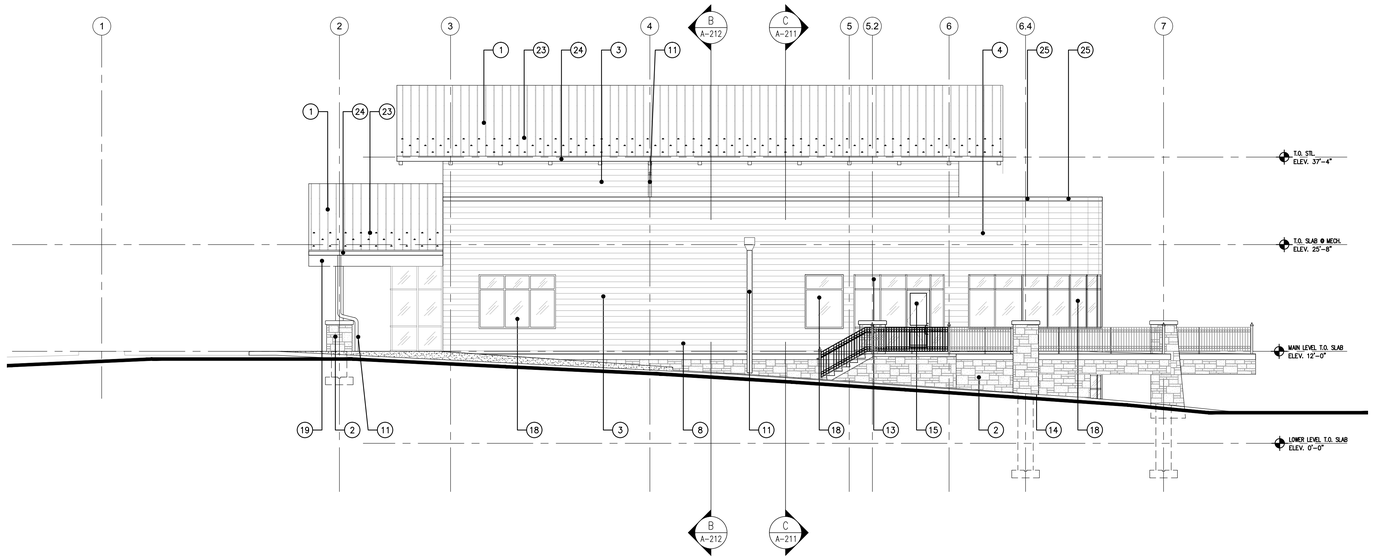
SHEET CONTENTS:

ROOF PLAN

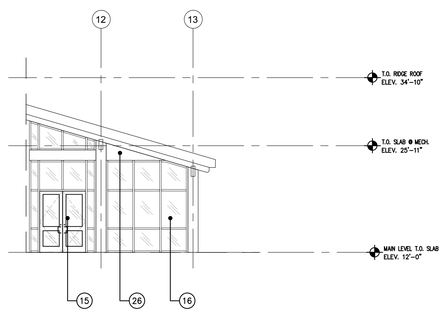
SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-103



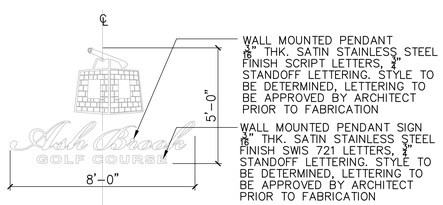
A A-201 **BUILDING ELEVATION**
SCALE: 1/8"=1'-0"



B A-201 **BUILDING ELEVATION**
SCALE: 1/8"=1'-0"



F A-201 **BUILDING ELEVATION**
SCALE: 1/8"=1'-0"



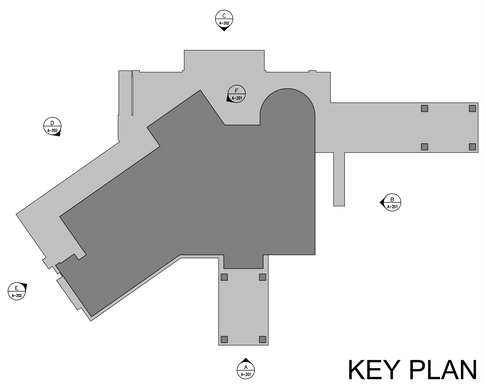
1 A-201 **SIGN**
SCALE: 1/4"=1'-0"

MATERIAL LEGEND:

1. STANDING SEAM METAL ROOFING SYSTEM–DEDUCT ALTERNATE #1
2. NATURAL STONE VENEER
3. WOOD CLADDING SIDINGS SYSTEM–DEDUCT ALTERNATE #2
4. WOOD TRUSS
5. CAST STONE SILL / FEATURE BAND
6. METAL COILING OVERHEAD DOOR
7. WALL SCONCE LIGHT FIXTURE
8. ALUMINUM RAILING
9. DECORATIVE METAL LOGO / SIGN
10. HOLLOW METAL DOOR & FRAME
11. LEADER
12. EXTERIOR LIGHTING ON EXTERIOR SERVICE DOORS (SEE LIGHTING SCHEDULE)
13. STEEL TUBE TYP.
14. CAST STONE CAP TYP.
15. GLASS DOOR ON ALUM. FRAME, TYP.
16. ALUM. STOREFRONT SYSTEM
17. GLAZED FOLDING PANEL & TRANSOM (NANAWALL)
18. ALUMINUM WINDOW
19. EXPOSED STRUCTURAL TRUSS
20. FIXED PANEL OVER HORIZ PASS THROUGH WINDOW
21. METAL LOUVER – REFER TO ENGINEERS DETAILS
22. MASONRY EXPANSION JOINT
23. SNOWGUARD TYP.
24. METAL GUTTER
25. METAL COPING

V.Es DEDUCT ALTERNATE ITEMS

ALTERNATE #1 ROOFING
ALTERNATE #2 EXTERIOR SIDINGS



KEY PLAN

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

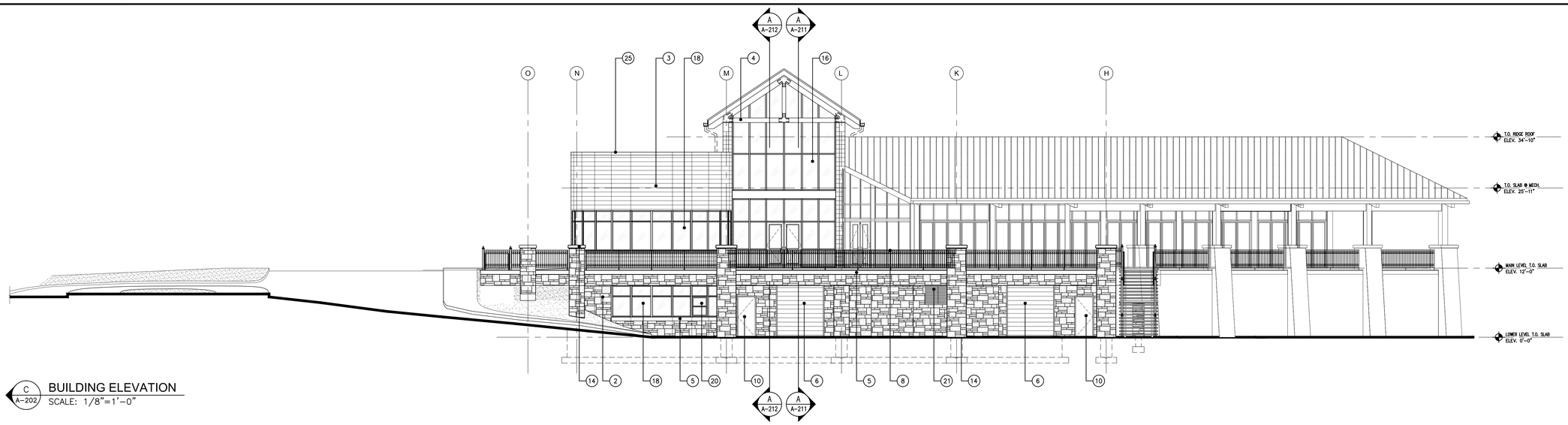
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

BUILDING ELEVATIONS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-201



C A-202 BUILDING ELEVATION
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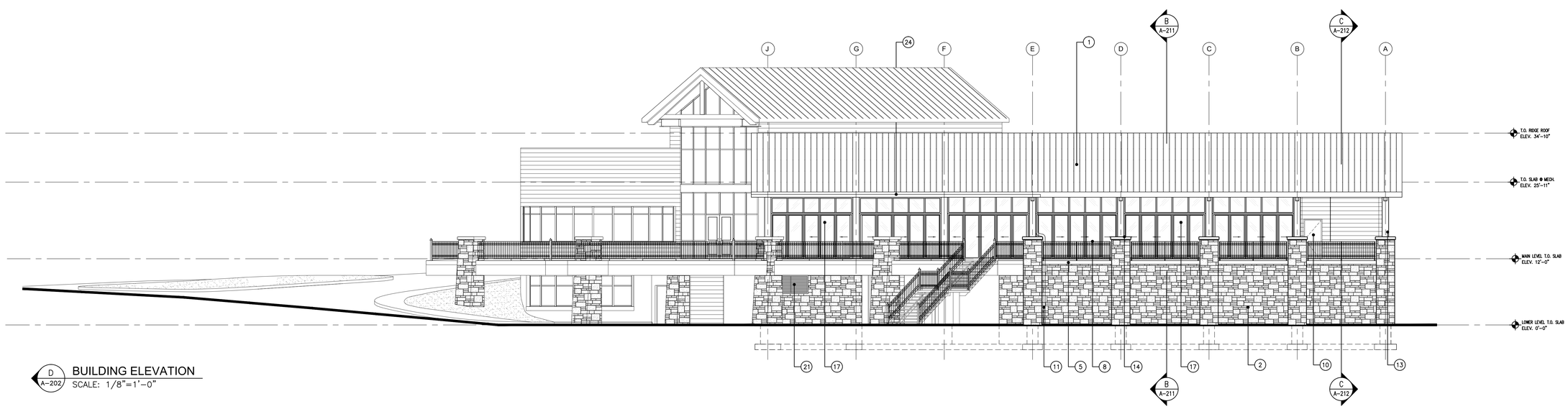
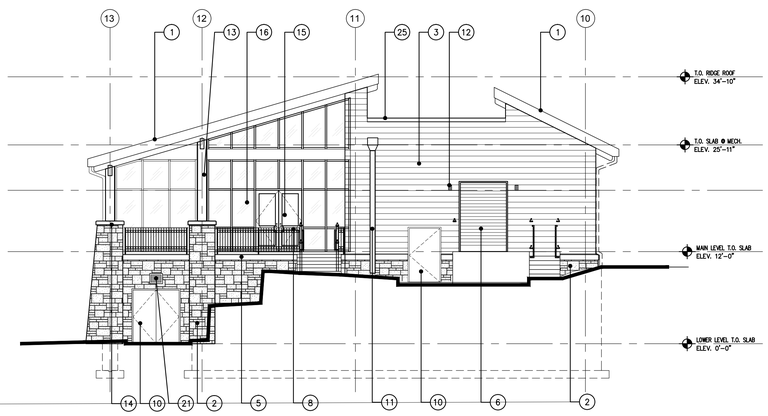


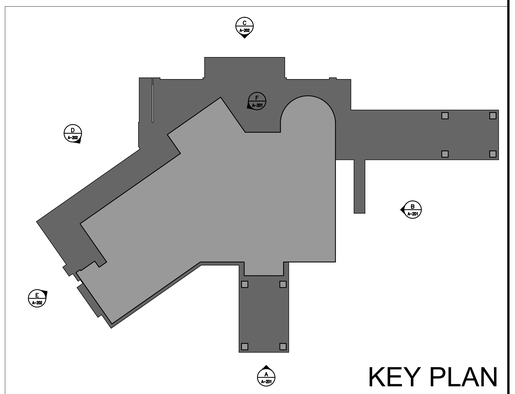
D A-202 BUILDING ELEVATION
SCALE: 1/8"=1'-0"



E A-202 BUILDING ELEVATION
SCALE: 1/8"=1'-0"

V.Es DEDUCT ALTERNATE ITEMS

ALTERNATE #1 ROOFING
ALTERNATE #2 EXTERIOR SIDINGS



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PROJECT:

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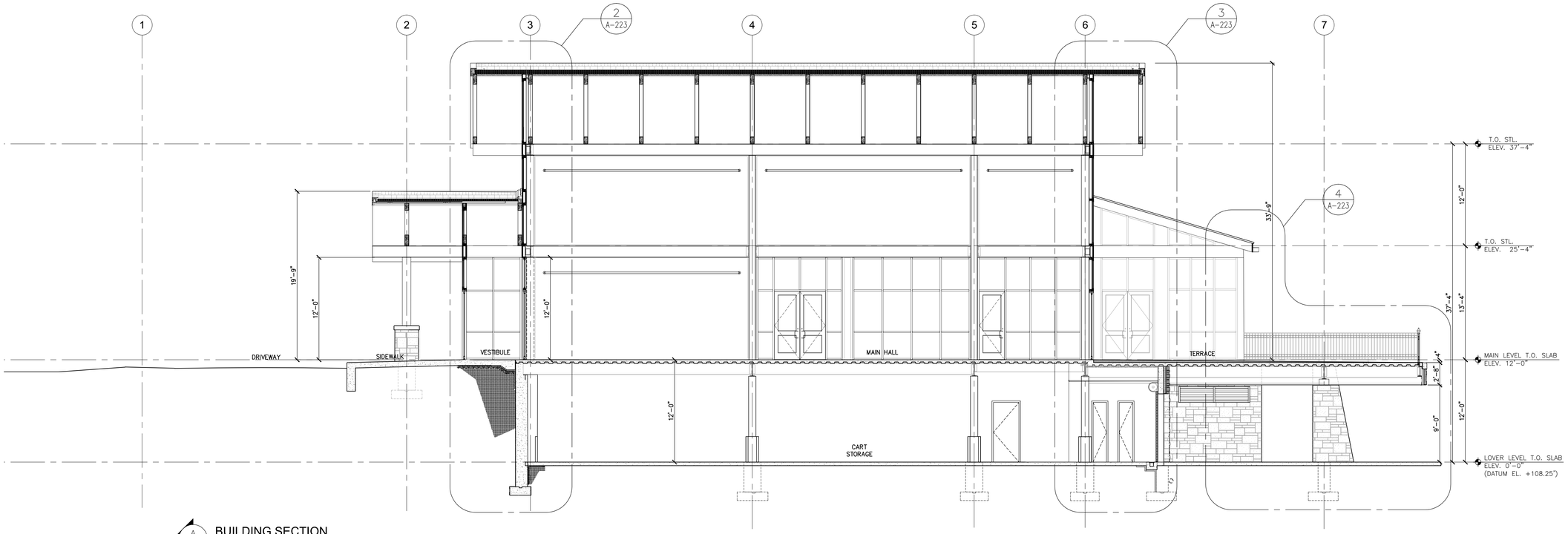
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

BUILDING ELEVATIONS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-202



A A-211 BUILDING SECTION
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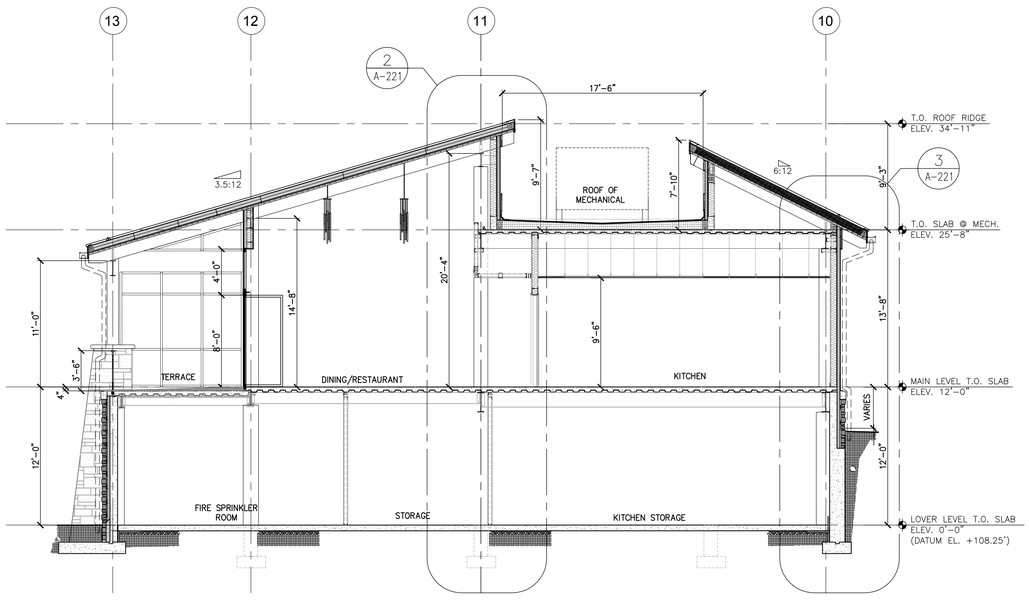

B A-211 BUILDING SECTION
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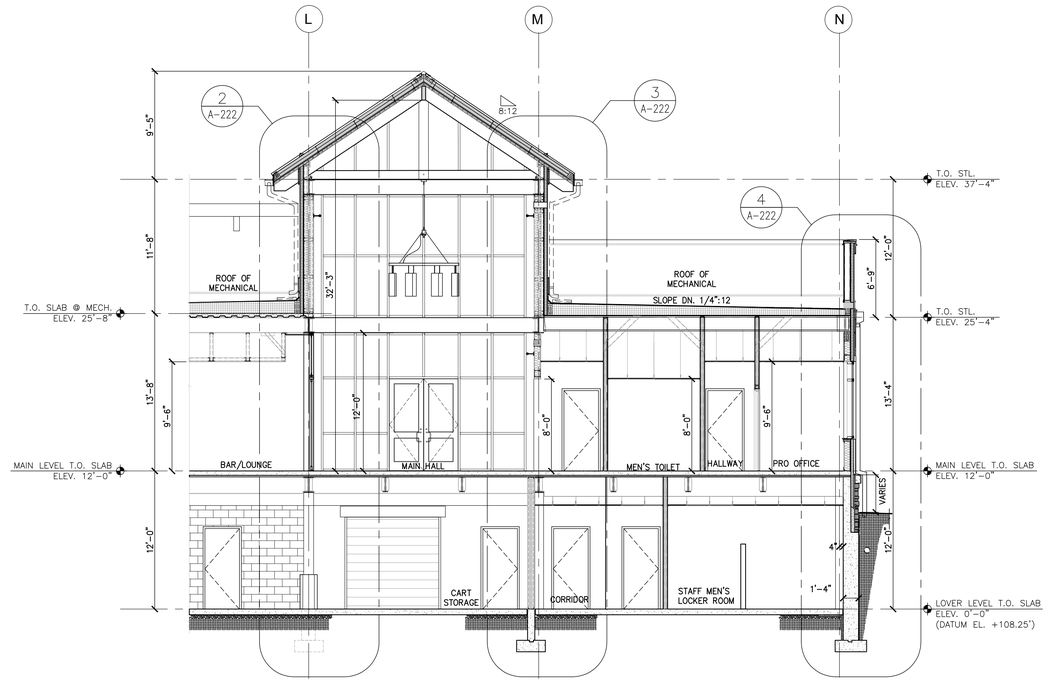

C A-211 BUILDING SECTION
SCALE: 3/16"=1'-0"

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02.22.17	BID SET		

DATE	02.22.2017
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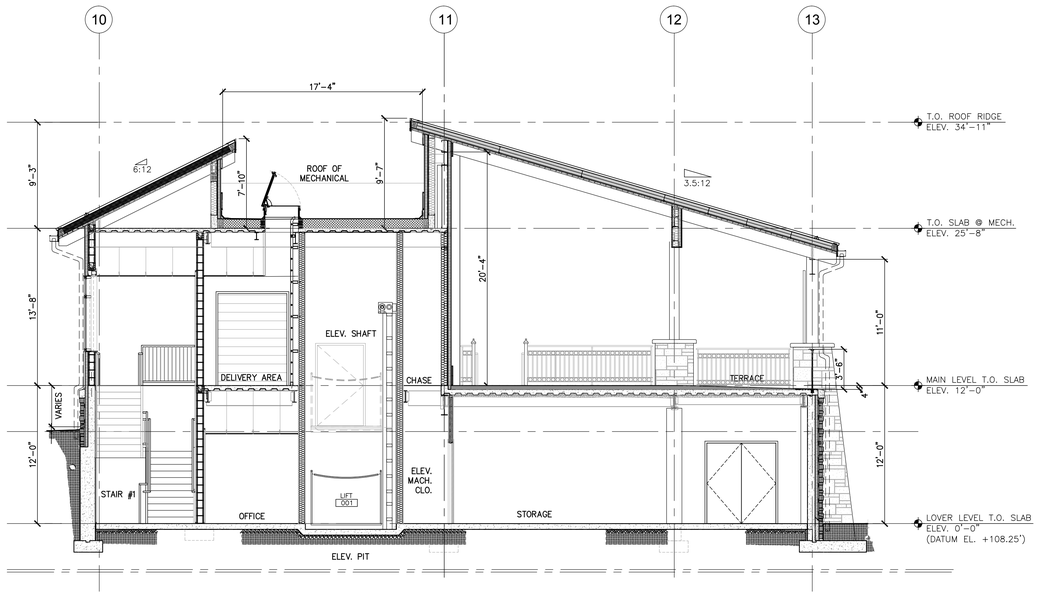
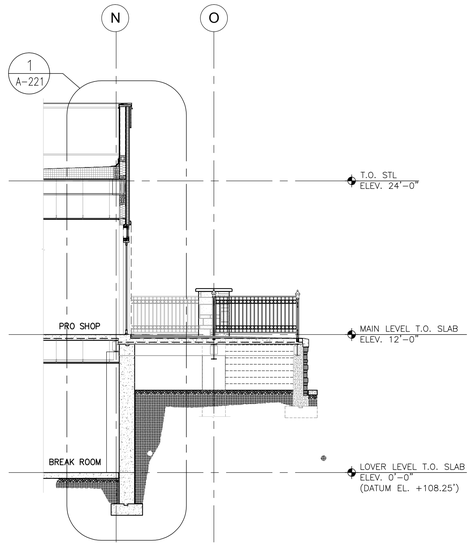
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-211



A
A-212
BUILDING SECTION
SCALE: 3/16"=1'-0"



B
A-212
PARTIAL BUILDING SECTION
SCALE: 3/16"=1'-0"

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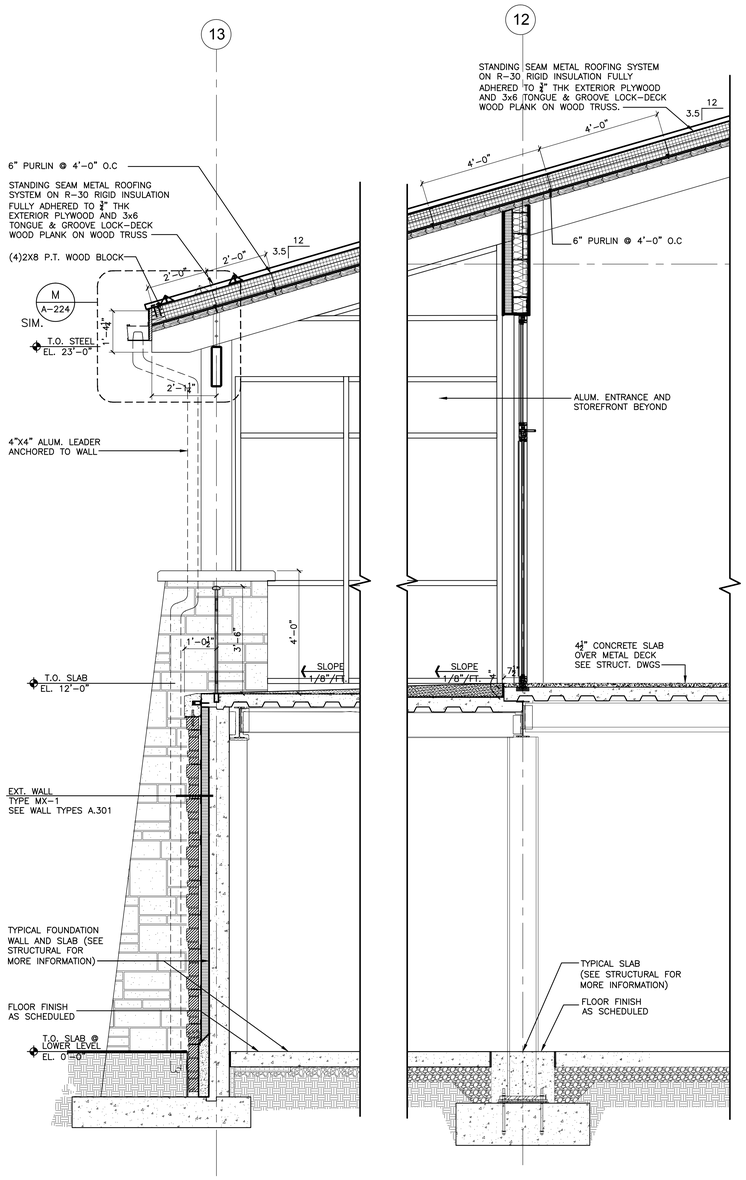
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-212



1 A-221 WALL SECTION
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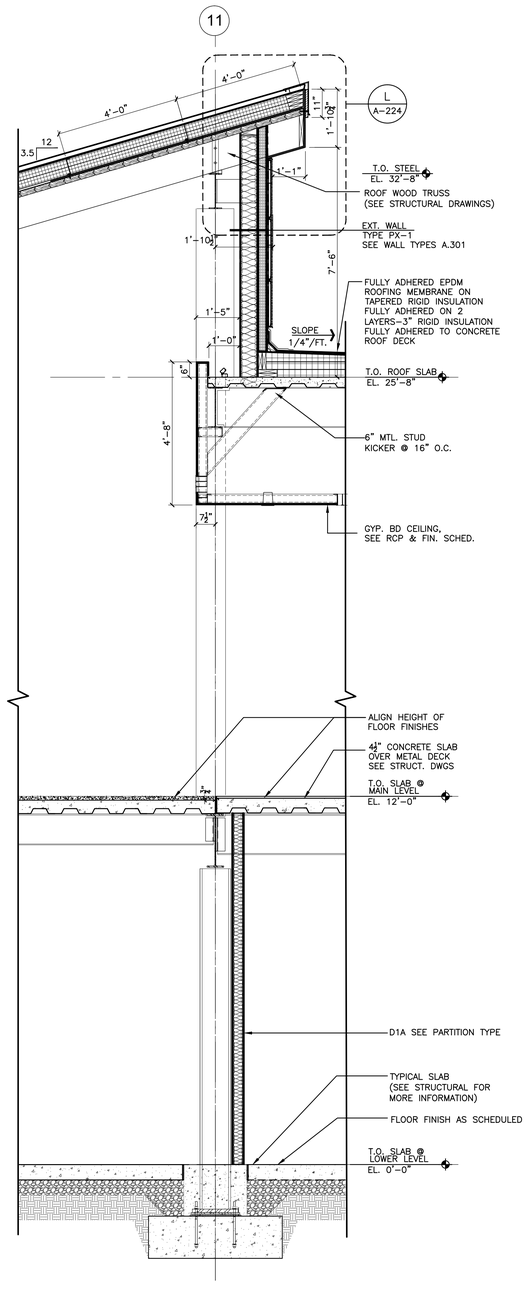

2 A-221 WALL SECTION
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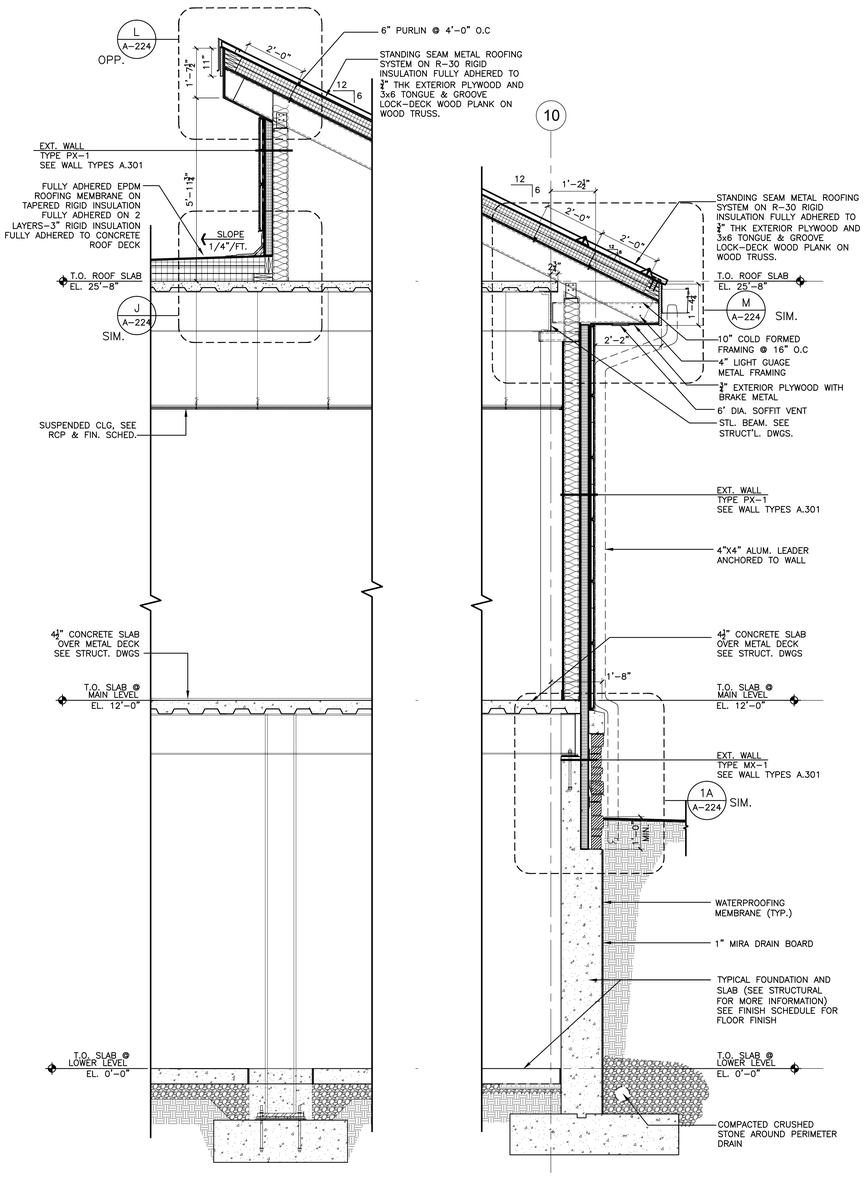

3 A-221 WALL SECTION
SCALE: 1/2"=1'-0"

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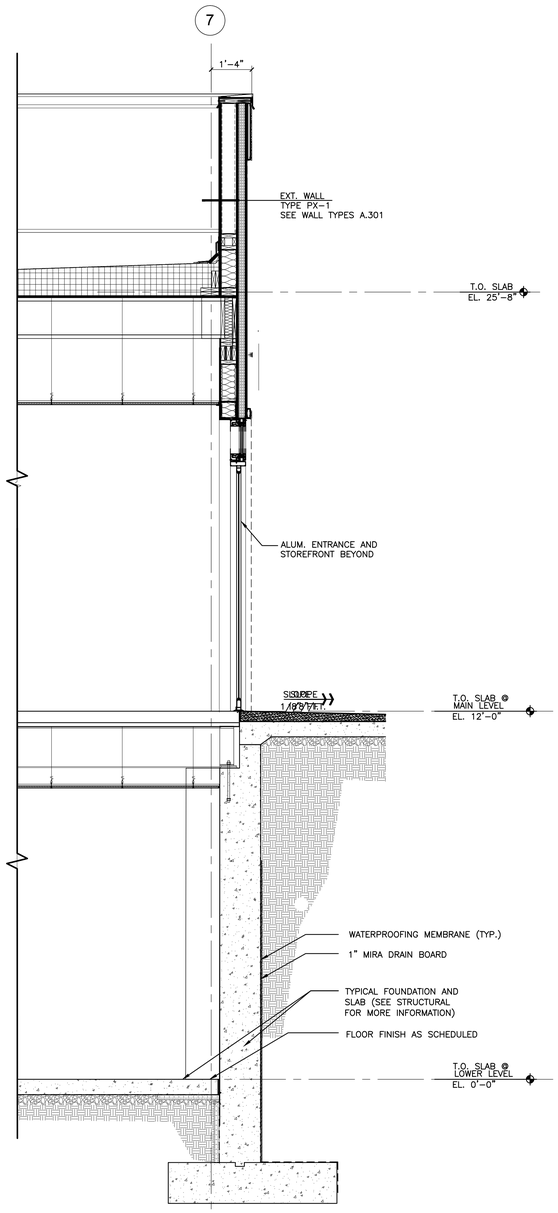
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-221



1 A-222 WALL SECTION
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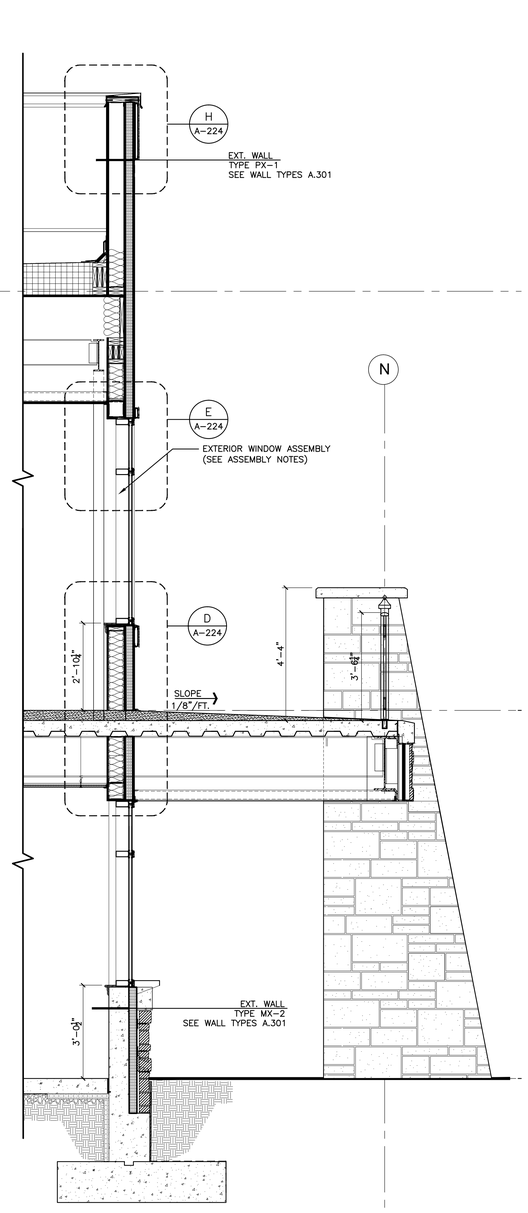

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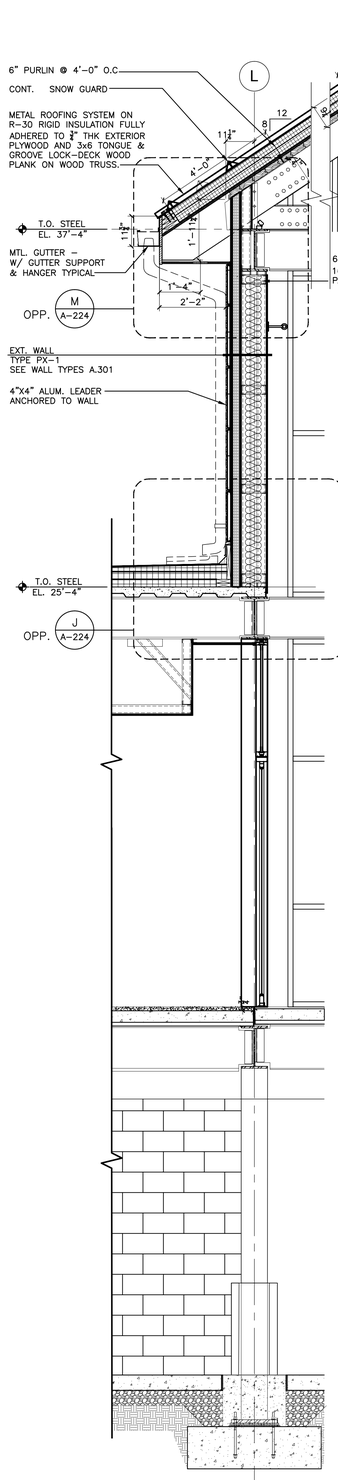

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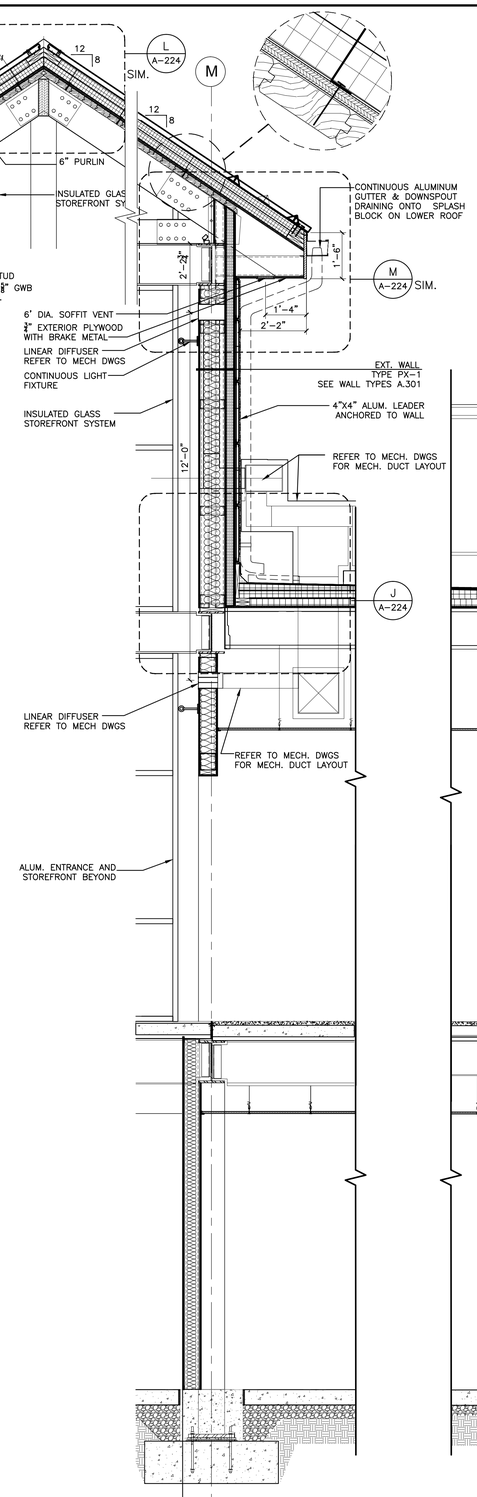

4 A-222 WALL SECTION
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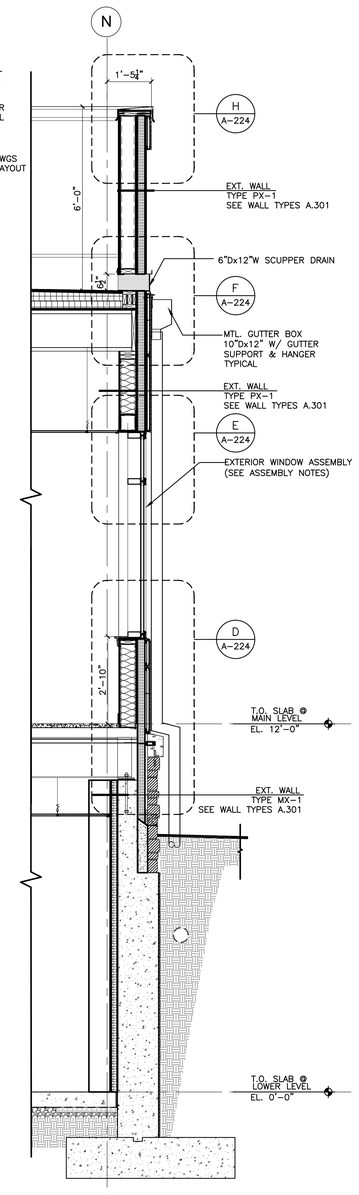

5 A-222 WALL SECTION
SCALE: 1/2"=1'-0"

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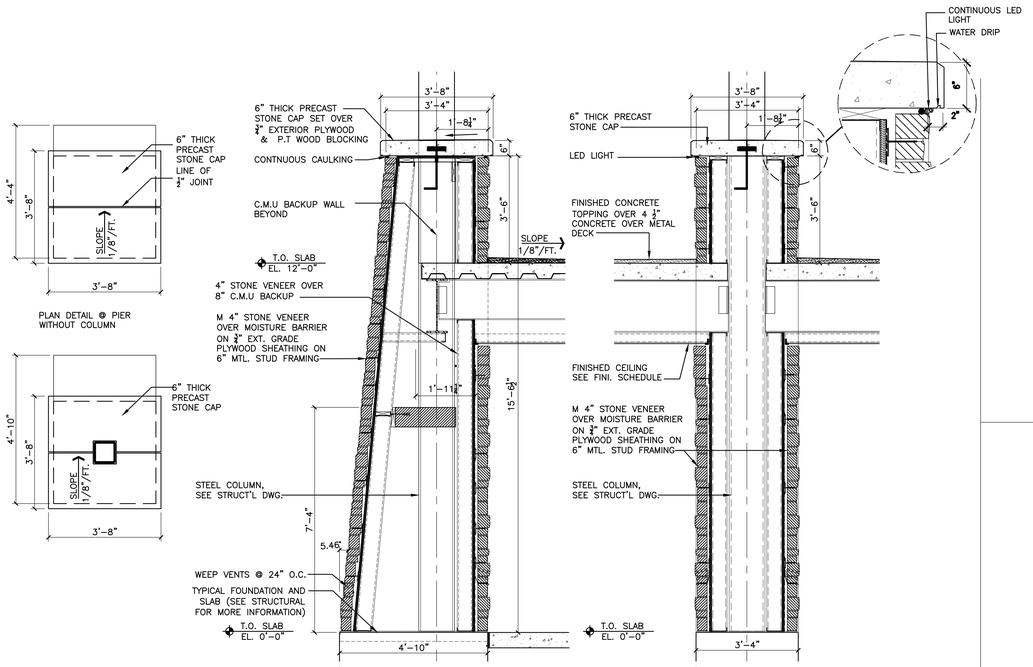
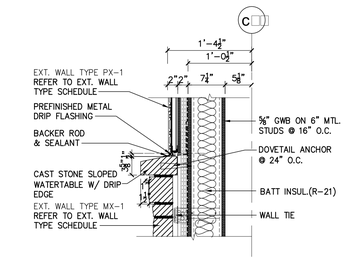
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-222



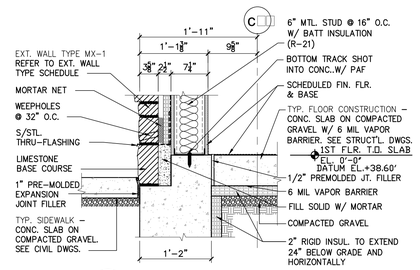
5 A-222 PLAN DETAIL
SCALE: 1/2"=1'-0"

6 A-222 COLUMN SECTION
SCALE: 1/2"=1'-0"

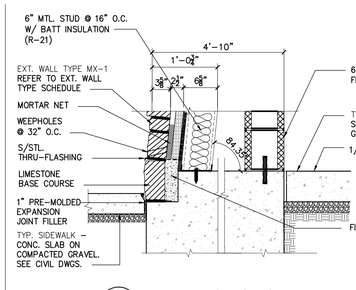
7 A-222 COLUMN SECTION
SCALE: 1/2"=1'-0"



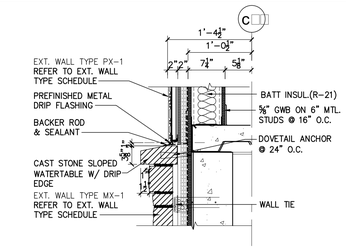
A A-224 TYP. SILL DETAIL
SCALE: 1" = 1'-0"



B A-224 TYP. EDGE OF SLAB
SCALE: 1" = 1'-0"



C A-224 TYP. EDGE OF SLAB
SCALE: 1" = 1'-0"



A1 A-224 TYP. SILL DETAIL
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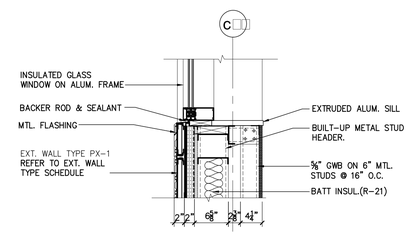

D A-224 TYP. SILL DETAIL
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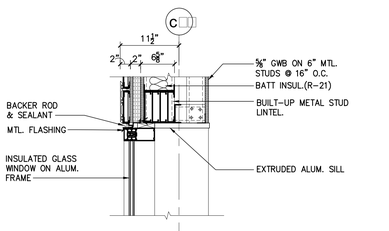

E A-224 TYP. HEAD DETAIL
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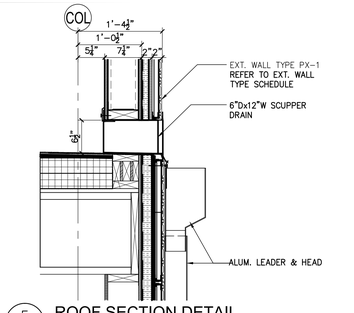
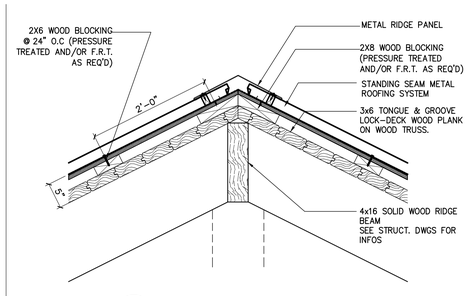


F A-224 ROOF SECTION DETAIL
SCALE: 1" = 1'-0"



G A-224 ROOF SECTION DETAIL
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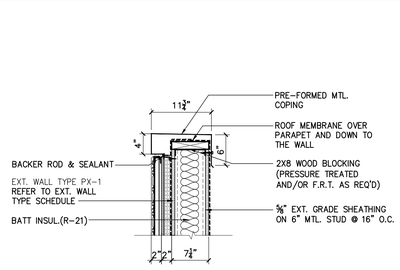

H A-224 TYP. COPING DETAIL
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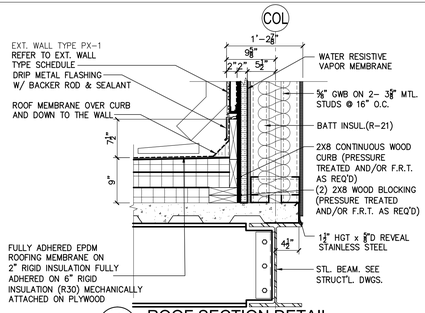
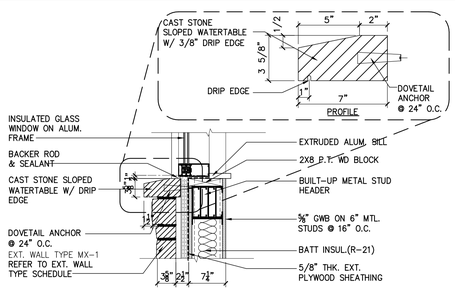
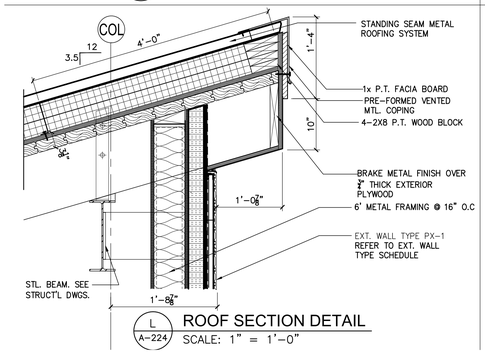


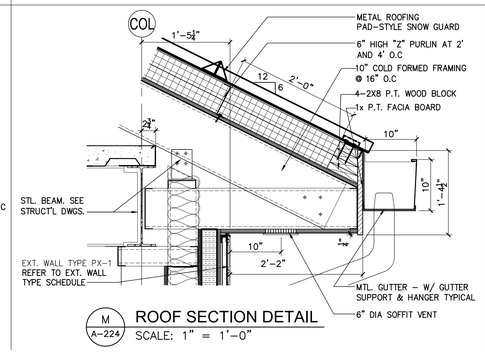
J A-224 ROOF SECTION DETAIL
SCALE: 1" = 1'-0"



K A-224 TYP. SILL DETAIL
SCALE: 1" = 1'-0"



L A-224 ROOF SECTION DETAIL
SCALE: 1" = 1'-0"



M A-224 ROOF SECTION DETAIL
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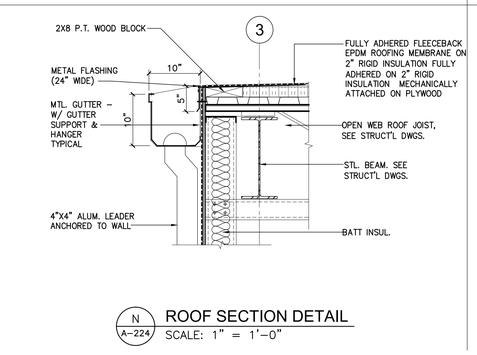

N A-224 ROOF SECTION DETAIL
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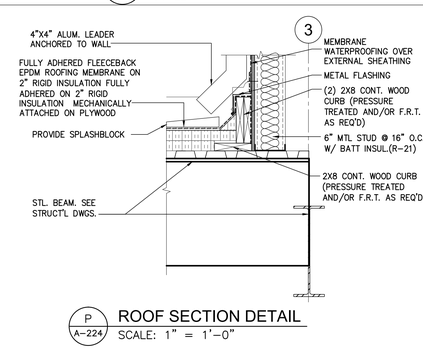

P A-224 ROOF SECTION DETAIL
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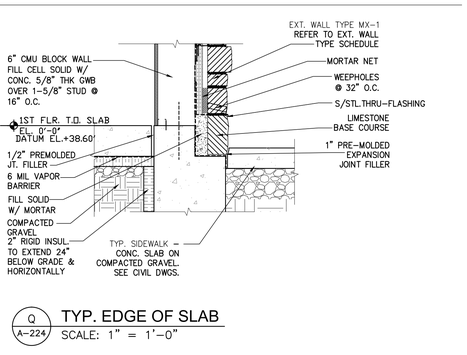

Q A-224 TYP. EDGE OF SLAB
SCALE: 1" = 1'-0"

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ARCHITECTURE - PLANNING - INTERIOR DESIGN
1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

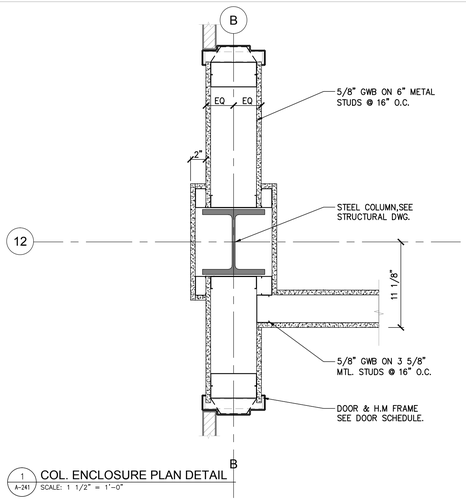
PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

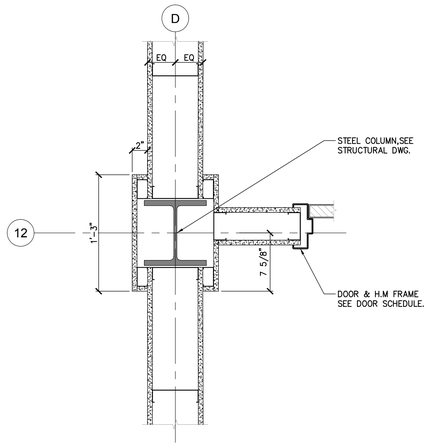
SHEET CONTENTS:

WALL SECTIONS & DETAILS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	DV
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-224



1 A-241 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



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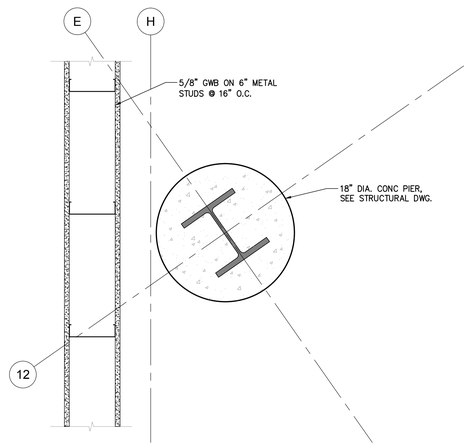

3 A-241 TYP.COL. ENCLOSURE @ CART STORAGE
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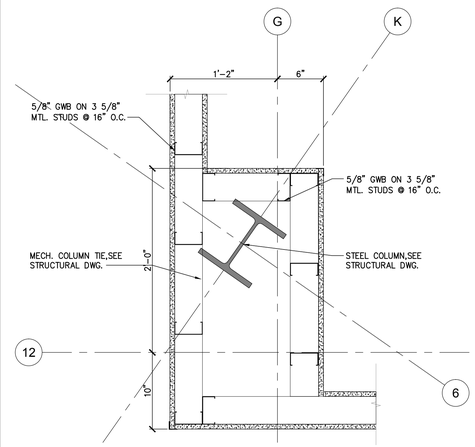

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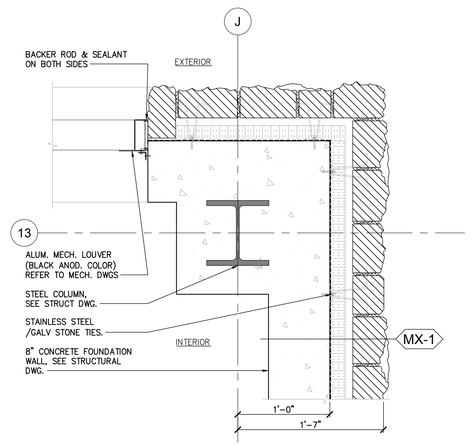
SCALE: 1 1/2" = 1'-0"



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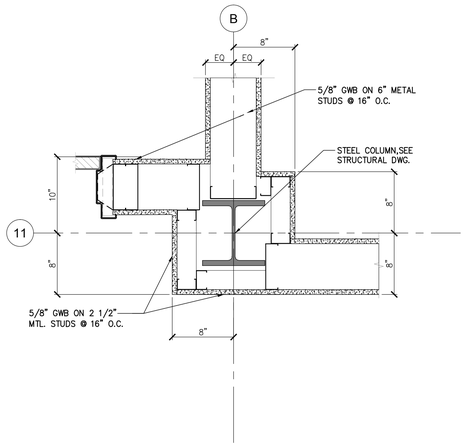
SCALE: 1 1/2" = 1'-0"



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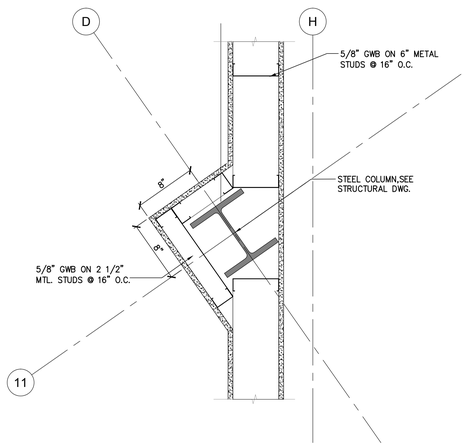
SCALE: 1 1/2" = 1'-0"



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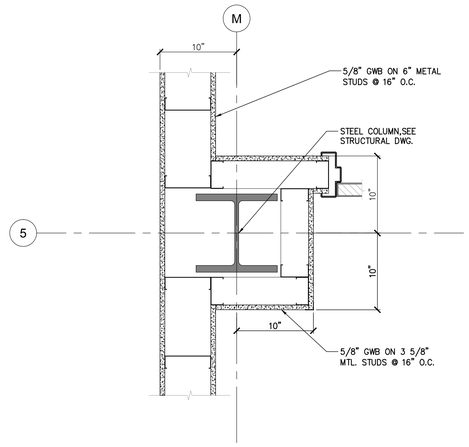
SCALE: 1 1/2" = 1'-0"



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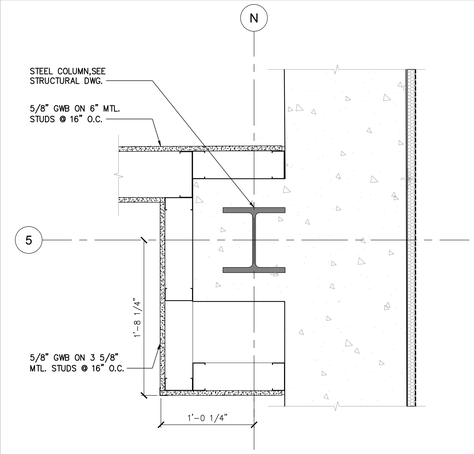
SCALE: 1 1/2" = 1'-0"



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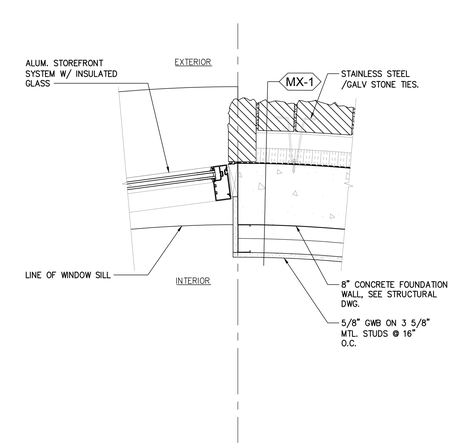
SCALE: 1 1/2" = 1'-0"



10 A-241 PLAN DETAIL
SCALE: 1 1/2" = 1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
NJ License No. AI 12118

MARK E. BESS, AIA, NCARB
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PLAN DETAILS

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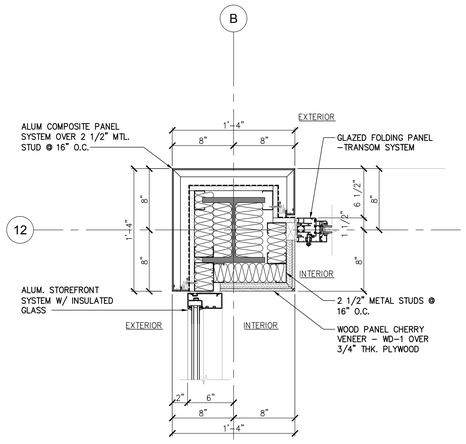
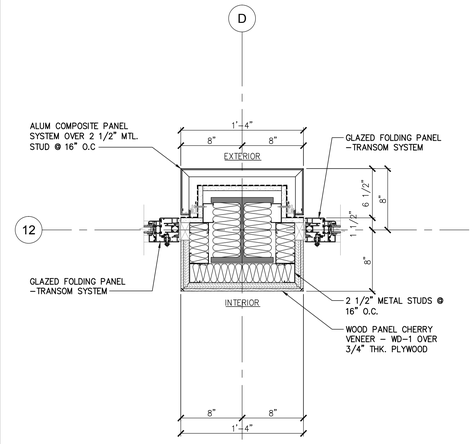
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-241



1 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



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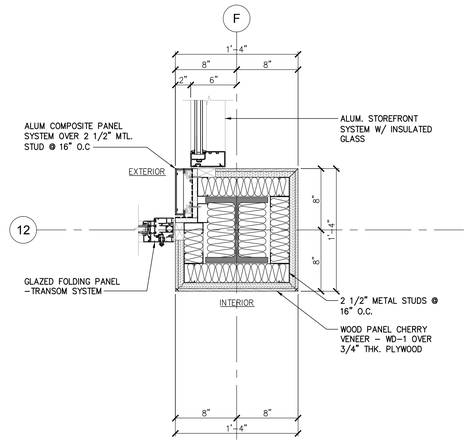
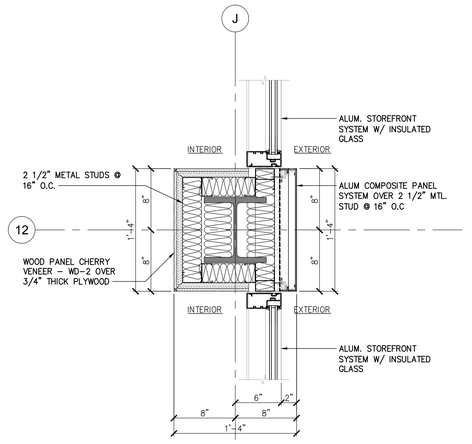


3 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



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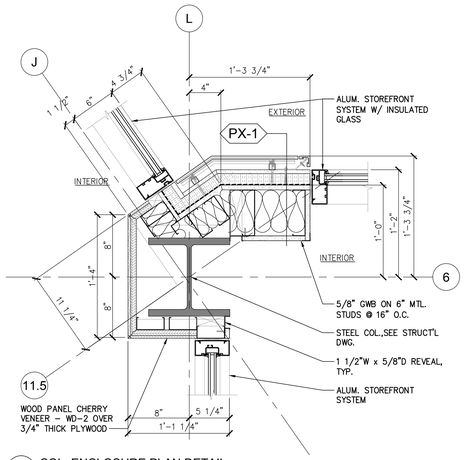
SCALE: 1 1/2" = 1'-0"



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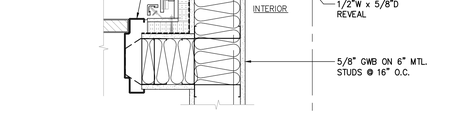

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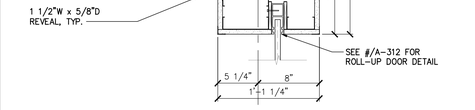

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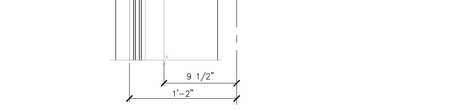
SCALE: 1 1/2" = 1'-0"



8 A-242 TYP. COL DETAIL @ PRO SHOP STOREFRONT
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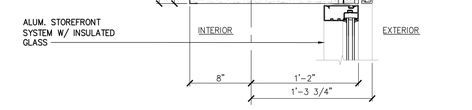
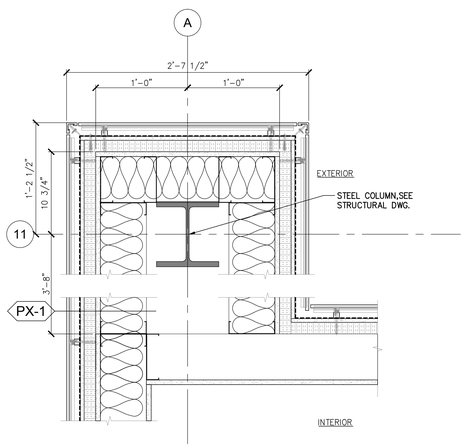


9 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"

10 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



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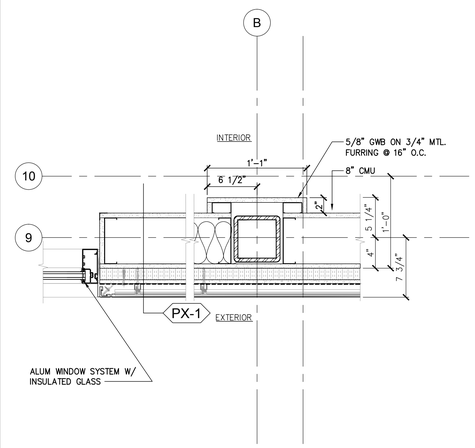

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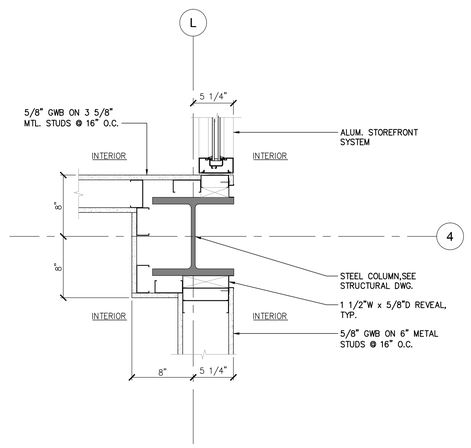
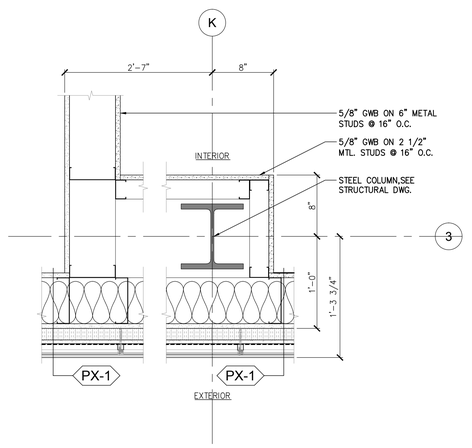


13 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



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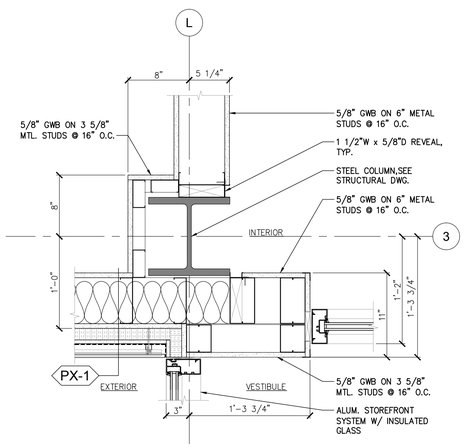

15 A-242 COL. ENCLOSURE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"

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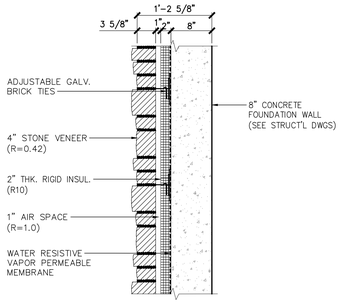
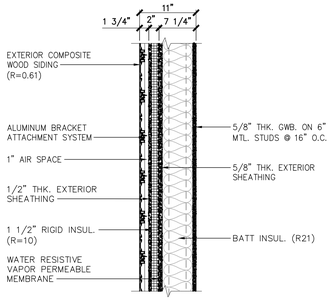
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-242



MX-1 — EXT. STONE CAVITY WALL TYPE

NON-RATED WALL

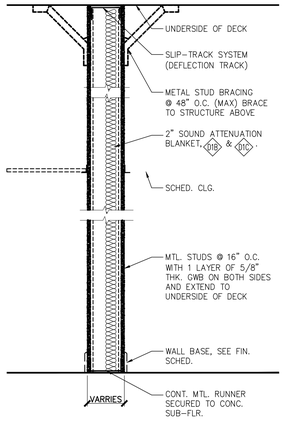
TOTAL "R" VALUE = 11.42



PX-1 — EXT. COMPOSITE WOOD SIDING

NON-RATED WALL

TOTAL "R" VALUE = 31



D1 — DRYWALL PARTITION TYPE

NON-RATED WALL, 6" MTL. STUD WITHOUT SOUND ATTENUATION

D1A — DRYWALL PARTITION TYPE

SAME AS D1 EXCEPT W/ 3 5/8" MTL. STUDS

D1B — DRYWALL PARTITION TYPE

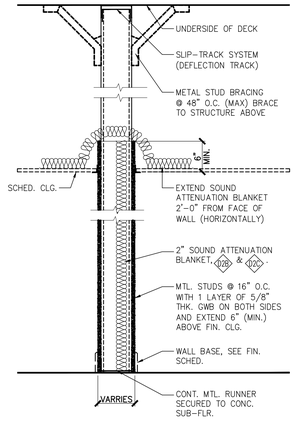
SAME AS D1 EXCEPT W/ 2" SOUND ATTENUATION BLANKET

D1C — DRYWALL PARTITION TYPE

SAME AS D1A EXCEPT W/ 2" SOUND ATTENUATION BLANKET

D1D — 1 HR FR DRYWALL PARTITION TYPE

SAME AS D1 EXCEPT W/ TYPE-X GWB ON BOTH SIDES W/ R-21 BATT INSULATION



D2 — DRYWALL PARTITION TYPE

NON-RATED WALL, NO SOUND ATTENUATION

D2A — DRYWALL PARTITION TYPE

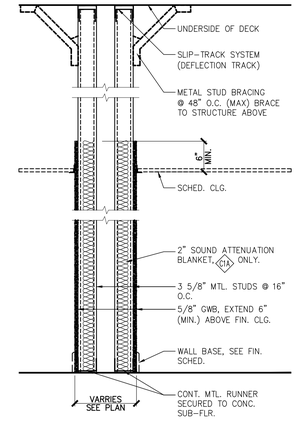
SAME AS D1 EXCEPT W/ 3 5/8" MTL STUDS

D2B — DRYWALL PARTITION TYPE

SAME AS D1 EXCEPT W/ 2" SOUND ATTENUATION BLANKET

D2C — DRYWALL PARTITION TYPE

SAME AS D1A EXCEPT W/ 2" SOUND ATTENUATION BLANKET

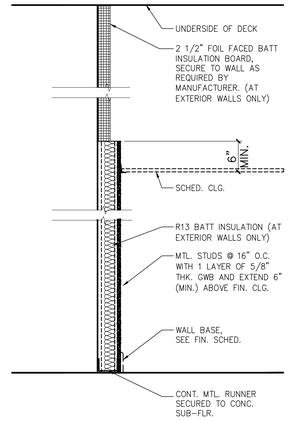


C1 — CHASE PARTITION

NON-RATED WALL

C1A — CHASE PARTITION

NON-RATED WALL
SAME AS C1 EXCEPT WITH INSULATION



F1 — FURRED-OUT PARTITION TYPE

NON-RATED WALL
3 5/8" MTL. STUDS

F1A — FURRED-OUT PARTITION TYPE

NON-RATED WALL
SAME AS F1 EXCEPT WITH 2 1/2" METAL STUDS

F1B — FURRED-OUT PARTITION TYPE

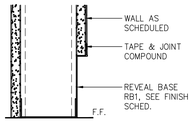
NON-RATED WALL
SAME AS F1 EXCEPT WITH 1 1/2" METAL STUDS

F1C — FURRED-OUT PARTITION TYPE

NON-RATED WALL
SAME AS F1 EXCEPT WITH 7/8 HAT FURRING CHANNELS

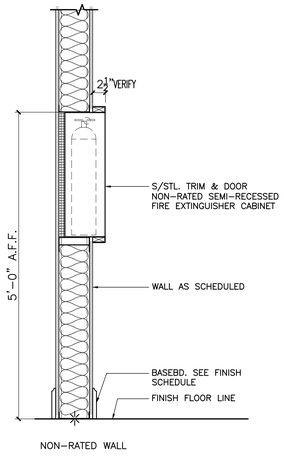
PARTITION NOTES

1. CONTRACTOR SHALL HAVE A NEW JERSEY LICENSED ENGINEER DESIGN THE EXTERIOR AND INTERIOR PARTITION METAL FRAMING SYSTEM. THE ENGINEER IS TO SIGN AND SEAL THE METAL FRAMING SHOP DRAWINGS AND STRUCTURAL CALCULATIONS AND SHALL BE SUBMITTED TO ARCHITECT FOR REVIEW.
2. PROVIDE CROSS BRACING AS REQUIRED TO SUPPORT PARTITIONS. CROSS BRACING SHALL BE ATTACHED TO STRUCTURAL STEEL.
3. GENERAL CONTRACTOR SHALL COORDINATE THE ATTACHMENT OF METAL FRAMING COMPONENTS TO STRUCTURAL STEEL.
4. INSTALL WATER RESISTANT GYP. BD. AT JANITOR CLOSET, TURNSTAND, & KITCHEN (WET SIDE) OF PARTITIONS.
5. INSTALL CEMENT BD. AT TOILET ROOM (WET SIDE) OF PARTITIONS.
6. FASTEN CONTINUOUS STUD TRACK TO UNDERSIDE OF METAL DECK.



1 / A-301 REVEAL BASE DETAIL

SCALE: 3"=1'-0"



NON-RATED WALL

A — FIRE EXTINGUISHER CABINET DETAIL

NON-RATED PARTITION

NOT FOR CONSTRUCTION
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2-22-2017

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PARTITION TYPES

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				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-301

DOOR AND FRAME SCHEDULE-LOWER LEVEL

DOOR NO.	DOOR LOCATION FROM	DOOR LOCATION TO	DOOR WD	DOOR HGT	DOOR THK	DOOR MAT'L.	FRAME TYPE	FRAME MAT'L.	FRAME TYPE	FRAME JAMB	FRAME HEAD	SILL MAT'L.	SILL TYPE	FIRE-RATING LABEL	HARDWARE SET (SEE SPECS.)	REMARKS
L01	TURNSTAND	BREAK ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	RB.	S4	–		
L02	BREAK ROOM	CART STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	RB.	S3	–		CARD READER ACCESS
L03	NOT USED															
L04	CORRIDOR	STAFF MEN'S LOCKER ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S9	–		
L05	CORRIDOR	STAFF WOMEN'S LOCKER ROOM	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S9	–		
L06A	CORRIDOR	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J2	H2	–	–	–		
L06B	CART STORAGE	STORAGE ROOM	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		INSULATED ROLL-UP DOOR
L07A	CART STORAGE	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L07B	CART STORAGE	EXTERIOR	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		INSULATED ROLL-UP DOOR
L07C	CART STORAGE	EXTERIOR	8'-0"	7'-6"	–	MTL.	M	MTL.	–	#	#	–	–	–		ROLL-UP DOOR
L07D	CART STORAGE	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L08	CART STORAGE	BAR STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		
L09	CART STORAGE	MECHANICAL ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		
L10	SERVICE CORRIDOR	CART STORAGE	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	–	–	–		CARD READER ACCESS
L11	STORAGE ROOM	SERVICE CORRIDOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	RB.	S3	–		
L12	ELECTRICAL ROOM	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	D	H.M.	F1	J1	H1	–	–	–		W/ TRANSFER GRILL
L13A	ELECTRICAL ROOM	FIRE SPRINKLER ROOM	3'-0"	7'-0"	1 3/4"	H.M.	D	H.M.	F1	J1	H1	–	–	–		W/ TRANSFER GRILL
L13B	FIRE SPRINKLER ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	E	H.M.	F1	J1	H1	RB.	S3	–		W/ TRANSFER GRILL
L14	HOT WATER HEATER ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	E	H.M.	F1	J1	H1	RB.	S3	–		W/ TRANSFER GRILL
L15A	SERVICE CORRIDOR	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J1	H1	RB.	S3	–		
L15B	STORAGE ROOM	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J1	H1	–	–	–		
L16	STORAGE ROOM	EXTERIOR	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J6	H6	ALUM.	S1	–		CARD READER ACCESS
L17	ELEVATOR MACHINE CL.	STORAGE ROOM	(2)3'-0"	7'-0"	1 3/4"	H.M.	B	H.M.	F1	J3	H3	RB.	S3	–		
L18	KITCHEN STORAGE	STORAGE ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J3	H3	RB.	S3	–		
L19	KITCHEN STORAGE	CHEF'S OFFICE	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	RB.	S5	–		
L20	KITCHEN STORAGE	STAIR #1	3'-0"	7'-0"	1 3/4"	H.M.	C	H.M.	F1	J2	H2	RB.	S3	1 HR		W/ VISION PANEL
L21	KITCHEN STORAGE	TOILET ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	ST.	S10	–		
L22	KITCHEN STORAGE	JAN. CL.	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	ST.	S10	–		
L23	OPEN OFFICE	STAFF LOCKER ROOM	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J1	H1	RB.	S3	–		

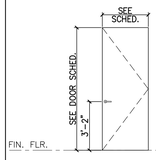
DOOR AND FRAME SCHEDULE-MAIN LEVEL

DOOR NO.	DOOR LOCATION FROM	DOOR LOCATION TO	DOOR WD	DOOR HGT	DOOR THK	DOOR MAT'L.	FRAME TYPE	FRAME MAT'L.	FRAME TYPE	FRAME JAMB	FRAME HEAD	SILL MAT'L.	SILL TYPE	FIRE-RATING LABEL	HARDWARE SET (SEE SPECS.)	REMARKS
100	VESTIBULE	EXTERIOR	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
101A	MAIN HALL	VESTIBULE	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	–	–	–		
101B	MAIN HALL	EXTERIOR	(2)3'-0"	8'-0"	1 3/4"	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
102	MAIN HALL	UNION COUNTY OPEN OFFICE	3'-0"	8'-0"	1 3/4"	ALUM.	F	ALUM.	F3	J8	H8	RB.	S8	–		
103	UNION COUNTY OPEN OFFICE	CONFERENCE ROOM	3'-0"	8'-0"	1 3/4"	WD	H	H.M.	F4	J7	H7	–	–	–		
104	UNION COUNTY OPEN OFFICE	OFFICE	3'-0"	8'-0"	1 3/4"	WD	H	H.M.	F4	J7	H7	–	–	–		
105	MAIN HALL	MEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S6	–		
106	MAIN HALL	WOMEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	H1	H1	ST.	S6	–		
107A	MAIN HALL	PRO SHOP	11'-0"	8'-0"	–	–	L	–	–	#	#	–	–	–		MANUAL ALUMINUM ROLL-UP OVERHEAD GRILLE W/ LOCKING FUNCTION
107B	PRO SHOP	EXTERIOR	3'-0"	8'-0"	1 3/4"	ALUM.	F	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
108	OPEN OFFICE	PRO SHOP	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	RB.	S8	–		
109	CORRIDOR	IT	3'-0"	7'-0"	1 3/4"	WD	K	H.M.	F1	J1	H1	RB.	S12	–		W/ TRANSFER GRILL
110	CORRIDOR	OFFICE	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	–	–	–		
111	NOT USED															
112A	BAR/LOUNGE	MAIN HALL	3'-0"	8'-0"	–	ALUM.	F	ALUM.	–	–	–	ALUM.	S7	–		
112B	BAR/LOUNGE	EXTERIOR	(2)3'-0"	8'-0"	–	ALUM.	G	ALUM.	–	–	–	ALUM.	S2	–		CARD READER ACCESS
112C	BAR/LOUNGE	EXTERIOR	–	8'-0"	–	–	N	–	F7	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
112D	BAR/LOUNGE	EXTERIOR	–	8'-0"	–	–	N	–	F7	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
113	RESTAURANT	WOMEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		CARD READER ACCESS
114	JAN. CL.	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		
115	RESTAURANT	MEN'S TOILET	3'-0"	7'-0"	1 3/4"	WD	H	H.M.	F1	J1	H1	ST.	S11	–		
116A	RESTAURANT	MAIN HALL	(2)3'-0"	8'-0"	–	ALUM.	G	ALUM.	–	–	–	ALUM.	S7	–		
116B	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116C	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116D	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116E	RESTAURANT	EXTERIOR	–	8'-0"	–	ALUM.	N	ALUM.	F6	–	–	–	–	–		FOLDING GLASS WALL SYSTEM
116F	RESTAURANT	EXTERIOR	(2)3'-0"	8'-0"	–	ALUM.	G	–	–	–	–	ALUM.	S2	–		CARD READER ACCESS
117A	KITCHEN	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	J	H.M.	F1	J2	H2	ALUM.	S7	–		W/ VISION PANEL
117B	KITCHEN	RESTAURANT	3'-0"	7'-0"	1 3/4"	WD	J	H.M.	F1	J2	H2	ALUM.	S7	–		W/ VISION PANEL
118	DELIVERY AREA	STAIR #1	3'-0"	8'-0"	1 3/4"	H.M.	C	H.M.	F1	J2	H2	RB.	S4	1 HR		W/ VISION PANEL
119A	DELIVERY AREA	EXTERIOR	3'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J9	H9	ALUM.	S1	–		CARD READER ACCESS
119B	DELIVERY AREA	EXTERIOR	6'-0"	8'-0"	–	MTL.	M	MTL.	F5	#	#	–	–	–		INSULATED ROLL-UP DOOR
119C	ELEVATOR	EXTERIOR	4'-0"	7'-0"	1 3/4"	H.M.	A	H.M.	F1	J6/10	H9	ALUM.	S1	–		

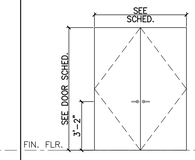
DOOR SCHEDULE LEGEND

ALUM.	ALUMINUM	I.T.	INSULATED TEMPERED GLASS
ANO.	ANODIZED ALUMINUM	ST.	STONE
CLR	CLEAR	RB.	RUBBER
GL	GLASS	WD	WOOD
INSUL. H.M.	INSULATED HOLLOW METAL	WT	WIRED TEMPERED GLASS
H.M.	HOLLOW METAL	FRP	FIBERGLASS REINFORCED POLYESTER
MIN.	MINUTE		
PNT.	PAINT – SEE FIN. SCHED.		

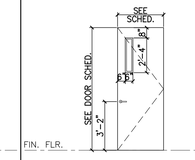
DOOR TYPE ELEVATIONS (SCALE: 1/4" = 1'-0")



A H.M. FLUSH DOOR
FIELD PAINTED



B H.M. FLUSH DOOR
FIELD PAINTED



C H.M. FLUSH DOOR
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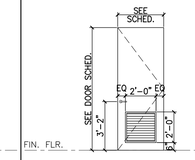

D H.M. FLUSH DOOR
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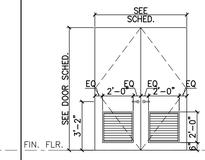
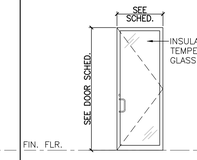
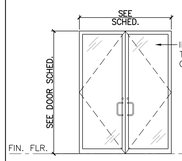


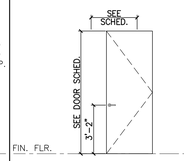
E H.M. FLUSH DOOR
FIELD PAINTED



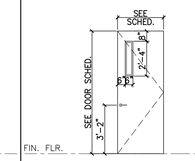
F GLASS DOOR ON ALUM. FRAME
INSULATED GLASS ON EXT. DOORS



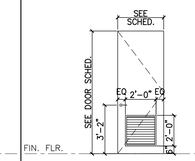
G GLASS DOOR ON ALUM. FRAME
INSULATED GLASS ON EXT. DOORS



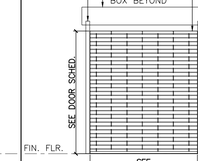
H SOLID CORE WOOD FLUSH DOOR



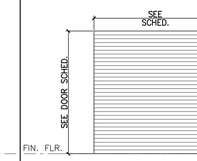
J SOLID CORE WOOD FLUSH DOOR



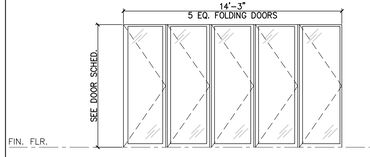
K SOLID CORE WOOD FLUSH DOOR



L ROLL-UP GRILLE
ALUMINUM ROLL-UP GRILL

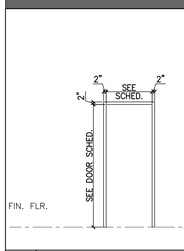


M ROLL-UP DOOR

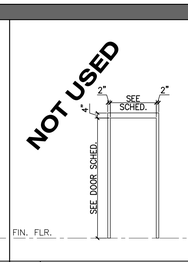


N FOLDING GLASS DOOR SYSTEM
INSULATED FOLDING GLASS DOOR SYSTEM

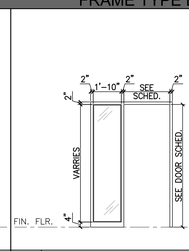
FRAME TYPE ELEVATIONS (SCALE: 1/4" = 1'-0")



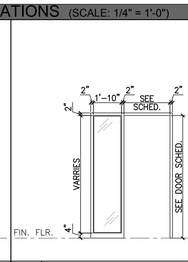
F1 H.M. FRAME
FIELD PAINTED



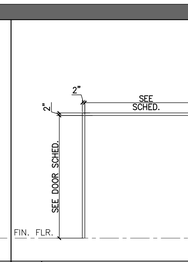
F2 H.M. FRAME
FIELD PAINTED



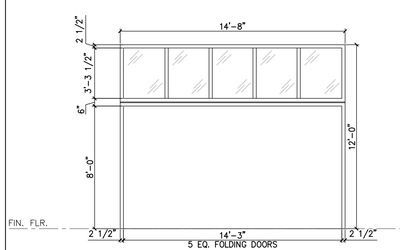
F3 ALUM. FRAME W/ SIDE LITE



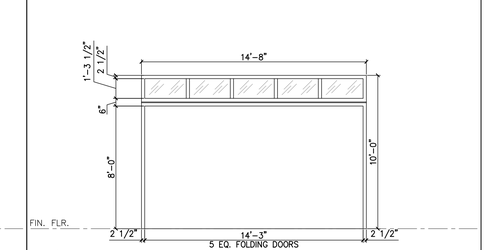
F4 H.M. FRAME W/ SIDE LITE



F5 MTL. FRAME
FIELD PAINTED



F6 ALUM. FRAME W/ TRANSOM



F7 ALUM. FRAME W/ TRANSOM

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

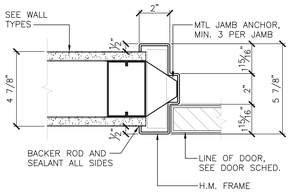
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

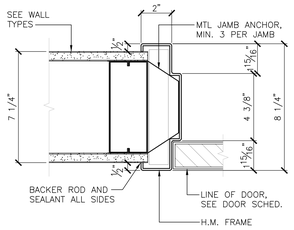
DOOR SCHEDULE

SUBMISSIONS DATE	DESCRIPTION	REVISIONS DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-311



J1 JAMB DETAIL
SCALE: 3" = 1'-0"



J2 JAMB DETAIL
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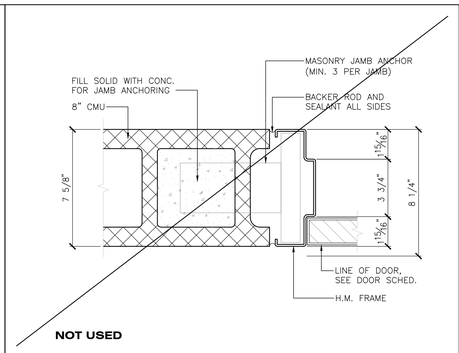

J3 JAMB DETAIL
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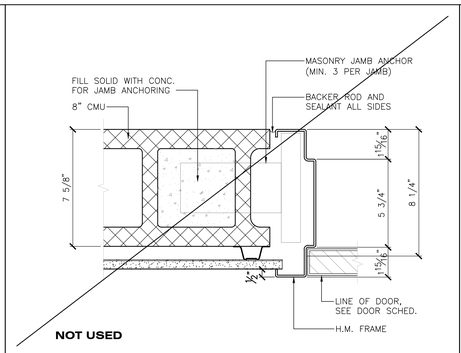

J4 JAMB DETAIL
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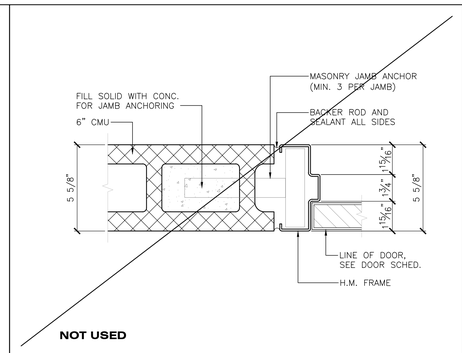

J5 JAMB DETAIL
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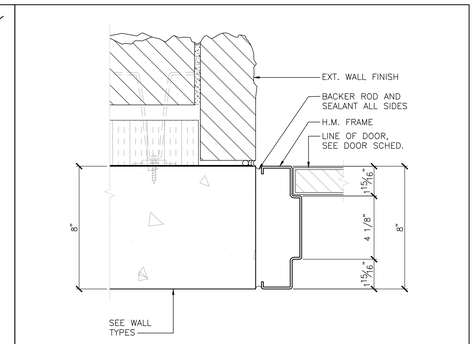

J6 JAMB DETAIL
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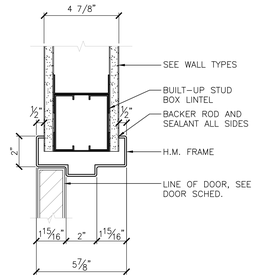

H1 HEAD DETAIL
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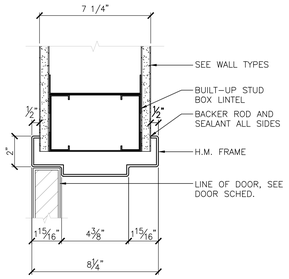

H2 HEAD DETAIL
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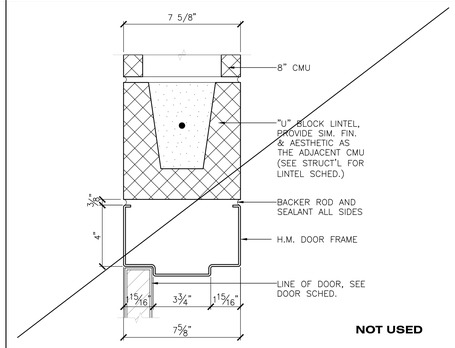
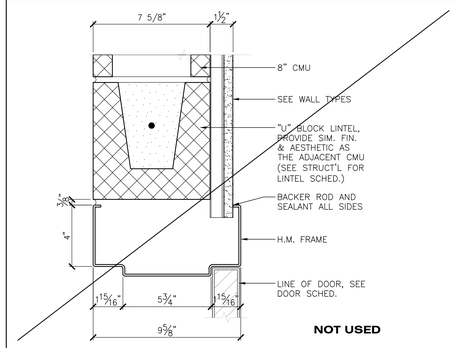
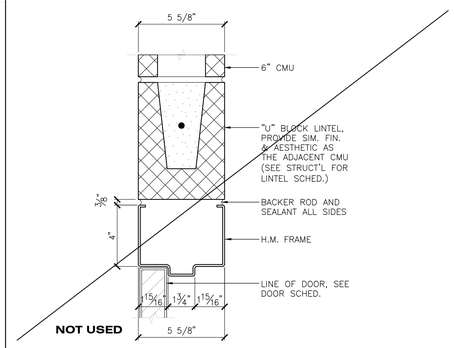


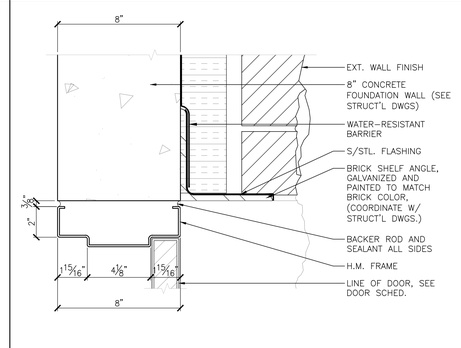
H3 HEAD DETAIL
SCALE: 3" = 1'-0"



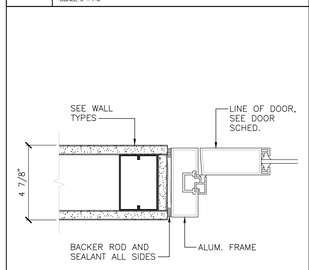
H4 HEAD DETAIL
SCALE: 3" = 1'-0"



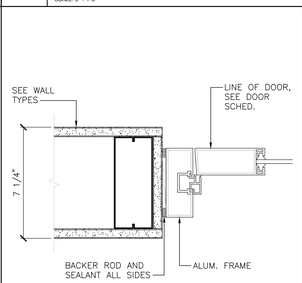
H5 HEAD DETAIL
SCALE: 3" = 1'-0"



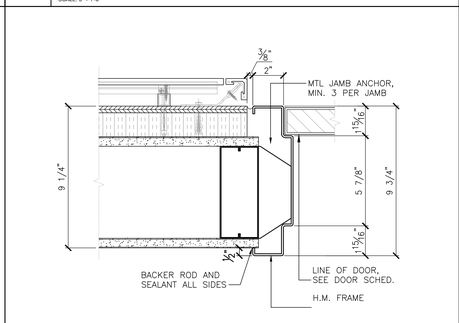
H6 HEAD DETAIL
SCALE: 3" = 1'-0"



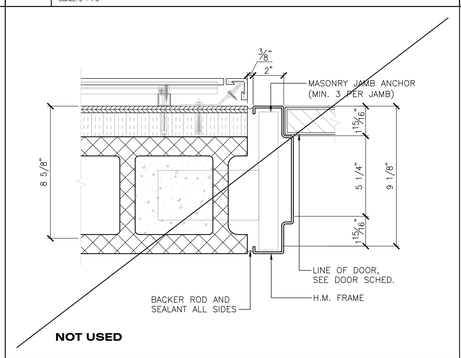
J7 JAMB DETAIL
SCALE: 3" = 1'-0"



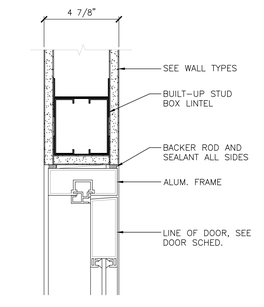
J8 JAMB DETAIL
SCALE: 3" = 1'-0"



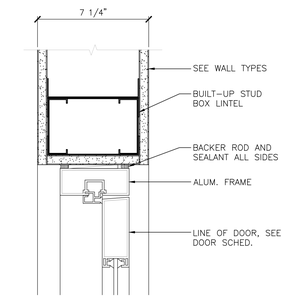
J9 JAMB DETAIL
SCALE: 3" = 1'-0"



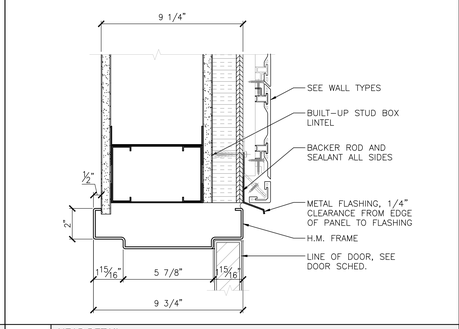
J10 JAMB DETAIL
SCALE: 3" = 1'-0"



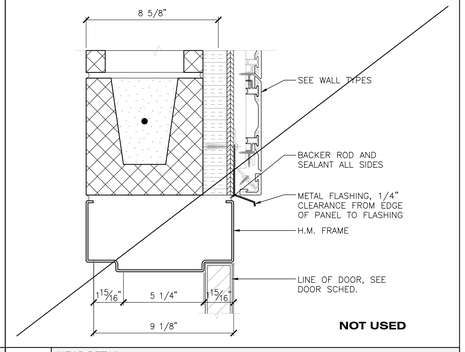
H7 HEAD DETAIL
SCALE: 3" = 1'-0"



H8 HEAD DETAIL
SCALE: 3" = 1'-0"



H9 HEAD DETAIL
SCALE: 3" = 1'-0"



H10 HEAD DETAIL
SCALE: 3" = 1'-0"

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

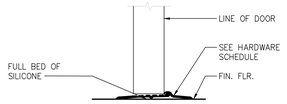
SHEET CONTENTS:

DOOR DETAILS

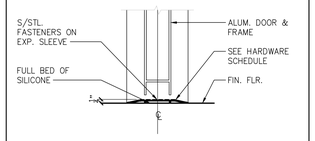
SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-312

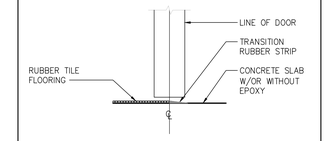
DOOR SILL TYPE SCHEDULE (SCALE: 3" = 1'-0")



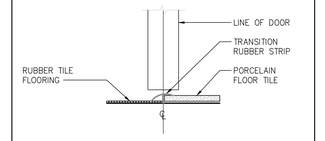
S1 ALUMINUM SADDLE
EXTERIOR DOOR



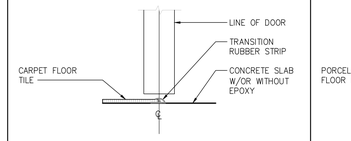
S2 ALUMINUM SADDLE
EXTERIOR DOOR



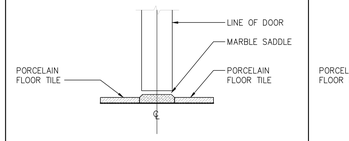
S3 RUBBER FLR. TILE TO CONC.



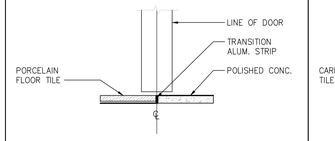
S4 RUBBER FLR. TILE TO PORCELAIN TILE



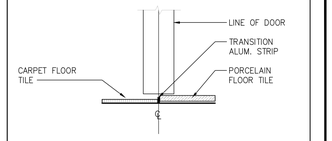
S5 CARPET TILE TO CONC.



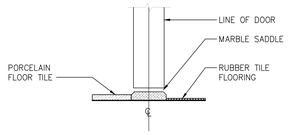
S6 PORCELAIN TILE TO PORCELAIN TILE



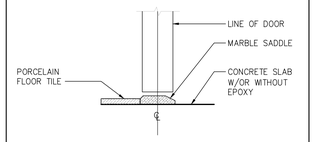
S7 PORCELAIN TILE TO POLISHED CONC.



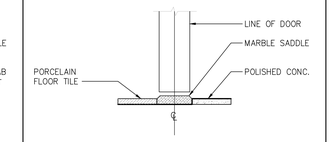
S8 CARPET TILE TO PORCELAIN TILE



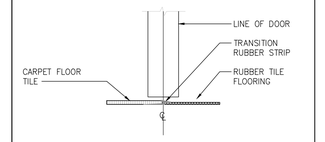
S9 PORCELAIN TILE TO RUBBER FLR. TILE



S10 PORCELAIN TILE TO CONC.



S11 PORCELAIN TILE TO POLISHED CONC.



S12 CARPET TILE TO RUBBER FLR. TILE

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2-22-2017

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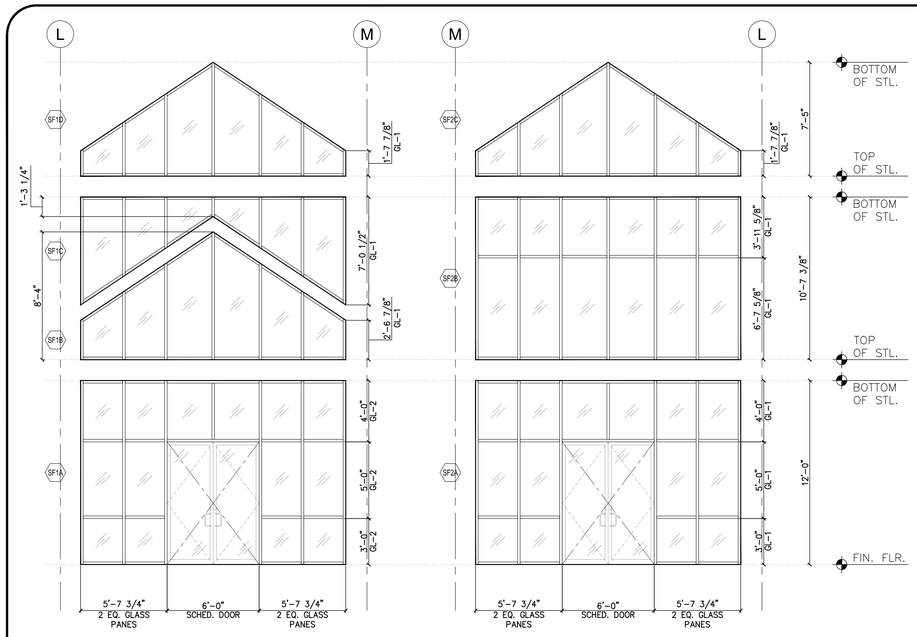
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-313

GLASS TYPE LEGEND

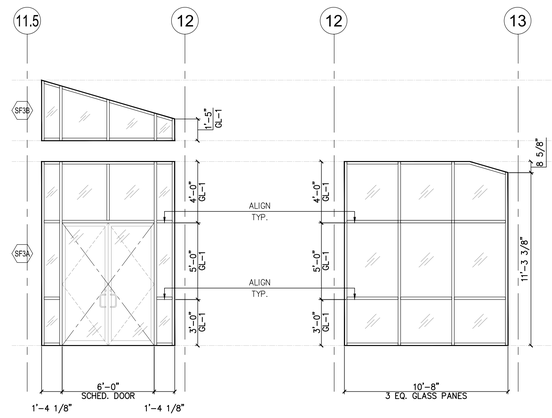
GL-1 1" THK. INSULATING VISION GLASS.
SEE SPECS. FOR GLAZING SCHEDULE

GL-2 1/4" THK. CLEAR TEMPERED GLASS (STOREFRONT)
SEE SPECS. FOR GLAZING SCHEDULE

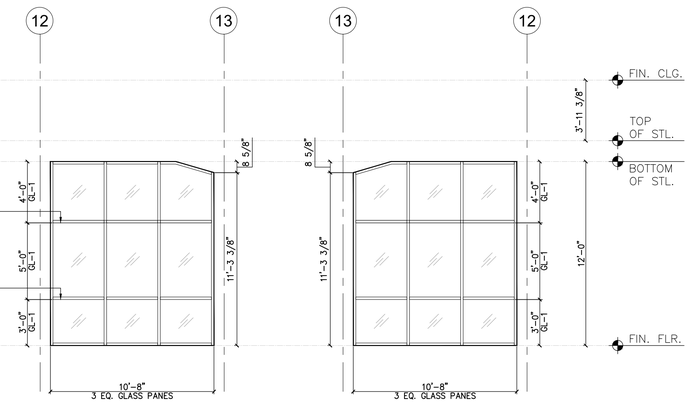


SF1 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
MAIN HALL #101

SF2 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
MAIN HALL #101

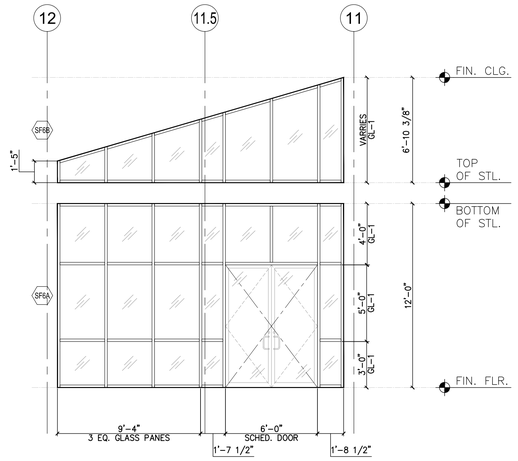


SF3 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
BAR/LOUNGE #112

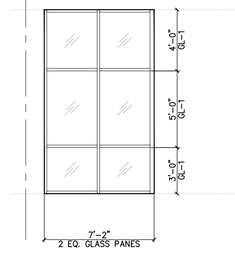


SF4 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
BAR/LOUNGE #112

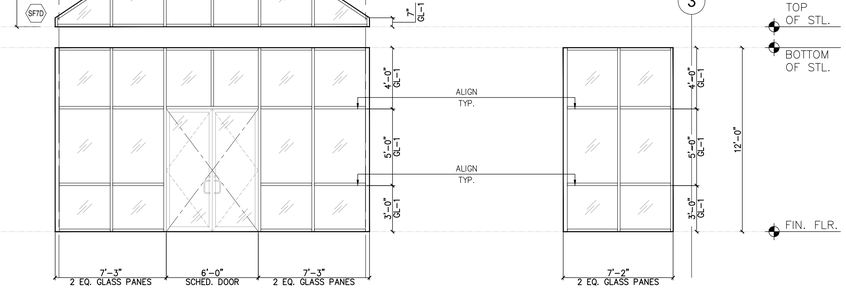
SF5 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
BAR/LOUNGE #112



SF6 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
RESTAURANT #116

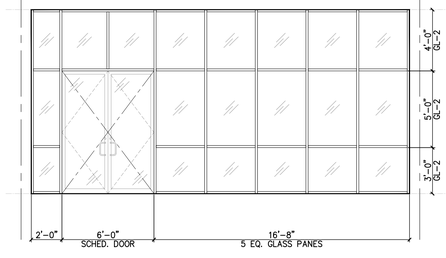


SF7A STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
VESTIBULE #100

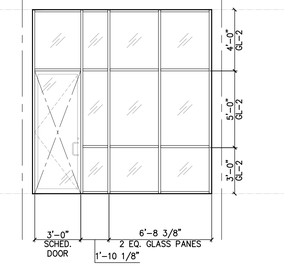


SF7B STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
VESTIBULE #100

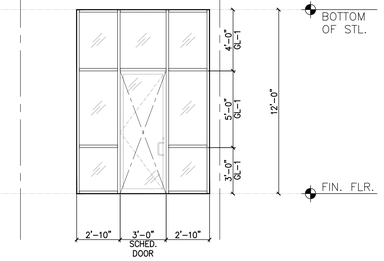
SF7C STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
VESTIBULE #100



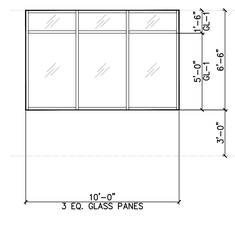
SF8 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
MAIN HALL #101



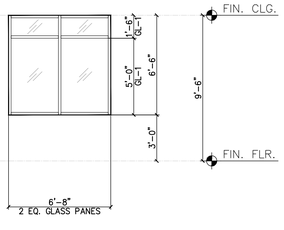
SF9 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
MAIN HALL #101



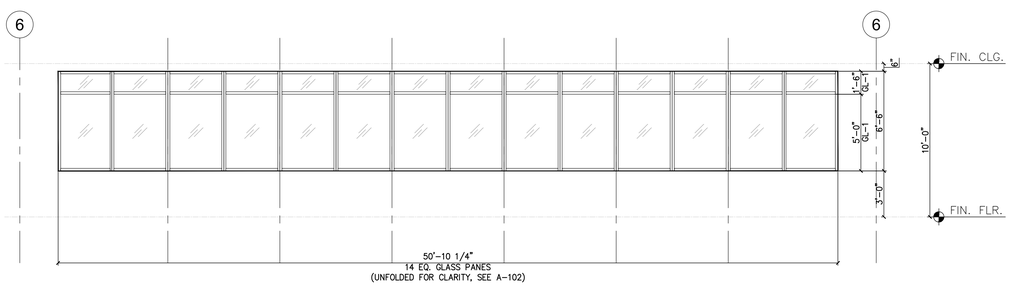
SF10 STOREFRONT ELEVATION
SCALE: 1/4" = 1'-0"
PRO SHOP #107



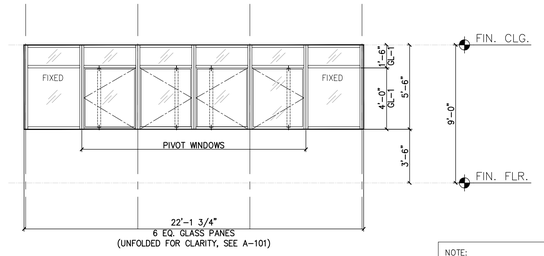
W1 WINDOW ELEVATION
SCALE: 1/4" = 1'-0"
MULTIPLE LOCATIONS



W2 WINDOW ELEVATION
SCALE: 1/4" = 1'-0"
OPEN OFFICE # 108



W3 WINDOW ELEVATION
SCALE: 1/4" = 1'-0"
PRO SHOP #107



W4 WINDOW ELEVATION
SCALE: 1/4" = 1'-0"
TURNSTAND #LO1

NOTE:
1. STOREFRONT VENDOR TO VERIFY ALL CLEAR OPENING DIMENSIONS IN FIELD, COORDINATE W/ G.C.
2. ALL HORIZONTAL FRAMES TO BE ALIGNED THROUGHOUT.

NOT FOR CONSTRUCTION
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STOREFRONT & WINDOW SCHEDULE

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DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
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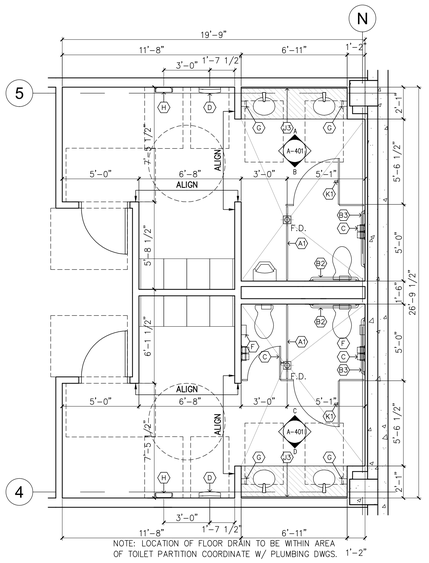
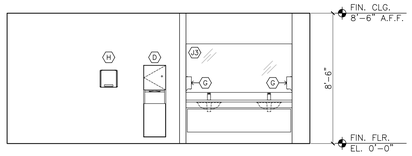
02.22.17	REBID SET		

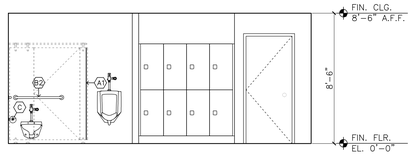
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-331



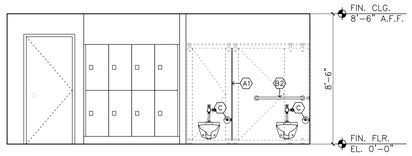
1 A-401 ENLARGED PLAN: TOILET #L04 & #L05
SCALE: 1/4"=1'-0"



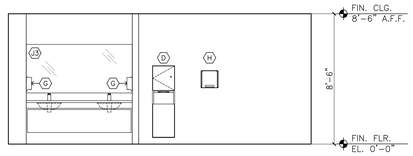
ELEVATION–A



ELEVATION–B

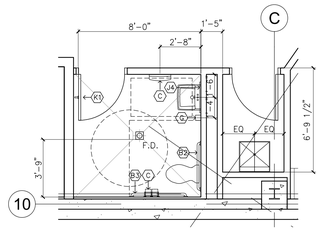


ELEVATION–C

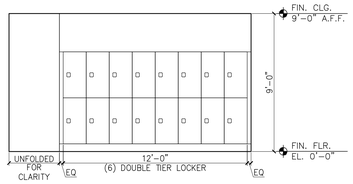


ELEVATION–D

A A-401 TOILET INTERIOR ELEVATIONS
SCALE: 1/4"=1'-0"

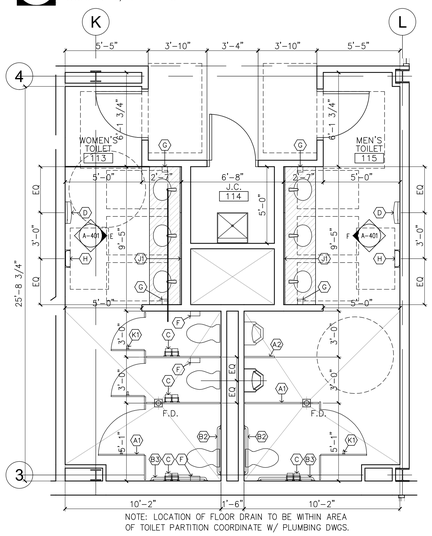


2 A-401 ENLARGED PLAN: TOILET #L20
SCALE: 1/4"=1'-0"

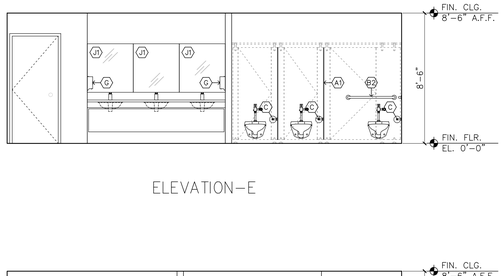


B A-401 TOILET INTERIOR ELEVATIONS
SCALE: 1/4"=1'-0"

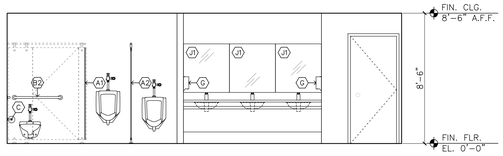
BASIS OF DESIGN FOR TOILET ACCESSORIES					
ITEM	PRODUCT NAME	DESCRIPTION	MANUFACTURER	MODEL #	REMARKS
A1	TOILET PARTITIONS (TP1)	ALPACO COLLECTION ELEGANCE PARTITIONS	ASI GROUP		SEE FINISH SCHEDULE
A2	URINAL SCREENS (TP1)	ALPACO COLLECTION ELEGANCE PARTITIONS 24"x72"	ASI GROUP		SEE FINISH SCHEDULE
B1	18" GRAB BARS	1½" O.D. ST/STL. WITH CONCEALED MOUNTING	BOBRICK	B-6806 x 18	SATIN FINISH
B2	36" GRAB BARS	1½" O.D. ST/STL. WITH CONCEALED MOUNTING	BOBRICK	B-6806 x 36	SATIN FINISH
B3	42" GRAB BARS	1½" O.D. STAINLESS STL. WITH CONCEALED MOUNTING	BOBRICK	B-6806 x 42	SATIN FINISH
C	TOILET TISSUE DISPENSER	SURFACE–MOUNTED DOUBLE–ROLL ST/STL.	BOBRICK	B-76867	SATIN FINISH
D	PAPER TOWEL DISPENSER/WASTE RECEPTACLE	"ConturaSeries" RECESSED ST/STL.	BOBRICK	B-43944	SATIN FINISH
E	NOT USED				
F	SANITARY NAPKIN DISPOSAL	"ConturaSeries" SURFACE–MOUNTED ST/STL.	BOBRICK	B-270	SATIN FINISH
G	SOAP DISPENSER	AUTOMATIC WALL–MOUNTED ST/STL.	BOBRICK	B-2013	SATIN FINISH
H	ELECTRIC HAND DRYER	TrimLine SURFACE–MOUNTED ADA DRYER ST/STL. COVER	BOBRICK	B-7128	SATIN FINISH
J1	MIRROR	CUSTOM–SIZED FRAMELESS MIRROR	T.B.D.	T.B.D.	
J2	MIRROR	CUSTOM–SIZED FRAMELESS MIRROR	T.B.D.	T.B.D.	
J3	MIRROR	CUSTOM–SIZED FRAMELESS MIRROR	T.B.D.	T.B.D.	
J4	MIRROR	TEMPERED GLASS W/ POLISH ST/STL. CHANNEL FRAME	BOBRICK	B-1659 24"x36"	
K1	HAT & COAT HOOK	SURFACE–MOUNTED ST/STL.	BOBRICK	B-6827	SATIN FINISH
K2	HOOK STRIP	SURFACE–MOUNTED ST/STL.	BOBRICK	B-232 x 24	SATIN FINISH, JANITOR'S CLOSETS
K3	UTILITY SHELF	UTILITY SHELF WITH MOP/BROOM HOLDERS AND RAG HOOKS STAINLESS STEEL	BOBRICK	B-239	SATIN FINISH, JANITOR'S CLOSETS



3 A-401 ENLARGED PLAN: TOILET #113 & #115
SCALE: 1/4"=1'-0"

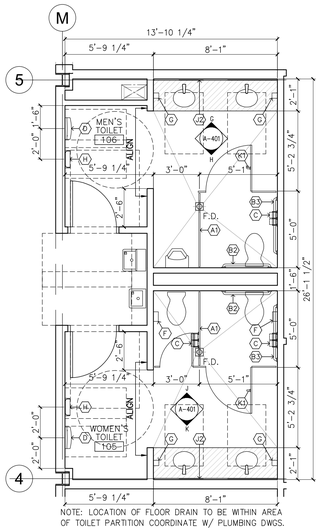


ELEVATION–E

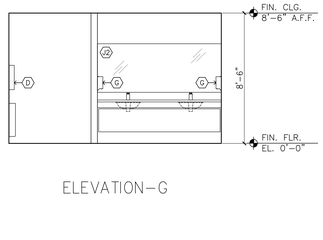


ELEVATION–F

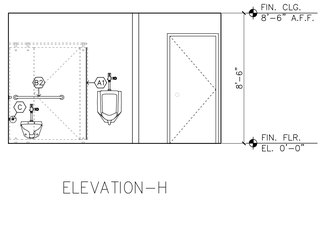
C A-401 TOILET INTERIOR ELEVATIONS
SCALE: 1/4"=1'-0"



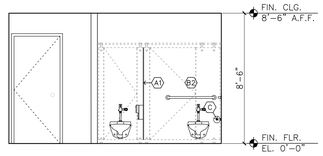
4 A-401 ENLARGED PLAN: TOILET #105 & #106
SCALE: 1/4"=1'-0"



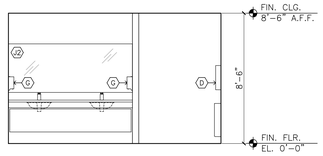
ELEVATION–G



ELEVATION–H

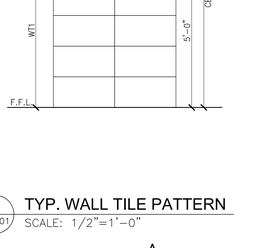


ELEVATION–J

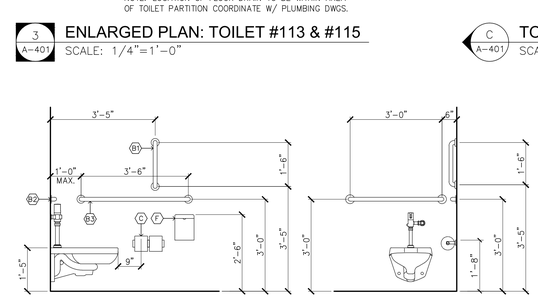


ELEVATION–K

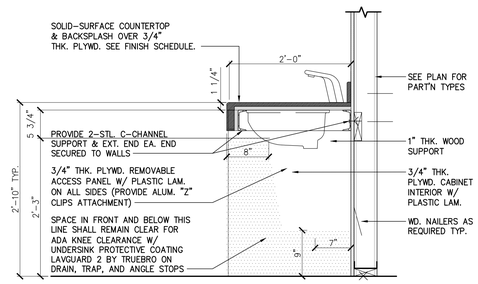
D A-401 TOILET INTERIOR ELEVATIONS
SCALE: 1/4"=1'-0"



E A-401 TYP. WALL TILE PATTERN
SCALE: 1/2"=1'-0"



E A-401 TOILET ACCESSORIES STANDARD MOUNTING HEIGHTS
SCALE: 1/2"=1'-0"



E A-401 TYP. WALL TILE PATTERN
SCALE: 1/2"=1'-0"

NOT FOR CONSTRUCTION
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2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

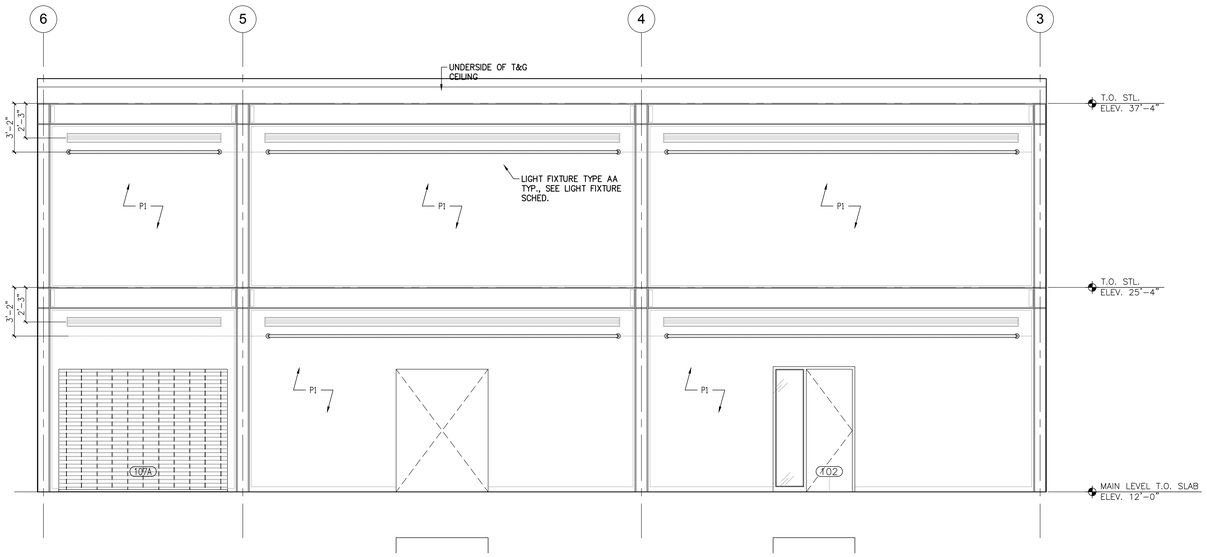
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

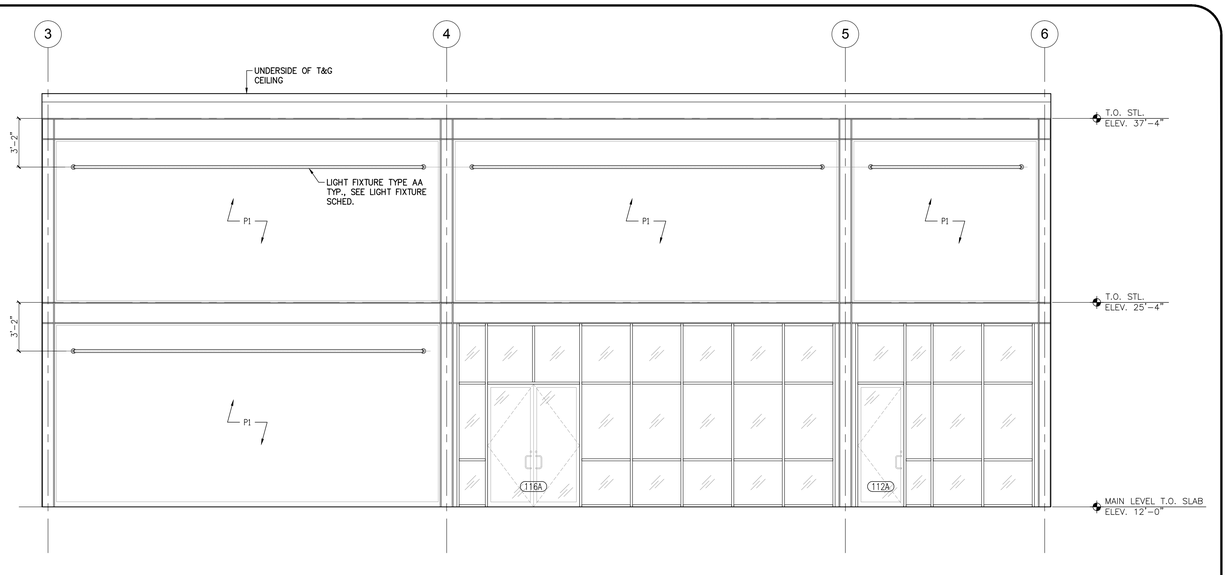
ENLARGED TOILET PLANS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

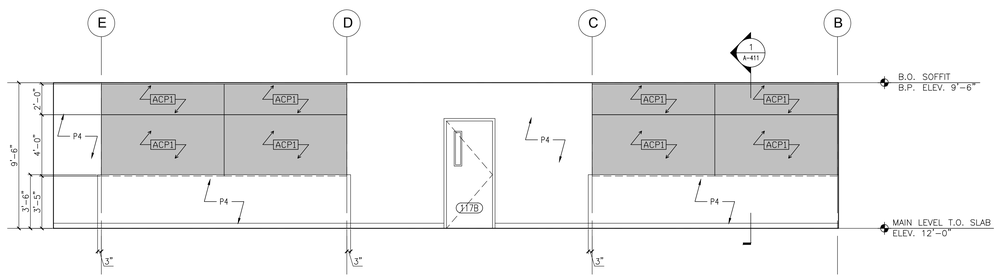
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-401



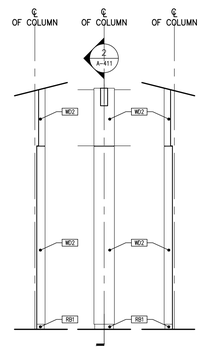
A A-411 MAIN HALL INTERIOR ELEVATION
SCALE: 1/4"=1'-0"



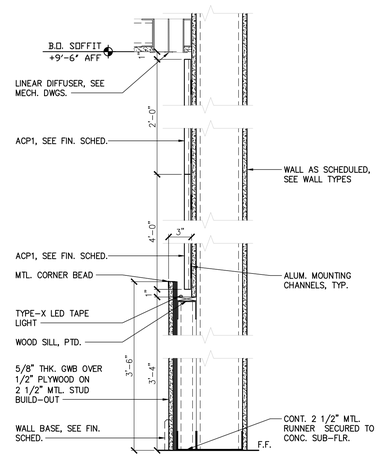
B A-411 MAIN HALL INTERIOR ELEVATION
SCALE: 1/4"=1'-0"



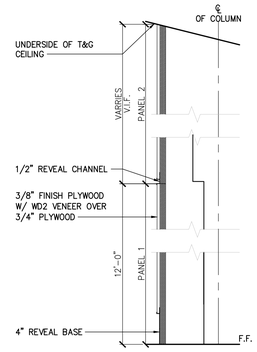
C A-411 RESTAURANT INTERIOR ELEVATION
SCALE: 1/4"=1'-0"



D A-411 COLUMN ELEVATIONS
SCALE: 1/4"=1'-0"



1 A-411 SECTION DETAIL
SCALE: 1 1/2"=1'-0"



2 A-411 SECTION DETAIL
SCALE: 1 1/2"=1'-0"

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

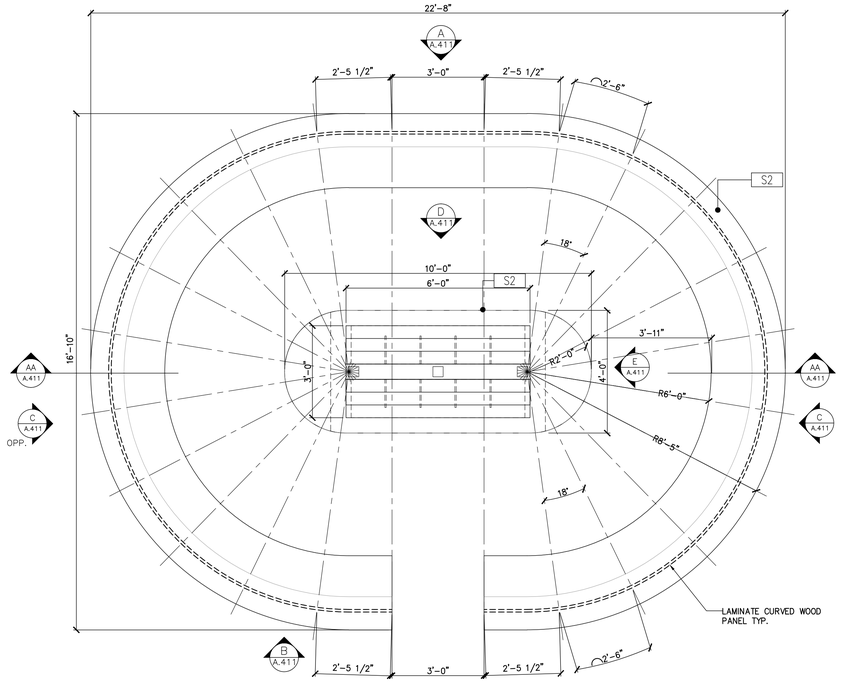
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

INTERIOR ELEVATIONS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

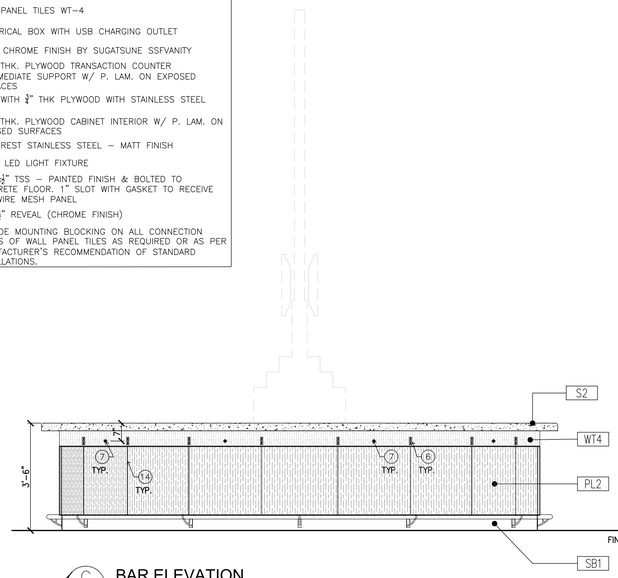
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-411



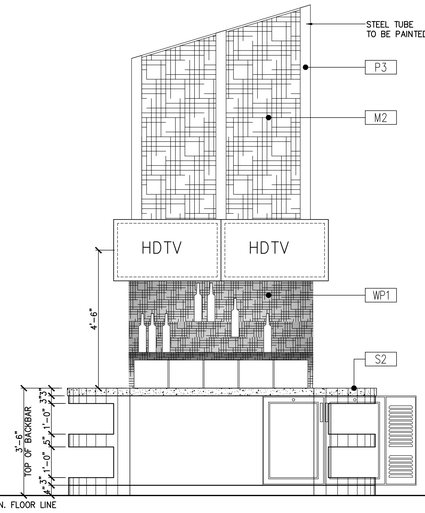
1 A-421 ENLARGED BAR PLAN
SCALE: 1/2"=1'-0"

KEYNOTES THIS DRAWING

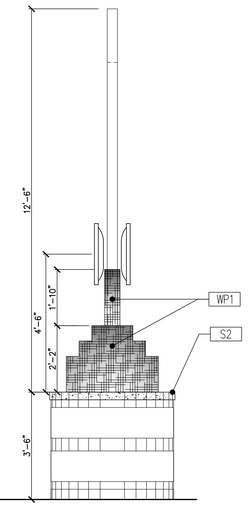
1. 1 ¼" THICK ONE PEICE QUATZ SURFACE COUNTER
2. 3/4" THK. PLYWOOD WITH PLASTIC LAMINATE PL-2
3. 3/4" THK. PLYWOOD WITH PLASTIC LAMINATE PL-5
4. WIRE MESH PANEL – STAINLESS STEEL FINISH WITH ½" FRAME
5. WALL PANEL TILES WT-4
6. ELECTRICAL BOX WITH USB CHARGING OUTLET
7. HOOK CHROME FINISH BY SUGATSUNE SSFVANITY
8. 3/4" THK. PLYWOOD TRANSACTION COUNTER INTERMEDIATE SUPPORT W/ P. LAM. ON EXPOSED SURFACES
9. BASE WITH ¾" THK PLYWOOD WITH STAINLESS STEEL SB-1
10. 3/4" THK. PLYWOOD CABINET INTERIOR W/ P. LAM. ON EXPOSED SURFACES
11. FOOT REST STAINLESS STEEL – MATT FINISH
12. CONT. LED LIGHT FIXTURE
13. 4"x4"x¼" TSS – PAINTED FINISH & BOLTED TO CONCRETE FLOOR. 1" SLOT WITH GASKET TO RECEIVE THE WIRE MESH PANEL
14. ½" x ½" REVEAL (CHROME FINISH)
15. PROVIDE MOUNTING BLOCKING ON ALL CONNECTION POINTS OF WALL PANEL TILES AS REQUIRED OR AS PER MANUFACTURER'S RECOMMENDATION OF STANDARD INSTALLATIONS.



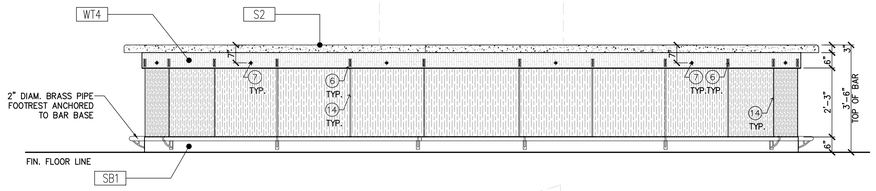
C A.411 BAR ELEVATION
SCALE: 1/2" = 1'-0"



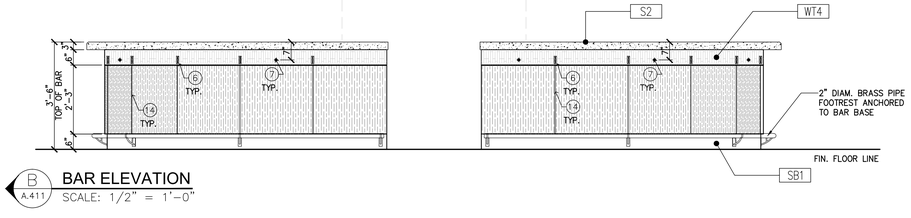
D A.411 BAR ELEVATION
SCALE: 1/2" = 1'-0"



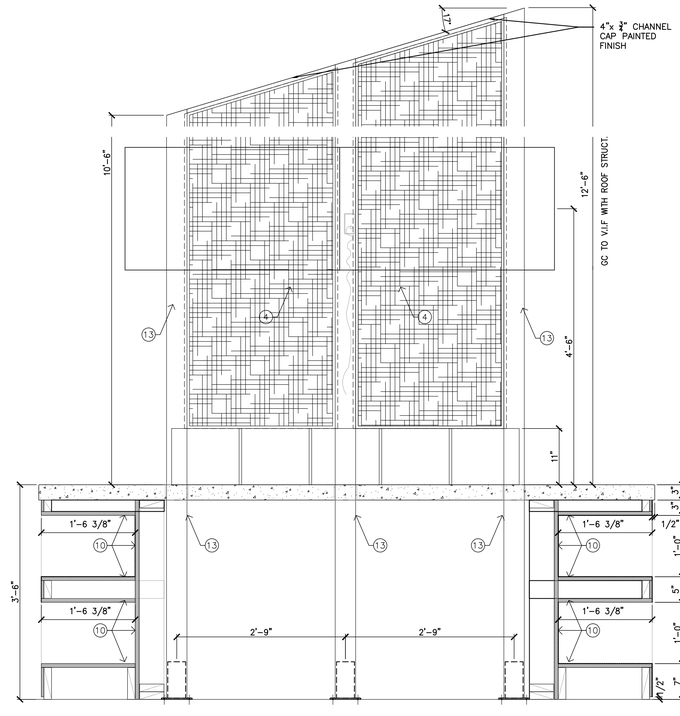
E A.411 BAR ELEVATION
SCALE: 1/2" = 1'-0"



A A.411 BAR ELEVATION
SCALE: 1/2" = 1'-0"



B A.411 BAR ELEVATION
SCALE: 1/2" = 1'-0"



AA A.411 BAR SECTION
SCALE: 1"=1'-0"

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

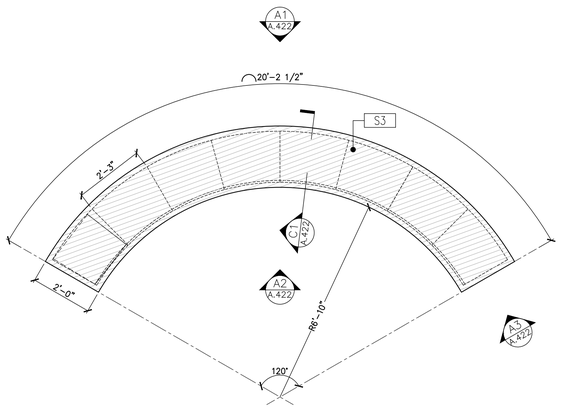
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

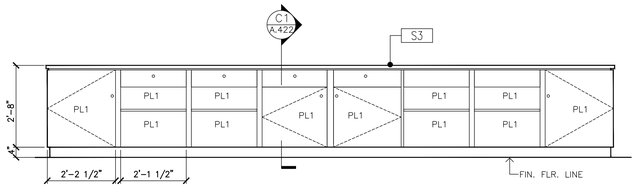
BAR/LOUNGE MILLWORK DETAILS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

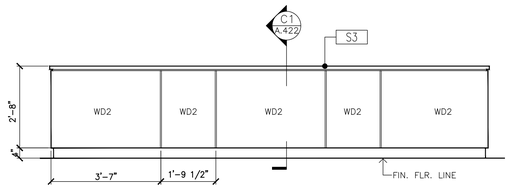
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	DV
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-421



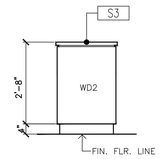
A ENLARGED SALES COUNTER PLAN
A.422 SCALE: 1/2"=1'-0"



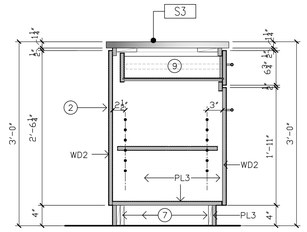
A1 A.422 SALES COUNTER ELEVATION
SCALE: 1/2" = 1'-0"



A2 A.422 SALES COUNTER ELEVATION
SCALE: 1/2" = 1'-0"



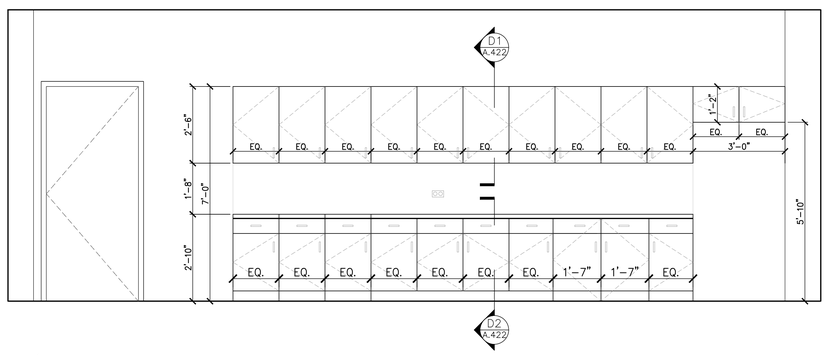
A3 A.422 SALES COUNTER ELEVATION
SCALE: 1/2" = 1'-0"



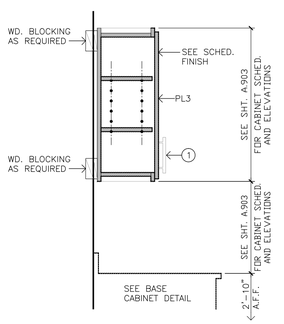
C2 A.902 TYP. COUNTER SECT. DET.
SCALE: 1" = 1'-0"

KEYNOTES THIS DRAWING

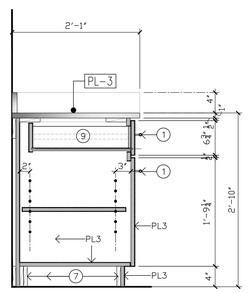
1. SCHEDULED COUNTERTOP S-2
2. 3/4" THK. PLYWOOD WITH PLASTIC LAMINATE PL-3
3. 3/4" THK. PLYWOOD WITH WOOD VENEER WD-2
4. 2" DIA. HOLE, TYP.
5. 19.68"x19.68"x2.36" WAVE WALL PANEL TILES #361 BY KIREI ECHOPANEL
6. COLUMN COVER, SEE SHEET A.241 FOR COL. ENCLOSURE DETAILS
7. DOUBLE 3/4" THK. PLYWOOD
8. 3/4" THK. PLYWOOD TRANSACTION COUNTER INTERMEDIATE SUPPORT W/ P. LAM. ON EXPOSED SURFACES
9. DRAWER SLIDES HAFELE CAT. NO. ACCURIDE 7434 (MATTE FIN.)
10. 3/4" THK. PLYWOOD CABINET INTERIOR W/ P. LAM. ON EXPOSED SURFACES
11. (2)3/4" THK. PLYWOOD RIBS @ 16" O.C. MAX.
12. CONT. LED LIGHT FIXTURE
13. CABINET DOOR PULL HAFELE CAT #117.05.600 (MATTE FIN.)
14. 1/2" REVEAL (PAINTED BLACK)
15. PROVIDE MOUNTING BLOCKING ON ALL CONNECTION POINTS OF WALL PANEL TILES AS REQUIRED OR AS PER MANUFACTURER'S RECOMMENDATION OF STANDARD INSTALLATIONS.



B A-412 BREAK ROOM INTERIOR ELEVATION
SCALE: 1/2"=1'-0"



D1 A.422 WALL CABINET DET.
SCALE: 1" = 1'-0"



D2 A.422 BASE CABINET DET.
SCALE: 1" = 1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

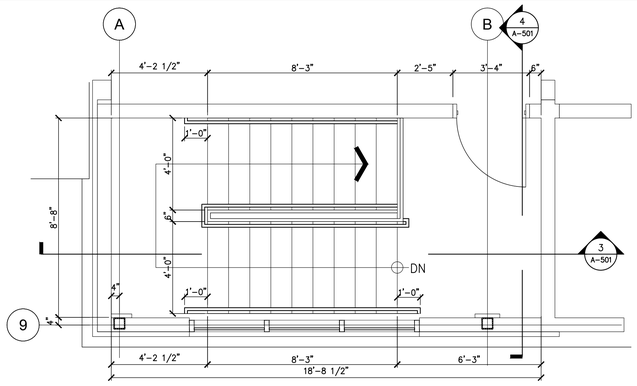
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

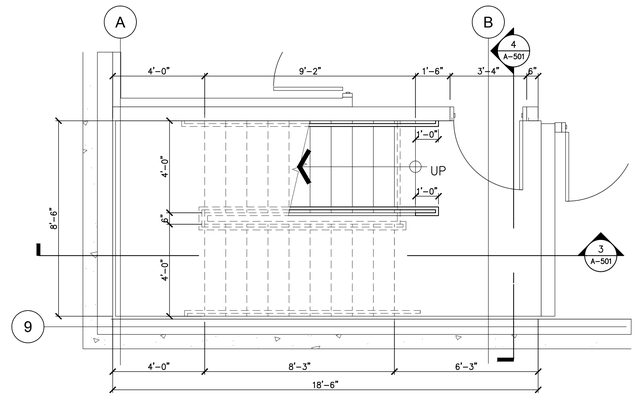
PRO SHOP & BREAK ROOM
MILLWORK DETAILS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

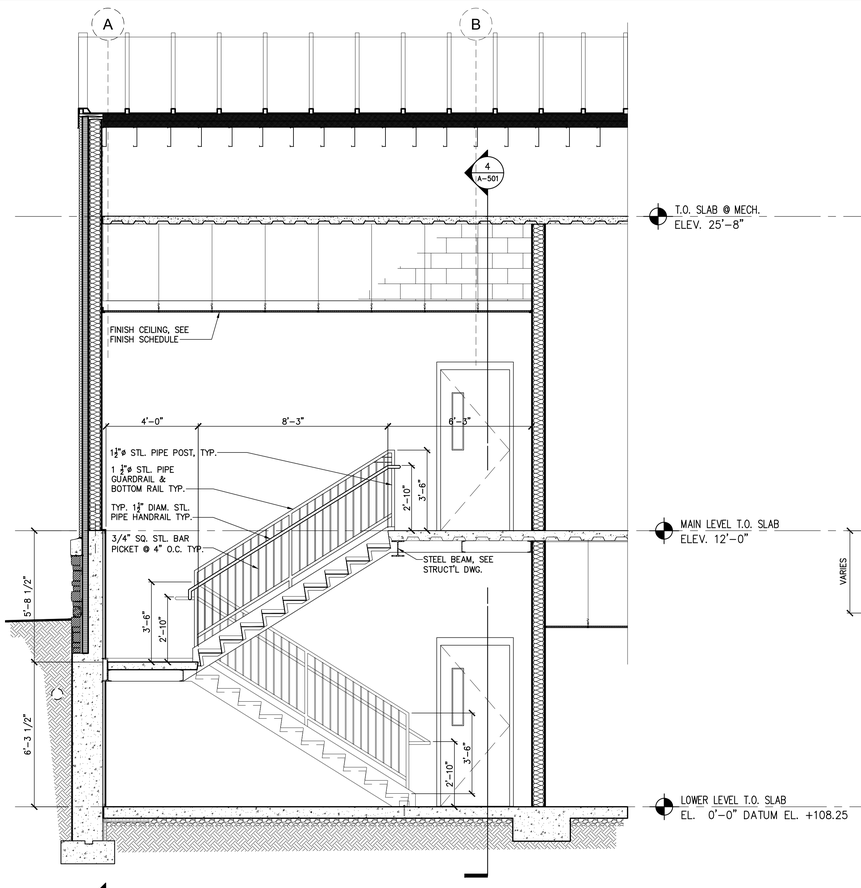
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	GA
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-422



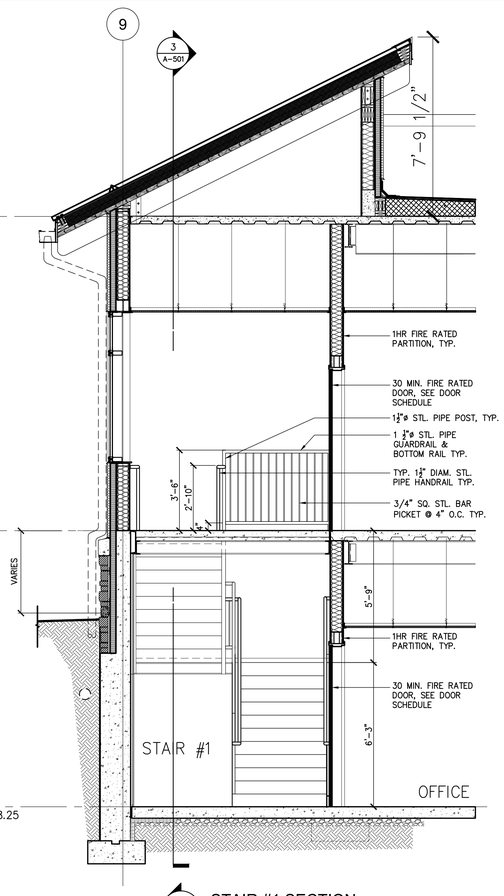
2 A-501 STAIR #1 PLAN-MAIN LEVEL
SCALE: 3/8"=1'-0"



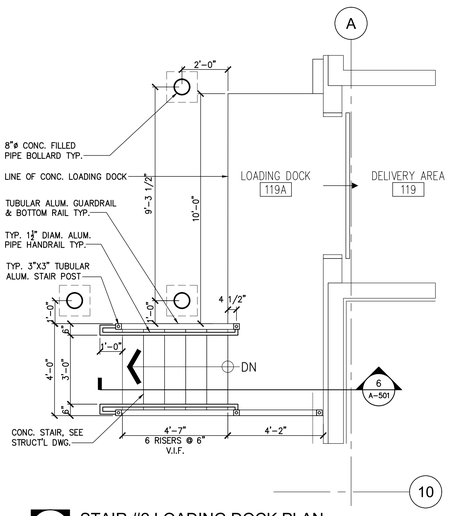
1 A-501 STAIR #1 PLAN-LOWER LEVEL
SCALE: 3/8"=1'-0"



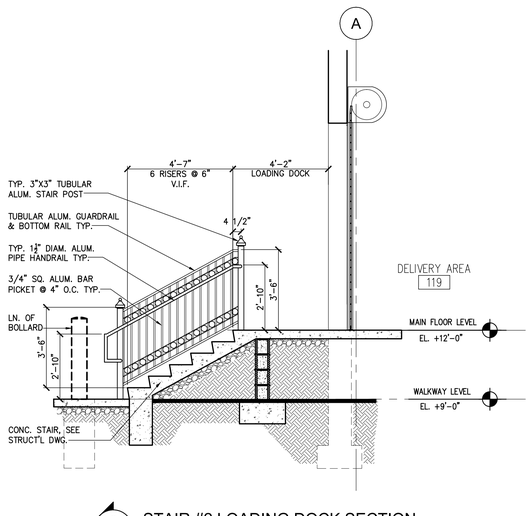
3 A-501 STAIR #1 SECTION
SCALE: 3/8"=1'-0"



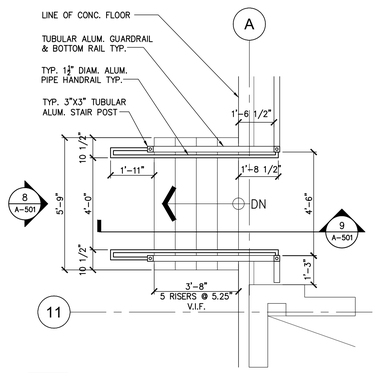
4 A-501 STAIR #1 SECTION
SCALE: 3/8"=1'-0"



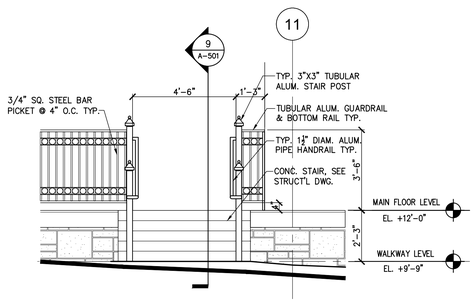
5 A-501 STAIR #2 LOADING DOCK PLAN
SCALE: 3/8"=1'-0"



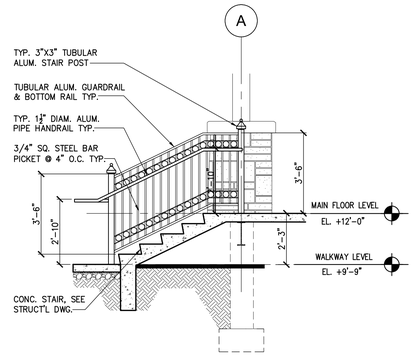
6 A-501 STAIR #2 LOADING DOCK SECTION
SCALE: 3/8"=1'-0"



7 A-501 STAIR #3 PLAN
SCALE: 3/8"=1'-0"



8 A-501 STAIR #3 ELEVATION
SCALE: 3/8"=1'-0"



9 A-501 STAIR #3 SECTION
SCALE: 3/8"=1'-0"

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2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

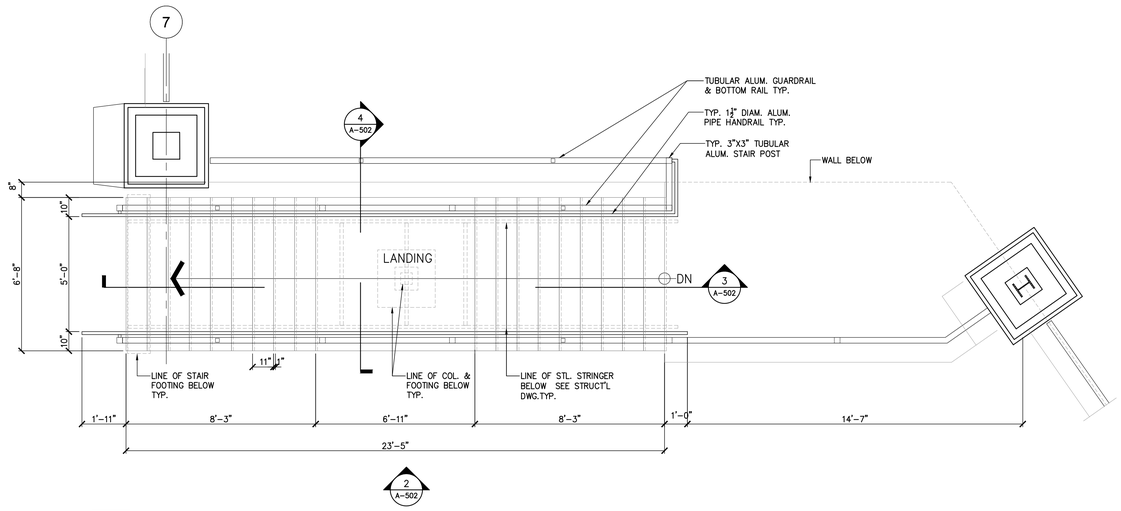
PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

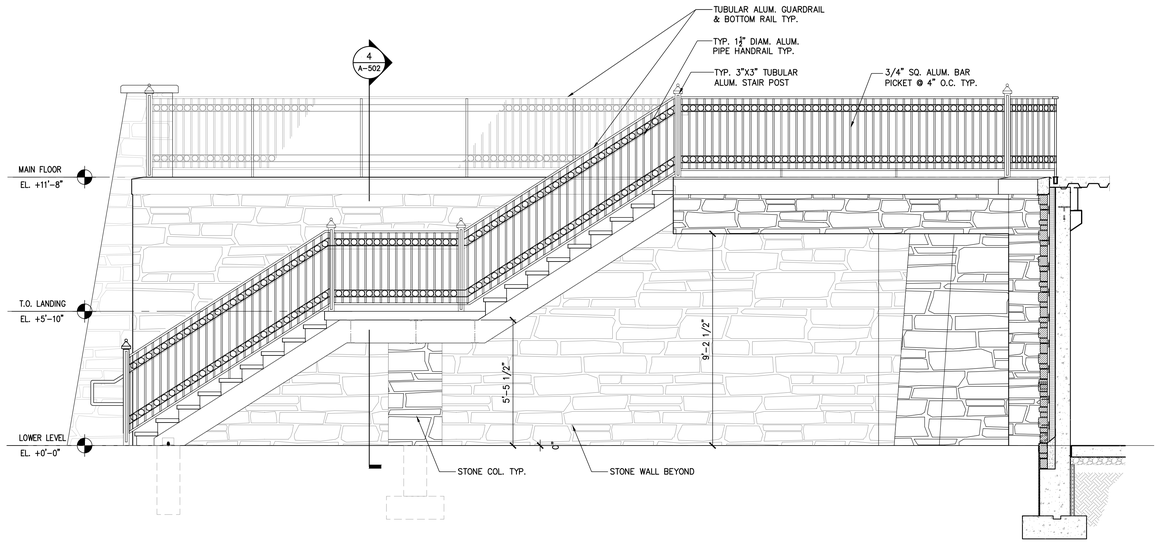
SHEET CONTENTS:

STAIR #1, #2, #3 PLANS & SECTIONS

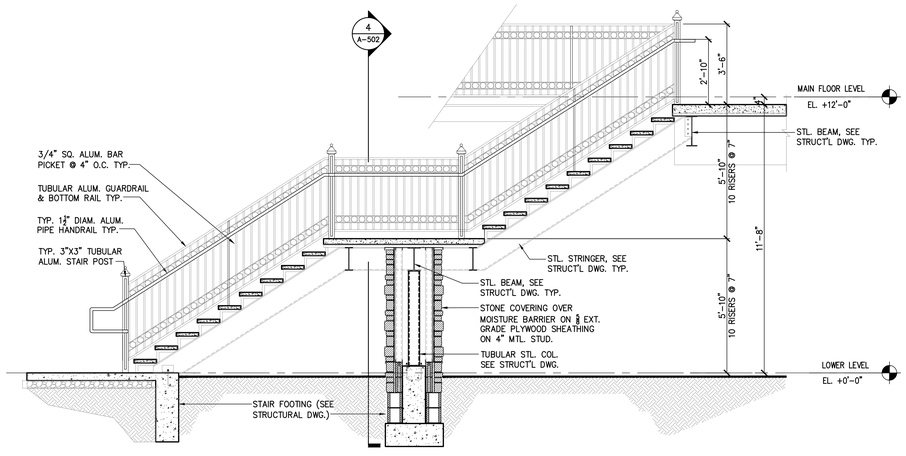
SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	WTJ
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-501



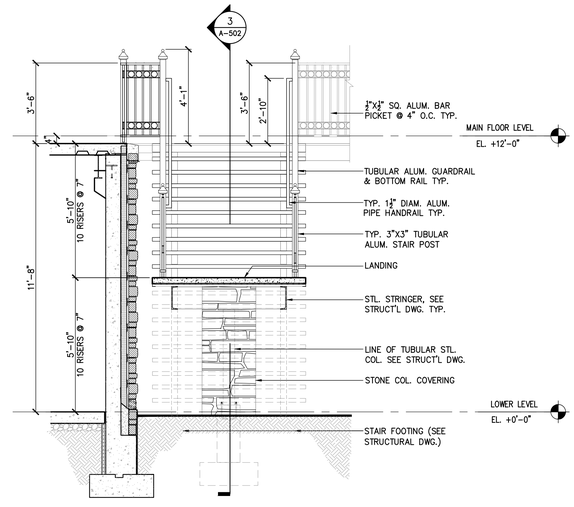
1 A-502 STAIR #3 PLAN
SCALE: 3/8"=1'-0"



2 A-502 STAIR #3 ELEVATION
SCALE: 3/8"=1'-0"



3 A-502 STAIR #3 SECTION
SCALE: 3/8"=1'-0"



4 A-502 STAIR #3 SECTION
SCALE: 3/8"=1'-0"

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
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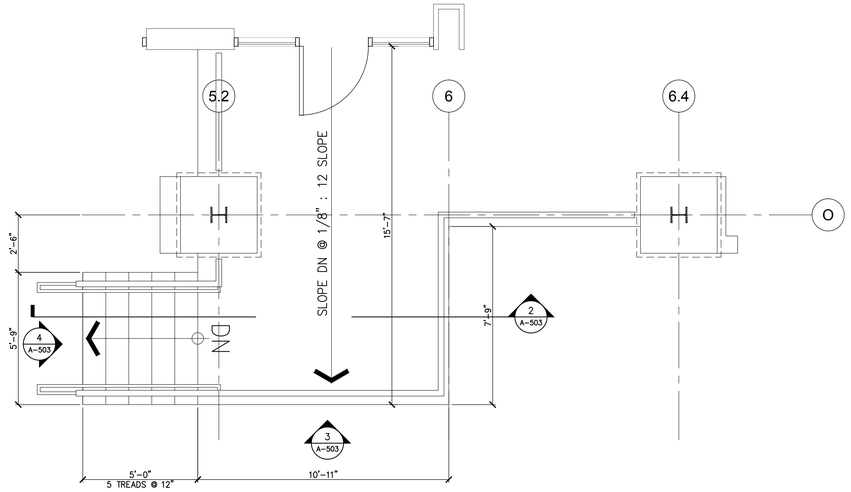
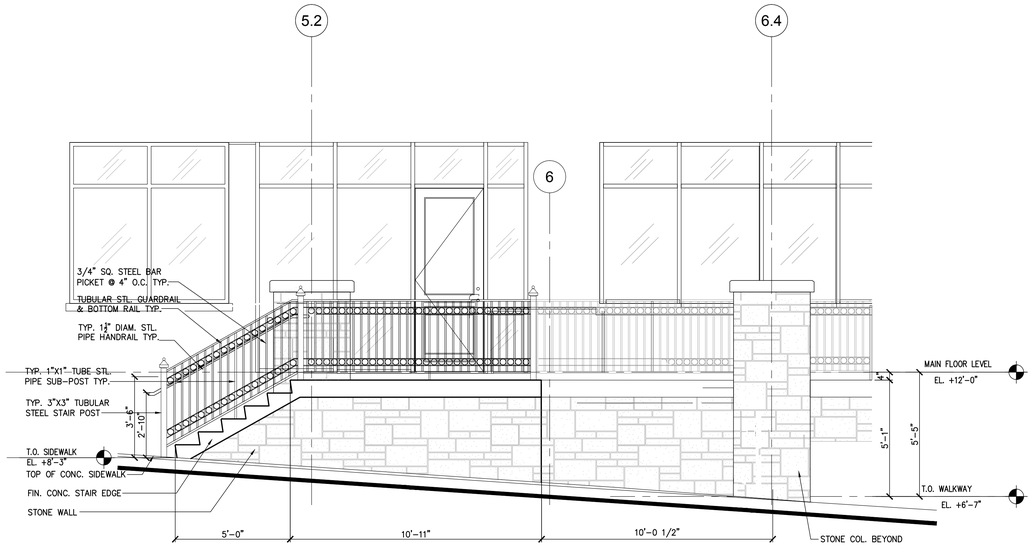
SHEET CONTENTS:

STAIR #4 PLANS & SECTIONS
TYPICAL STAIR DETAILS

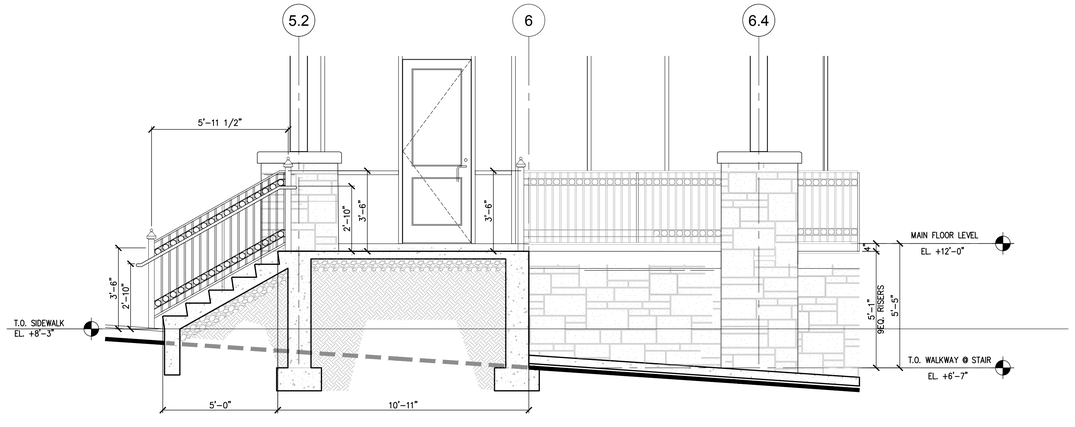
SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	WTJ
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-502



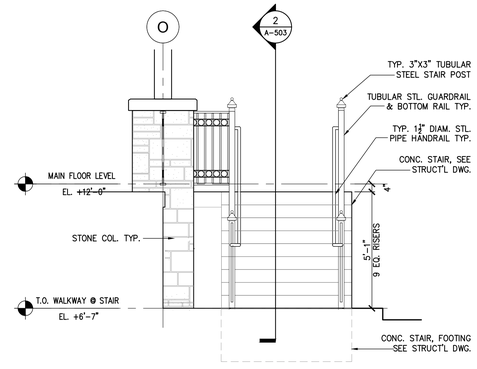
1 A-503 **STAIR #5 PLAN**
SCALE: 3/8"=1'-0"



3 A-503 **STAIR #5 ELEVATION**
SCALE: 3/8"=1'-0"



2 A-503 **STAIR #5 SECTION**
SCALE: 3/8"=1'-0"



4 A-503 **STAIR #3 ELEVATION**
SCALE: 3/8"=1'-0"

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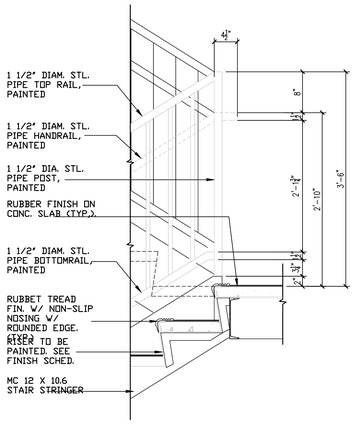
SHEET CONTENTS:

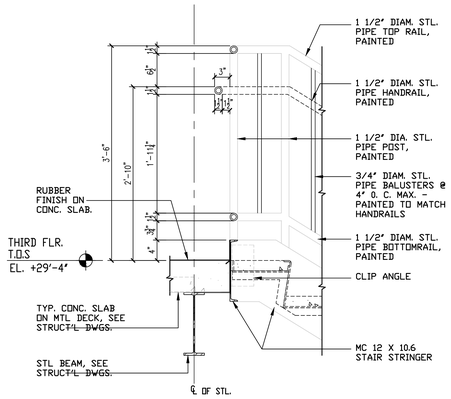
STAIR #5 DETAILS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

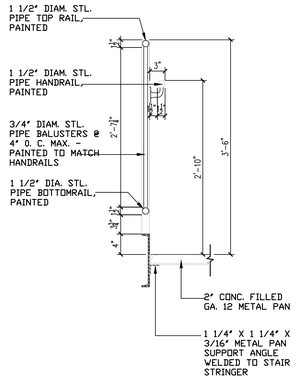
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	WTJ
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-503



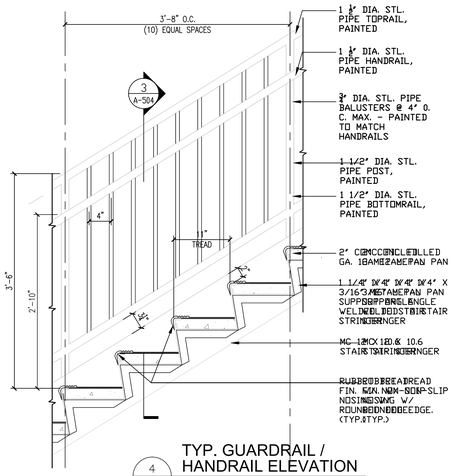
1 TYP. STAIR LANDING DETAIL
A-504 SCALE: 1" = 1'-0"



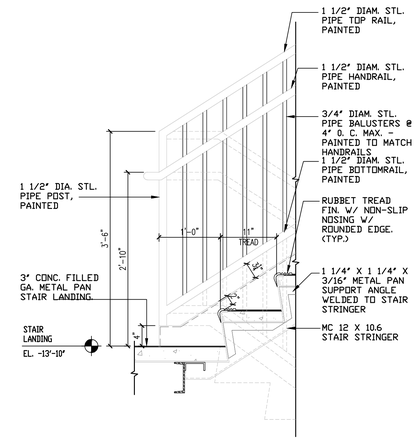
2 EDGE OF SLAB DETAIL
A-504 SCALE: 1" = 1'-0"



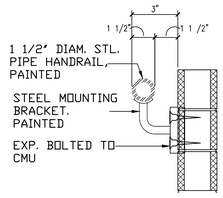
3 TYP. GUARDRAIL / HANDRAIL DETAIL
A-504 SCALE: 1" = 1'-0"



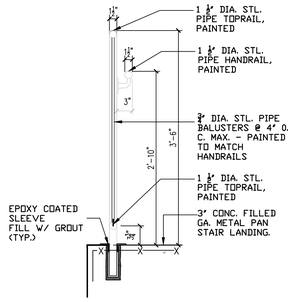
4 TYP. GUARDRAIL / HANDRAIL ELEVATION
A-504 SCALE: 1" = 1'-0"



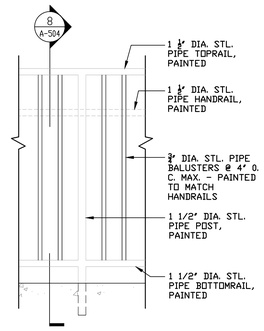
5 STAIR LANDING DETAIL
A-504 SCALE: 1" = 1'-0"



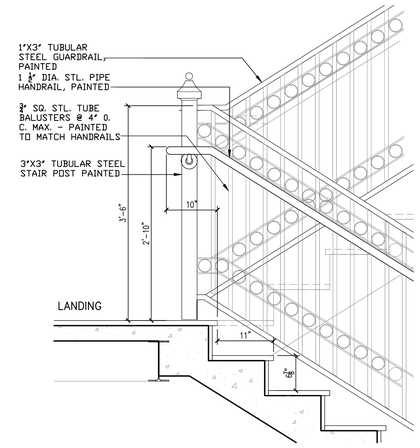
7 TYP. HANRAIL WALL MOUNT DETAIL
A-504 SCALE: 1" = 1'-0"



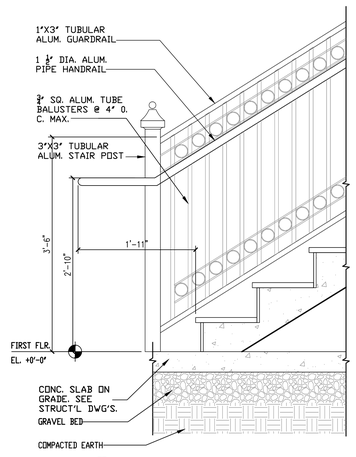
8 TYP. HAND / GUARDRAIL SECT.
A-504 SCALE: 1" = 1'-0"



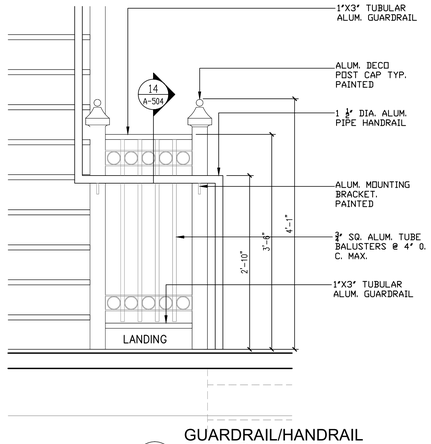
9 TYP. HAND / GUARDRAIL ELEV.
A-504 SCALE: 1" = 1'-0"



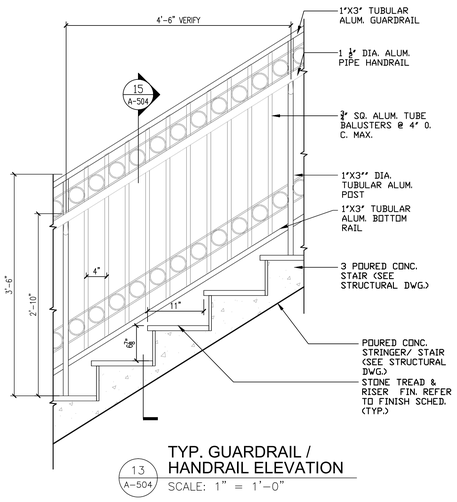
10 EXT. STAIR LANDING DETAIL
A-504 SCALE: 1" = 1'-0"



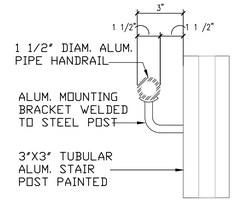
11 HANDRAIL EXTENSION DETAIL
A-504 SCALE: 1" = 1'-0"



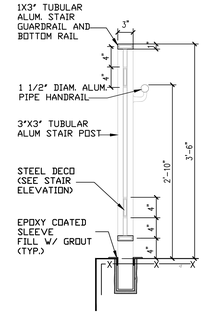
12 GUARDRAIL/HANDRAIL ELEV. @ LANDING
A-504 SCALE: 1" = 1'-0"



13 TYP. GUARDRAIL / HANDRAIL ELEVATION
A-504 SCALE: 1" = 1'-0"



14 TYP. HANRAIL WALL MOUNT DETAIL
A-504 SCALE: 1" = 1'-0"



15 TYP. HAND / GUARDRAIL SECT.
A-504 SCALE: 1" = 1'-0"

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PROJECT:

NEW CLUB HOUSE
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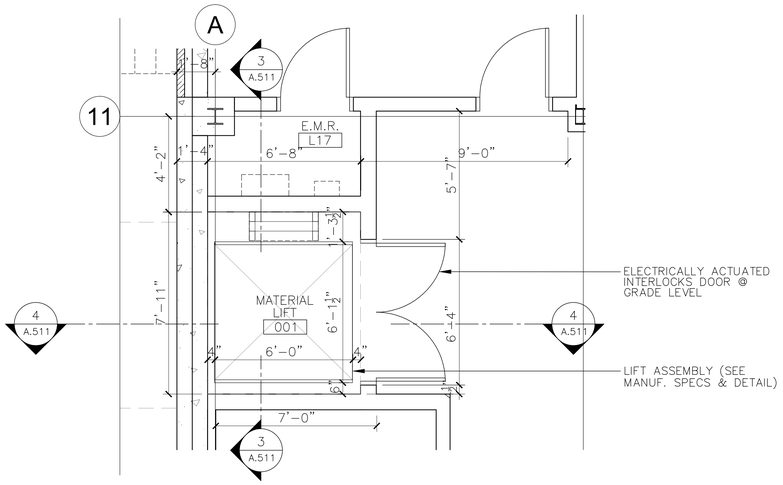
SHEET CONTENTS:

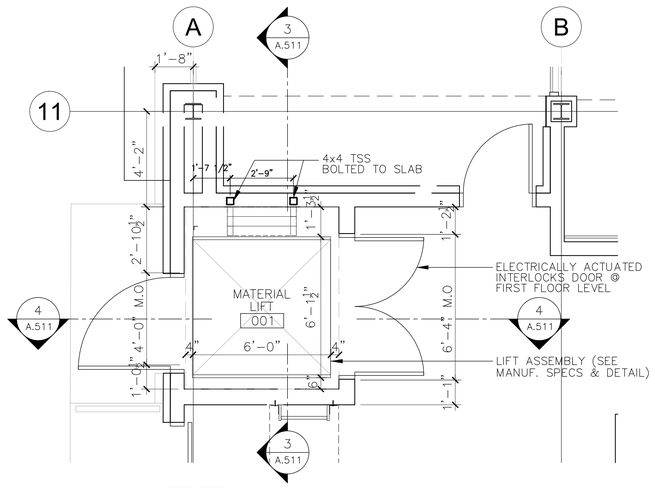
STAIR DETAILS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	WTJ
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-504



1 A.511 **ELEVATOR - LOWEL LEVEL PLAN**
SCALE: 1/4"=1'-0"



2 A.511 **ELEVATOR - MAIN LEVEL PLAN**
SCALE: 1/4"=1'-0"

4 A-501 **MATERIAL LIFT SECTION**
SCALE: 3/8"=1'-0"

4 A-501 **MATERIAL LIFT SECTION**
SCALE: 3/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

ELEVATOR PLANS & SECTIONS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:

DRWG NO

A-511

FINISH CEILING LEGEND

GWB
GYPSUM BOARD CEILING, PAINTED

ACT–1
2'X2' LAY–IN ACOUSTICAL CEILING TILES
(SEE FIN. SCHED. FOR ADDITIONAL INFO.)

ACT–2
2'X4' LAY–IN ACOUSTICAL CEILING TILES
(SEE FIN. SCHED. FOR ADDITIONAL INFO.)

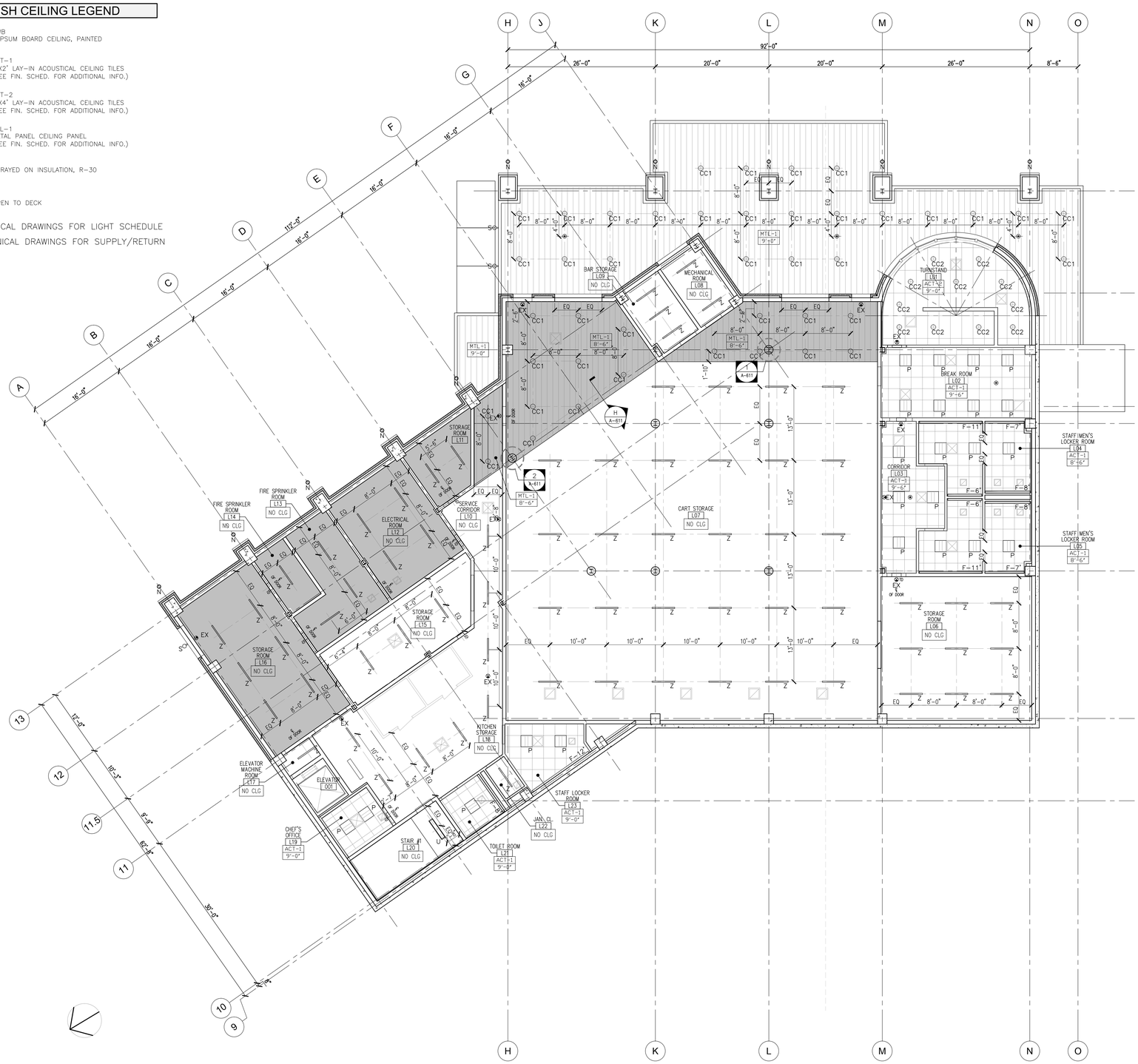
MTL–1
METAL PANEL CEILING PANEL
(SEE FIN. SCHED. FOR ADDITIONAL INFO.)

SPRAYED ON INSULATION, R–30

OPEN TO DECK

*SEE ELECTRICAL DRAWINGS FOR LIGHT SCHEDULE

*SEE MECHANICAL DRAWINGS FOR SUPPLY/RETURN SCHEDULE



1 A–601 LOWER LEVEL REFLECTED CEILING PLAN
SCALE: 1/8"=1'–0"

LIGHT FIXTURE SCHEDULE

TAG	TYPE	MANUFACTURER	MODEL#	WATTS	REMARKS
A	RECESSED LED 2'X4' STATIC TROFFER	H.E. WILLIAMS	50 STATIC		ACRYLIC PRISMATIC LENS INSTALLED WITH PRISM FACING INTO HOUSING
B	NOT USED				
C	GLOWSTICK PENDANT CLUSTER	OCL	GS1–P5CA–08		
C–1	GLOWSTICK PENDANT CLUSTER	OCL	GS1–P5CA–08		
D	TUBIE PENDANT 5	OCL	TB5–P1EA–28		
E	RECESSED LED DOWNLIGHT ROUND PINHOLE APERTURE FIXED DEEP REGRESS	LUCIFER	2RP–FD–1		
E–1	RECESSED LED DOWNLIGHT ROUND PINHOLE APERTURE ADJUSTABLE	LUCIFER	2RP–AD–1		
F	SEEM 4 LED	FOCAL POINT	FSM4L		SEE PLAN FOR FIXTURE LENGTHS
G	NOT USED				
I	NOT USED				
H	CUSTOM INDOOR RING CHANDELIER	G–LIGHTING	P–18787–A		
J	TROV	ECOSENSE	L50		INTERIOR 12"
K	TROV	ECOSENSE	L50		EXTERIOR 12"
L	OUTDOOR TAPE 12V	WAC	8101		SEE DETAIL #/A–###
M	BIJOU PENDANT MTD. DECORATIVE DOWNLIGHT	FABBIAN	D75		
N	TESIS IN–GROUND LUMINAIRE	ERCO	33637–023		INGRADE DIRECTIONAL LED UPLIGHT
P	RECESSED LED 2x2 SHALLOW PLENUM TROFFER	H.E. WILLIAMS	PT–22		
Q	CURVABLE SURFACE MOUNT LED COVE LIGHT	TIVOLI	TVCP		TRIAC DIMMING (CONSULT FACTORY), SEE PLAN FOR FIXTURE LENGTHS
R	NOT USED				
S	WALL MOUNTED LED DOWNLIGHT CYLINDER	WAC	DS–WS05		AWAY FROM WALL DISTRIBUTION
S–1	WALL MOUNTED LED DOWNLIGHT CYLINDER	WAC	DS–WS08		AWAY FROM WALL DISTRIBUTION
T	4" LED DOWNLIGHT	KIRLIN	LRS–04046		RECESSED SQUARE APERTURE LED WIDE FLOOD DOWNLIGHT
U	SURFACED MOUNTED LED STAIR LIGHTER	LUMINAIRE	TSL 9		
V	CORRAL BOLLARD LED	SELUX	CORL–4		GROUND MOUNTED LED BOLLARD
W	VEGA WALL MTD. LED UP/DOWN SCONCE	OCL	VA2–010A		
X	SURFACE MTD. LED TAPE LIGHT	WAC	LED–TX24		SEE PLAN FOR FIXTURE LENGTHS
Y	CORRAL LED	SELUX	CORL–2.5		
Z	LINEAR LED 4' STRIP LIGHT PENDANT MTD.	H.E. WILLIAMS	LMM–4		PENDANT MOUNTED
AA	HAILEY LED 3.25"	BIRCHWOOD HAILEY	HAI–LED–325		12" CANTILEVER MOUNTING ARMS, SEE PLAN FOR FIXTURE LENGTHS
CC–1	4" RECESSED LED DOWNLIGHT	KIRLIN	LRR–04006		
CC–2	4" RECESSED LED DOWNLIGHT	KIRLIN	LRR–05440		
EX	EDGELIT LED EXIT SIGN	EVENLITE	SOV–EM–G		

LEGEND FOR ADDITIONAL SYMBOLS, SEE T–002

SUPPLY DIFFUSER

RETURN DIFFUSER

TD TRANSFER DUCT

SPEAKER

GENERAL NOTES

1. ALL ACT CEILING GRIDS TO BE CENTERED IN ROOMS U.O.N.
2. ALL FIXTURES IN ACT CEILINGS TO BE CENTERED IN CEILING TILES.
3. FIXTURES TO BE CENTERED ON WOOD TRUSS MEMBERS U.O.N.
4. FIXTURES TO BE CENTERED IN ROOMS IN BOTH DIRECTIONS U.O.N.
5. TRANSFER DUCT TO BE CENTERED ABOVE DOORWAYS, U.O.N. SEE MECH. DWG.

NOT FOR CONSTRUCTION
BID SET
2-22-2017

NICHOLAS J. NETTA, AIA, NCARB
NJ License No. AI 12541

FRANCISCO J. MELENDEZ, SR., AIA
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NETTAARCHITECTS
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1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

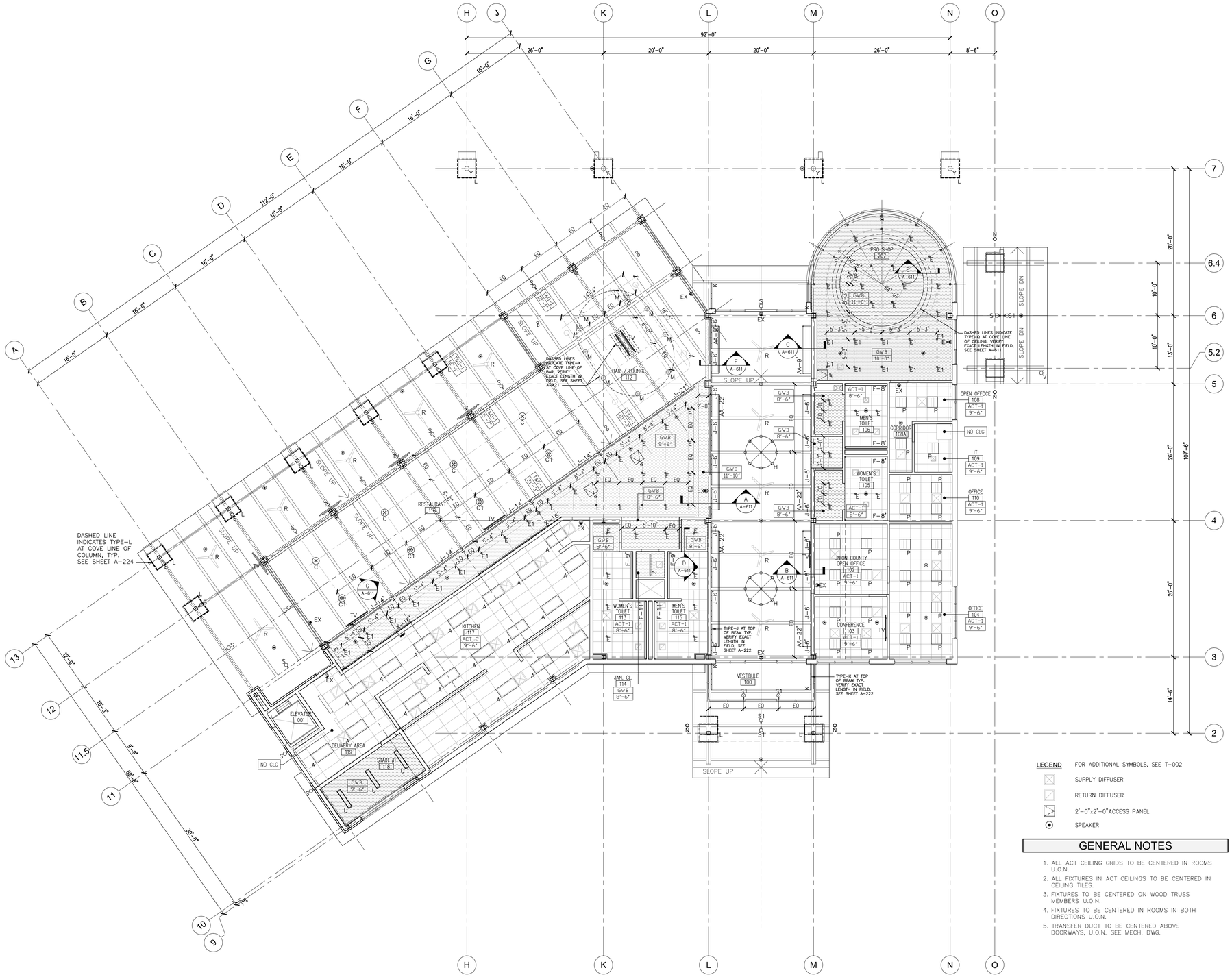
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL REFLECTED CEILING PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:

DRWG NO
A-601



LEGEND FOR ADDITIONAL SYMBOLS, SEE T-002

- SUPPLY DIFFUSER
- RETURN DIFFUSER
- 2'-0"x2'-0"ACCESS PANEL
- SPEAKER

GENERAL NOTES

1. ALL ACT CEILING GRIDS TO BE CENTERED IN ROOMS U.O.N.
2. ALL FIXTURES IN ACT CEILINGS TO BE CENTERED IN CEILING TILES.
3. FIXTURES TO BE CENTERED ON WOOD TRUSS MEMBERS U.O.N.
4. FIXTURES TO BE CENTERED IN ROOMS IN BOTH DIRECTIONS U.O.N.
5. TRANSFER DUCT TO BE CENTERED ABOVE DOORWAYS, U.O.N. SEE MECH. DWG.

1 / A-602 MAIN LEVEL REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

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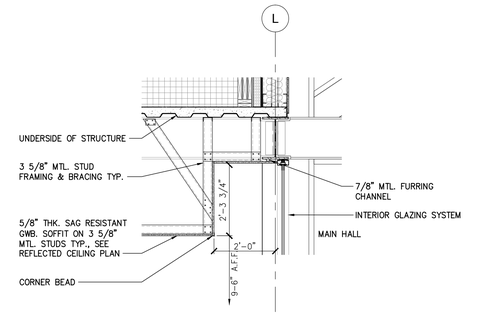
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

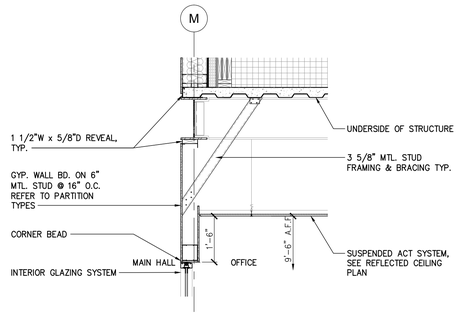
MAIN LEVEL REFLECTED CEILING PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

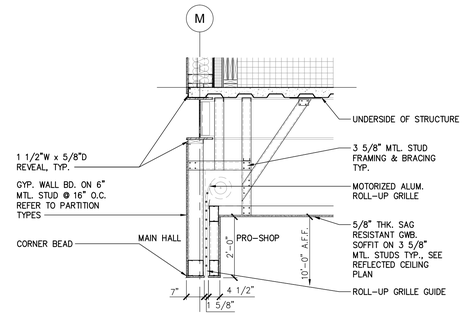
DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-602



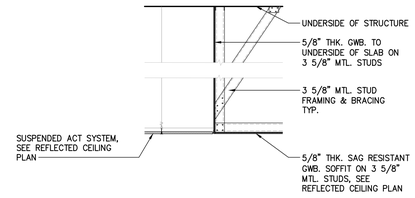
A A-611 SOFFIT DETAIL @ MAIN HALL
SCALE: 1/2" = 1'-0"



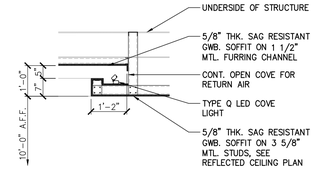
B A-611 INTERIOR STOREFRONT DETAIL @ MAIN HALL
SCALE: 1/2" = 1'-0"



C A-611 ROLL-UP GRILLE DETAIL AT PRO SHOP
SCALE: 1/2" = 1'-0"



D A-611 TYPICAL GWB. TO ACT CEILING DETAIL
SCALE: 1/2" = 1'-0"



E A-611 COVE LIGHTING DETAIL @ PRO SHOP
SCALE: 1/2" = 1'-0"

F A-611 SOFFIT DETAIL @ MAIN HALL
SCALE: 1/2" = 1'-0"

G A-611 SOFFIT DETAIL @ DINING
SCALE: 1/2" = 1'-0"

H A-611 LINEAR METAL CEILING DETAIL @ LOWER LEVEL
SCALE: 1/2" = 1'-0"

J A-611 CEILING FINISH DETAIL AT COL.
SCALE: 1/2" = 1'-0"

1 A-611 CEILING FINISH DETAIL AT COL
SCALE: 1 1/2" = 1'-0"

2 A-611 CEILING FINISH DETAIL AT COL
SCALE: 1 1/2" = 1'-0"

3 A-611 BATTERY CHARGER RACK MOUNTING DETAIL
SCALE: 1 1/2" = 1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

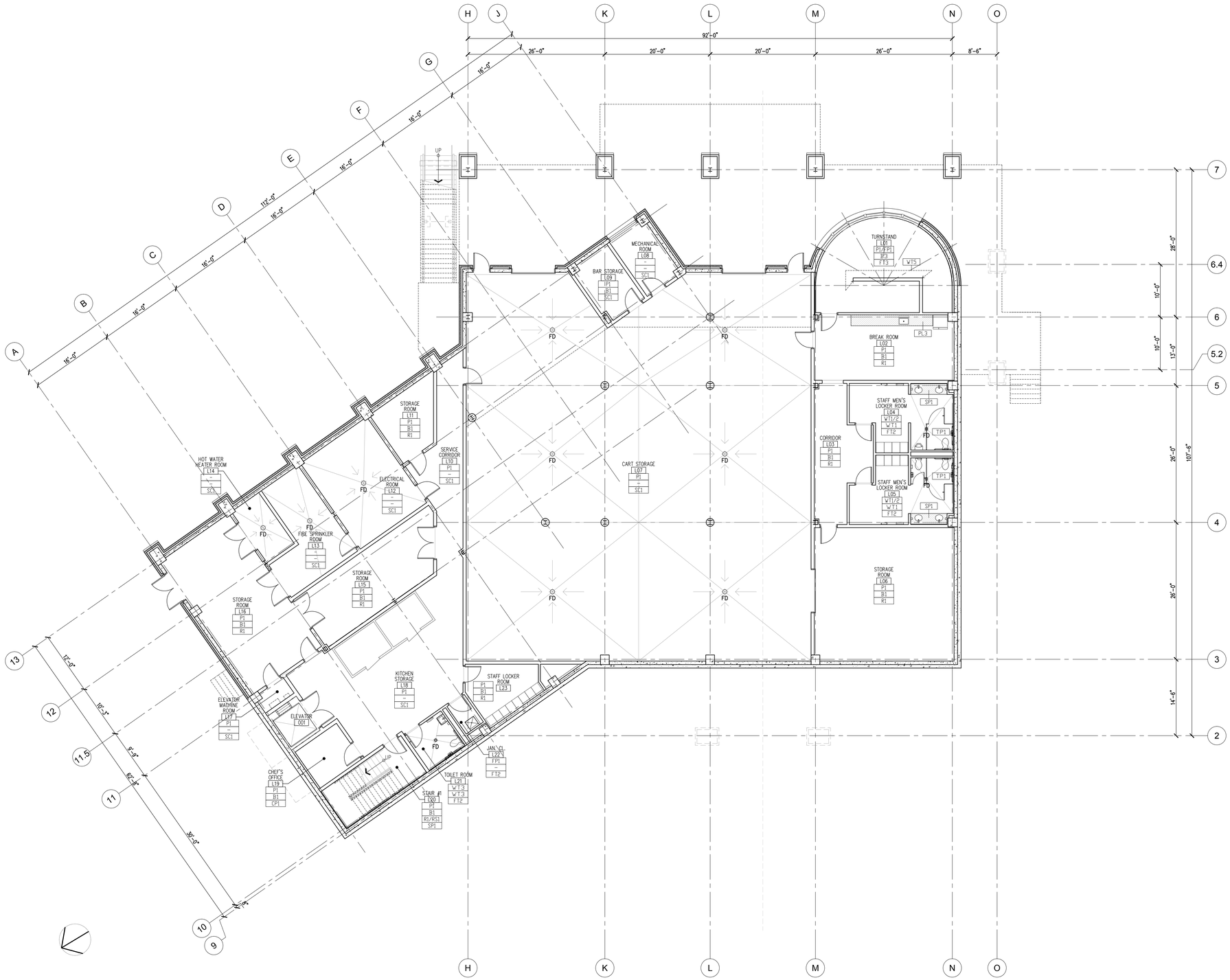
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CEILING DETAILS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-611



1 A-701 LOWER LEVEL FINISH PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

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LOWER LEVEL FINISH PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
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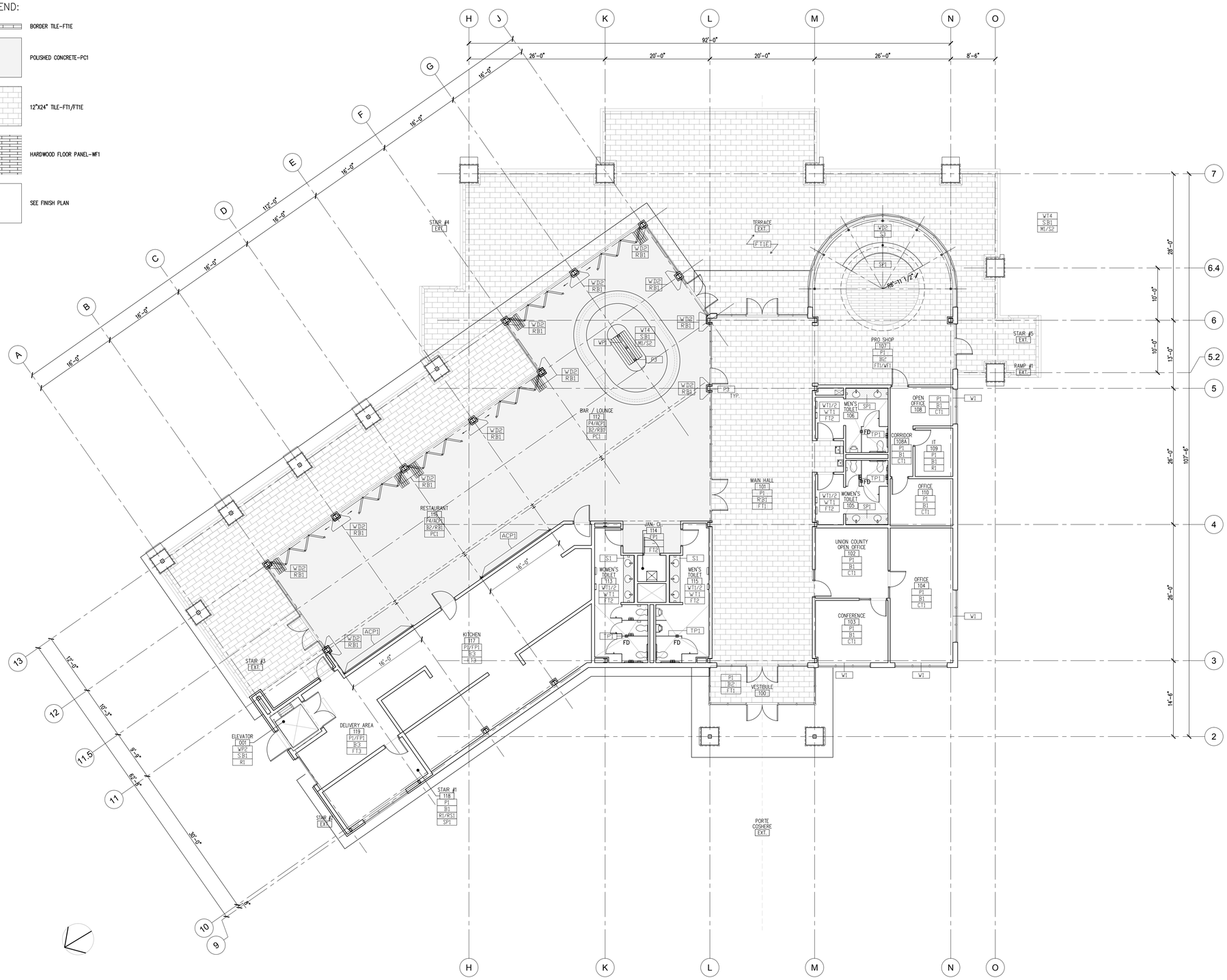
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	A-701

LEGEND:

- BORDER TILE-FT1E
- POLISHED CONCRETE-PC1
- 12"X24" TILE-FT1/FT1E
- HARDWOOD FLOOR PANEL-WF1
- SEE FINISH PLAN



1 A-702 MAIN LEVEL FINISH PLAN
SCALE: 1/8"=1'-0"

NOT FOR CONSTRUCTION
BID SET
2-22-2017

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PROJECT:

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1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

MAIN LEVEL FINISH PLAN

SUBMISSIONS		REVISIONS	
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10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:

DRWG NO
A-702

FINISH SCHEDULE

	MATERIAL	TYPE	DESCRIPTION	BASE OF DESIGN MANUFACTURER	CONTACT	REMARKS
FLOOR	CARPET TILE	CT1	50CM.X50CM. (19.7"X19.7") MODULAR CARPET. COLLECTION: NATURALLY DRAWN. STYLE: WATERCOLOR LESSON. COLOR: WLN13-79 PEPPERCORN.	MILLIKEN	JENNIFER CAMERONI 609.286.3514	INSTALLATION METHOD: ASHLAR
	PORCELAIN / CERAMIC / QUARRY TILE	FT1	3/8" THICK 12"X24" PORCELAIN FLOOR TILE. COLLECTION: SLATE ATTACHE. COLOR: SA09 MULTI GREEN.	DALTILE	KELLY HOLLAND-YOUNG 908.340.8400	
		FT1E	3/8" THICK 12"X24" PORCELAIN FLOOR TILE. COLLECTION: SLATE ATTACHE. COLOR: SA09 MULTI GREEN. WITH STEP WISE TECHNOLOGY.	DALTILE	KELLY HOLLAND-YOUNG 908.340.8400	BORDER TILE: 6"x24"
		FT2	12"X24" PORCELAIN FLOOR TILE. COLLECTION: GIUSHADES BY CROSSVILLE. COLOR: AV244 MIST. FINISH: UPS.	CROSSVILLE	ALEX BELTRA TEL: 212.979.6400	MEN'S & WOMEN'S ROOM
		FT3	6"X6" QUARRY TILE. COLLECTION: QUARRY NATURALS. COLOR: LAVA RED N01.	AMERICAN OLEAN	MICHELLE PETRIELLO TEL: 908.307.1267	KITCHEN
	WOOD	WF1	ENGINEERED HARDWOOD FLOORING SYSTEM. PERFORMANCE PLUS. COLOR: WALNUT - FIERY BRONZE PRODUCT: ESP5253LG. SIZE: 3/8"X5"X48". FINISH: LOW GLOSS.	ARMSTRONG		PRO SHOP
	RUBBER TILE	R1	3.5 MM 39.53"X39.53" RUBBER FLOOR TILE. STYLE: NORAMENT GRANO. COLOR: 4881 HEMATITE.	NORA	TORY CHURCHILL 201.661.3514	
	POLISHED CONCRETE	PC1	MULTI-COLORED CUSTOM DESIGNED ACID STAINED CONCRETE FLOOR			
	SEALED CONCRETE	SC1	ASHFORD FORMULA	CURE CRETE, INC.	TEL: 801.489.5663	
BASE	RUBBER	B1	4" RUBBER WALL BASE COLOR: 6201 BLACK	JOHNSONITE	KAREN LEVEY-LYNCH 440.708.5769	
		B2	4" MILLWORD MASQUERADE STONE WALL BASE. COLOR: D87 CLOUDED SANDSTONE CG.	JOHNSONITE	KAREN LEVEY-LYNCH 440.708.5769	
	PORCELAIN / CERAMIC / QUARRY TILE	B3	5"X6" COVE BASE. COLLECTION: QUARRY NATURALS. COLOR: DESERT N03.	AMERICAN OLEAN	MICHELLE PETRIELLO TEL: 908.307.1267	
	REVEAL BASE	RB1	4" ALUMINUM REVEAL BASE	FRY REGLET		
	STAINLESS STEEL	SB1	SATIN STAINLESS STEEL BASE	OTIS		ELEVATOR CAB
WALL	PAINT	P1	PAINT SHIELD MICROBICIDAL INTERIOR LATEX PAINT EG-SHEL FINISH. COLOR: SW6253 OLYMPUS WHITE.	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
		P2	PAINT SHIELD MICROBICIDAL INTERIOR LATEX PAINT EG-SHEL FINISH. COLOR: SW7668 MARCH WIND.	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
		P3	ULTRA SPEC 500 INTERIOR PAINT. EGGSHELL FINISH. COLOR: 2125-20 DEEP SPACE.	BENJAMIN MOORE		STEEL COLUMN
		P4	PAINT SHIELD MICROBICIDAL INTERIOR LATEX PAINT EG-SHEL FINISH. COLOR: SW7633 TAUPE TONE.	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
	TILE	WT1	12"X24" PORCELAIN WALL TILE. COLLECTION: GIUGIARO. COLOR: HGA 18 BLACK MATTE.	STONE SOURCE	ALEX BELTRA TEL: 212.979.6400	FIELD TILE
		WT2	6"X24" PORCELAIN WALL TILE. COLLECTION: GIUGIARO. COLOR: HGA 18 BLACK AIR INTAKE.	STONE SOURCE	ALEX BELTRA TEL: 212.979.6400	ACCENT TILE
		WT3	6"X6" CERAMIC WALL TILE. COLLECTION: MOSA COLORS. COLOR: 16850.	MOSA TILE	GABE LEVINSON TEL: 347.244.4452	
		WT4	1/8" 5/8"X3" RANDOM MOSAIC. COLLECTION: FASHION ACCENT, SHIMMER SERIES. COLOR: F016 ILLUMINI UMBER.	DALTILE	KELLY HOLLAND-YOUNG 908.340.8400	
		WT5	1/4" 2"X2" MOSAIC MOUNTED ON 12"X24" SHEET. COLLECTION: SLATE ATTACHE, COLOR: MULTI GREEN.	DALTILE	KELLY HOLLAND-YOUNG 908.340.8400	
	WALL PANELING	WP1	5/16" THICK PANEL. COLLECTION: INFINITE GLASS. STYLE: BANTER ETCH (SCALE A)+SABLE. FRONT: LOW IRON. BACK: CLEAR FLOAT MIRROR.	3FORM	NAOMI SCHIFF 732.395.0550	BAR
		WP2	SATIN STAINLESS STEEL WALL PANEL	OTIS		ELEVATOR CAB
	ACOUSTIC WALL PANEL	ACP1	3/4" THICK PROFILE PANEL. PATTERN: RAY A. STYLE: RAY + BORDEAUZ. PANEL: FIRE RATED MDF. FINISH: WOOL FELT.	STUDIO BY 3FORM	NAOMI SCHIFF 732.395.0550	DINING ROOM
	FRP PANEL	FP1	4'X9' GLASBORD WITH SURFASEAL. PANEL AND ACCESSORIES COLOR: SILVER 66. PANEL FINISH: EMBOSSED	CRANE COMPOSITES		
CEILING	ACOUSTIC CEILING PANEL	ACT1	24"x24"x3/4" ULTIMA 9/16" BEVELED TEGULAR. COLOR: WHITE	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
		ACT2	24"x48"x5/8" KITCHEN ZONE SQUARE LAY-IN. PRODUCT #672. COLOR: WHITE	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
	LINEAR METAL CEILING PANEL	MTL1	96"x6"x5/8" METALWORKS LINEAR EXTERIOR. PRODUCT #7161. COLOR: SILVER GREY.	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
	WOOD LAMINATED DECKING	TG1	2 3/16" X 5 1/4" TONGUE & GROOVE ROOF DECKING. SPECIES: WESTERN RED CEDAR. GRADE: SUPREME. PATTERN: STANDARD VEE. FACTORY PREFINISHING. STAIN COLOR: TO MATCH ARCHITECT'S SAMPLE.			APPLY SEALER FOR EXTERIOR APPLICATION. SEE SPECIFICATION.
	SUSPENDED SYSTEM	SS1	SUPRAFINE 9/16" EXPOSED TEE SYSTEM. 1/8" SHADOW MOLDING. COLOR: WHITE	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
		SS2	PRELUDE XL 15/16" EXPOSED TEE SYSTEM. COLOR: WHITE	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
		SS3	6" PANEL CARRIER SPLICE	ARMSTRONG	WILLIAM MENDEK TEL.: 717.396.6279	
	PAINT	CP1	INTERIOR ACRYLIC LATEX PAINT. PROMAR 200 FLAT FINISH. COLOR:CEILING WHITE	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
		CP2	ULTRA SPEC 500 INTERIOR PAINT. FLAT FINISH. COLOR: 2125-20 DEEP SPACE.	BENJAMIN MOORE		DUCT
DOOR DOOR FRAME	WOOD FINISH FOR WOOD DOORS	WD1	PLAIN SLICED SELECT WHITE CHERRY VENEER. COLOR: 850 MIDNIGHT.	GRAHAM	TEL: 641.423.2444	SEE DOOR SCHEDULE FOR DOOR TYPE
	METAL DOOR PAINT	DP1	INTERIOR ACRYLIC LATEX PAINT PROMAR 200 SEMIGLOSS FINISH. COLOR: SW 7668 MARCH WIND.	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
	METAL DOOR FRAME PAINT	DP2	SCUFFMASTER ENVIROMETAL ROLLED PAINT. COLOR: #EM9735R	MASTER COATING TECHNOLOGIES	KEITH DRUCKS 800.347.0550 X 827	
MILLWORK	PLASTIC LAMINATE	PL1	PREMIUM LAMINATE COLOR: LOW LINE 7998K-18.	WILSONART	SANDRA GAVINHO TEL: 800.220.2233	GENERAL AREA
		PL2	COLLECTION: COLOURS AND TEXTURES. COLOR: 421 FIN. ROOT. FINISH: ROOT-BK.	ABET LAMINATI		
		PL3	STANDARD LAMINATE COLOR: HIGH RISE 4996-38.	WILSONART	SANDRA GAVINHO TEL: 800.220.2233	
	WOOD	WD2	PREMIUM PLAIN SLICED SELECT CHERRY VENEER. COLOR: TO MATCH WD1.			
SPECIALTIES	TOILET PARTITIONS/URINAL SCREENS	TP1	ALPACO ELEGANCE PARTITIONS. MATERIAL: 1/2" THICK SOLID BLACK CORE PHENOLIC. DECORATIVE SURFACE SHEET COLOR: WILSONART PREMIUM LAMINATE (PL1) LOW LINE 7998K-18.	GLOBAL PARTITIONS	JERRY MILLS 973.699.0065	
	LOCKERS	L1	DOUBLE TIER METAL LOCKER. COLOR TO BE SELECTED BY ARCHITECT.	ASI STORAGE SOLUTIONS	JERRY MILLS 973.699.0065	
	WIRE MESH	M2	DESIGNER WIRE MESH TECHNA 8164. STAINLESS STEEL TYPE 304. 77% OPEN AREA.	MCNICHOLS		BAR
COUNTER TOP	NATURAL QUARTZ SURFACE	S1	1 1/4" THICK ONE PIECE QUARTZ SURFACE COUNTERTOP. CLASSICO COLLECTION. COLOR: 4130 CLAMSHELL.	CAESARSTONE		TOILETS
		S2	1 1/4" THICK ONE PIECE QUARTZ SURFACE COUNTERTOP. WATERSTONE COLLECTION. COLOR: WESTMINSTER.	CAMBRIA	SANDRA GAVINHO TEL: 800.220.2233	BAR SERVICE COUNTER
		S3	1 1/4" THICK ONE PIECE QUARTZ SURFACE COUNTERTOP. WATERSTONE COLLECTION. COLOR: NEVERN.	CAMBRIA	SANDRA GAVINHO TEL: 800.220.2233	PRO SHOP
STAIR	STAIR TREAD / RISER / LANDING	RS1	ONE-PIECE NOSING-TREAD-RISER RUBBER STAIRTREADS. STYLE: NORAMENT GRANO. COLOR: 4881 HEMATITE.	NORA	TORY CHURCHILL 201.661.3514	
	RAILING, GUARDRAIL & STRINGER	SP1	INTERIOR ACRYLIC LATEX PAINT PROMAR 200 SEMI-GLOSS FINISH. COLOR: SW7668 MARCH WIND.	SHERWIN WILLIAMS	DAVID HALL TEL: 908.309.8709	
FLOOR MAT	FLOOR MATS	FM1	6'x8' ENTRY MAT. COLLECTION: STANDARD MATS. DESIGN: TERRAMAT (TM). COLOR: CHARCOAL.	MILLIKEN	JENNIFER CAMERONI 609.286.3514	
WINDOW TREATMENT	WINDOW TREATMENT	W1	MANUAL FLEXSHADE. CLUTCH FLEXSHADE XD. FABRIC: 1% OPENNING E-SCREEN BY MERMET. COLOR: WHITE/PEARL.	DRAPER		

GENERAL FINISH NOTES:

1. ALL WALL AND CEILING FINISHES SHALL BE CLASS A. FLAME SPREAD INDEX 25 OR UNDER. SMOKE DEVELOPED 450 OR UNDER.
2. DECORATIVE MATERIALS SHALL BE FLAME RETARDANT AND MEET THE CRITERIA OF NFPA 701.
3. DECORATIVE MATERIAL SHALL NOT CONCEAL EXITS, EXIT LIGHTS, ALARM STATIONS, HOSE CABINETS, AND EXTINGUISHER LOCATIONS.
4. WHEN BUILDING TYPE IS A NON-COMBUSTIBLE CATEGORY, ALL PLYWOOD SHALL BE FIRE RETARDANT TREATED.
5. PROVIDE CEMENT BOARD BACKER OR EQUIVALENT AT ALL TILE LOCATIONS.
6. ALL FLOOR FINISH SHALL BE CLASS I , 0.45 WATTS/SQ. CM OR GREATER.
7. ALL INTERSECTIONS OF FLOOR FINISH MATERIALS SHALL BE LOCATED DIRECTLY UNDER CENTER OF DOOR, WHERE OCCURS, U.O.N.
8. PROVIDE 1/2" PLYWOOD BEHIND INTERIOR FINISH BOARD FOR ALL WALL-MOUNTED MONITORS - VERIFY WITH DECOR DRAWINGS.
9. ALL EXPOSED HVAC DUCT AND PIPING TO RECEIVE CP2.
10. ALL EXPOSED STRUCTURAL STEEL TO BE PAINTED WITH INTUMESCENT PAINT AS REQUIRED BY THE LOCAL JURISDICTION.

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CERTIFICATE OF AUTHORIZATION AC-438

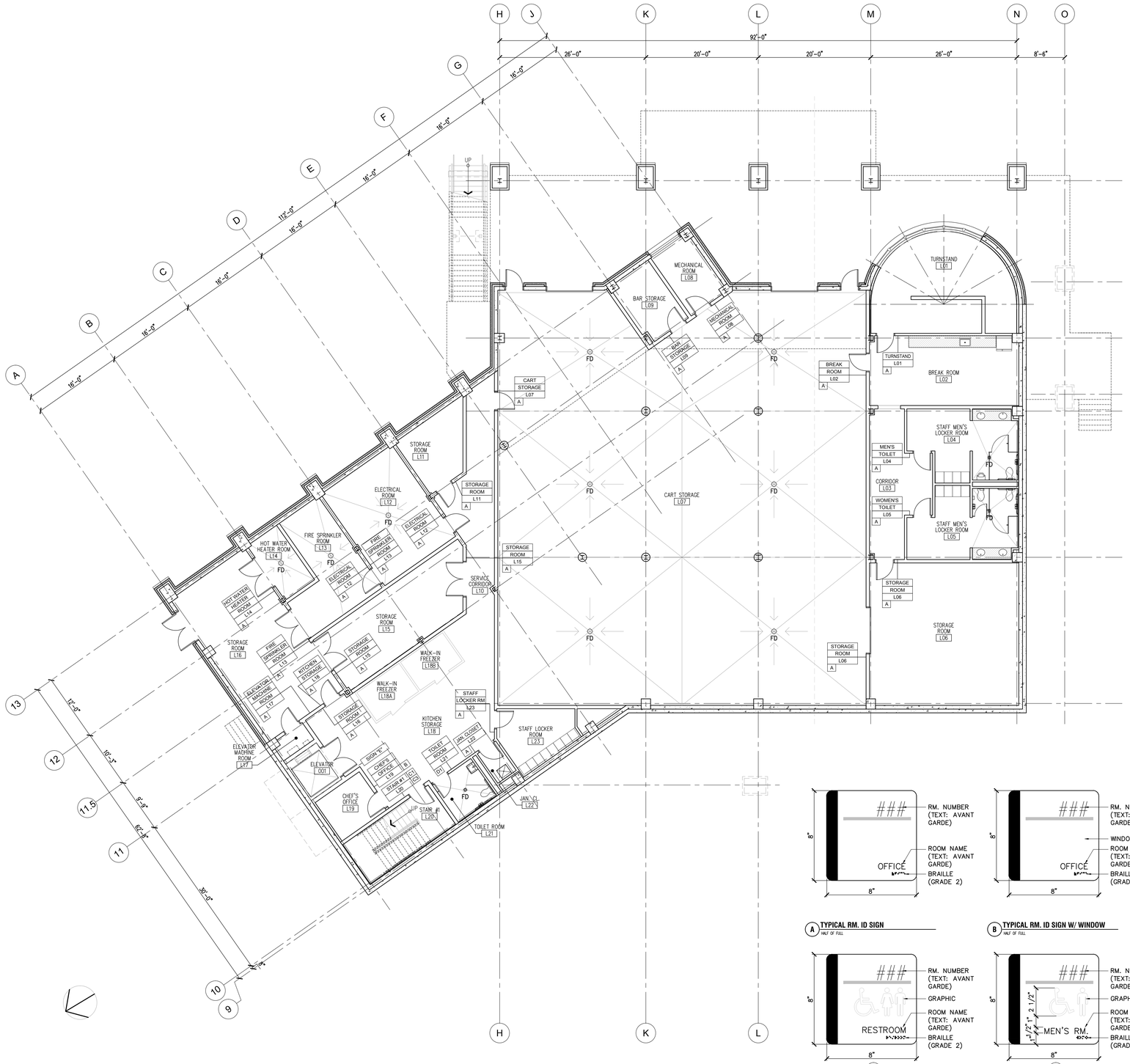
PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

FINISH SCHEDULE

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-703



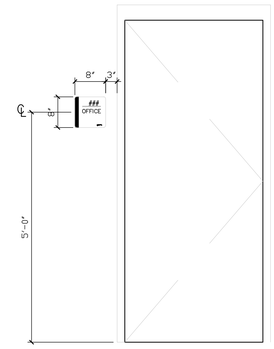
1 A-801 LOWER LEVEL SIGNAGE PLAN
SCALE: 1/8"=1'-0"

SIGNAGE SCHEDULE-LOWER LEVEL

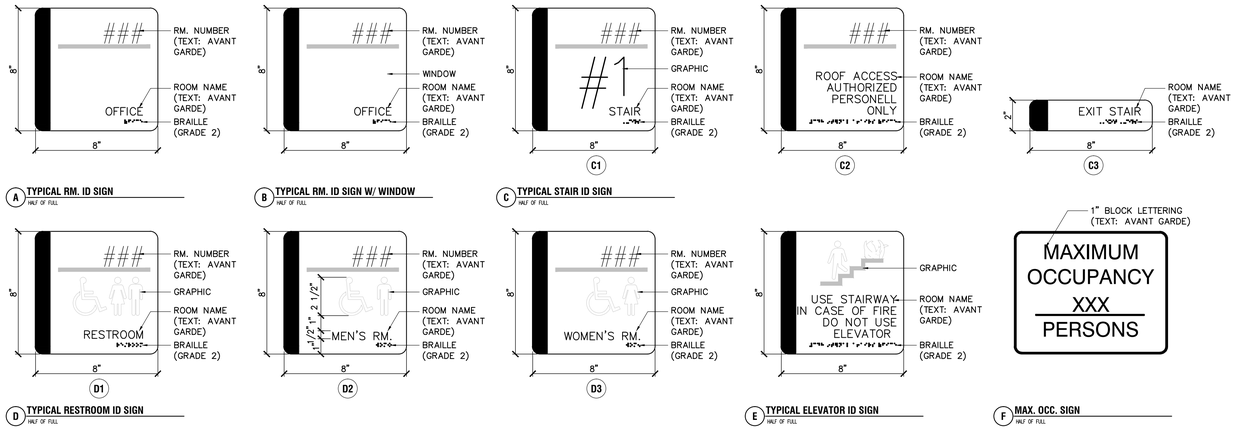
NO.	TEXT	SIGN TYPE	SIGN TYPE DESCRIPTION	QUANTITY
L01	TURNSTAND	A	BRAILLE RM. ID SIGN	1
L02	BREAK ROOM	A	BRAILLE RM. ID SIGN	1
L04	MEN'S TOILET	D2	RESTROOM	1
L05	WOMEN'S TOILET	D3	RESTROOM	1
L06	STORAGE ROOM	A	BRAILLE RM. ID SIGN	2
L07	CART STORAGE	A	BRAILLE RM. ID SIGN	1
L08	MECHANICAL ROOM	A	BRAILLE RM. ID SIGN	1
L09	BAR STORAGE	A	BRAILLE RM. ID SIGN	1
L11	STORAGE ROOM	A	BRAILLE RM. ID SIGN	1
L12	ELECTRICAL ROOM	A	BRAILLE RM. ID SIGN	2
L13	FIRE SPRINKLER ROOM	A	BRAILLE RM. ID SIGN	2
L14	HOT WATER HEATER ROOM	A	BRAILLE RM. ID SIGN	1
L15	STORAGE ROOM	A	BRAILLE RM. ID SIGN	2
L16	STORAGE ROOM	A	BRAILLE RM. ID SIGN	1
L17	ELEVATOR MACHINE ROOM	A	BRAILLE RM. ID SIGN	1
L18	KITCHEN STORAGE	A	BRAILLE RM. ID SIGN	1
L19	CHEF'S OFFICE	B	ROOM ID SIGN W/ WINDOW	1
L20	STAIR #1	C1/C3	BRAILLE STAIR ID SIGN	1
L21	TOILET ROOM	D1	RESTROOM	1
L22	JANITOR'S CLOSET	A	BRAILLE RM. ID SIGN	1
L23	STAFF LOCKER ROOM	A	BRAILLE RM. ID SIGN	1

SIGNAGE SCHEDULE-MAINLEVEL

NO.	TEXT	SIGN TYPE	SIGN TYPE DESCRIPTION	QUANTITY
L05	WOMEN'S TOILET	D3	RESTROOM	1
L06	MEN'S TOILET	D2	RESTROOM	1
L09	IT ROOM	A	BRAILLE RM. ID SIGN	1
L13	WOMEN'S TOILET	D3	RESTROOM	1
L14	JANITOR'S CLOSET	A	BRAILLE RM. ID SIGN	1
L15	MEN'S TOILET	D2	RESTROOM	1



2 A-801 TYPICAL SIGN MOUNTED TO WALL
SCALE: 3/4" = 1'-0"



A TYPICAL RM. ID SIGN — HALF OF FULL
B TYPICAL RM. ID SIGN W/ WINDOW — HALF OF FULL
C TYPICAL STAIR ID SIGN — HALF OF FULL
D TYPICAL RESTROOM ID SIGN — HALF OF FULL
E TYPICAL ELEVATOR ID SIGN — HALF OF FULL
F MAX. OCC. SIGN — HALF OF FULL

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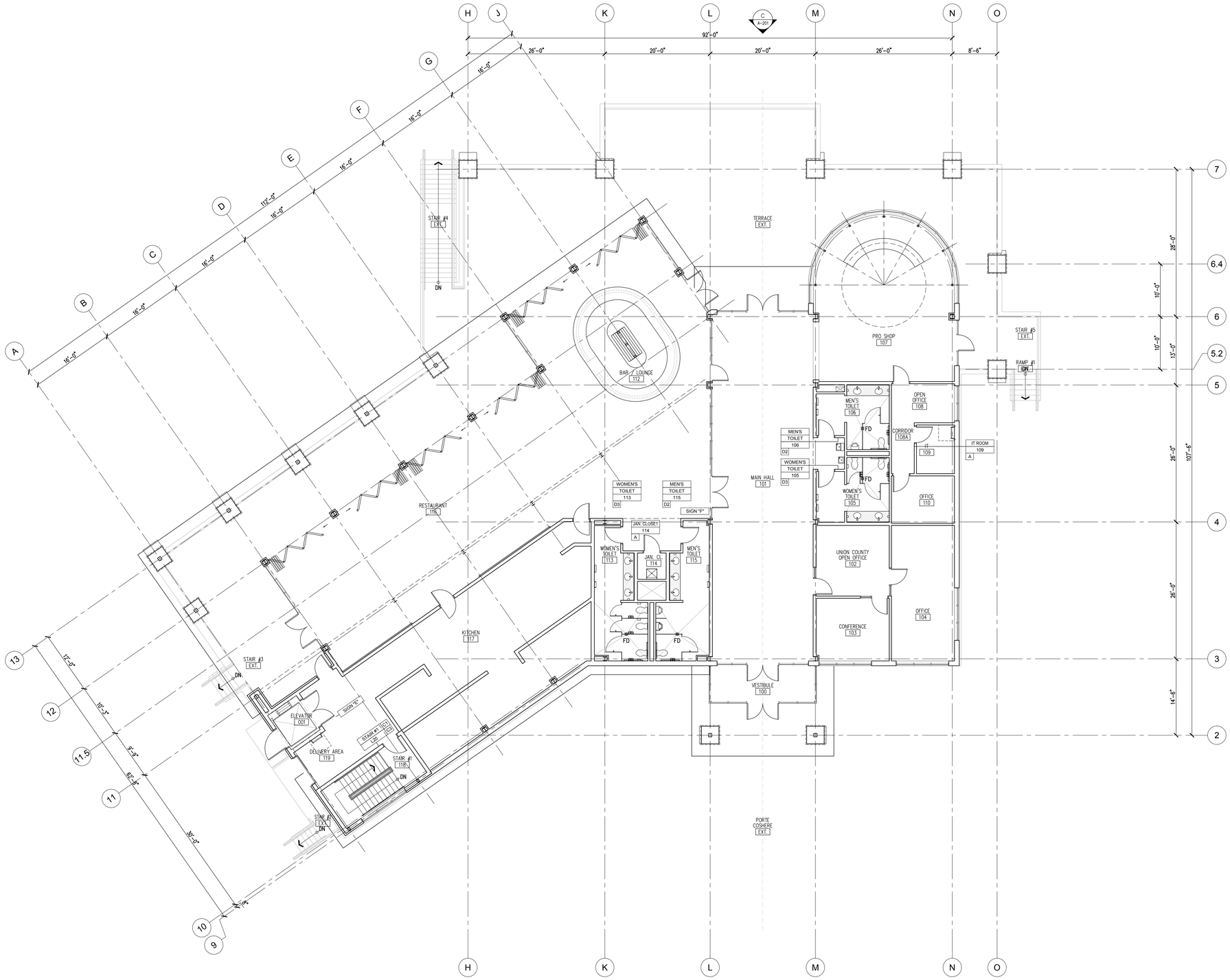
PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:
LOWER LEVEL SIGNAGE PLAN & SCHEDULE

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-801



1 / A-802 MAIN LEVEL SIGNAGE PLAN
SCALE: 1/8"=1'-0"

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2-22-2017

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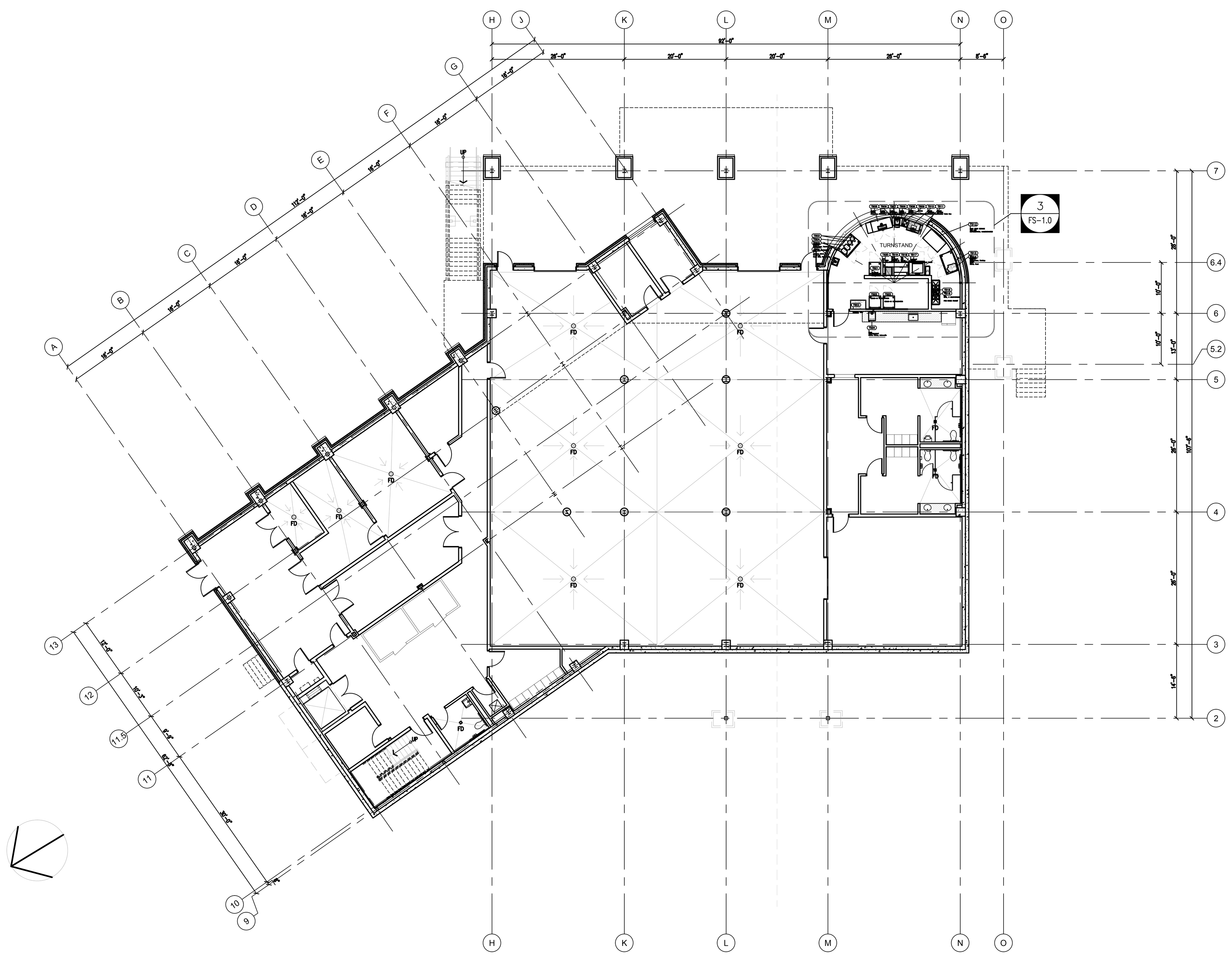
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

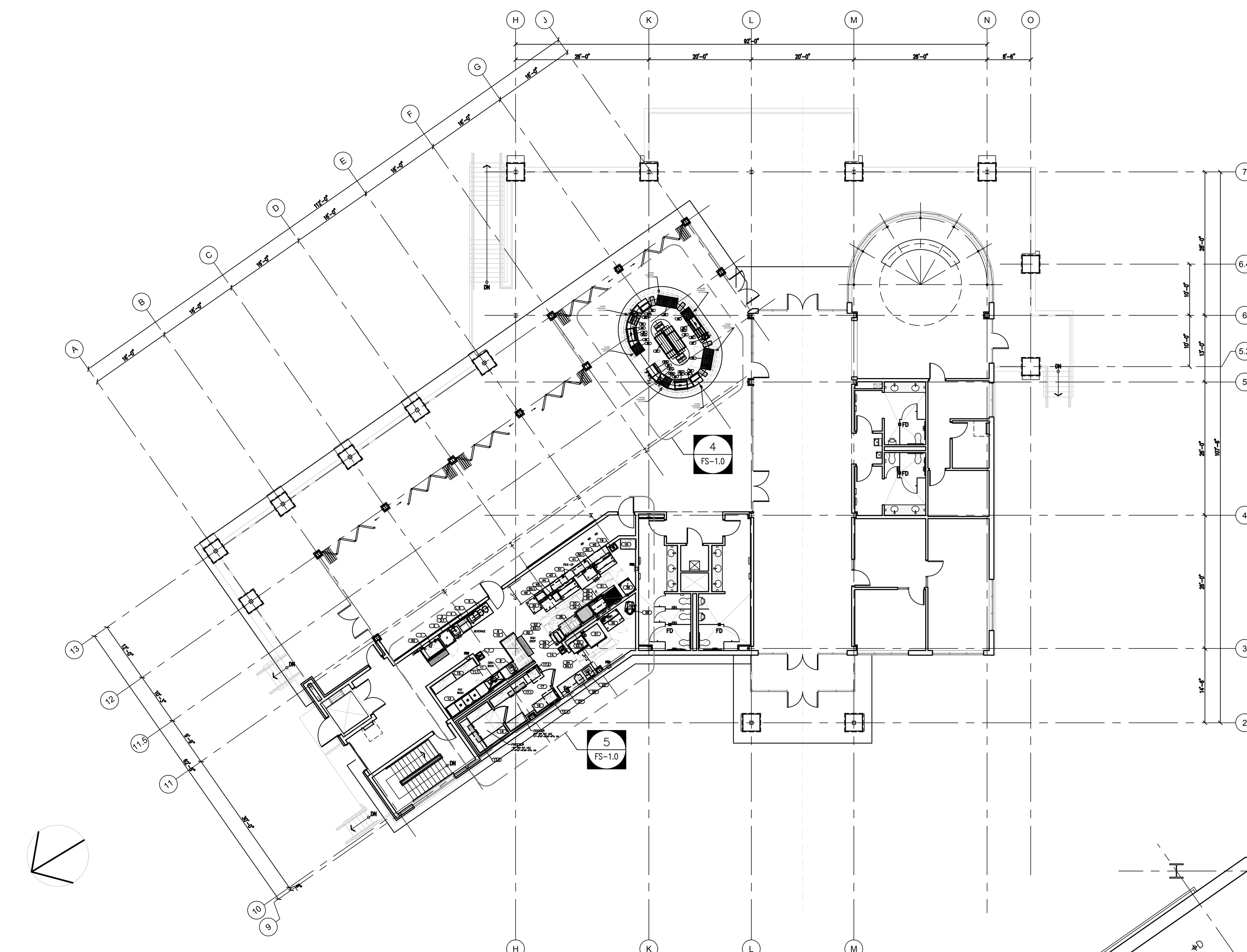
SHEET CONTENTS:

MAIN LEVEL SIGNAGE PLAN

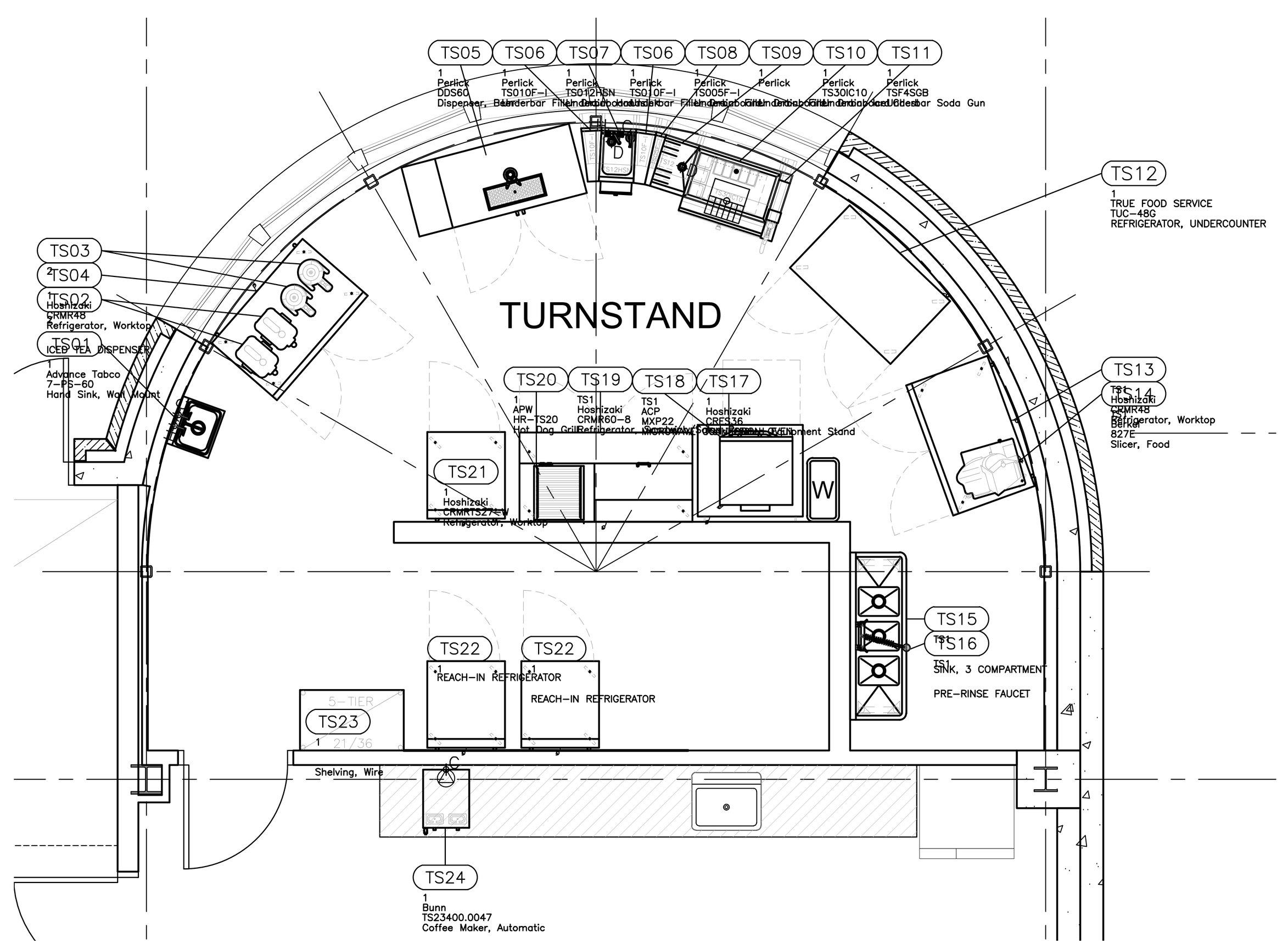
SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS SHOWN
10.17.16	BID SET			DRWN BY	ACM
02.22.17	REBID SET			CHKD BY	NJN
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	A-802



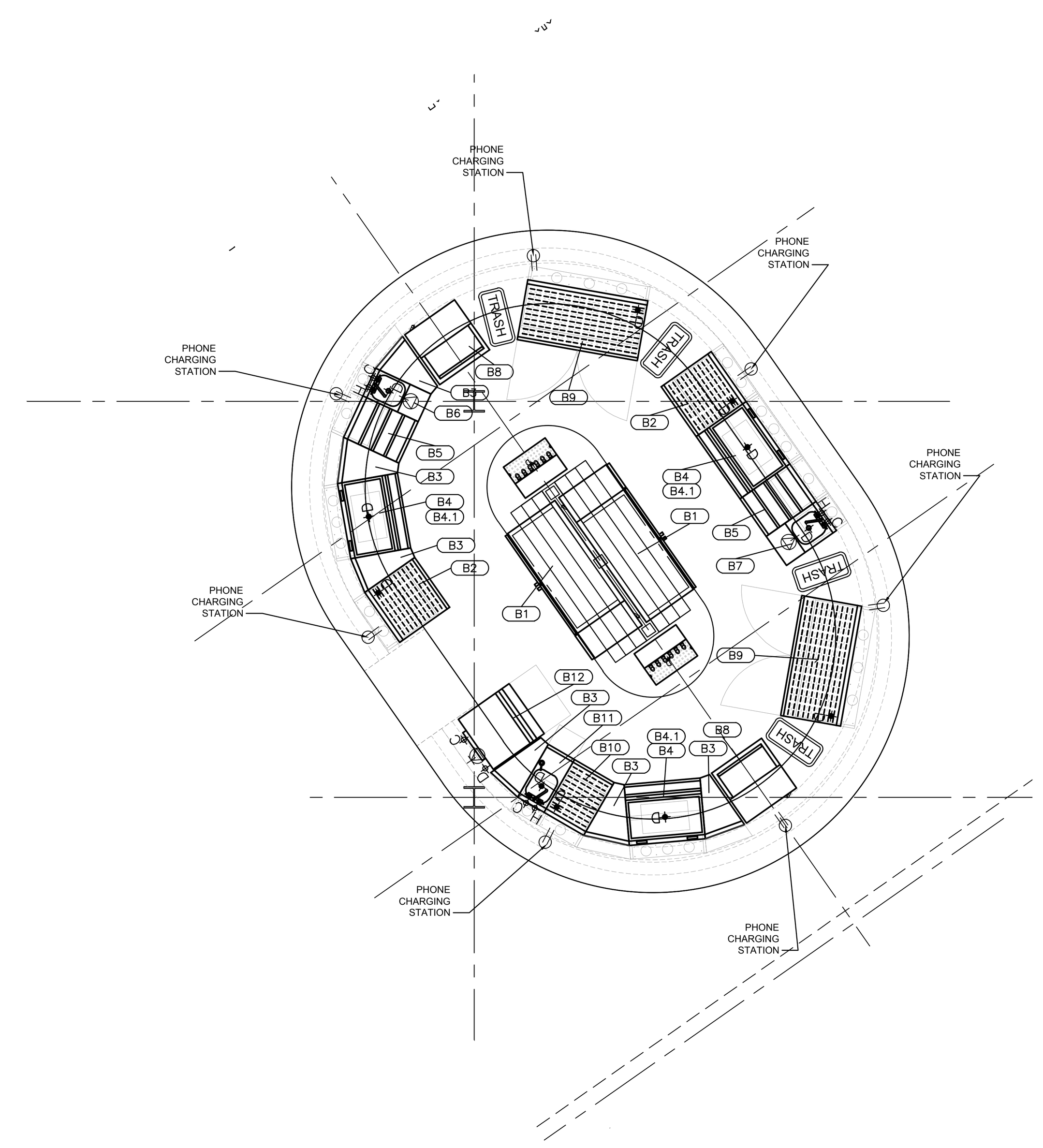
1 FS-1.0 **LOWER LEVEL KEY PLAN**
SCALE: 1/16"=1'-0"



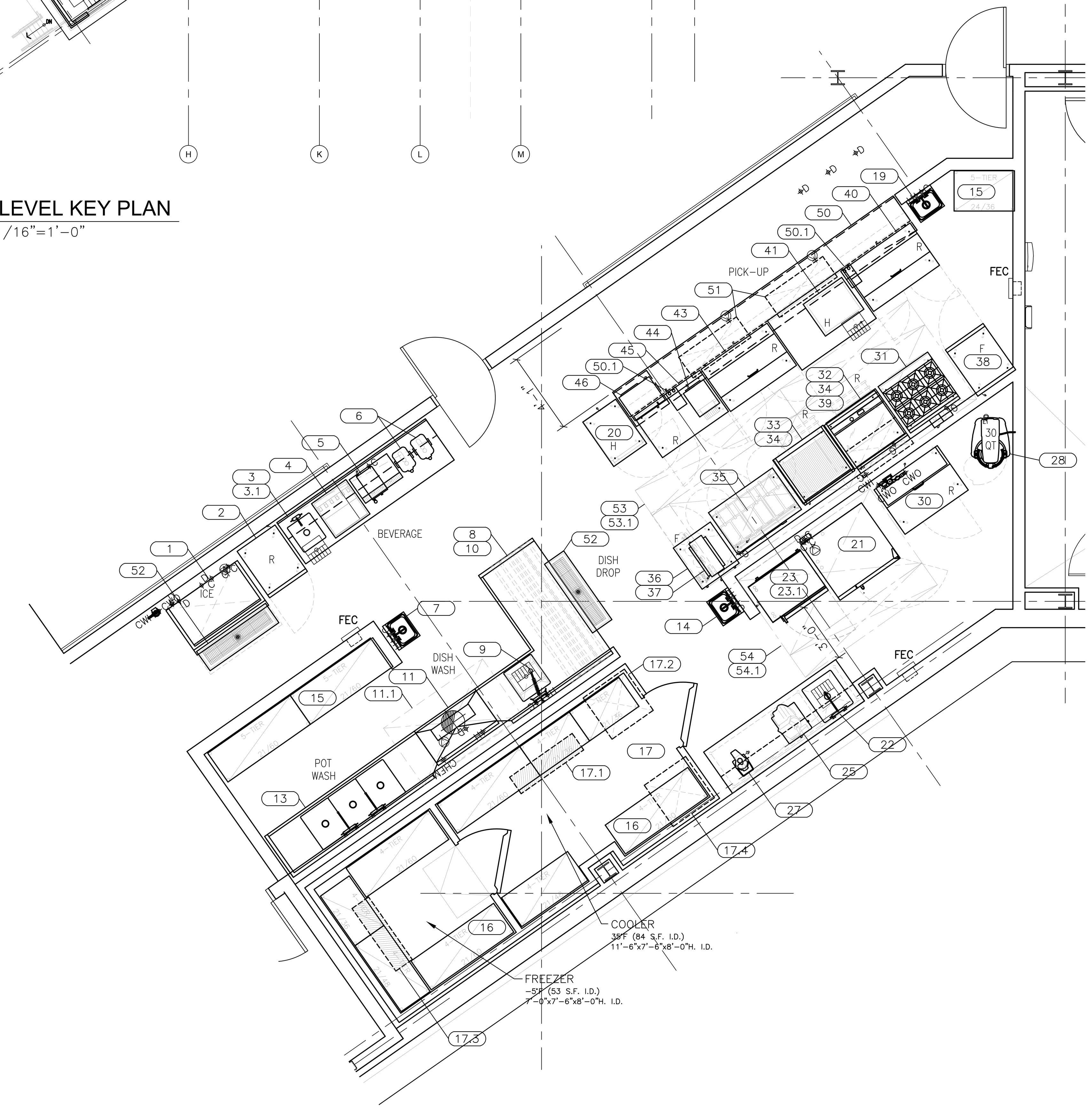
2 FS-1.0 **MAIN LEVEL KEY PLAN**
SCALE: 1/16"=1'-0"



3 FS-1.0 **ENLARGED TURNSTAND EQUIPMENT PLAN**
SCALE: 1/4"=1'-0"



4 FS-1.0 **ENLARGED BAR EQUIPMENT PLAN**
SCALE: 1/4"=1'-0"



5 FS-1.0 **ELNARGED KITCHEN EQUIPMENT PLAN**
SCALE: 1/4"=1'-0"

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PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:
FOOD SERVICE EQUIPMENT PLANS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	FS-1.0

BAR EQUIPMENT SCHEDULE

ITEM NO.	QTY.	EQUIPMENT CATEGORY	MANUFACTURER	MODEL NUMBER	EQUIPMENT REMARKS	CONTRACTOR TO FURNISH	COUNTY TO FURNISH	CONTRACTOR TO INSTALL
B1	2	BACK BAR COOLER		BS60R	KNS-LR	X	–	X
B2	2	UNDERBAR GLASS RACK		KR18-GSB3		X	–	X
B3	6	UNDERBAR FILLERS & DRAINBOARDS		ROYAL FILLER		X	–	X
B4	3	UNDERBAR ICE CHEST		KR18-30-10		X	–	X
B4.1	3	UNDERBAR SPEED RAIL		RS-30		X	–	X
B5	2	UNDERBAR LIQUOR DISPLAY		KR18-18RD		X	–	X
B6	1	UNDERBAR BLENDER STATION		KR18-12BD		X	–	X
B7	1	UNDERBAR BLENDER STATION		KR18-14BD		X	–	X
B8	2	FROSTER/CHILLER, GLASS/MUG/PLATE		MC24S		X	–	X
B9	2	UNDERBAR DRY STORAGE W/ DOORS		KR18-SD48		X	–	X
B10	1	UNDERBAR DRY STORAGE		KR18-S18		X	–	X
B11	1	UNDERBAR HANDSINK, SOAP & TOWEL		KR18-12DST		X	–	X
B12	1	GLASSWASHER		GWD-24		X	–	X

TURNSTAND EQUIPMENT SCHEDULE

ITEM NO.	QTY.	EQUIPMENT CATEGORY	MANUFACTURER	MODEL NUMBER	EQUIPMENT REMARKS	CONTRACTOR TO FURNISH	COUNTY TO FURNISH	CONTRACTOR TO INSTALL
TS01	1	HAND SINK, WALL MOUNT	SPG	SPG EHS-1RL		X	–	X
TS02	2	ICED TEA DISPENSER				–	X	X
TS03	2	COFFEE DISPENSER				–	X	X
TS04	1	REFRIGERATOR, WORKTOP	HOSHIZAKI	CRMR48		X	–	X
TS05	1	DISPENSER, BEER	PERLICK	DDS60		X	–	X
TS06	2	UNDERBAR FILLER DRAINBOARD	PERLICK	TS10F-I		X	–	X
TS07	1	UNDERBAR HANDSINK	PERLICK	TS12HSN		X	–	X
TS08	1	UNDERBAR FILLER DRAINBOARD	PERLICK	TS05F-I		X	–	X
TS09	1	UNDERBAR FILLER DRAINBOARD	PERLICK			X	–	X
TS10	1	UNDERBAR ICE CHEST	PERLICK	TS30IC10		X	–	X
TS11		NOT USED						
TS12		NOT USED						
TS13		NOT USED						
TS14	1	SLICER, FOOD	BERKEL	827E		X	–	X
TS15	1	SINK, 3 COMPARTMENT				X	–	X
TS16	1	PRE-RINSE FAUCET				X	–	X
TS17	1	REFRIGERATED EQUIPMENT STAND	HOSHIZAKI	CRES36		X	–	X
TS18	1	MICROWAVE CONVECTION OVEN	ACP	MXP22		X	–	X
TS19	1	REFRIGERATOR, SANDWICH/SALAD PREP	HOSHIZAKI	CRMR60-8		X	–	X
TS20	1	HOT DOG GRILL	STAR GRILL-MAX	STAR 20C		X	–	X
TS21		NOT USED						
TS22	2	REACH-IN REFRIGERATOR	HOSHIZAKI	CR1S-FS		–	X	–
TS23	1	SHELVING, WIRE				X	–	X
TS24		NOT USED						

MAIN KITCHEN EQUIPMENT SCHEDULE

ITEM NO.	QTY.	EQUIPMENT CATEGORY	MANUFACTURER	MODEL NUMBER	EQUIPMENT REMARKS	CONTRACTOR TO FURNISH	COUNTY TO FURNISH	CONTRACTOR TO INSTALL
1	1	ICE MAKER W/ BIN	HOSHIZAKI AMERICA	KM-1601SAH	W/ FILTER	–	X	X
2	1	REFRIGERATOR, REACH-IN	HOSHIZAKI AMERICA	CR1S-FS		–	X	X
3	1	BEVERAGE COUNTER	SPG	BC-72L		–	X	X
3.1	2	WALL SHELVES	SPG	CUSTOM FABRICATION		–	X	X
4	1	SODA DISPENSER			BY COCA COLA	–	X	X
5	1	COFFEE MAKER, AUTOMATIC	DOUWE EGBERTS	C-700	BY OTHERS	–	X	X
6	2	DISPENSER, ICE TEA/ICE COFFEE	CURTIS CO., WILBUR	TCO421A000	BY OTHERS	–	X	X
7	1	HAND SINK	SPG	EHS-1RL		–	X	X
8	1	SOILED DISH TABLE	SPG	CUSTOM FABRICATION		–	X	X
9	1	PRE-RINSE FAUCET, WALL MOUNT	T & S BRASS8'-0"	B-0133-B		–	X	X
10	1	DBL RACK SHELF	SPG	CUSTOM FABRICATION	MOUNTED TO ITEM #8	–	X	X
11	1	WAREWASHER, RACK CONVEYOR	ECOLAB	EC-44		–	X	X
11.1	1	CONDENSATE HOOD	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
11.2	1	EXHAUST FAN	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
12		SPARE NUMBER						
13	1	CLEAN DISH TABLE/3 COMP SINK	SPG	CUSTOM FABRICATION		–	X	X
14	1	HAND SINK	SPG	EHS-1RL		–	X	X
15	LOT	SHELVING	INTERMETRO	BR3		–	X	X
16	LOT	SHELVING	INTERMETRO	NK3		–	X	X
17	1	WALK-IN COOLER/FREEZER	KOLPAK	CUSTOM FABRICATION		–	X	X
17.1	1	COOLER COIL	KOLPAK	CUSTOM FABRICATION		–	X	X
17.2	1	COOLER CONDENSER	KOLPAK	CUSTOM FABRICATION	ON TOP OF BOX	–	X	X
17.3	1	FREEZER COIL	KOLPAK	CUSTOM FABRICATION		–	X	X
17.4	1	FREEZER CONDENSER	KOLPAK	CUSTOM FABRICATION	ON TOP OF BOX	–	X	X
18		SPARE NUMBER						
19	1	HAND SINK	SPG	EHS-1RL		–	X	X
20	1	CABINET, MOBILE, HOLDING	CRES COR	H-339-214C		–	X	X
21	1	OVEN-STEAMER, COMBI., GAS	ALTO-SHAAM	CTC7-20G		–	X	X
22	1	TABLE, WORK	UNIVERSAL STAINLESS	CUSTOM FABRICATION	W/ SINK	–	X	X
23	1	ROTISSERIE, ELECTRIC	ALTO-SHAAM	AR-7E-DLX	ON TOP OF ITEM #23.1	–	X	X
23.1	1	CABINET, MOBILE, HOLDING	ALTO-SHAAM	AR-7H-DLX		–	X	X
24		SPARE NUMBER						
25	1	SLICER	BERKEL			–	X	X
26		SPARE NUMBER						
27	1	CUTTER/MIXER, VERTICAL	ROBOT COUPE	R2N		–	X	X
28	1	MIXER, FLOOR	HOBART US FOODSERVICE	HL300-1STD		–	X	X
29		SPARE NUMBER						
30	1	REFRIGERATOR, PIZZA PREP	HOSHIZAKI AMERICA	CPT46		–	X	X
31	1	RANGE, RESTAURANT, GAS	VULCAN	36C-6B-N		–	X	X
32	1	GRIDDLE, GAS	VULCAN	MSA36		–	X	X
33	1	BROILER, GAS, COUNTER	VULCAN	VACB36		–	X	X
34	2	REFRIGERATED EQUIPMENT STAND	HOSHIZAKI AMERICA	CRES36		–	X	X
35	1	FRYER BATTERY, GAS W/FILTER	VULCAN	3GR45MF		–	X	X
36	1	FREEZER, UNDERCOUNTER	HOSHIZAKI AMERICA	CRMF27		–	X	X
37	1	WARMER, FOOD OVERHEAD	VULCAN	GRFFL		–	X	X
38	1	REFRIGERATOR, REACH-IN	HOSHIZAKI AMERICA	CR1S-FS		–	X	X
39	1	SALAMANDER BROILER	VULCAN	36RB		–	X	X
40	1	REFRIGERATOR, PREP	HOSHIZAKI AMERICA	CRMR48-12		–	X	X
41	1	DROP-IN, HOT WELLS, INSULATED	ALTO-SHAAM	200-HW4D		–	X	X
42		SPARE NUMBER						
43	1	REFRIGERATOR, PREP	HOSHIZAKI AMERICA	CRMR48-12		–	X	X
44	1	TOASTER, CONVEYOR	HATCO	TQ-400H		–	X	X
45	1	REFRIGERATOR, WORKTOP	HOSHIZAKI AMERICA	CRMR48-W		–	X	X
46	1	OVEN, MICROWAVE	ACP, INC.	RCS10TS		–	X	X
47		SPARE NUMBER						
48		SPARE NUMBER						
49		SPARE NUMBER						
50	1	PICK-UP COUNTER	SPG	CUSTOM FABRICATION		–	X	X
50.1	2	PRINTER (NIC)			BY OTHERS	–	X	X
51	2	WARMER, FOOD OVERHEAD	HATCO	GRAH-42D3		–	X	X
52	2	FLOOR TROUGH	EAGLE GROUP/METAL MASTERS	FT-1248-SG		X	–	X
53	1	EXHAUST HOOD	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
53.1	1	FIRE SUPPRESSION	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
53.2	1	EXHAUST FAN	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
53.3	1	SUPPLY FAN	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
54	1	EXHAUST HOOD	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
54.1	1	FIRE SUPPRESSION	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
54.2	1	EXHAUST FAN	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X
54.3	1	SUPPLY FAN	CAPTIVEAIRE	CUSTOM FABRICATION		X	–	X

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ASH BROOK GOLF COURSE
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SHEET CONTENTS:

FOOD SERVICE EQUIPMENT SCHEDULES

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS SHOWN
DRWN BY	ACM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	FS-2.0

ABBREVIATIONS

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

ADJ.	ADJUSTMENT	E.W.	EACH WAY	N.T.S.	NOT TO SCALE
ALT.	ALTERNATE	EXP.	EXPANSION	O.C.	ON-CENTER
ATTACH.	ATTACHMENT	E.J.	EXPANSION JOINT	PL	PLATE
BOT.	BOTTOM	EXT.	EXTENSION	PSF	POUNDS PER SQUARE FOOT
BLDG.	BUILDING	FIN.	FINISH	PSI	POUNDS PER SQUARE INCH
BM.	BEAM	FT.	FOOT/FEET	R.D.	ROOF DRAIN
CANT.	CANTILEVER	FTG.	FOOTING	REINF.	REINFORCING
CL	CENTERLINE	H	HANGER	REQ'D	REQUIRED
CLR.	CLEAR	H.P.	HIGH POINT	S.C.	SLIP CONNECTION
CA; C.A.	COLUMN ABOVE	HOR.; HORIZ.	HORIZONTAL	S.O.G.	SLAB-ON-GRADE
CB; C.B.	COLUMN BELOW	HSB, H.S.B.	HIGH STRENGTH BOLT	SPL	SPLICE
COL.	COLUMN	IN.	INCH, INCHES	SP.	SPACING
CONC.	CONCRETE	JT.	JOINT	SQ.	SQUARE
CONN.	CONNECTION	LBS.	POUNDS	SYM.	SYMMETRY
COL.	CONTINUOUS	LLH. L.L.H.	LONG LEG HORIZONTAL	T & B	TOP AND BOTTOM
DIA.;	DIAMETER	LLV, L.L.V.	LONG LEG VERTICAL	THK.	THICKNESS
DWG.	DRAWINGS	L.P.	LOW POINT	T.O.J.	TOP OF JOIST
EA.	EACH	LOC'N(S)	LOCATION(S)	T.O.S.	TOP OF STEEL
E.F.	EACH FACE	MAX.	MAXIMUM	TYP.	TYPICAL
EL, ELEV.	ELEVATION	MID.	MIDDLE	U.O.N.	UNLESS OTHERWISE NOTED
E.O.D.	EDGE OF DECK	MIN.	MINIMUM	VERT.	VERTICAL
EQ.	EQUALLY	NO.	NUMBER	W.W.F.	WELDED WIRE FABRIC

GENERAL INFORMATION

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. "LOADS" INDICATED ON THIS DRAWING ARE THOSE FOR THE DESIGN OF THE BUILDING SUPERSTRUCTURE.
2. DESIGN LOADS AND CRITERIA USED IN THE DESIGN OF SPECIALTY STRUCTURAL SYSTEMS (i.e. CURTAIN WALL, FIRE STAIRS, LIGHT GAGE STEEL STUDS, ARCHITECTURAL PRECAST CONCRETE, METAL PANELS, ETC.) IS TO BE DETERMINED BY A THIRD PARTY ENGINEER CONTRACTED BY THE SPECIALTY STRUCTURAL SYSTEM MANUFACTURER IN ACCORDANCE WITH CODE REQUIREMENTS OF GOVERNING JURISDICTION. SPECIALTY ENGINEER IS RESPONSIBLE FOR ALL CONNECTIONS OF THESE SYSTEMS TO THE SUPERSTRUCTURE, INCLUDING, BUT NOT LIMITED TO, ENGINEERING, DETAILING, AND INSTALLATION. IF ALTERATION TO THE SUPERSTRUCTURE ARE REQUIRED AS DETERMINED BY THE E.O.R. TO REINFORCE FOR HIGH CONCENTRATED FORCES APPLIED TO THE SPECIALTY SYSTEM CONNECTION, THE REINFORCEMENT AND COST SHALL BE BORNE BY THE SPECIALTY CONTRACTOR AND SHALL BE CONSIDERED A PART OF THE SPECIALTY CONNECTION.
3. ALL DETAILS MARKED "TYPICAL" IN THE SET OF STRUCTURAL DRAWINGS SHALL BE APPLIED THROUGHOUT THE PROJECT AS REQUIRED TO SATISFY THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE REQUIREMENTS FOR QUANTITY AND LOCATION OF WHERE THE "TYPICAL" DETAILS APPLY.
4. FAILURE ON THE PART OF THE CONTRACTOR TO REVIEW THE DRAWINGS OF OTHER DISCIPLINES (i.e. ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, ETC.) TOGETHER WITH THE FULL EXTENT OF THE PROJECT SPECIFICATIONS DOES NOT RELIEVE THEM OF THE RESPONSIBILITY TO FURNISH AND INSTALL ITEMS THAT ARE PART OF THEIR WORK AS INDICATED BY THE DRAWINGS AND SPECIFICATIONS OF OTHER TRADES. ALL STRUCTURAL TRADE CONTRACTORS AND SUB-CONTRACTORS ARE PROHIBITED FROM EXCLUDING STRUCTURAL WORK FROM THEIR CONTRACT NOT SHOWN IN THE STRUCTURAL DRAWINGS.

SYMBOL KEY/LEGEND

NEW COLUMN LINE

MOMENT CONNECTION

INDICATES SPAN OF METAL DECK. DECK SPANS PERPENDICULAR TO FRAMING UNLESS OTHERWISE NOTED.

SECTION NUMBER

SECTION SHEET LOCATION

DROP-IN FRAME FOR OPENING IN ROOF CONSTRUCTION

SHORING AND BRACING NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. CONTRACTOR SHALL PROVIDE LAYOUT DRAWINGS AND CALCULATIONS FOR SHORING AND BRACING SYSTEM AND OTHER DATA, AS REQUIRED, PREPARED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY. SUBMIT TO ARCHITECT ONE WEEK PRIOR TO THE START OF WORK.
2. SHORING AND BRACING SHALL COMPLY WITH THE LOCAL BUILDING CODE AND ORDINANCES OF THE LOCAL GOVERNING AUTHORITIES.
3. INSPECTION FOR STRUCTURAL STABILITY SHALL BE PROVIDED BY AN APPROVED LICENSED ENGINEER EMPLOYED BY THE CONTRACTOR, AS REQUIRED BY LOCAL GOVERNING AUTHORITIES.
4. SUBMIT WEEKLY FIELD OBSERVATION REPORTS TO ARCHITECT DURING THE DURATION OF THE SHORING OPERATION.
5. BENCHMARKS ARE TO BE ESTABLISHED BEFORE EXCAVATIONS AND RESURVEYED WEEKLY BY A LICENSED LAND SURVEYOR EMPLOYED BY THE CONTRACTOR.
6. BRACING SHALL BE LOCATED TO CLEAR NEW CONSTRUCTION AND OTHER PERMANENT WORK.
7. MAINTAIN SHORING AND BRACING UNTIL STRUCTURAL ELEMENTS ARE REBRACED BY OTHER BRACING OR UNTIL PERMANENT CONSTRUCTION IS IN PLACE.

SITE PREPARATION GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. THE SURFACE OF THE EXPOSED SUB-GRADE SHALL BE INSPECTED BY PROBING OR TESTING TO CHECK FOR POCKETS OF SOFT OF UNSUITABLE MATERIAL. EXCAVATE UNSUITABLE SOIL AS DIRECTED BY THE GEOTECHNICAL ENGINEER / TESTING AGENCY.
2. FILL ALL EXCAVATED AREAS WITH APPROVED CONTROLLED FILL. PLACE IN 6 INCH LOOSE LIFTS AND COMPACT TO A MINIMUM OF 95% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557.
3. ALL CONTROLLED FILL MATERIAL SHALL BE A SELECT GRANULAR MATERIAL FREE FROM ALL ORGANICS OR OTHERWISE DELETERIOUS MATERIAL WITH NOT MORE THAN 20% BY WEIGHT PASSING A NO. 200 SIEVE (CLASSIFIED AS SC, SM, SP OR BETTER IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM) AND WITH A PLASTICITY INDEX NOT EXCEEDING 6%.
4. PROVIDE FIELD DENSITY TESTS FOR EACH 3,000 S.F. OF BUILDING AREA FOR EACH LIFT OF CONTROLLED FILL.
5. EXCAVATIONS SHALL BE KEPT DRY BY PUMPING UNTIL UNDERGROUND CONSTRUCTION IS COMPLETE.
6. LOOSENED BEARING SOILS SHALL BE RECOMPACTED WITH A SMALL VIBRATORY PLATE COMPACTOR PRIOR TO PLACEMENT OF REINFORCING BARS.
7. FOUNDATION EXCAVATIONS TO BE INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO CONCRETE PLACEMENT. ALL SOFTENED OR OTHERWISE UNSUITABLE BEARING MATERIALS SHALL BE REMOVED AND REPLACED WITH LOAD-BEARING FILL OR WITH LEAN CONCRETE (2000 PSI).

FOUNDATION DESIGN AND CONSTRUCTION CRITERIA

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. FOUNDATION DESIGN CRITERIA IS TAKEN FROM THE GEOTECHNICAL EVALUATION / SOILS REPORT BY ANS Geo, Inc. DATED June 7, 2016. REFERENCE THE PROJECT MANUAL FOR SOILS REPORT.
2. ALL FOOTINGS AND FOUNDATIONS HAVE BEEN DESIGNED FOR ANALLOWABLE SOIL BEARING PRESSURE OF 1 TON PER SQUARE FOOT (2,000 PSF) PER THE REQUIREMENTS OF THE SITE-SPECIFIC SOILS REPORT.
3. MINIMUM DEPTH REQUIRED FOR FROST PROTECTION IS FOURTY-TWO INCHES (-3'-6") TO BOTTOM OF FOOTING. THIS APPLIES TO ALL PERIMETER WALLS AND ISOLATED EXTERIOR COLUMN FOOTINGS. INTERIOR FOOTINGS SHALL BE PLACED SO THE THE BOTTOM OF FOOTING IS AT A MINIMUM (-2'-0") BELOW GRADE.
4. BACKFILL SHALL BE BROUGHT UP EQUALLY ON BOTH SIDES OF FOUNDATION WALLS UNTIL THE FINAL ELEVATION IS ACHIEVED. VARIATIONS SHALL NOT EXCEED 2'-0" BETWEEN BACKFILL ELEVATIONS ON EITHER SIDE WITHOUT ENGINEER'S APPROVAL.
5. UNLESS OTHERWISE NOTED, WALL FOOTINGS SHALL BE MINIMUM 12" THICK AND 24" WIDE AND AS A MINIMUM CONTAIN #5@12" O.C. BOTTOM BARS.
6. MAXIMUM STEP OF FOOTINGS SHALL BE ONE VERTICALLY TO TWO HORIZONTALLY WHERE ELEVATIONS CHANGE.
7. LOCATIONS OF FOOTING STEPS SHOWN ON THE FOUNDATION PLAN ARE APPROXIMATE. GENERAL CONTRACTOR SHALL FIELD VERIFY EXACT GRADE LOCATIONS AROUND THE BUILDING AND LOCATE ANY FOOTING STEPS ACCORDINGLY, IN ORDER TO MAINTAIN A MINIMUM OF 4'-0" OF REQUIRED COVER FOR FROST AT ALL LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

CAST-IN-PLACE CONCRETE GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. ALL CONCRETE WORK SHALL CONFORM WITH THE REQUIREMENTS OF THE AMERICAN CONCRETE INSTITUTE ACI 318 (LATEST EDITION).
2. UNLESS OTHERWISE INDICATED ON DRAWINGS ALL CAST-IN-PLACE CONCRETE SHALL DEVELOP A MINIMUM STRENGTH OF 4,000 PSI AT 28 DAYS.
3. REINFORCEMENT SHALL BE DEFORMED BARS ASTM DESIGNATION A-615, GRADE 60.
4. CONCRETE PROTECTION FOR REINFORCEMENT SHALL CONFORM TO LATEST ACI SPECIFICATION.
5. TEMPERATURE REINFORCING SHALL BE SUFFICIENTLY EMBEDDED TO DEVELOP FULL STRENGTH IN CONCRETE WALLS AND SLABS.
6. PROVIDE ADEQUATE TIES FOR REINFORCEMENT IN SLABS, BEAMS, PIERS AND WALLS. REINFORCEMENT TO BE HELD AT CORRECT DISTANCE FROM FORMS AND EARTH BY STEEL CHAIRS OR TIES.
7. FOLLOW C.R.S.I. RULES FOR PLACING OF REINFORCING STEEL AND ACCESSORIES.
8. NO CONCRETE SHALL BE CAST UNTIL THE PRELIMINARY TESTS REQUIRED HAVE BEEN MADE, REPORTS THEREOF FILED WITH THE ENGINEER, AND APPROVED. THE CONTROLLED CONCRETE TO BE USED SHALL CONFORM TO THE APPROVED DESIGN MIX OBTAINED AS A RESULT OF THE PRELIMINARY TESTS. THE USE OF ANY ADDITIVES NOT PRESENT IN THE PRELIMINARY TEST MIX IS PROHIBITED.
9. REPRESENTATIVE TEST CYLINDERS WILL BE TAKEN FROM THE CONCRETE PLACED EACH DAY IN ACCORDANCE WITH CONCRETE SPECIFICATIONS.
10. WELDED WIRE FABRIC SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 70,000 PSI AND SHALL CONFORM TO ASTM A-185 AND A-497.
11. MESH SHALL BE SPLICED SO THAT THE OVERLAP BETWEEN OUTERMOST CROSS WIRES OF EACH SHEET IS NOT LESS THAN THE SPACING OF THE CROSS WIRES PLUS TWO INCHES, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
12. THIS CONTRACTOR SHALL COOPERATE WITH OTHER TRADES AND WHERE REQUIRED INSTALL ALL BUILT-IN WORK, SLEEVES, INSERTS, ETC., AS REQUIRED FOR A COMPLETE JOB.
13. STRUCTURAL MEMBERS SHALL BE POURED FOR THEIR FULL DEPTHS IN ONE OPERATION. CONSTRUCTION JOINTS SUCH AS A DAY'S POUR JOINTS SHALL BE LOCATED IN THE MIDDLE THIRD OF THE SPAN, MAIN REINFORCING TO RUN THROUGH THE JOINT, KEY AND ROUGHEN JOINTS TO EXPOSE AGGREGATE FOR CHEMICAL BOND.
14. NO HORIZONTAL JOINTS SHALL BE PLACED IN WALLS EXCEPT AS SHOWN ON THE DRAWINGS, WITHOUT THE APPROVAL OF THE ENGINEER.
15. STRUCTURAL SLABS-ON-GRADE SHALL BE OF A THICKNESS AND REINFORCED AS INDICATED ON DRAWINGS.
16. SLABS-ON-GRADE SHALL HAVE THICKENINGS, DEPRESSIONS, OPENINGS, ETC., AS REQUIRED OR AS SHOWN HEREIN OR AS SHOWN ON THE ARCHITECTURAL DRAWINGS. ALL SLABS-ON-GRADE SUPPORTING INTERIOR CMU PARTITION WALLS SHALL BE HAUNCHED AS REQUIRED PER THE TYPICAL HAUNCHED SLAB DETAIL - CMU WALL.
17. LOCATION OF CUTOFF POINTS FOR CONCRETE BEAM REINFORCEMENT SHALL BE AS SHOWN ON TYPICAL DETAILS AND/OR PER THE ACI SPECIFICATIONS.
18. PROVIDE 100% CONTINUITY OVER SUPPORTS FOR CONTINUOUS SLABS AND BEAMS.
19. PROVIDE TWO #5 BARS AT ALL RE-ENTRANT CORNERS AND AROUND OPENINGS IN ANY CONCRETE WALL, BEAM, SLAB, GRADE BEAM OR MASONRY BEARING WALL.
20. PROVIDE POCKETS IN WALLS FOR COLUMNS, BEAMS AND SLABS.
21. MINIMUM BEARING ON WALL OR BEAMS 4" FOR SLABS, 8" FOR BEAMS UNLESS OTHERWISE NOTED.
22. PROVIDE PRECAST LINTELS FOR ALL OPENINGS OR RECESSES IN BLOCK WALLS WHERE NO SPECIFIC LINTEL IS NOTED.
23. TOP ELEVATION OF SLABS SHALL VARY ACCORDING TO FINISH FLOOR MATERIAL; COORDINATE WITH THE ARCHITECTURAL DRAWINGS AS REQUIRED FOR ALL ELEVATIONS AND FLOOR FINISHES.
24. SEE MECHANICAL, ELECTRICAL, PLUMBING AND ARCHITECTURAL DRAWINGS FOR SIZE AND LOCATION OF ALL OPENINGS IN ROOF, FLOORS AND WALLS NOT SHOWN ON STRUCTURAL DRAWINGS.
25. IN ANY APPROVED CONSTRUCTION JOINT WITHIN CONCRETE CONSTRUCTION, PROVIDE 2x4 KEY AND 48 x BAR DIAMETER LAP (16" MINIMUM) OF REINFORCING THROUGH THE CONSTRUCTION JOINT, EXCEPT FOR SLABS-ON-GRADE.

COLD-FORMED STEEL FRAMING GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. PER THE PROJECT REQUIREMENTS THE FINAL DESIGN OF ALL COLD-FORMED ELEMENTS, INCLUDING STUDS, CONNECTIONS TO THE SUPERSTRUCTURE, BUILT-UP JAMBS AND BOX-HEADERS, SHALL BE PERFORMED BY A REGISTERED ENGINEER EMPLOYED BY THE CONTRACTOR. SEE THE STRUCTURAL AND ARCHITECTURAL DRAWINGS FOR STUD DEPTH AND MINIMUM SPACING REQUIREMENTS.
2. ALL COLD FORMED STEEL FRAMING MEMBERS, THEIR DESIGN, FABRICATION, AND ERECTION SHALL CONFORM TO THE "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS" OF THE AISI (2007 ED.)
3. ALL FRAMING MEMBERS SHALL BE FORMED FROM STEEL CONFORMING TO ASTM A446 WITH A MINIMUM YIELD STRENGTH AS FOLLOWS:
   - 12, 14, & 16 GAUGE MEMBERS: Fy = 50 KSI (GRADE D)
   - 18 & 20 GAUGE MEMBERS: Fy = 33 KSI (GRADE A)
4. GALVANIZE ALL FRAMING MEMBERS WITH G-60 COATING MEETING THE REQUIREMENTS OF ASTM A525.
5. MEMBERS SHALL BE THE MANUFACTURER'S. STANDARD "C" SHAPED STUDS/JOISTS, HAVE A FLANGE LIP RETURN OF 1/2" AND SATISFY THE MINIMUM PROPERTIES AS PER "MARINO/ WARE", OR APPROVED EQUAL PER MINIMUM REQUIREMENTS AND NOTES ON THIS SHEET.
6. THE GAUGE OF ALL TRACKS SHALL BE NO LIGHTER THAN THE FRAMING THAT IS BEING CONNECTED. UNLESS OTHERWISE INDICATED, CONNECT TRACKS TO CONCRETE WITH 0.205" DIA. POWER DRIVEN FASTENERS (WITH 1.25" EMBEDMENT) AT 16" ON CENTER.
7. ALL WELDING SHALL BE IN CONFORMANCE WITH AWS D1.3. ALL WELDS SHALL BE TOUCHED UP WITH ZINC RICH PAINT.
8. DEFLECTION LIMITS: DESIGN FRAMING SYSTEMS TO WITHSTAND DESIGN LOADS INDICATED WITHOUT DEFLECTIONS GREATER CODE LIMITATIONS OR THE FOLLOWING.
   - EXTERIOR NON-LOAD BEARING FRAMING: HORIZONTAL DEFLECTION OF L/360 (EIFS FINISH)
   - CEILING JOIST FRAMING VERTICAL DEFLECTION OF L/240 OF THE SPAN
9. ALL STRUCTURAL MEMBERS SHALL BE PROPERLY CONNECTED TO EACH OTHER AND TO THE SUPPORTING BACK-UP FRAMING. FASTENINGS SHALL BE MADE WITH SELF TAPPING SCREWS OR WELDS OF SUFFICIENT SIZE TO INSURE THE CONNECTION STRENGTH. UNLESS OTHERWISE NOTED, CONNECT ALL MEMBERS BASED ON THE FOLLOWING LOADS:
   - JOIST/RAFTERS: DEAD LOAD AND LIVE LOAD PER THE "DESIGN CRITERIA NOTES".
   - RAFTERS: NET WIND UPLIFT OF 25 PSF
   - EXTERIOR WALL STUDS: MATERIAL DEAD LOAD + WIND LOAD PER THE "DESIGN CRITERIA NOTES"
   - INTERIOR WALL STUDS: MATERIAL DEAD LOAD + 5 PSF LATERAL LOAD PER CODE REQUIREMENTS.
9. PROVIDE BRIDGING FOR STUDS, JOISTS AND RAFTERS AT MID-SPAN AND AT A MAX. SPACING NOT TO EXCEED 6'-0". ALL BRIDGING SHALL BE INSTALLED PRIOR TO THE ADDITION OF ANY LOAD. CONNECT BRIDGING TO EACH MEMBER BY WELDING, CLIP ANGLES OR ALT. METHOD PER THE MANUFACTURER. STANDARDS.
10. PROVIDE WEB STIFFENERS AT JOIST AND RAFTER BEARINGS IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS.
11. ALL AXIALLY LOADED STUDS SHALL HAVE FULL BEARING AGAINST THE INSIDE TRACK WEB, PRIOR TO STUD AND TRACK ALIGNMENT. SPLICES IN AXIALLY LOADED STUDS IS NOT PERMITTED.
12. PROVIDE THE MANUFACTURER. STANDARD TRACK, CLIP ANGLES, BRACING, REINFORCEMENTS, FASTENERS & ACCESSORIES AS RECOMMENDED BY MANUFACTURER. FOR THE APPLICATION INDICATED AS NEEDED TO PROVIDE A COMPLETE FRAMING SYSTEM. UNLESS OTHERWISE NOTED, INSTALL THE METAL FRAMING SYSTEM IN ACCORDANCE WITH THE MANUFACTURER. WRITTEN INSTRUCTIONS AND RECOMMENDATIONS.
13. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING FOR APPROVAL:
   - MANUFACTURERS PRODUCT DATA AND LATEST TECHNICAL DATA
   - ERECTION DRAWINGS SHOWING THE NUMBER, TYPE, LOCATION, AND SPACING OF ALL MEMBERS. ALL CONNECTIONS AND ATTACHMENTS SHALL BE CLEARLY SHOWN
   - THE PROPERTIES OF ALL FRAMING MEMBERS THAT ARE USED IN LOAD-BEARING APPLICATIONS, DEMONSTRATING CONFORMANCE WITH THE MINIMUM ACCEPTABLE PROPERTIES NOTED HEREIN
   - STRUCTURAL CALCULATIONS FOR ALL CONNECTIONS NOT OTHERWISE DETAILED ON THE DRAWINGS

MASONRY GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. MASONRY WALL DESIGN STRESSES ARE BASED UPON "SPECIAL INSPECTION" REQUIREMENTS OF ACI 530.1 / ASCE 6 / TMS 602 LATEST EDITION. CONSTRUCTION OF CMU MASONRY WALLS MUST BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS FOR LEVEL B QUALITY ASSURANCE GUIDELINES DEFINED BY ACI 530.
2. CONCRETE MASONRY UNITS (CMU) SHALL CONFORM TO ASTM C90 FOR LOAD BEARING UNITS. CMU SHALL BE NORMAL WEIGHT.
3. CMU BLOCK SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1,900 PSI ON THE NET AREA OF THE BLOCK.
4. MINIMUM f'm SHALL BE 1,500 PSI.
5. COMPRESSIVE STRENGTH OF THE GROUT SHALL BE A MINIMUM OF 3,000 PSI WITH A 9" TO 11" SLUMP AND COMPLY WITH THE REQUIREMENTS FOR FINE GROUT PER ASTM 476.
6. MORTAR SHALL BE TYPE S HIGH STRENGTH CONFORMING TO ASTM C270.
7. GROUTING PROCEDURES SHALL BE IN STRICT COMPLIANCE WITH THE RECOMMENDATIONS AS OUTLINED BY NCMA AND ACI.
8. CELL RECEIVING REINFORCING SHALL BE FULLY GROUTED.
9. MASONRY UNITS SHALL BE LAID IN RUNNING BOND PATTERN WITH FULL FACE SHELL MORTAR BEDS.
10. AREA ADJACENT TO ALL CMU WALL OPENINGS SHALL BE GROUT FILLED FOR THE FULL HEIGHT OF THE WALL FOR A DISTANCE OF 24 INCHES WIDE FROM THE FACE OF THE OPENING.
11. STARTING JOINT FOR ALL MASONRY SHALL BE LAID WITH FULL BED MORTAR COVERAGE.
12. MORTAR SHALL BE APPLIED TO CROSS WEBS OF CMU IN ADDITION TO HORIZONTAL AND VERTICAL EDGES OF BEAM BEARING AREAS.
13. UNLESS OTHERWISE NOTED, REINFORCE WALLS AS FOLLOWS:
   - PROVIDE A MINIMUM ONE (1) #5 VERTICAL REBAR SPACED 48" ON-CENTER, MAXIMUM, CONTINUOUSLY FROM SUPPORT TO SUPPORT IN ALL 8" CMU WALL CONSTRUCTION UNLESS OTHERWISE NOTED. PROVIDE A MINIMUM (1) #4 VERTICAL REBAR SPACED 32" ON-CENTER, MAXIMUM, CONTINUOUSLY FROM SUPPORT TO SUPPORT IN ALL 6" CMU WALL CONSTRUCTION UNLESS OTHERWISE NOTED. IN ADDITION, PROVIDE ONE (1) #5 REBAR EACH SIDE OF EACH OPENING WITHIN A CONTINUOUS LENGTH OF WALL AND AT THE ENDS OF ALL CMU WALLS. MAKE THESE BARS CONTINUOUS FROM SUPPORT TO SUPPORT.
   - INSTALL STANDARD WEIGHT (W1.7) TRUSS-TYPE HORIZONTAL REINFORCING AS A MAXIMUM SPACING OF 16" ON-CENTER. WHERE TWO LONGITUDINAL WIRES ARE USED, THE SPACES BETWEEN THESE WIRES SHALL BE THE WIDEST THAT THE MORTAR JOINT WILL ACCOMMODATE. INSTALL JOINT REINFORCING CONTINUOUS IN ALL SUCH JOINTS. LAP ACCORDING TO THE MANUFACTURER SPECIFICATIONS. JOINT REINFORCING SHALL CONSIST OF AT LEAST TWO (2) LONGITUDINAL WIRES FOR WALLS GREATER THAN 4" IN WIDTH AND AT LEAST ONE (1) WIRE FOR WALLS NOT EXCEEDING 4" IN WIDTH.
   - AT THE TOP OF ALL 8" CMU WALLS PROVIDE A CONTINUOUS SOLIDLY GROUTED BOND BEAM CONTAINING TWO (2) #5 LONGITUDINAL BARS. AT THE TOP OF ALL 6" CMU WALLS PROVIDE A CONTINUOUS SOLIDLY GROUTED BOND BEAM CONTAINING ONE (1) #5 LONGITUDINAL BARS.
14. PROVIDE MECHANICAL ANCHORAGE BETWEEN ALL MASONRY ELEMENTS AND STRUCTURAL FRAMING BY APPROVED MATERIALS AND METHODS PER PRODUCT SPECIFICATIONS. MECHANICAL ANCHORS ARE REQUIRED AT ALL LOCATIONS WHERE MASONRY ELEMENTS ARE ADJACENT TO STRUCTURAL FRAMING AND SYSTEMS. PROVIDE ANCHORS AT A SPACING NOT TO EXCEED 16 INCHES ON-CENTER (MAXIMUM). INDIVIDUAL ANCHORS SHALL BE CAPABLE TO WITHSTAND A HORIZONTAL LOAD OF 500 POUNDS (WITHOUT AN ALLOWABLE STRESS INCREASE FOR WIND/SEISMIC). CMU/MASONRY WALLS ARE TO BE ANCHORED AT TOP, ALWAYS.
15. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM A-615, GRADE 60. SHOP FABRICATE REINFORCING BARS WHICH ARE SHOWN TO BE HOOKED OR BENT. PROVIDE A MINIMUM OF 48 x BAR DIAMETER AT ALL SPLICES, UNLESS OTHERWISE INDICATED.
16. PROVIDE HORIZONTAL BOND BEAMS WITH CONTINUOUS REINFORCING AS INDICATED. DISCONTINUE HORIZONTAL REINFORCING AT CONTROL JOINTS EXCEPT FOR THE BOND BEAMS AT BEARING ELEVATIONS.
17. PROVIDE REBAR DOWELS FROM SUPPORTING ELEMENTS (EXTERIOR PERIMETER EDGES OF ALL SLABS, CONCRETE WALLS, ETC.) TO MATCH VERTICAL WALL REINFORCING SIZE AND SPACING. DOWELS SHALL HAVE STANDARD 90 DEGREE HOOKS AND TENSION LAP WITH THE FIRST LIFT OF REINFORCING.
18. COORDINATE WITH THE LINTEL SCHEDULES FOR LINTELS ABOVE MASONRY OPENINGS, INCLUDING DOORS AND WINDOWS AND CONSULT WITH THE MASONRY OR STEEL LINTEL SCHEDULES FOR ADDITIONAL WALL REINFORCING REQUIRED AT SUCH MASONRY OPENINGS. SEE THE ARCHITECTURAL DRAWINGS FOR THE REQUIRED DIMENSIONS OF ALL DOOR AND WINDOW OPENINGS. PROVIDE A BOND BEAM LINTEL AND BRICK SHELF ANGLE ABOVE ALL MASONRY WALL OPENINGS AT A MINIMUM, UNLESS OTHERWISE INDICATED.
19. THE USE OF U-BLOCK MASONRY LINTELS IS PERMITTED WHEN THE OPENING IS WITHIN A NON-LOAD BEARING CMU WALL AND DOES NOT EXCEED 4'-0" IN SPAN / LENGTH.
20. NO CONDUIT OR PIPE SHALL BE INSTALLED VERTICALLY OR HORIZONTALLY IN EXTERIOR WALL CAVITIES, EXCEPT FOR ITEMS SUCH AS WALL HYDRANTS, RAINWATER CONDUCTORS, ELECTRICAL FIXTURES, ETC., FOR WHICH PENETRATIONS SHALL BE HORIZONTAL MINIMUM (PERPENDICULAR THROUGH CAVITY) TO MEET THE INTENDED INSTALLATION AT THE MASONRY VENEER. SUCH CONDUIT OR PIPE SHALL BE INSTALLED VERTICAL THROUGH MASONRY UNIT CORES OR INTENDED CHASES OF MASONRY BACK-UP WALL.
21. PROVIDE CMU CONTROL JOINTS AS INDICATED ON THE ARCHITECTURAL DRAWINGS, WITH ADDITIONAL JOINTS SUCH THAT THE SPACING BETWEEN JOINTS DOES NOT EXCEED A SPACING OF 3 x WALL HEIGHT (35 FEET MAXIMUM). CONTROL JOINTS TO BE COORDINATED WITH EXTERIOR MASONRY CONTROL JOINTS WHERE CMU WALL CONSTRUCTION IS THE BACK-UP WALL CONSTRUCTION BEHIND EXTERIOR MASONRY FACADE. WHERE BEAMS OR LINTELS BEAR AT CONTROL JOINTS WITHIN CMU WALLS, OFFSET AND LAP THE VERTICAL WALL REINFORCING AS INDICATED.
22. PROVIDE ALL REQUIRED TEMPORARY CMU BRACING AND SHORING DURING CONSTRUCTION.

STEEL DECK GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. METAL DECK, GAUGE AND TYPE (FLOOR AND/OR ROOF) ARE CALLED OUT AND INDICATED ON THE FRAMING PLANS AND THE GENERAL NOTES THAT ACCOMPANY THE FRAMING PLANS.
2. METAL DECK UNITS AND ACCESSORY ITEMS SHALL BE FORMED FROM STEEL SHEETS CONFORMING TO ASTM SPECIFICATION A-611 WITH A MINIMUM YIELD STRENGTH OF 33,000 PSI. BEFORE FORMING, THE STEEL SHEET SHALL RECEIVE A PROTECTIVE METAL COATING OR ZINC CONFORMING TO ASTM SPECIFICATION A-653, G60.
3. METAL DECK SHALL BE SHORED AS REQUIRED BY PLANS OR BY SPAN AND LOAD CONDITIONS TO SUPPORT WET WEIGHT OF CONCRETE AND CONSTRUCTION LOADS.
4. METAL DECK SHALL BE COORDINATED WITH ALL ARCHITECTURAL AND ELECTRICAL/MECHANICAL REQUIREMENTS.
5. HANGING DIRECTLY FROM THE FLOOR AND/OR ROOF DECK USING PIERCING HANGER TABS OR OTHER SIMILAR METHODS IS STRICTLY PROHIBITED. ANYTHING TO BE HUNG WITHIN THE CEILING PLENUM SHALL BE HUNG FROM THE STEEL FRAMING AND/OR ALTERNATE SUB-FRAMING THAT IS DESIGNED AND PROVIDED BY THE CONTRACTOR INSTALLING THE ITEMS TO BE HUNG WITHIN THE PLENUM.
6. UNFRAMED DECK OPENINGS IN COMPOSITE STEEL DECK WITH CONCRETE SHALL BE REINFORCED AS FOLLOWS:
   A. ROUND HOLES 6" TO 10" IN DIAMETER: 14 GAUGE FLAT SHEET EXTENDING 8" BEYOND THE HOLE/OPENING ON ALL SIDES. THE FLAT SHEET REINFORCING SHALL BE WELDED TO THE TOP SIDE OF THE DECK. ADDITIONAL STEEL REBAR REINFORCING SHALL ALSO BE PLACED AROUND THE OPENING WITHIN THE SLAB CONSTRUCTION PER TYPICAL DETAILS TO PREVENT CONCRETE CRACKING.
   B. RECTANGULAR HOLES 6" TO 10" IN WIDTH PARALLEL TO THE DECK SPAN AND A MAXIMUM OF 12" IN LENGTH PERPENDICULAR TO THE DECK SPAN: SIMILAR TO THE REINFORCING PREVIOUSLY NOTED FOR ROUND HOLES.
   C. OPENINGS LARGER THAN THOSE NOTED ABOVE REQUIRE SUPPLEMENTAL STEEL FRAMING; CONTRACTOR SHALL COORDINATE WITH THE TYPICAL DROP-IN ANGLE OR TYPICAL DROP-IN FRAME DETAILS.
9. UNFRAMED OPENINGS IN ROOF DECK SHALL BE REINFORCED AS FOLLOWS:
   A. HOLES LESS THAN 8" IN DIAMETER OR OVERALL LENGTH AND WIDTH: PROVIDE A 16 GAUGE FLAT SHEET EXTENDING 8" MINIMUM BEYOND THE HOLE/OPENING ON ALL DIRECTIONS.
   B. HOLES 8" TO 12" IN DIAMETER OR OVERALL LENGTH AND WIDTH: PROVIDE A 14 GAUGE FLAT SHEET EXTENDING 8" MINIMUM BEYOND THE HOLE/OPENING ON ALL DIRECTIONS.
   C. HOLES GREATER THAN 12" REQUIRE SUPPLEMENTAL FRAMING; COORDINATE WITH THE TYPICAL DROP-IN ANGLE OR TYPICAL DROP-IN FRAME DETAILS.

STRUCTURAL STEEL GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) STEEL CONSTRUCTION MANUAL THIRTEENTH EDITION.
2. UNLESS OTHERWISE NOTED, ALL MATERIALS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

MEMBER	ASTM	MIN. STRENGTH
ROLLED SHAPES	A992	50 KSI
OTHER ROLLED PLATES	A36	36 KSI
STRUCTURAL TUBING	A500 (GRADE B)	46 KSI
STEEL PIPE	A500 (GRADE B)	42 KSI
CONNECTION BOLTS	A325	92 KSI
ANCHOR BOLTS	F1554	----
THREADED RODS	A36	36 KSI
NON-SHRINK GROUT	C1107	8,000 PSI

3. CONNECTIONS SHALL BE SHEAR TYPE CONNECTIONS AND DESIGNED BY THE FABRICATOR FOR THE SHEAR FORCES INDICATED ON PLAN IN ACCORDANCE WITH THE AISC THIRTEENTH EDITION SPECIFICATIONS. MINIMUM BOLT DIAMETER SHALL BE 3/4" UNLESS OTHERWISE NOTED. BOLTS SHALL BE SHEAR/BEARING TYPE BOLTS AND BE "SNUG-TIGHT". STEEL BEAM CONNECTIONS SHALL BE DESIGNED TO SUPPORT A MINIMUM OF ONE HALF THE MAXIMUM TOTAL UNIFORM LOAD FOR PARTICULAR BEAM AND SPAN CONDITION AS DEFINED BY THE AISC MANUAL OF STEEL CONSTRUCTION (FOR COMPOSITE BEAMS, MULTIPLY BY 1.33).
4. METAL DECK SHALL BE ATTACHED ACCORDING TO METAL DECK MANUFACTURER AND STEEL DECK INSTITUTE STANDARDS.
5. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 USING E70XX ELECTRODES. UNLESS OTHERWISE NOTED, PROVIDE CONTINUOUS MINIMUM SIZED FILLET WELDS PER A.I.S.C. REQUIREMENTS. FILLER MATERIALS SHALL HAVE A MINIMUM YIELD STRENGTH OF 58 KSI.
6. WHERE "CONTINUOUS CHORD" ANGLES ARE INDICATED, PROVIDE A CONTINUOUS BUTT WELD OR FULL PENETRATION WELD AT THE SPLICE POINTS. THE STEEL FABRICATOR MAY SUBMIT AN ALTERNATE BOLTED CONNECTION DETAIL FOR APPROVAL.
7. MOMENT CONNECTIONS DENOTED THUS ( ) ON PLAN. SEE TYPICAL DETAILS.
8. WHERE STEEL BEAMS BEAR ACROSS BUILDING EXPANSION JOINTS OR AT WALL CONTROL JOINTS, PROVIDE A "SLIP" CONNECTION PER TYPICAL DETAILS.
9. HOLES IN STEEL BEAMS SHALL BE DRILLED OR PUNCHED. ALL SLOTTED HOLES SHALL BE PROVIDED WITH SMOOTH EDGES. BURNING OF HOLES AND TORCH CUTTING AT THE SITE IS NOT PERMITTED.
10. THE STRUCTURAL STEEL ERECTOR SHALL PROVIDE TEMPORARY GUYING AND BRACING AS REQUIRED. COLUMNS, ANCHOR BOLTS, BASE PLATES, ETC. HAVE BEEN DESIGNED FOR THE FINAL COMPLETE CONDITION, AND HAVE NOT BEEN INVESTIGATED FOR POTENTIAL LOADINGS ENCOUNTERED DURING STEEL ERECTION AND CONSTRUCTION. ANY INVESTIGATION OF THE COLUMNS, ANCHOR BOLTS, FRAMING, ETC. FOR ADEQUACY DURING THE STEEL ERECTION AND CONSTRUCTION PROCESS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
11. STEEL FABRICATORS SHALL BE AN AISC CERTIFIED SHOP FOR CATEGORY I STEEL STRUCTURES AND MAINTAIN DETAILED QUALITY CONTROL PROCEDURES AS REQUIRED TO SATISFY THE SPECIAL INSPECTION REQUIREMENTS OF THE LATEST BUILDING CODE HAVING JURISDICTION.
12. UNLESS OTHERWISE NOTED, STRUCTURAL STEEL PERMANENTLY EXPOSED TO THE WEATHER, INCLUDING ALL BRICK SHELF ANGLES, SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123. PROTECTIVE PROTECTIVE COATING DAMAGED DURING THE TRANSPORT, ERECTING AND FIELD WELDING PROCESS SHALL BE REPAIRED IN THE FIELD TO MATCH THE SHOP APPLIED COATING.
13. THE OWNER WILL HIRE AN INDEPENDENT TESTING AGENCY TO PROVIDE SPECIAL INSPECTIONS OF THE BOLTING, WELDING, AND OTHER ITEMS IN ACCORDANCE WITH THE LATEST BUILDING CODES HAVING JURISDICTION.
14. SPECIAL OR COMPLEX CONNECTIONS THAT ARE TO BE DESIGNED BY THE FABRICATOR ARE DENOTED AS SUCH ON PLAN. THE FABRICATOR SHALL DESIGN THESE CONNECTIONS FOR THE FORCES SHOWN AND SUBMIT CALCULATIONS AND SHOP DRAWINGS BEARING THE SIGNED AND DATED SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE WHERE THE WORK IS DONE.
15. PROVIDE ANGLE FRAMES AT ALL ROOF OPENINGS AND MECHANICAL ROOFTOP UNITS PER TYPICAL DROP-IN FRAME DETAIL.
16. REINFORCING SHALL BE PROVIDED AT CONNECTIONS WHERE CUTS HAVE REDUCED THE SHEAR OR MOMENT CAPACITY BELOW THAT REQUIRED TO SUSTAIN THE REACTION. FLANGES AND WEB ARE TO BE REINFORCED WHERE THE LOCAL CAPACITY TO SUSTAIN LOAD IS INADEQUATE.
17. STEEL FABRICATOR TO SUPPLY 16 GAGE CLOSURE ANGLES AROUND ALL FLOOR OPENINGS AND PERIMETER OF BUILDING. FOR SLAB OVERHANG GREATER THAN 6" REFER TO TYPICAL SLAB EDGE DETAIL.
18. SEE ARCHITECTURAL DETAILS ON ROOF DRAINS AND MISCELLANEOUS ROOF OPENINGS FOR CURBS AND OF BUILDING. FOR SLAB OVERHANG GREATER THAN 6" REFER TO TYPICAL SLAB EDGE DETAIL.
19. SEE ARCHITECTURAL DETAILS ON ROOF DRAINS AND MISCELLANEOUS ROOF OPENINGS FOR CURBS AND MISCELLANEOUS ANGLE IRON.
20. MISCELLANEOUS IRON CONTRACTOR TO PROVIDE MISCELLANEOUS STEEL SHOWN ON ARCHITECTURAL DRAWINGS THAT IS NOT SHOWN ON STRUCTURAL DRAWINGS.
21. ALL STEEL USED IN THE FABRICATION OF EXPOSED STRUCTURAL STEEL, INCLUDING CONNECTIONS, SHALL BE CONSIDERED ARCHITECTURALLY EXPOSED STRUCTURAL STEEL AND WILL BE SUBJECT TO THE OF SECTION 10 OF THE AISC CODE OF STANDARD PRACTICE FOR ALL STEEL BUILDINGS AND BRIDGES, MARCH 18, 2005.
22. AT LOCATIONS ON THE ARCHITECTURAL DRAWINGS OR OTHER TRADES WHERE A STEEL ANGLE OR PLATE IS SHOWN DIAGRAMMATICALLY AND REFERENCE IS MADE TO THE STRUCTURAL DRAWINGS FOR SIZE, PROVIDE MINIMUM THICKNESS OF 3/8" MATERIAL AND PLATE WIDTH OR ANGLE SIZE AS SCALED FOR THE DRAWINGS. INSTALL THE PLATE OR ANGLE TO THE EXTENT REQUIRED TO ACCOMPLISH A COMPLETE JOB.
23. WHEN NO MEMBER SIZE IS GIVEN IN PLAN AND/OR SECTION, AND THE SIZE CANNOT BE DETERMINED GRAPHICALLY, THE MINIMUM SIZE ASSUMED FOR BIDDING SHALL BE AS FOLLOWS:

CHANNELS	C12x35
W-SHAPES	W16x50
ANGLES	L6x6x1/2
TUBES	HSS6x6x1/2
PIPES	6"ø X-STRONG
WT (TEE'S)	WT8x25

UNLESS OTHERWISE NOTED ALL MEMBERS INDICATED ON PLAN ARE W-SHAPES. FINAL SIZES SHALL BE CONFIRMED BY ENGINEER VIA A REQUEST FOR INFORMATION (RFI) DURING THE BID PERIOD OR DURING THE SHOP DRAWING PHASE. CONTRACTOR SHALL NOT BE ENTITLED TO COSTS FOR REVISIONS TO THE MEMBER SIZE IF AN RFI IS NOT SUBMITTED IN A TIMELY MANNER. STRUCTURAL STEEL SHALL BE PAINTED PER THE PROJECT SPECIFICATIONS.

24. STRUCTURAL STEEL FABRICATOR AND INSTALLER SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL FRAMED OPENINGS IN FRAMED FLOORS AND ROOF WITH APPROVED EQUIPMENT MANUFACTURER(S). OPENINGS SHALL INCLUDE, BUT ARE NOT LIMITED TO: MECHANICAL UNITS, EXHAUST FANS, CURB MOUNTED EQUIPMENT, ROOF DRAINS, SKYLIGHTS, STAIRS, SMOKE HATCHES, DUCT PENETRATIONS, EXPANSION JOINTS, ETC.

STATEMENT OF TESTING AND SPECIAL INSPECTION

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

TESTING: OWNER SHALL ENGAGE A QUALIFIED INDEPENDENT TESTING AND INSPECTING AGENCY TO PERFORM THE FOLLOWING SERVICES:

1. INSPECTION AND TESTING OF ALL STRUCTURAL FILL WITH REPORTS SUBMITTED TO THE ARCHITECT STATING COMPLIANCE OR NON-COMPLIANCE WITH PERCENT COMPACTION REQUIREMENTS.
2. SPECIAL INSPECTIONS FOR EXISTING SITE SOIL CONDITIONS, FILL PLACEMENT AND LOAD-BEARING REQUIREMENTS SHALL BE PERFORMED IN ACCORDANCE WITH IBC SECTION 1704.7 AND TABLE 1704.7. THE APPROVED SOILS REPORT, REQUIRED BY SECTION 1803.6, SHALL BE USED TO DETERMINE COMPLIANCE.
3. CONCRETE AND REINFORCEMENT: SHALL BE INSPECTED PER THE REQUIREMENTS OF IBC SECTION 1704.4 AND TABLE 1704.4.
4. MASONRY AND REINFORCEMENT: SHALL BE INSPECTED PER IBC SECTION 1704.5 AND THE LEVEL 1 REQUIREMENTS OF IBC TABLE 1704.5.1.
5. STRUCTURAL STEEL: STRUCTURAL STEEL MEMBERS AND CONNECTIONS SHALL BE INSPECTED PER THE REQUIREMENTS OF IBC SECTION 1704.3 AND TABLE 1704.3.

5.1. STEEL FABRICATOR INSPECTION: THE FABRICATOR SHALL BE AN AISC CERTIFIED SHOP FOR CATEGORY I STEEL STRUCTURES AND MAINTAIN DETAILED QUALITY CONTROL PROCEDURES AS REQUIRED TO SATISFY THE SPECIAL INSPECTION REQUIREMENTS OF IBC SECTIONS 1704.2.1 AND 1704.2.2.

6. WRITTEN REPORTS SHALL BE SUBMITTED TO THE ARCHITECT STATING COMPLIANCE OR NONCOMPLIANCE WITH THE DESIGN DOCUMENTS. ALL REPORTS SHALL BE SIGNED AND SEALED BY A LICENSED ENGINEER FROM THE STATE OF NEW JERSEY.
7. FAILURE TO RETAIN A TESTING AGENCY TO PERFORM THE REQUIRED SERVICES SPECIFIED ABOVE, OR FAILURE TO SUBMIT SIGNED AND SEALED REPORTS, INDICATES NONCOMPLIANCE WITH THE CONTRACT DOCUMENTS.
8. SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING CONSTRUCTION DOCUMENTS FOR ADDITIONAL NON-STRUCTURAL SPECIAL INSPECTION ITEMS.

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PROJECT:

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SHEET CONTENTS:

GENERAL STRUCTURAL NOTES

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	NONE
DRWN BY	TPM
CHKD BY	
JOB NO	2161228
SHEET:	OF:
DRWG NO	S-001

WOOD FRAMING GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. ALL WOOD FRAMING MATERIAL SHALL BE SURFACED DRY AND USED AT 19% MAXIMUM MOISTURE CONTENT.
2. ALL STUD AND WALL FRAMING SHALL BE EITHER OF THE FOLLOWING:
   A. NO. 2 GRADE SOUTHERN YELLOW PINE (SYP)
   B. NO. 2 GRADE SPRUCE–PINE–FIR (SPF)
   "STUD" GRADE MATERIAL IS STRICTLY PROHIBITED FROM USE
3. ALL JOIST, RAFTER & MISCELLANEOUS FRAMING SHALL BE NO. 2 GRADE, SOUTHERN PINE. PROVIDE FULL–DEPTH (OR METAL) BRIDGING AT MID–SPAN AND AT A MAXIMUM SPACING OF 8'–0" O.C. IN BETWEEN.
4. ALL FRAMING EXPOSED TO THE WEATHER OR IN CONTACT WITH MASONRY OR CONCRETE SHALL BE PRESSURE–TREATED IN ACCORDANCE WITH THE AMERICAN WOOD PRESERVERS ASSOCIATION SPECIFICATION. WHERE POSSIBLE, ALL CUTS AND HOLES SHOULD BE COMPLETE BEFORE TREATMENT. CUTS AND HOLES DUE TO ON–SITE FABRICATION SHALL BE BRUSHED WITH 2 COATS OF COPPER NAPHTHENATE SOLUTION CONTAINING A MINIMUM OF 2% METALLIC COPPER IN SOLUTION (PER AWPA ST. M4).
5. THE CONTRACTOR SHALL CAREFULLY SELECT LUMBER TO BE USED IN LOAD–BEARING APPLICATIONS. THE LENGTH OF SPLIT ON THE WIDE FACE OF 3" (NOMINAL) AND THICKER LUMBER SHALL BE LIMITED TO 1/2 OF THE NARROW FACE DIMENSION.
6. PROVIDE DOUBLE JOISTS UNDER ALL PARTITIONS WHICH RUN PARALLEL WITH JOISTS AND UNDER ALL CONCENTRATED LOADS FROM FRAMING ABOVE.
7. PROVIDE HEADER BEAMS OF THE SAME SIZE AS JOISTS OR RAFTERS TO FRAME AROUND OPENINGS IN THE PLYWOOD DECK UNLESS OTHERWISE INDICATED.
8. STRUCTURAL STEEL PLATE CONNECTORS SHALL CONFORM TO ASTM A–36 SPECIFICATION AND BE 1/4" THICK UNLESS OTHERWISE INDICATED. BOLTS CONNECTING WOOD MEMBERS SHALL BE PER ASTM A–307 AND BE 3/4" DIAMETER UNLESS OTHERWISE INDICATED. PROVIDE WASHERS FOR ALL BOLT HEADS AND NUTS IN CONTACT WITH WOOD SURFACES.
9. BOLT HOLES SHALL BE CAREFULLY CENTERED AND DRILLED NOT MORE THAN 1/16" LARGER THAN THE BOLT DIAMETER. BOLTED CONNECTIONS SHALL BE SNUGGED TIGHT BUT NOT TO THE EXTENT OF CRUSHING WOOD UNDER WASHERS.
10. PREFABRICATED "MICRO–LAM" LUMBER HEADERS AND BEAMS SHALL BE AS MANUFACTURED BY "TRUS JOIST MacMILLAN CORP." BOISE, IDAHO OR APPROVED EQUAL. MICRO–LAM MATERIAL SHALL BE 2.0E. SOUTHERN PINE. DO NOT CUT OR NOTCH MICRO–LAM MATERIAL WITHOUT THE MANUFACTURER'S WRITTEN APPROVAL.
11. PREFABRICATED METAL JOIST HANGERS, HURRICANE CLIPS, HOLD–DWN ANCHORS AND OTHER ACCESSORIES SHALL BE AS MANUFACTURED BY "SIMPSON STRONG–TIE COMPANY", TEL. 800–999–5099). OR APPROVED EQUAL. INSTALL ALL ACCESSORIES PER THE MANUFACTURER'S REQUIREMENTS. ALL STEEL SHALL HAVE A MINIMUM THICKNESS OF 0.04 INCHES (PER ASTM A446, GRADE A) AND BE GALVANIZED (COATING G60).
12. CUTTING, NOTCHING AND DRILLING OF WALL STUDS, FLOOR JOISTS, RAFTERS AND CEILING JOISTS TO COMPLY WITH IBC 2009 SECTION 2308.9 AND 2308.10.
13. ALL PLATES, ANCHORS, NAILS, BOLTS, NUTS, WASHERS, AND OTHER MISCELLANEOUS HARDWARE SHALL BE HOT DIP GALVANIZED.

GLUE–LAMINATED FRAMING GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. GLUE–LAMINATED MEMBERS SHALL CONFROM TO THE REQUIREMENTS OF ONE OF THE FOLLOWING STANDARDS AND PUBLICATIONS:
   A. AMERICAN NATIONAL STANDARD FOR STRUCTURAL GLUE LAMINATED TIMBER.
   B. ANSI / AITC STANDARD A190.1 AND ASTM D 3737.
   C. AND CODE–APPROVED STANDARD PUBLICATION. APPROVAL MUST FIRST BE OBTAINED BY THE STRUCTURAL ENGINEER OF RECORD.
2. THE MINIMUM GLUE–LAMINATED MEMBER GRADES SHALL BE AS FOLLOWS:

MEMBER	MINIMUM GRADE
SIMPLE SPAN	24F–V4
CONTINUOUS/CANTILEVER	24F–V8

3. APPEARANCE SHALL BE FRAMING INDUSTRIAL FOR HIDDEN/CONCEALED MEMBERS VIEW AND ARCHITECTURAL FOR EXPOSED MEMBERS UNLESS OTHER WISE NOTED/INDICATED ON THE DRAWINGS; REFERENCE THE ARCHITECTURAL DRAWINGS FOR ADDITIONAL FINISH REQUIREMENTS.
4. ALL STRUCTURAL GLUE–LAMINATED MEMBERS NOTED ON THE DRAWINGS AS WELL AS ANY MEMBERS EXPOSED TO WEATHER SHALL BE PRESSURE–TREATED,
5. ALL BEAMS SHALL HAVE A 1600 FOOT RADIUS CAMBER UP UNLESS OTHERWISE NOTED ON THE DRAWINGS.
6. NO NOTCHING OR BORING OF HOLES IN BEAMS IS ALLOWED WITHOUT APPROVAL OF THE ENGINEER OF RECORD.
7. GLUE SHALL BE WET–USE EXTERIOR WATERPROOF GLUE.
8. WHERE HANGERS ARE REQUIRED BUT NOT SPECIFICALLY SIZED, SIMPSON STRONG–TIE GLT HANGERS SHALL BE USED. SUBSTITUTION OF HARDWARE IS NOT ALLOWED WITHOUT APPROVAL OF THE ENGINEER OF RECORD. THE SUBSTITUTION SUBMITTAL SHALL INCLUDE DOCUMENTATION SHOWING THE ALLOWABLE LOADS OF THE SPECIFIED HARDWARE ALONG WITH TABULATED ALLOWABLE LOADS FOR THE SUBSTITUTED ITEMS. ALL ITEMS ATE TO BE INSTALLED PER THE MANUFACTURER'S WRITTEN INSTALLATION REQUIREMENTS.

PLYWOOD & GYPSUM SHEATHING NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. ALL PLYWOOD CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE AMERICAN PLYWOOD ASSOCIATION (APA) SPECIFICATIONS.
2. ALL ROOF SHEATHING SHALL BE 3/4" (NOMINAL) APA RATED STURD–I–FLOOR EXPOSURE I, WITH A TONGUE AND GROOVE EDGE. UNLESS OTHERWISE NOTED, ROOF SHEATHING SHALL BE FASTENED WITH 10d COMMON NAILS SPACED 6" ON–CENTER AT SUPPORTED EDGES AND 12" ON–CENTER AT INTERMEDIATE SUPPORTS. FIELD–GLUE USING ADHESIVES MEETING APA SPECIFICATION AFT–01 APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL WALL PANEL SHEATHING SHALL BE 1/2" (NOMINAL) TYPE CDX. APA EXPOSURE RATED SHEATHING. UNLESS OTHERWISE NOTED, WALL SHEATHING SHALL BE FASTENED WITH 10d COMMON NAILS SPACED 6" ON–CENTER AT SUPPORTED PANEL EDGES AND 12" ON–CENTER AT INTERMEDIATE SUPPORTS.
4. INSTALL ALL PLYWOOD SHEATHING WITH THE LONG DIMENSION OF THE PANEL ACROSS SUPPORTS AND WITH PANEL CONTINUOUS OVER TWO OR MORE SPANS. STAGGER PANEL END JOINTS. ALLOW 1/8" SPACING AT PANEL ENDS AND EDGES UNLESS OTHERWISE RECOMMENDED BY THE SHEATHING MANUFACTURER.
5. ALL NAILING SHALL BE CAREFULLY DRIVEN AND NOT OVERDRIVEN. THE USE OF STAPLES IS STRICTLY PROHIBITED.
6. PROVIDE 2x BLOCKING AT UNSUPPORTED PANEL EDGES FOR ALL FLOORS, ROOFS, AND WALLS.

CUTTING & NOTCHING JOIST CUTTING NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. NOTCHES IN SOLID LUMBER JOISTS, RAFTERS AND BEAMS SHALL NOT EXCEED ONE–SIXTH OF THE DEPTH OF THE MEMBER, SHALL NOT BE LONGER THAN ONE–THIRD OF THE DEPTH OF THE MEMBER AND SHALL NOT BE LOCATED IN THE MIDDLE ONE–THIRD OF THE SPAN.
2. NOTCH DEPTH AT THE ENDS OF THE MEMBER SHALL NOT EXCEED ONE–FOURTH OF THE DEPTH OF THE MEMBER.
3. A NOTCH OVER A SUPPORT IS PERMITTED TO EXTEND THE FULL WIDTH OF THE SUPPORT.
4. NOTCHES ON CANTILEVERED PORTIONS OF THE MEMBER ARE PERMITTED TO EXTEND THE FULL LENGTH OF THE CANTILEVER IF THE STRENGTH AND DEFLECTION OF THE CANTILEVER IS CALCULATED BASED ON THE REDUCED MEMBER SECTION.
5. HOLES BORED OR CUT INTO SOLID LUMBER JOISTS, RAFTERS OR BEAMS SHALL NOT BE CLOSER THAN 2" TO THE TOP OR BOTTOM OF THE JOISTS, OR TO ANY OTHER HOLE LOCATED IN THE MEMBER.
6. WHERE MEMBERS ARE NOTCHED, THE HOLE SHALL NOT BE CLOSER THAN 2" TO THE NOTCH.
7. THE DIAMETER OF THE HOLE IN JOISTS SHALL NOT EXCEED ONE–THIRD OF THE DEPTH OF THE MEMBER.

PRE–ENGINEERED WOOD TRUSS NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. WOOD TRUSSES SHALL BE DESIGNED BY THE MANUFACTURER TO SUPPORT THE FOLLOWING LOADS:
   A. GRAVITY LOADING CASE
      TOP CHORD LOADING
         LIVE LOAD – 40 PSF (ON THE HORIZONTAL PROJECTION)
         DEAD LOAD – 20 PSF (ON THE SURFACE AREA)
                   – ADDITIONAL 5 PSF AT BUILT–UP FRAMING AREAS
      BOTTOM CHORD LOADING
         DEAD LOAD – 5 PSF
   B. WIND LOADING CASE (PER 2009 IBC NEW JERSEY EDITION)
      SEE DESIGN CRITERIA NOTES FOR WIND COMPONENT CRITERIA
      TOP CHORD LOADING ON THE SURFACE AREA
         NET UPLIFT = P – (TOP CHORD DL x .67)
         P = Ce x Cq x qs x Iw (PER 2009 IBC)
      BOTTOM CHORD LOADING, ON THE SURFACE AREA
         NET UPLIFT = P – (BOTTOM CHORD DL x .67)
         P = Ce x Cq x qs x Iw (PER 2009 IBC)
2. WOOD TRUSSES SHALL BE DESIGNED BY THE MANUFACTURER IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE LATEST EDITION OF THE NATIONAL DESIGN SPECIFICATION OF THE NATIONAL FOREST PRODUCTS ASSOCIATION. THE DESIGN SPECIFICATION FOR METAL PLATE CONNECTED WOOD TRUSSES OF THE TRUSS PLATE INSTITUTE AND THE 2009 IBC NEW JERSEY EDITION..
3. WOOD MATERIALS SHALL BE SOUTHERN PINE, DOUGLAS FIR OR LARCH AND SHALL BE KILN DRIED AND USED AT 19% MAXIMUM MOISTURE CONTENT. PROVIDE GRADE NO. 2 OR AS REQUIRED TO SATISFY STRESS REQUIREMENTS.
4. CONNECTOR PLATES SHALL BE NOT LESS THAN 0.036 INCHES (20 GAUGE) IN COATED THICKNESS, SHALL MEET OR EXCEED ASTM GRADE A OR HIGHER AND SHALL BE HOT DIPPED GALVANIZED ACCORDING TO ASTM A–525 (COATING G60). MINIMUM STEEL YIELD STRESS SHALL BE 33,000 PSI.
5. TRUSSES SHALL BE FABRICATED IN A PROPERLY EQUIPPED MANUFACTURING FACILITY OF A PERMANENT NATURE. TRUSSES SHALL BE MANUFACTURED BY EXPERIENCED WORKMEN. USING PRECISION CUTTING, JIGGING AND PRESSING EQUIPMENT UNDER THE REQUIREMENTS IN QUALITY CONTROL STANDARDS QST–88 OF THE TRUSS PLATE INSTITUTE.
6. SECONDARY BENDING STRESSES IN TRUSS TOP AND BOTTOM CHORDS DUE TO DEAD, LIVE AND WIND LOADS SHALL BE CONSIDERED IN THE DESIGN. LOAD DURATION FACTORS SHALL BE PER THE "NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION".
7. WOOD TRUSSES SHALL BE ERECTED IN ACCORDANCE WITH THE TRUSS MANUFACTURER'S REQUIREMENTS. THIS WORK SHALL BE DONE BY A QUALIFIED AND EXPERIENCED CONTRACTOR. TRUSS ERECTION BY AN INEXPERIENCED OR NON–QUALIFIED CONTRACTOR CAN RESULT IN CONSTRUCTION COLLAPSE AND/OR SERIOUS INJURY AND DAMAGE.
8. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY AND PERMANENT BRACING AS REQUIRED FOR SAFE ERECTION AND PERFORMANCE OF THE TRUSSES. THE GUIDELINES SET FORTH BY THE TRUSS PLATE INSTITUTE PUBLICATION "HIB–91, COMMENTARY AND RECOMMENDATIONS FOR HANDLING, INSTALLING AND BRACING METAL PLATE CONNECTED WOOD TRUSSES" SHALL BE A MINIMUM REQUIREMENT.
9. TRUSS MANUFACTURER TO PROVIDE UPLIFT LOADS USED FOR DESIGN OF WOOD TRUSSES. TRUSS CLIP TYPE AND QUANTITY TO BE PROVIDED BY MANUFACTURER.
10. SUBMIT COMPLETE SHOP DRAWINGS FOR ALL WOOD TRUSSES SHOWING MEMBER SIZES, SPECIES, GRADE, MOISTURE CONTENT, SPAN, CAMBER, DIMENSIONS, CHORD PITCH, BRACING REQUIREMENTS AND LOADINGS. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER AND SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW JERSEY.

POST–INSTALLED ANCHOR GENERAL NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. EXCEPT WHERE INDICATED ON THE DRAWINGS, POST–INSTALLED ANCHORS SHALL CONSIST OF THE FOLLOWING ANCHOR TYPES AS PROVIDED BY HILTI, INC. CONTACT HILTI AT (800) 879–8000 FOR PRODUCT RELATED QUESTIONS.
2. ANCHOR TYPES:
   2.1. ANCHORAGE TO CONCRETE:
   – ADHESIVE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:
      –– HILTI HIT–HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW HIT–Z ROD PER ICC ESR–3187
      –– HILTI HIT–HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT SYSTEM WITH HAS–E THREADED ROD PER ICC ESR–3187
      –– HILTI HIT–RE 500 –SD EPOXY ADHESIVE ANCHORING SYSTEM WITH HAS–E THREADED ROD PER ICC ESR–2322 FOR SLOW CURE APPLICATIONS
   – MEDIUM DUTY MECHANICAL ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:
      –– HILTI KWIK HUS EZ AND KWIK HUS EX–I SCREW ANCHORS PER ICC ESR–3027.
      –– HILTI KWIK BOLT–TZ EXPANSION ANCHORS PER ICC ESR–1917
      –– HILTI KWIK BOLT 3 EXPANSION ANCHORS (UNCRACKED CONCRETE ONLY) PER ISS ESR–2302
   – HEAVY DUTY MECHANICAL ANCHORS FOR CRACJED AND UNCRACKED CONCRETE USE:
      –– HILTI HDA UNDERCUT ANCHORS PER ICC ESR–1546
      –– HILTI HSL–3 EXPANSION ANCHORS PER ICC ESR–1545
   2.2 REBAR DOWELING INTO CONCRETE:
   – ADHESIVE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE USE:
      –– HILTI HIT–HY 200 SAFE SET SYSTEM WITH HILTI HOLLOW DRILL BIT SYSTEM WITH CONTINUOUSLY DEFORMED REBAR PER ICC ESR–3187
      –– HILTI HIT–RE 500–SD EPOXY ADHESIVE ANCHORING SYSTEM WITH CONTINUOUSLY DEFORMED REBAR PER ICC ESR–2322
   2.3 ANCHORAGE TO SOLID GROUTED MASONRY:
   – ADHESIVE ANCHORS USE:
      –– HILTI HILTI HIT–HY 70 MASONRY ADHESIVE ANCHORING SYSTEM
      –– STEEL ANCHOR ELEMENT SHALL BE HILTI HAS–E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR
   – MECHANICAL ANCHORS USE:
      –– HILTI KWIK BOLT–3 EXPANSION ANCHORS PER ICC ESR–1385
   2.4 ANCHORAGE TO HOLLOW / MULTI–WYTHE MASONRY:
   – ADHESIVE ANCHORS USE:
      –– HILTI HIT–HY 70 MASONRY ADHESIVE ANCHORING SYSTEM PER ICC ESR–3342
      –– STEEL ANCHOR ELEMENT SHALL BE HILTI HAS–E CONTINUOUSLY THREADED ROD OR CONTINUOUSLY DEFORMED STEEL REBAR
      –– THE APPROPRIATE SIZE SCREEN TUBE SHALL BE USED PER ADHESIVE MANUFACTURER'S RECOMMENDATION.
3. ANCHOR CAPACITY USED IN DESIGN SHALL BE BASED ON THE TECHNICAL DATA PUBLISHED BY HILTI OR SUCH OTHER METHOD AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERFORMANCE VALUES OF THE SPECIFIED HILTI PRODUCT. SUBSTITUTIONS WILL BE EVALUATED BY THEIR HAVING AN ICC ESR SHOWING COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN–SERVICE TEMPERATURE AND INSTALLATION TEMPERATURE.
4. INSTALL ANCHORS PER THE MANUFACTURERS INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.
5. OVERHEAD ADHESIVE ANCHORS MUST BE INSTALLED USING THE HILTI PROFIS SYSTEM.
6. THE CONTRACTOR SHALL ARRANGE ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. THE STRUCTURAL ENGINEER MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO WILL INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF INSTALLING ANCHORS.

TENSION DEVELOPMENT AND LAP SPLICE LENGTH (BEAMS AND COLUMNS)

BAR SIZE	LAP CLASS	CONCRETE STRENGTH f'c = 4,000 PSI: TOP BARS CASE 1	TOP BARS CASE 2	OTHER BARS CASE 1	OTHER BARS CASE 2	STANDARD 90° HOOK: EMBEDMENT	LEG LENGTH
# 3	A	19"	28"	15"	22"	6"	6"
	B	24"	36"	19"	28"		
# 4	A	25"	37"	19"	29"	7"	8"
	B	32"	48"	25"	37"		
# 5	A	31"	47"	24"	36"	9"	10"
	B	40"	60"	31"	47"		
# 6	A	37"	56"	29"	43"	10"	12"
	B	48"	72"	37"	56"		
# 7	A	54"	81"	42"	63"	12"	14"
	B	70"	106"	54"	81"		
# 8	A	62"	93"	48"	71"	14"	16"
	B	80"	121"	62"	93"		
# 9	A	70"	105"	54"	81"	15"	19"
	B	91"	136"	70"	105"		
# 10	A	79"	118"	61"	91"	17"	22"
	B	102"	153"	79"	118"		
# 11	A	87"	131"	67"	101"	19"	24"
	B	113"	170"	87"	131"		

SCHEDULE GENERAL NOTES:

1. TABLE SHALL BE USED FOR UNCOATED REINFORCING BAR ONLY.
2. ALL LENGTHS SHOWN IN THE SCHEDULE ARE IN INCHES.
3. USE LAP CLASS "B" UNLESS CLASS "A" IS SPECIFIED FOR PARTICULAR SITUATIONS ELSEWHERE ON DRAWINGS.
4. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE COVER BELOW THE BAR CAST AT THE SAME TIME AS THE CONCRETE DIRECTLY SURROUNDING THE BAR.
5. CASE 1 AND 2 ARE DEFINED AS THE FOLLOWING:
   5.1. BEAMS AND COLUMNS:
      5.1.1. CASE 1: CONCRETE COVER AT LEAST 1.0 x BAR AND C–C SPACING AT LEAST 2.0 x BAR.
      5.1.2. CASE 2: CONCRETE COVER LESS THAN 1.0 x BAR OR C–C SPACING LESS THAN 2.0 x BAR.
   5.2. ALL OTHERS:
      5.2.1. CASE 1: CONCRETE COVER AT LEAST 1.0 x BAR AND C–C SPACING AT LEAST 3.0 x BAR.
      5.2.2. CASE 2: CONCRETE COVER LESS THAN 1.0 x BAR OR C–C SPACING LESS THAN 3.0 x BAR.

TENSION DEVELOPMENT AND LAP SPLICE LENGTH (WALLS AND SLABS)

BAR SIZE	LAP CLASS	CONCRETE STRENGTH f'c = 4,000 PSI: CONCRETE COVER = 0.75": TOP	0.75": OTHER	CONCRETE COVER = 1.00": TOP	1.00": OTHER	CONCRETE COVER = 1.50": TOP	1.50": OTHER	CONCRETE COVER = 2.00": TOP	2.00": OTHER
# 3	A	12"	12"	12"	12"	12"	12"	12"	12"
	B	15"	12"	15"	12"	15"	12"	15"	12"
# 4	A	19"	15"	15"	12"	15"	12"	15"	12"
	B	24"	19"	20"	15"	20"	15"	20"	15"
# 5	A	28"	21"	22"	17"	19"	15"	19"	15"
	B	36"	28"	29	22"	24"	19"	24	19"
# 6	A	37"	29"	31"	24"	22"	17"	22"	17"
	B	48"	37"	40"	31"	29"	22"	29"	22"
# 7	A	60"	46"	50"	38"	37"	28"	33"	25"
	B	78"	60"	64"	50"	48"	37"	42"	33"
# 8	A	74"	57"	62"	48"	47"	36"	37"	29"
	B	96"	74"	80"	62"	60"	47"	48"	37"
# 9	A	90"	69"	76"	58"	57"	44"	46"	36"
	B	117"	90"	98"	76"	74"	57"	60"	46"
# 10	A	108"	83"	92"	70"	70"	54"	57"	44"
	B	140"	108"	119"	92"	91"	70"	74"	57"
# 11	A	127"	98"	108"	83	84"	64"	68"	53"
	B	165"	127"	141"	108"	109"	84"	89"	68"

SCHEDULE GENERAL NOTES:

1. TABLE SHALL BE USED FOR UNCOATED REINFORCING BAR ONLY.
2. ALL LENGTHS SHOWN IN THE SCHEDULE ARE IN INCHES.
3. USE LAP CLASS "B" UNLESS CLASS "A" IS SPECIFIED FOR PARTICULAR SITUATIONS ELSEWHERE ON DRAWINGS.
4. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE COVER BELOW THE BAR CAST AT THE SAME TIME AS THE CONCRETE DIRECTLY SURROUNDING THE BAR.

COMPRESSION DEVELOPMENT LENGTHS AND COMPRESSION LAP SPLICES

BAR SIZE	DOWEL EMBEDMENT	MINIMUM LAP LENGTH: STANDARD LAP	w/ COLUMN SPIRALS
# 3	9"	12"	12"
# 4	11"	15"	12"
# 5	14"	19"	14"
# 6	17"	23"	17"
# 7	19"	27"	20"
# 8	22"	30"	23"
# 9	25"	34"	25"
#10	28"	38"	29"
#11	31"	43"	32"

SCHEDULE GENERAL NOTES:

1. TABLE SHALL BE USED FOR UNCOATED REINFORCING BAR ONLY.
2. FOLLOW THIS SCHEDULE FOR ALL COMPRESSION DEVELOPMENT LENGTHS OF COMPRESSION LAP SPLICES UNLESS DIRECTED OTHERWISE IN SECTION.

DESIGN INFORMATION

2015 INTERNATIONAL BUILDING CODE (NJ EDITION)

EARTHQUAKE DESIGN DATA

- SEISMIC IMPORTANCE FACTOR (I_e) = 1.00
- RISK CATEGORY = II
- 0.2 SPECTRAL RESPONSE ACCELERATION (S_s) = 0.264
- 1.0 SPECTRAL RESPONSE ACCELERATION (S_1) = 0.070
- SITE CLASS = C
- DAMPED DESIGN SPECTRAL RESPONSE (S_{DS}) = 0.211 ACCELERATION (SHORT PERIOD)
- DAMPED DESIGN SPECTRAL RESPONSE (S_{D1}) = 0.079 ACCELERATION (1–second PERIOD)
- SEISMIC DESIGN CATEGORY = B
- SEISMIC FORCE–RESISTING SYSTEM: *STEEL MOMENT FRAMES*
- PLAN STRUCTURAL IRREGULARITIES = NO
- VERTICAL STRUCTURAL IRREGULARITIES = NO
- SEISMIC RESPONSE COEFFICIENT (C_s) = 0.022
- RESPONSE MODIFICATION FACTOR (R) = 3.0; C_t = 0.020
- ANALYSIS PROCEDURE = EQUIVALENT LATERAL FORCE PROCEDURE

WIND DESIGN DATA

- BASIC WIND SPEED (V_{ASD}) = 115 MPH
- IMPORTANCE FACTOR (I_w) = 1.00
- RISK CATEGORY = II
- EXPOSURE CATEGORY = B
- GUST EFFECT FACTOR (G) = 0.85
- INTERNAL PRESSURE COEFFICIENT (GC_{pi}) = ±0.18
- HORIZONTAL WIND PRESSURES (MWFRS) DESIGN LOAD:
- HORIZONTAL WIND PRESSURES (COMPONENTS & CLADDING) EFFECTIVE WIND AREA = 10 SQ. FT. (ASSUMED) INTERIOR WALL ZONE (ZONE 4): EXTERIOR WALL ZONE (ZONE 5):
- VERTICAL WIND PRESSURES (COMPONENTS & CLADDING) EFFECTIVE WIND AREA = 10 SQ. FT. (ASSUMED) INTERIOR ROOF ZONE (ZONE 1): PERIMETER ROOF ZONE (ZONE 2): CORNER ROOF ZONE (ZONE 3):

SNOW LOAD

- GROUND SNOW LOAD (P_g) = 25 PSF
- FLAT ROOF SNOW LOAD (P_f) = 20 PSF (CODE MINIMUM)
- SNOW EXPOSURE FACTOR (C_e) = 0.9
- SNOW IMPORTANCE FACTOR (I_s) = 1.00
- SNOW THERMAL FACTOR (C_t) = 1.0

DESIGN DEAD LOADS

MAIN LEVEL/1st FLOOR
- 66 PSF – 4.5" N.W. CONC. + 1.5" COMP. MTL. DECK
- 3 PSF – CEILING
- 16 PSF – FLOOR FINISH – GRANITE TILE
- 5 PSF – MECHANICAL/ELECTRICAL
- 90 PSF – TOTAL (DOES NOT INCLUDE FRAMING WEIGHT)

LOW ROOF (STEEL FRAMED)
- 42 PSF – 2.5" N.W. CONC. + 1.5" COMP. MTL. DECK
- 3 PSF – CEILING
- 7 PSF – MECHANICAL/ELECTRICAL
- 3 PSF – MISCELLANEOUS
- 55 PSF – TOTAL (DOES NOT INCLUDE FRAMING WEIGHT)

LOW ROOF (WOOD FRAMED)
- 3 PSF – CEILING
- 10 PSF – ROOFING & INSULATION
- 5 PSF – MECHANICAL/ELECTRICAL
- 2 PSF – MISCELLANEOUS
- 20 PSF – TOTAL (DOES NOT INCLUDE FRAMING WEIGHT)

TYPICAL PITCHED/SLOPED ROOF
- 6 PSF – T & G LOCK–DECK TIMBER DECKING
- 11 PSF – ROOFING & INSULATION
- 5 PSF – MECHANICAL/ELECTRICAL
- 3 PSF – MISCELLANEOUS
- 25 PSF – TOTAL (DOES NOT INCLUDE FRAMING WEIGHT)

DESIGN LIVE LOADS

OCCUPANCY OR USE	PSF
OFFICES	50
DINING ROOM/RESTAURANT	100
RESTROOMS	100
STAIRS	100
LOBBIES, LOUNGES & VESTIBULES	100
MAIN FLOORS AND PUBLIC BALCONY/DECK	100
MECHANICAL/UTILITIES ROOM	75
ROOF SNOW LOAD	**25

** DOES NOT INCLUDE DRIFTING SNOW

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NJ Professional Engineer
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

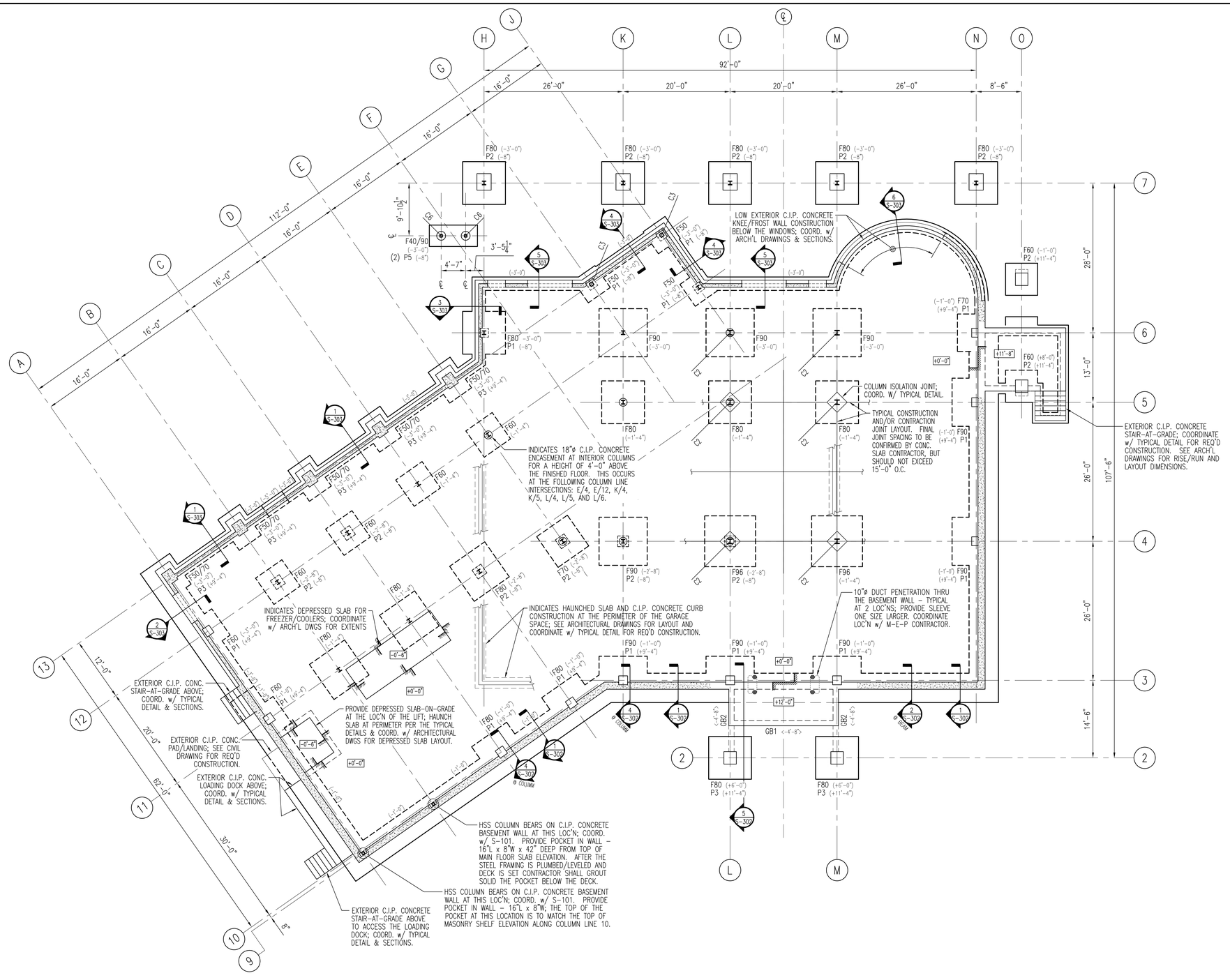
SHEET CONTENTS:

STRUCTURAL DESIGN INFORMATION

SUBMISSIONS DATE	DESCRIPTION
10.03.16	100% ISSUE
10.17.16	BID SET
02.22.17	REBID SET

REVISIONS DATE	DESCRIPTION

DATE	02.22.2017
SCALE	NONE
DRWN BY	TPM
CHKD BY	
JOB NO	2161228
SHEET:	OF:
DRWG NO	S-002



LOWER LEVEL FOUNDATION PLAN – GENERAL NOTES

SCALE: 1/8" = 1'-0"

1. LOWER LEVEL TOP OF SLAB ELEVATION +0'-0" (DATUM) [CIVIL ELEVATION +108.25'] UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE ALL ELEVATIONS WITH THE ARCHITECTURAL AND CIVIL DRAWINGS.
2. ±X'-X" INDICATES TOP OF SLAB ELEVATION ABOVE OR BELOW THE DATUM ELEVATION.
3. ALL ELEVATIONS SHOWN THUS (±X'-X") ARE TO THE TOP OF FOOTING OR PIER ELEVATION ABOVE OR BELOW THE DATUM ELEVATION.
4. LOWER LEVEL SLAB-ON-GRADE CONSTRUCTION: 5" THICK SLAB-ON-GRADE [f'c = 4,000 PSI AT 28 DAYS NORMAL WEIGHT CONCRETE (150 PCF) REINFORCED WITH 6x6-W2.9x2.9 INSTALLED 1/3 OF SLAB DEPTH BELOW TOP OF SLAB] ABOVE VAPOR BARRIER AND A MINIMUM 6" THICK POROUS FILL SUB-BASE COMPACTED PER THE RECOMMENDATIONS OF THE GEOTECHNICAL SOILS REPORT. VAPOR BARRIER SPECIFICATIONS PER THE ARCHITECTURAL DRAWINGS AND PROJECT SPECIFICATIONS.
5. CONSTRUCTION/CONTROL JOINT SPACING IN SLAB-ON-GRADE SHALL NOT EXCEED 15'-0" IN ANY DIRECTIONS. LAYOUT SHOWN ON PLAN IS DIAGRAMMATIC AND A FINAL JOINT LAYOUT PLAN SHALL BE COORDINATED WITH THE ARCHITECT.
6. ALL COLUMNS ARE CENTERED ON COLUMN CENTERLINES UNLESS OTHERWISE NOTED.
7. F# INDICATES COLUMN FOOTING MARK; COORDINATE WITH FOOTING SCHEDULE ON DRAWING S-301 FOR THE REQUIRED FOOTING SIZE AND REINFORCING.
8. P# INDICATES CAST-IN-PLACE CONCRETE PIER; COORDINATE WITH PIER SCHEDULE ON DRAWING S-301 FOR THE REQUIRED PIER SIZE AND REINFORCING
9. GB# INDICATES CAST-IN-PLACE CONCRETE GRADE BEAM FOUNDATION; COORDINATE WITH SCHEDULE ON DRAWING S-301 FOR REQUIRED SIZE AND REINFORCING. AT A MINIMUM, PROVIDE (4) #8 TOP AND BOTTOM BARS AND #4 TIES SPACED 12" ON-CENTER ALONG THE LENGTH OF THE GRADE BEAM.
10. CONCRETE WORK SHALL CONFORM WITH THE REQUIREMENTS OF THE AMERICAN CONCRETE INSTITUTE ACI 318 (LATEST EDITION).
11. REINFORCEMENT SHALL BE DEFORMED BARS ASTM DESIGNATION A-615, GRADE 60.
12. ALL BAR SUPPORTS SHALL BE CLASS 1 STAINLESS STEEL PROTECTED. FOLLOW C.R.S.I. RULES FOR PLACING OF REINFORCING STEEL AND ACCESSORIES. PROVIDE BAR SUPPORTS IN ACCORDANCE WITH ACI DETAILING MANUAL.
13. STEP SLAB-AT-GRADE AS REQUIRED AT ALL SLAB DEPRESSION LOCATIONS SHOWN ON PLAN; COORDINATE AS REQUIRED WITH THE ARCHITECTURAL DRAWINGS FOR EXACT DEPRESSION LOCATIONS AND DEPTHS.
14. SEE DRAWINGS S-001 AND S-002 FOR ADDITIONAL GENERAL STRUCTURAL NOTES AND FRAMING AND/OR CONSTRUCTION INFORMATION.
15. FOUNDATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE SITE SPECIFIC GEOTECHNICAL SOILS REPORT AS PREPARED BY ANS Geo, Inc. DATED June 7, 2016.
16. CONTROL SURFACE OR SUB-SURFACE WATER TO ALLOW FOUNDATION WORK TO BE PERFORMED/DONE IN DRY UNDISTURBED CONDITIONS.
17. PIPE SLEEVES FOR UTILITIES ARE TO BE TWO PIPE SIZES LARGER THAN THE PIPE SHOWN ON THE MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS. VERIFY AND COORDINATE WITH THE INDIVIDUAL TRADE CONTRACTOR AS REQUIRED. COORDINATE WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR REQUIRED LOCATIONS AND INVERT ELEVATIONS.
18. STAKEOUT/LOCATE THE BUILDING USING THE CIVIL AND ARCHITECTURAL DRAWINGS.
19. COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS. NOTIFY THE ARCHTIECT/ENGINEER OF ANY DIMENSIONAL DISCREPANCIES.

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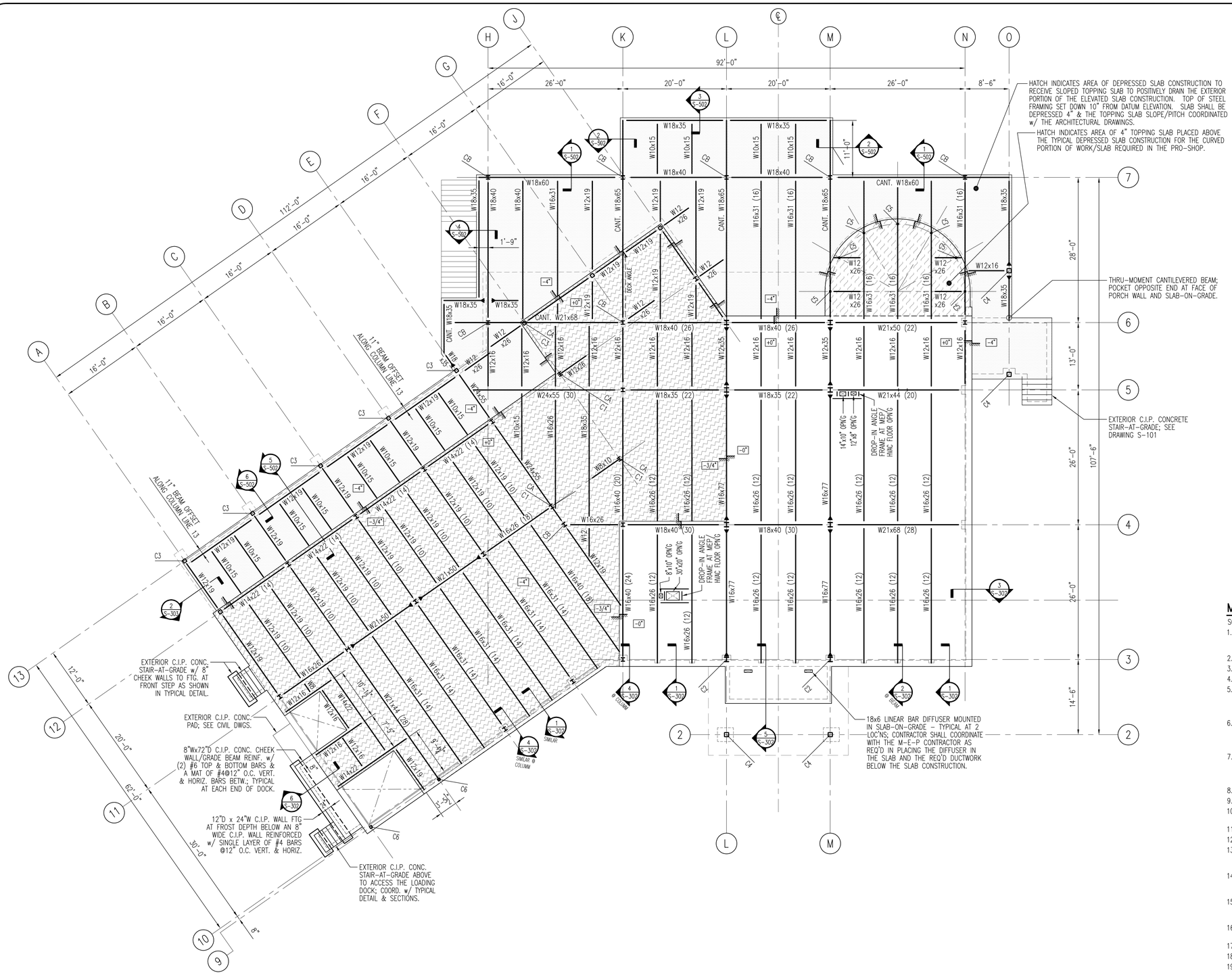
SHEET CONTENTS:

LOWER LEVEL FOUNDATION PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	1/8" = 1'-0"
10.17.16	BID SET			DRWN BY	TPM
02.22.17	REBID SET			CHKD BY	
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	S-100



MAIN LEVEL (1st FLOOR) FRAMING PLAN – GENERAL NOTES

SCALE: 1/8" = 1'-0"

1. TOP OF MAIN LEVEL SLAB ELEVATION +12'-0" [CIVIL ELEVATION +120.25'] (DATUM) UNLESS OTHERWISE NOTED. TOP OF STEEL (-6") UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE ALL ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
2. ±X'-X" INDICATES TOP OF SLAB ELEVATION ABOVE OR BELOW THE DATUM ELEVATION.
3. INDICATES THE TOP OF SLAB ELEVATION ABOVE OR BELOW THE GIVEN DATUM ELEVATION.
4. ALL ELEVATIONS SHOWN THUS (±X'-X") ARE TO THE TOP OF STEEL FRAMING ABOVE OR BELOW THE DATUM.
5. CLUBHOUSE LEVEL ELEVATED SLAB CONSTRUCTION: 4-1/2" NORMAL WEIGHT CONCRETE FILL (145 PCF DESIGN WEIGHT, 4,000 PSI AT 28 DAYS REINFORCED W/ 6x6-W2.1x2.1 WWF PLACED 1" DOWN FROM TOP OF SLAB) ON 1-1/2" - 18 GAGE GALVANIZED (G60) COMPOSITE FLOOR DECK - 1.5VLI BY VULCRAFT (OR APPROVED EQUAL). 6" TOTAL SLAB THICKNESS.
6. SHADED AREA ON PLAN INDICATES 4" DEPRESSED SLAB CONSTRUCTION FOR THE PLACEMENT OF A SLOPED EXTERIOR NORMAL WEIGHT CONCRETE TOPPING SLAB (1/8"/FOOT) TO THE PERIMETER EDGE ABOVE A WATERPROOF MEMBRANE (SEE ARCHITECTURAL SPECIFICATIONS) TO PROPERLY DRAIN THE EXTERIOR SLAB CONDITIONS/CONSTRUCTION AT THE DECK.
7. HATCHED AREA ON PLAN INDICATES 3/4" DEPRESSED SLAB CONSTRUCTION FOR THE PLACEMENT OF A 3/4" THICK COLORED AND POLISHED SLAB TOPPING WITHIN THE DINING ROOM/ BARS SPACES; THE CONTRACTOR SHALL COORDINATE AS REQUIRED WITH THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR THE EXTENTS OF THE FINISHED CONCRETE TOPPING.
8. ALL COLUMNS ARE CENTERED ON COLUMN CENTERLINES UNLESS OTHERWISE NOTED/INDICATED.
9. ALL STEEL TO BE ASTM - A992 GRADE 50 HIGH STRENGTH.
10. (##) INDICATES THE NUMBER OF 3/4" X 5" LONG (AFTER WELDING) SHEAR STUDS EQUALLY SPACED FOR THE ENTIRE LENGTH OF THE BEAM.
11. ▶—— INDICATES MOMENT CONNECTION; COORDINATE/SEE TYPICAL MOMENT CONNECTION DETAILS.
12. ALL FILLER BEAMS AND/OR JOISTS NOT DIMENSIONED ARE TO BE EQUALLY SPACED.
13. DIMENSION FROM BEAM CENTERLINE TO EDGE OF SLAB OPENING TO BE 6" UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE AS REQUIRED WITH THE TYPICAL SLAB EDGE DETAIL FOR SIZE OF REQUIRED CLOSURE ANGLE/POUR STOP.
14. FLOOR DECK SUPPLIER TO PROVIDE ANGLE CLOSURE AROUND PERIMETER AND ALL AROUND FLOOR OPENINGS UNLESS OTHERWISE NOTED; GAGE AS REQUIRED (#16 GAGE MINIMUM); CONTRACTOR SHALL COORDINATE AS REQUIRED WITH STEEL FABRICATOR/ERECTOR.
15. DECK SUPPLIER SHALL PROVIDE A 12"X12"X20 GAUGE SEALER SHEET AROUND ALL PIPE PENETRATIONS 4" OR LESS. FLOOR DECK SUPPLIER TO PROVIDE ANGLE CLOSURE AROUND PERIMETER AND ALL AROUND FLOOR OPENINGS UNLESS OTHERWISE NOTED; GAGE AS REQUIRED (#16 GAGE MINIMUM).
16. SEE DRAWINGS S-001 AND S-002 FOR GENERAL NOTES, SHORING AND BRACING REQUIREMENTS AND ADDITIONAL CONSTRUCTION AND DESIGN CRITERIA.
17. W12 INDICATES W12x16. W8 INDICATES W8x15.
18. STAKEOUT/LOCATE THE BUILDING USING THE ARCHITECTURAL AND CIVIL DRAWINGS AND ASSOCIATED SPECIFICATIONS.
19. REFERENCE THE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS; CONTRACTOR SHALL COORDINATE WITH THOSE DIMENSIONS SHOWN HEREIN AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES WHAT-SO-EVER PRIOR TO THE START OF WORK.
20. WALLS THAT ARE SHOWN ON THE STRUCTURAL PLANS ARE DIAGRAMMATIC. CONTRACTOR SHALL VERIFY ALL WALL LOCATIONS, OPENINGS, ETC. WITH THE ARCHITECTURAL DRAWINGS AND PROVIDE THE PROPER REINFORCING, HEADERS, ACCESSORIES, BRACING, ETC. AS PER SECTIONS, TYPICAL DETAILS, GENERAL NOTES, AND THE ENTIRE SET OF CONSTRUCTION DOCUMENTS.

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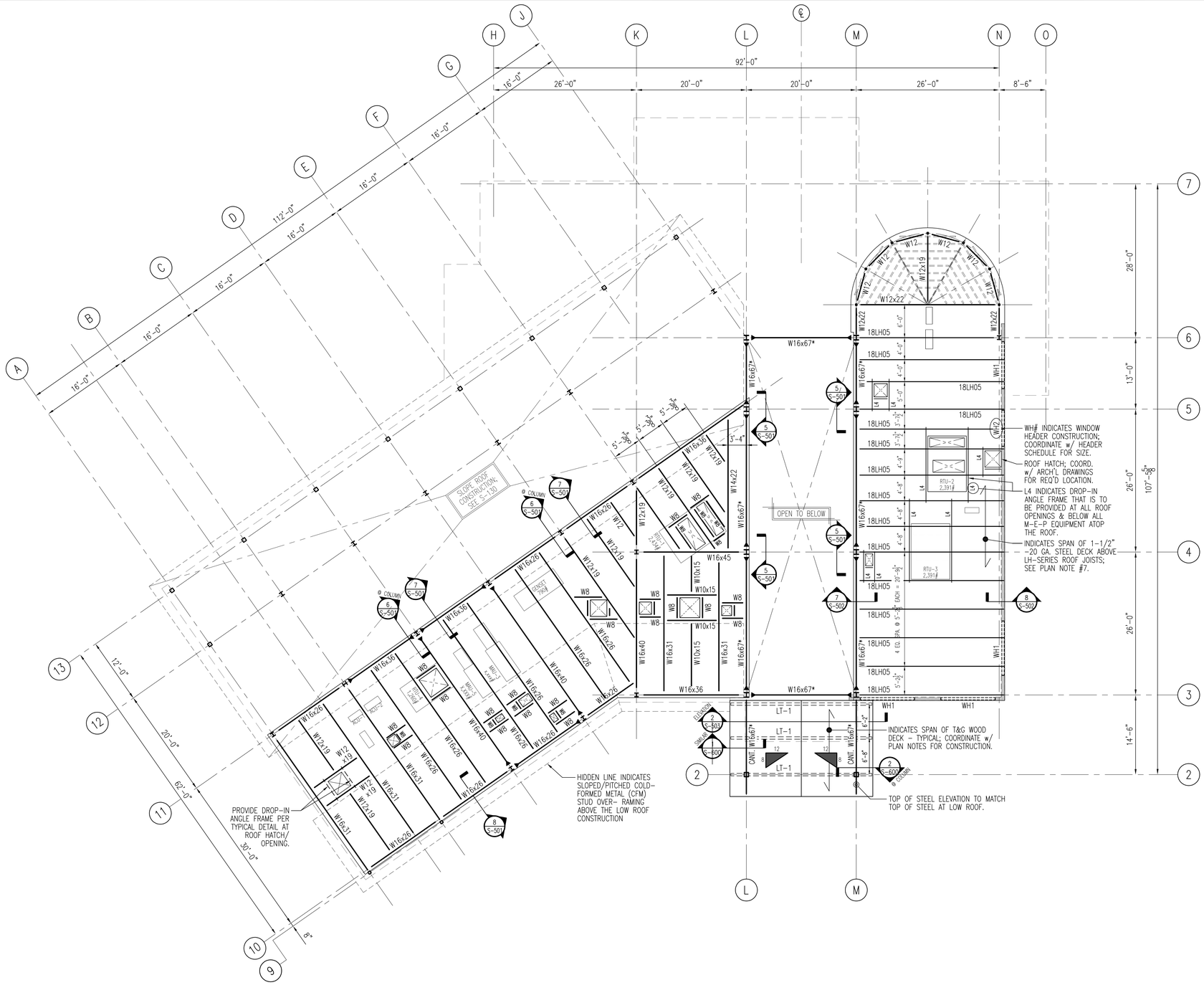
SHEET CONTENTS:

MAIN LEVEL FRAMING PLAN

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	TPM
CHKD BY	
JOB NO	2161228
SHEET:	OF:
DRWG NO	S-101



LOW ROOF FRAMING PLAN – GENERAL NOTES

SCALE: 1/8" = 1'-0"

1. TOP OF LOW ROOF ELEVATED SLAB ELEVATION +25'-8" [CIVIL ELEVATION +133.92'] (DATUM) UNLESS OTHERWISE NOTED. TOP OF STEEL (-4") UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE ALL ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
2. ±X'-X" INDICATES TOP OF SLAB ELEVATION ABOVE OR BELOW THE DATUM ELEVATION.
3. INDICATES THE TOP OF SLAB ELEVATION ABOVE OR BELOW THE GIVEN DATUM ELEVATION.
4. ALL ELEVATIONS SHOWN THUS (±X'-X") ARE TO THE TOP OF STEEL FRAMING ABOVE OR BELOW THE DATUM.
5. LOW ROOF ELEVATED SLAB CONSTRUCTION: 2-1/2" NORMAL WEIGHT CONCRETE FILL (145 PCF DESIGN WEIGHT, 4,000 PSI AT 28 DAYS REINFORCED W/ 6x6-W2.1xW2.1 WWF PLACED 1" DOWN FROM TOP OF SLAB) ON 1-1/2" - 18 GAGE GALVANIZED (G60) COMPOSITE FLOOR DECK - 1.5VLI BY VULCRAFT (OR APPROVED EQUAL). 4" TOTAL SLAB THICKNESS.
6. SLOPED ROOF CONSTRUCTION AT PORTE-COCHERE: 3x6 NOMINAL (2-3/16" x 5-1/4" ACTUAL) TONGUE & GROOVE LOCK-DECK LAMINATED TIMBER DECK (OR EQUAL). DECK SHALL BE FASTENED PER MANUFACTURER'S WRITTEN SPECIFICIATIONS TO THE ROOF FRAMING INDICATED ON PLAN. THE DECK SHALL BE FASTENED/FACE NAILED TO THE ROOF FRAMING w/ 2-20D NAILS AND TOENAILED ALONG EACH COURSE WITH 8D NAILS @ 30" O.C. MAXIMUM. THE CONTRACTOR SHALL COORDINATE WITH THE ROOF CONSTRUCTION DETAIL ON THE ARCHITECTURAL DRAWINGS FOR THE REQUIRED INSULATION AND CONSTRUCTION ABOVE THE TIMBER DECK - AT A MINIMUM, A VAPOR BARRIER SHALL BE PLACED ABOVE THE TIMBER DECK.ALL COLUMNS ARE CENTERED ON COLUMN CENTERLINES UNLESS OTHERWISE NOTED/INDICATED.
7. LOW ROOF CONSTRUCTION: 1-1/2" WIDE RIB 20 GAUGE GALVANIZED (G60) - TYPE 1.5B BY VULCRAFT (OR APPROVED EQUAL) FOR THE LOW ROOF CONSTRUCTION BETWEEN COLUMN LINES M & N.
8. ALL STEEL TO BE ASTM - A992 GRADE 50 HIGH STRENGTH.
9. ▶—— INDICATES MOMENT CONNECTION; COORDINATE/SEE TYPICAL MOMENT CONNECTION DETAILS.
10. ALL FILLER BEAMS AND/OR JOISTS NOT DIMENSIONED ARE TO BE EQUALLY SPACED.
11. DIMENSION FROM BEAM CENTERLINE TO EDGE OF SLAB OPENING TO BE 6" UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE AS REQUIRED WITH THE TYPICAL SLAB EDGE DETAIL FOR SIZE OF REQUIRED CLOSURE ANGLE/POUR STOP.
12. FLOOR DECK SUPPLIER TO PROVIDE ANGLE CLOSURE AROUND PERIMETER AND ALL AROUND FLOOR OPENINGS UNLESS OTHERWISE NOTED; GAGE AS REQUIRED (#16 GAGE MINIMUM); CONTRACTOR SHALL COORDINATE AS REQUIRED WITH STEEL FABRICATOR/ERECTOR.
13. DECK SUPPLIER SHALL PROVIDE A 12"x12"x20 GAUGE SEALER SHEET AROUND ALL PIPE PENETRATIONS 4" OR LESS. FLOOR DECK SUPPLIER TO PROVIDE ANGLE CLOSURE AROUND PERIMETER AND ALL AROUND FLOOR OPENINGS UNLESS OTHERWISE NOTED; GAGE AS REQUIRED (#16 GAGE MINIMUM).
14. SEE DRAWINGS S-001 AND S-002 FOR GENERAL NOTES, SHORING AND BRACING REQUIREMENTS AND ADDITIONAL CONSTRUCTION AND DESIGN CRITERIA.
15. W12 INDICATES W12x16. W8 INDICATES W8x15.
16. LT-1 INDICATES LOW ROOF TRUSS. COORDINATE WITH ELEVATIONS ON DRAWING S-600 FOR PROFILE AND MEMBER SIZES. TRUSSES ARE TO BEAR ON THE STEEL FRAMING AT THE PORTE-COCHERE.
17. * - INDICATES STEEL FRAMING THAT IS ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (A.E.S.S.) FRAMING; THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT SPECIFICATIONS FOR FINISH REQUIREMENTS.
18. STAKEOUT/LOCATE THE BUILDING USING THE ARCHITECTURAL AND CIVIL DRAWINGS AND ASSOCIATED SPECIFICATIONS.
19. REFERENCE THE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS; CONTRACTOR SHALL COORDINATE WITH THOSE DIMENSIONS SHOWN HEREIN AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES WHAT-SO-EVER PRIOR TO THE START OF WORK.
20. WALLS THAT ARE SHOWN ON THE STRUCTURAL PLANS ARE DIAGRAMMATIC. CONTRACTOR SHALL VERIFY ALL WALL LOCATIONS, OPENINGS, ETC. WITH THE ARCHITECTURAL DRAWINGS AND PROVIDE THE PROPER REINFORCING, HEADERS, ACCESSORIES, BRACING, ETC. AS PER SECTIONS, TYPICAL DETAILS, GENERAL NOTES, AND THE ENTIRE SET OF CONSTRUCTION DOCUMENTS.

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2-22-2017

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DATE 08/26/16

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CERTIFICATE OF AUTHORIZATION AC-438

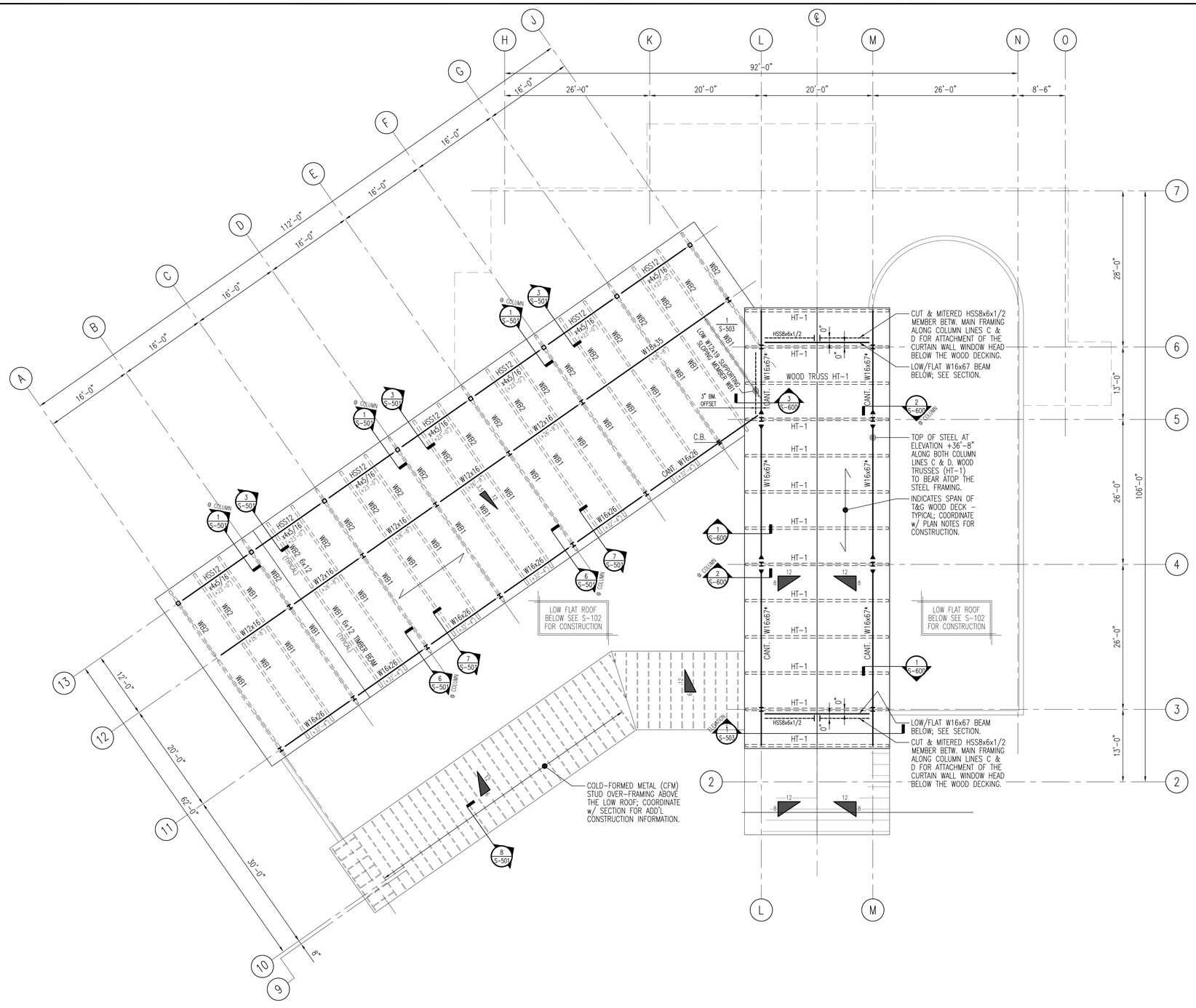
PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOW ROOF FRAMING PLAN

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	1/8" = 1'-0"
10.17.16	BID SET			DRWN BY	TPM
02.22.17	REBID SET			CHKD BY	
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	S-102



MAIN/HIGH ROOF FRAMING PLAN – GENERAL NOTES

SCALE: 1/8" = 1'-0"

1. MAIN AND HIGH ROOF TOP OF STEEL ELEVATION VARIES; CONTRACTOR SHALL COORDINATE ALL ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS. ELEVATIONS INDICATED ON PLAN ARE ABOVE THE DATUM ELEVATION OF THE MAIN LEVEL/FIRST FLOOR SLAB CONSTRUCTION.
2. (±X'-X") INDICATES ELEVATION ABOVE THE MAIN LEVEL/FIRST FLOOR SLAB [DATUM].
3. SLOPED ROOF DECK CONSTRUCTION: 3x6 NOMINAL (2-3/16" x 5-1/4" ACTUAL) TONGUE & GROOVE LOCK-DECK LAMINATED TIMBER DECK (OR EQUAL). DECK SHALL BE FASTENED PER MANUFACTURER'S WRITTEN SPECIFICATIONS TO THE ROOF FRAMING INDICATED ON PLAN. THE DECK SHALL BE FASTENED/FACE NAILED TO THE ROOF FRAMING w/ 2-20d NAILS AND TOENAILED ALONG EACH COURSE WITH 8d NAILS @ 30" O.C. MAXIMUM. THE CONTRACTOR SHALL COORDINATE WITH THE ROOF CONSTRUCTION DETAIL ON THE ARCHITECTURAL DRAWINGS FOR THE REQUIRED INSULATION AND CONSTRUCTION ABOVE THE TIMBER DECK - AT A MINIMUM, A VAPOR BARRIER SHALL BE PLACED ABOVE THE TIMBER DECK.
4. MINIMUM WARRANTY OF ROOFING MATERIAL SHALL BE 30 YEARS UNLESS REDUCED BY THE OWNER; COORDINATE WITH THE ARCHITECTURAL DRAWINGS AND PROJECT SPECIFICATIONS FOR THE REQUIRED ROOFING CONSTRUCTION.
5. ALL SILL PLATES OR EXTERIOR WOOD SHALL BE PRESSURE TREATED.
6. SEE ARCHITECTURAL DRAWINGS FOR REQUIRED EAVE AND OVERHANG CONSTRUCTION AT THE PERIMETER OF THE FACILITIES BUILDING.
7. ALL COLUMNS ARE CENTERED ON COLUMN CENTERLINES UNLESS OTHERWISE NOTED/INDICATED.
8. ALL STEEL TO BE ASTM - A992 GRADE 50 HIGH STRENGTH.
9. ▶— INDICATES MOMENT CONNECTION; COORDINATE/SEE TYPICAL MOMENT CONNECTION DETAILS.
10. ALL FILLER BEAMS AND/OR JOISTS NOT DIMENSIONED ARE TO BE EQUALLY SPACED.
11. MINIMUM WARRANTY OF ROOFING MATERIAL SHALL BE 30 YEARS UNLESS REDUCED BY THE OWNER; COORDINATE WITH THE ARCHITECTURAL DRAWINGS AND PROJECT SPECIFICATIONS FOR THE REQUIRED ROOFING CONSTRUCTION.
12. INSTALL ALL ROOFING PRODUCTS IN STRICT ACCORDANCE WITH THE WRITTEN MANUFACTURER REQUIREMENTS.
13. CUTTING, NOTCHING AND DRILLING OF WALL STUDS, FLOOR AND/OR ROOF JOISTS, RAFTERS AND CEILING JOISTS SHALL COMPLY WITH THE REQUIREMENTS SET FORTH IN SECTION 2308.10.4.2. IN THE 2009 IBC. CUTTING AND NOTCHING OF ENGINEERED LUMBER/TJI FRAMING SHALL ONLY BE PERFORMED IN ACCORDANCE WITH THE WRITTEN SPECIFICATIONS OF THE MANUFACTURER.
14. WB# INDICATES WOOD BEAM; COORDINATE WITH SCHEDULE ON S-600 FOR SIZE.
15. HT-1 INDICATES HIGH ROOF TRUSS. COORDINATE WITH ELEVATIONS ON DRAWING S-600 FOR PROFILE AND MEMBER SIZES. TRUSSES ARE TO BEAR ON THE STEEL FRAMING AT THE PORTE-COCHERE.
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20. WALLS THAT ARE SHOWN ON THE STRUCTURAL PLANS ARE DIAGRAMMATIC. CONTRACTOR SHALL VERIFY ALL WALL LOCATIONS, OPENINGS, ETC. WITH THE ARCHITECTURAL DRAWINGS AND PROVIDE THE PROPER REINFORCING, HEADERS, ACCESSORIES, BRACING, ETC. AS PER SECTIONS, TYPICAL DETAILS, GENERAL NOTES, AND THE ENTIRE SET OF CONSTRUCTION DOCUMENTS.

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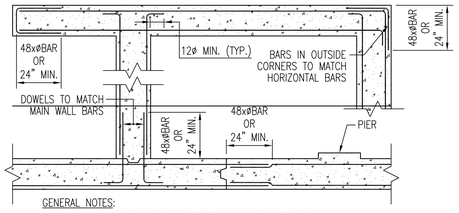
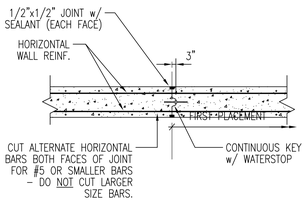


GENERAL NOTES:
1. WALL SHAPES AS SHOWN ARE FOR BAR PLACEMENT ONLY. EXACT WALL SHAPES AS SHOWN MAY NOT APPEAR ON PROJECT.
2. REFER TO ACI-318 FOR CONCRETE COVER REQUIREMENTS.
3. REFER TO WALL SCHEDULE OR SECTIONS FOR REINFORCING.
4. "48xø BAR OR 24" MIN." INDICATES THE MINIMUM REQUIRED LAP LENGTH (WHICHEVER IS GREATER).

TYPICAL WALL INTERSECTION SCHEMATIC

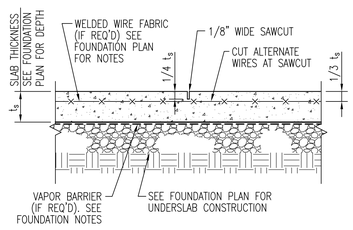
SCALE: N.T.S.



GENERAL NOTES:
1. JOINT LOCATIONS AND DETAILS TO BE APPROVED BY STRUCTURAL ENGINEER.
2. PRIOR TO SECOND PLACEMENT OF WALL AT CONSTRUCTION JOINTS, ABRASIVE BLAST OR CHIP FIRST PLACEMENT FACE OF JOINT TO REMOVE LAITANCE, HONEY COMBING, ETC. CLEAN WITH WATER AND STIFF BRUSH AND MAKE SECOND PLACEMENT WHEN CONCRETE IS DAMP.

PLAN DETAIL – VERTICAL CONSTRUCTION JOINT IN CONCRETE WALL

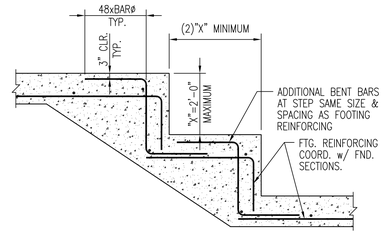
SCALE: N.T.S.



GENERAL NOTE:
1. FILL SAWCUT WITH JOINT FILLER 120 DAYS (MINIMUM) AFTER CUTTING (SEE SPECS).

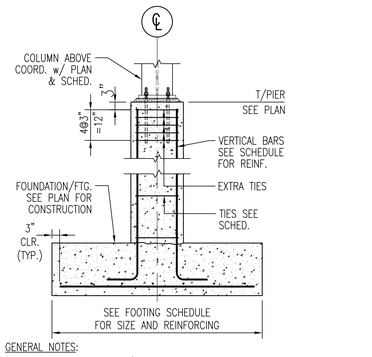
TYPICAL CONTROL JOINT DETAIL

SCALE: N.T.S.



TYPICAL STEPPED FOOTING DETAIL

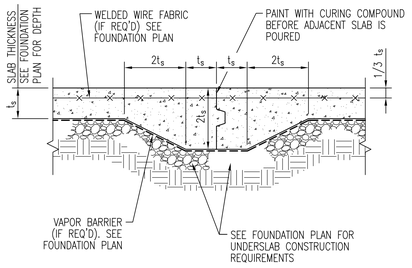
SCALE: N.T.S.



GENERAL NOTES:
1. DOWELS INTO FOOTING/FOUNDATION TO BE SAME SIZE AND SPACING AS VERTICAL BARS (PROVIDE TENSION LAP).
2. TYPICAL DETAIL TO BE USED IN COORDINATION WITH PIER AND FOOTING SCHEDULES TO DETERMINE REQUIRED REINFORCING.

TYPICAL PIER AND FOOTING DETAIL

SCALE: N.T.S.



TYPICAL CONSTRUCTION JOINT DETAIL

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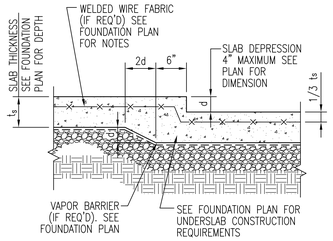
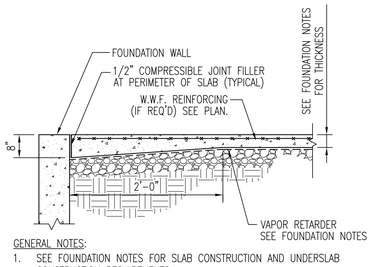


TYPICAL SLAB DEPRESSION DETAIL

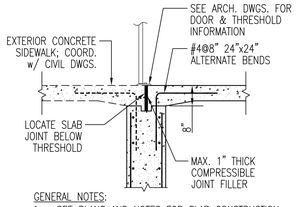
SCALE: N.T.S.



GENERAL NOTES:
1. SEE FOUNDATION NOTES FOR SLAB CONSTRUCTION AND UNDERSLAB CONSTRUCTION REQUIREMENTS.
2. COORDINATE WITH PLAN FOR FOUNDATION WALL DESIGN & REINFORCING.

TYPICAL THICKENED SLAB EDGE DETAIL

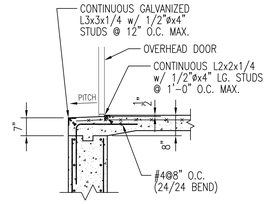
SCALE: N.T.S.



GENERAL NOTES:
1. SEE PLANS AND NOTES FOR SLAB CONSTRUCTION.
2. COORDINATE WITH SECTIONS FOR REQ'D FOUNDATION WALL THICKNESS AND REINFORCING.

TYPICAL SLAB DETAIL AT DOOR

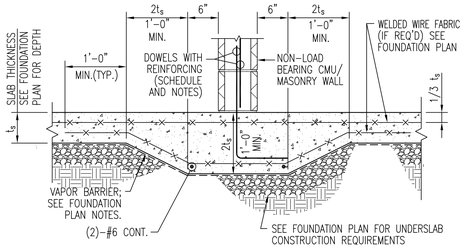
SCALE: N.T.S.



GENERAL NOTES:
1. SEE PLANS AND NOTES FOR SLAB CONSTRUCTION.
2. COORDINATE WITH SECTIONS FOR REQ'D FOUNDATION WALL THICKNESS AND REINFORCING.

TYPICAL SLAB DETAIL AT OVERHEAD DOOR

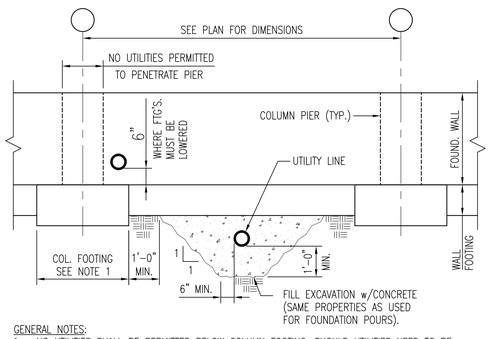
SCALE: N.T.S.



GENERAL NOTES:
1. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR WALL LOCATIONS/LAYOUT AND CMU SIZE/THICKNESS.
2. PROVIDE A MINIMUM #4@48" O.C. BENT BAR DOWEL INTO THE CMU WALL CONSTRUCTION ABOVE THE HAUNCHED SLAB. THE CONTRACTOR SHALL REINFORCE THE WALL CONSTRUCTION WITH #4 VERTICAL BARS SPACED 48" ON-CENTER MAXIMUM, UNLESS OTHERWISE NOTED.

TYPICAL HAUNCHED SLAB DETAIL – CMU WALL

SCALE: N.T.S.



GENERAL NOTES:
1. NO UTILITIES SHALL BE PERMITTED BELOW COLUMN FOOTING. SHOULD UTILITIES NEED TO BE LOCATED IN THE VICINITY OF COLUMN FOOTING, THE FOOTING SHALL BE LOWERED IN ELEVATION (SEE TYPICAL STEPPED FOOTING DETAIL). IF LOWERING OF FOOTING IS NOT POSSIBLE, CONSULT A/E FOR FURTHER DIRECTION.
2. COORDINATE WITH PLANS AND SECTIONS FOR REQUIRED WALL, FOOTING AND PIER CONSTRUCTION.

TYPICAL DETAIL – UTILITY LINE BELOW WALL FOOTING

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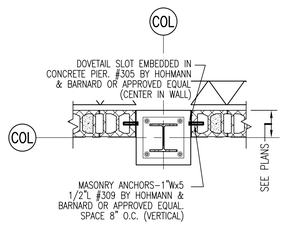
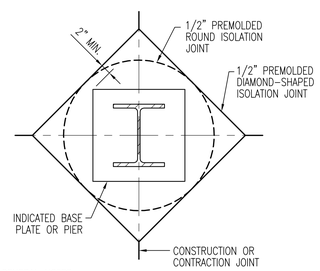


GENERAL NOTES:
1. ALL MASONRY ACCESSORIES TO BE HOT DIP GALVANIZED PER SPECIFICATIONS.
2. SEE WALL SECTIONS AND SCHEDULES FOR WALL CONSTRUCTION.
3. SEE PLANS OR COLUMN SCHEDULE FOR PIER, BASE PLATE, AND COLUMN SIZE. ACTUAL COLUMN TYPE AND MATERIAL MAY VARY FROM THE STEEL COLUMN SHOWN IN THE ABOVE PLAN DETAIL.
4. MASONRY CONTRACTOR TO VERIFY COMPATIBILITY OF MASONRY ACCESSORIES.

TYPICAL CONCRETE PIER & MASONRY WALL INTERSECTION SINGLE WYTHE

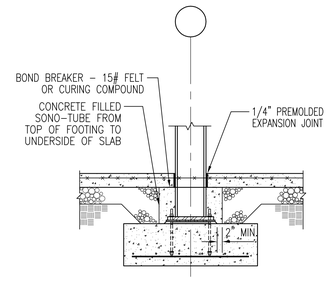
SCALE: N.T.S.



GENERAL NOTES:
1. CONTRACTOR HAS OPTION OF USING ROUND OR DIAMOND SHAPED ISOLATION JOINT.
2. USE HALF-CIRCLE OR HALF-DIAMOND AT EXTERIOR WALLS.
3. PROTECT FROM STORM WATER BEFORE FILLING.

TYPICAL COLUMN ISOLATION JOINT

SCALE: N.T.S.



TYPICAL COLUMN BASE ON FOOTING

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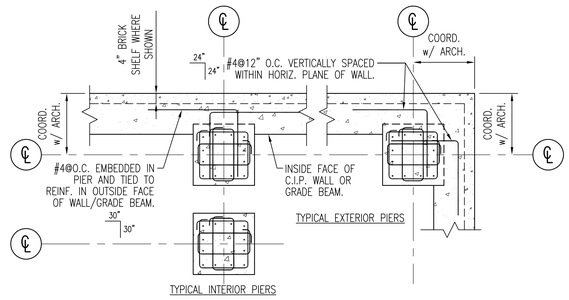

GENERAL NOTES:
1. SEE PLAN NOTES AND SCHEDULES FOR PIER SIZE AND REINFORCING.
2. REFER TO ACI-318 FOR CONCRETE COVE REQUIREMENTS.
3. REFER TO WALL SCHEDULE OR SECTIONS FOR REINFORCING IN WALLS.

TYPICAL PIER DETAILS

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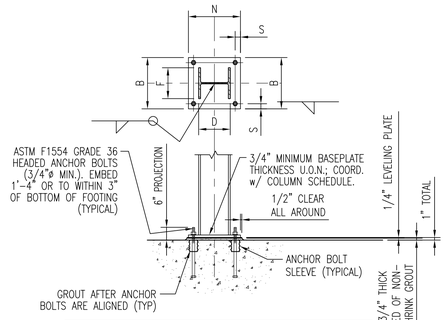

MINIMUM BASEPLATE DIMENSIONS			
CONDITION (SEE ABOVE)	N (in)	B (in)	S (in)
(4) HOLE BASEPLATE	D+6"	F+6"	1 1/2"

GENERAL NOTES:
1. THE TYPICAL DETAIL APPLIES UNLESS OTHERWISE NOTED ON PLANS OR COLUMN SCHEDULE.
2. WELDS INDICATED ARE MINIMUM REQUIRED. VERIFY THROAT THICKNESS OF WELD PER AISC MANUAL OF STEEL CONSTRUCTION.

TYPICAL BASEPLATE DETAILS

SCALE: N.T.S.

COLUMN SCHEDULE

MARK	SIZE	BASE PLATE	ANCHOR BOLTS	COMMENTS/ REMARKS
C1	W8x48	1-1/2" x 15" x 15"	(4) 1"ø	–
C2	W10x77	1-1/2" x 18" x 18"	(4) 1"ø	–
C3	HSS8x8x3/8	1" x 14" x 14"	(4) 3/4"ø	–
C4	HSS10x10x3/8	1" x 18" x 18"	(4) 3/4"ø	–
C5	HSS4x4x3/8	COORD. w/ TYP. DET.	(4) 3/4"ø	COLUMN ABOVE
C6	HSS6x6x3/8	1" x 7" x 12"	(4) 3/4"ø	STAIR COLUMNS

GENERAL NOTES:
1. UNLESS OTHERWISE NOTED, ALL COLUMNS ARE MARK C1. REFER TO THE FOUNDATION PLAN FOR MARKS OTHER THAN C1.
2. COMPLY WITH TYPICAL DETAILS AND GENERAL NOTES FOR ALL CONNECTIONS, REINFORCING, AND OTHER REQUIREMENTS TO COMPLETE THE WORK.
3. COLUMNS, CAP PLATES, LEVELING PLATES AND BASE PLATES BY STEEL FABRICATOR.
4. STEEL CAP PLATES TO BE 3/4" x COLUMN SIZE UNLESS OTHERWISE NOTED. PROVIDE CAP PLATE ATOP ALL HSS COLUMNS AND W-SHAPE COLUMNS THAT ARE PART OF A MOMENT FRAME AS INDICATED ON THE FRAMING PLANS.
5. ALL BASEPLATES TO BE 4-BOLT ANCHOR ARRANGEMENT; COORDINATE WITH TYPICAL BASEPLATE DETAIL ON S-301.

FOOTING SCHEDULE

ALLOWABLE BEARING CAPACITY/ PRESSURE 2,000 PSF (NOTE 5).

MARK	SIZE	DEPTH	REINFORCING @ BOTTOM EACH WAY	REINFORCING @ TOP EACH WAY
F40	4'-0" x 4'-0"	1'-0"	8-#4	–
F50	5'-0" x 5'-0"	1'-0"	6-#5	–
F60	6'-0" x 6'-0"	1'-1"	7-#5	–
F70	7'-0" x 7'-0"	1'-2"	9-#5	–
F80	8'-0" x 8'-0"	1'-4"	10-#5	–
F90	9'-0" x 9'-0"	1'-6"	9-#6	–
F96	9'-6" x 9'-6"	1'-6"	10-#6	–
F120	12'-0" x 12'-0"	1'-11"	12-#7	–
F130	13'-0" x 13'-0"	2'-1"	13-#7	–
F40/90	4'-0" x 9'-0"	1'-6"	8-#6 x 3'-6" 5-#6 x 8'-6"	–
F50/70	5'-0" x 7'-0"	1'-2"	9-#5 x 4'-6" 6-#5 x 6'-6"	– 6-#5 x 6'-6"

GENERAL NOTES:
1. f'c = 4,000 PSI @ 28 DAYS
2. fy = 60,000 PSI
3. PROVIDE ACI STANDARD 180° HOOKED REBAR ENDS WHERE INDICATED.
4. FOOTING MARKS SHOWN ON SCHEDULE MAY NOT APPEAR IN THE PROJECT.
5. ALLOWABLE SOIL BEARING CAPACITY/PRESSURE OF 2,000 PSF PER THE ON-SITE GEOTECHNICAL INVESTIGATION PROVIDED BY ANS Geo, Inc. DATED JUNE 7, 2016.

GRADE BEAM SCHEDULE

MARK	SIZE (W x D)	CONTINUOUS BOTTOM BARS	CONTINUOUS TOP BARS	HOOPS/ TIES	COMMENTS/ REMARKS
GB1	12" x 48"	(4) #7 BARS	(4) #7 BARS	#4@12"	–
GB2	12" x 48"	(4) #8 BARS	(4) #8 BARS	#4@12"	–

GENERAL NOTES:
1. f'c = 4,000 PSI @ 28 DAYS (NORMAL WEIGHT 145 PCF)
2. fy = 60,000 PSI
4. TOP OF GRADE BEAM SHALL BE SET 8" BELOW THE TOP OF FINISHED FLOOR ELEVATION. AND THE NEW SLAB-ON-GRADE CONSTRUCTION BEAR ON THE TOP OF THE GRADE BEAM

PIER SCHEDULE

MARK	SIZE	VERTICAL REINFORCING	STIRRUPS/TIES	COMMENTS/ REMARKS
P1	20" x 20"	(12) #7 BARS	#4 @ 12"	–
P2	24" x 24"	(12) #8 BARS	#4 @ 12"	–
P3	24" x 30"	(14) #8 BARS	#4 @ 12"	4 x 5 PATTERN
P4	24" x 36"	(14) #8 BARS	#4 @ 12"	TAPERED PIER
P5	20"ø	(8) #5 BARS	#3 @ 12"	AROUND COLUMN

GENERAL NOTES:
1. f'c = 4,000 PSI @ 28 DAYS (NORMAL WEIGHT 145 PCF)
2. fy = 60,000 PSI
4. TOP OF PIER ELEVATION VARIES; SEE PLAN FOR ELEVATIONS.
5. COORDINATE AS REQUIRED w/ THE TYPICAL PIER DETAIL ON S-300.

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2-22-2017

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NJ License No. AI 14394

NAME: Marc Bowen, PE
NJ Professional Engineer
LICENSE NO.: 44034
DATE 08/26/16

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

TYPICAL DETAILS & SCHEDULES

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS NOTED
10.17.16	BID SET			DRWN BY	TPM
02.22.17	REBID SET			CHKD BY	
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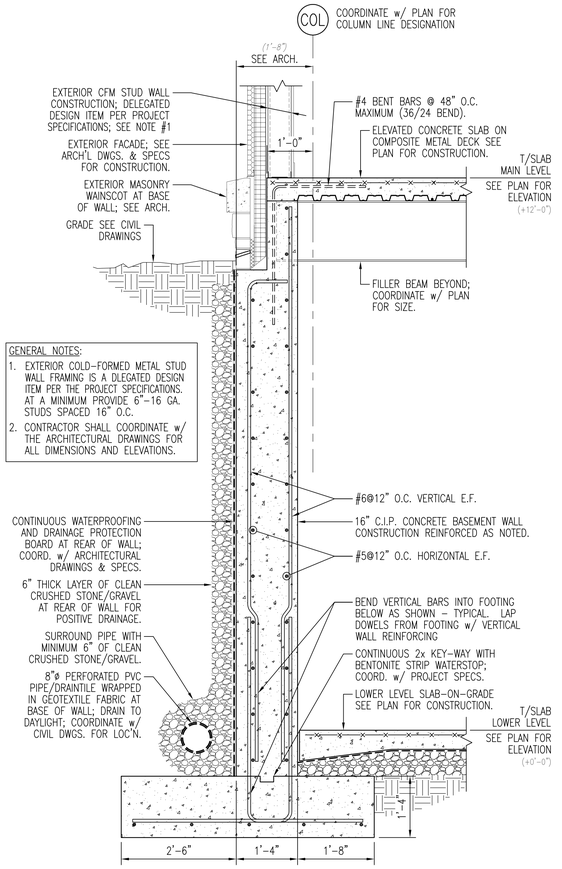
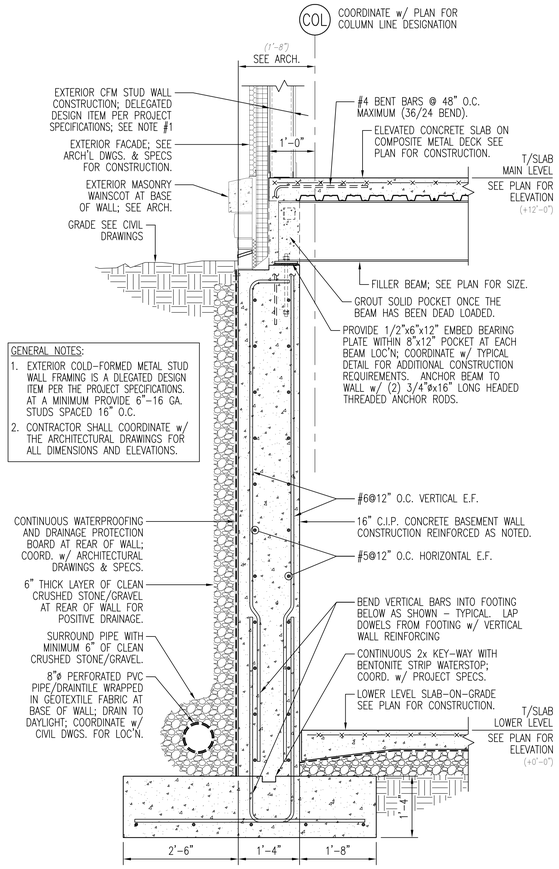
				SHEET:	OF:
				DRWG NO	S-301



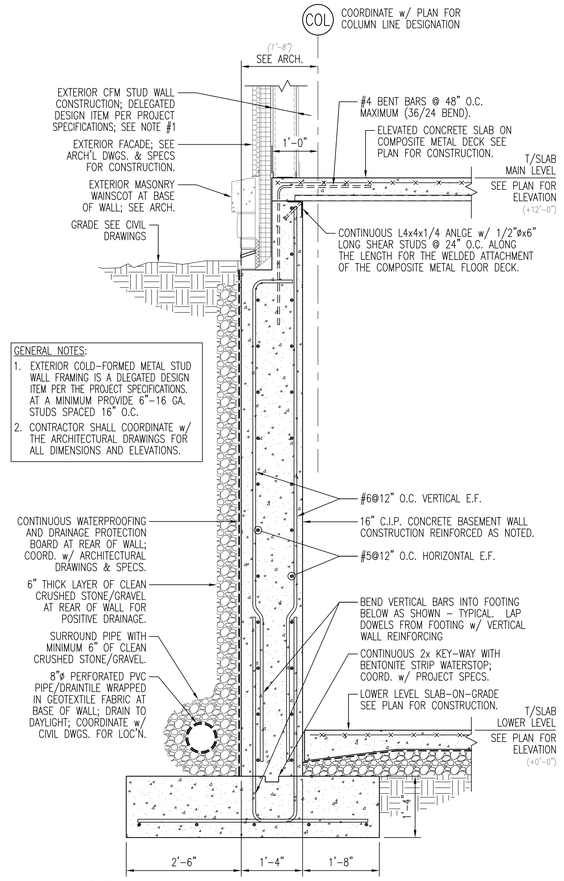
1 / S-302 **COMMON/TYPICAL BASEMENT WALL SECTION**

SCALE: 3/4" = 1'-0"



2 / S-302 **COMMON/TYPICAL BASEMENT WALL SECTION AT BEAM BRG.**

SCALE: 3/4" = 1'-0"



3 / S-302 **COMMON/TYPICAL BASEMENT WALL SECTION**

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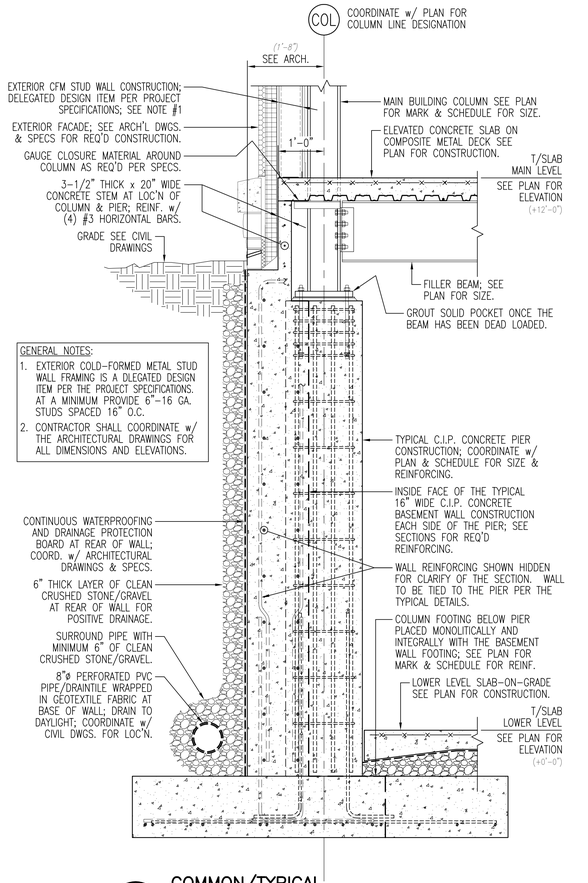
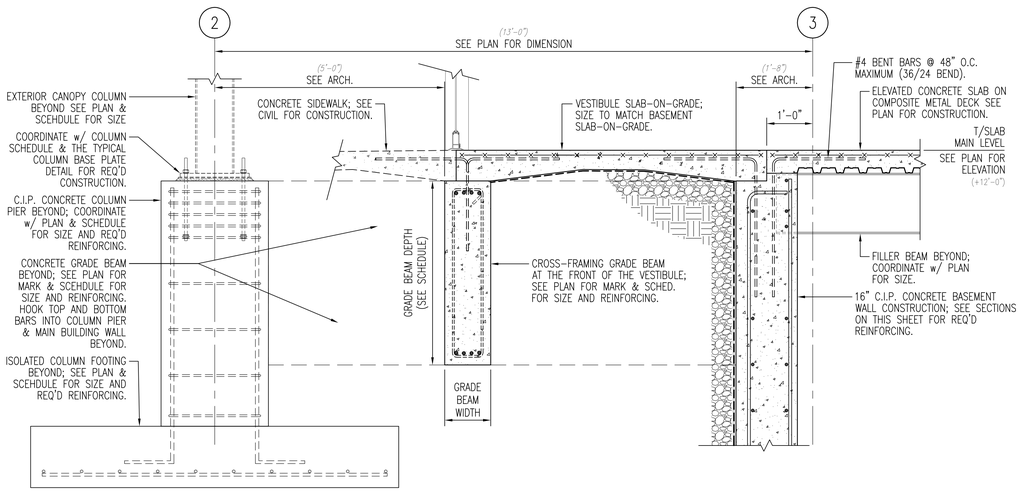


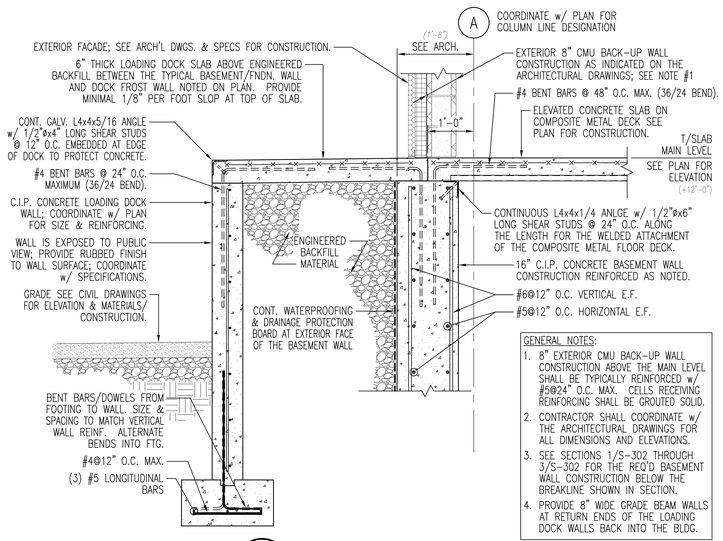
4 / S-302 **COMMON/TYPICAL SECTION AT COLUMN IN BASEMENT**

SCALE: 3/4" = 1'-0"



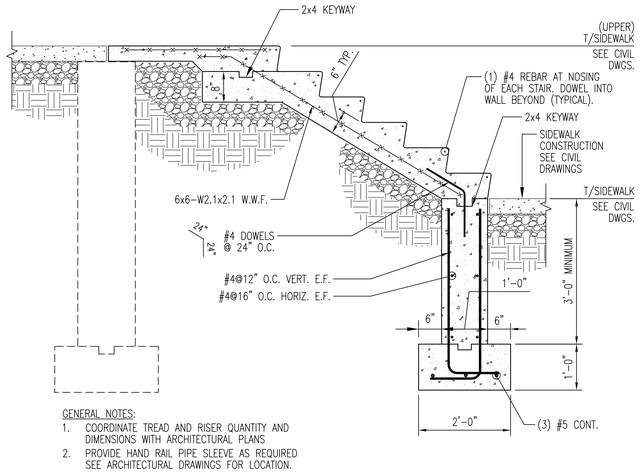
5 / S-302 **SECTION AT/THRU VESTIBULE**

SCALE: 3/4" = 1'-0"



6 / S-302 **SECTION AT/THRU LOADING DOCK**

SCALE: 3/4" = 1'-0"



TYPICAL CONCRETE STAIR AT GRADE

SCALE: N.T.S.

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PROJECT:

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SHEET CONTENTS:

FOUNDATION SECTIONS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
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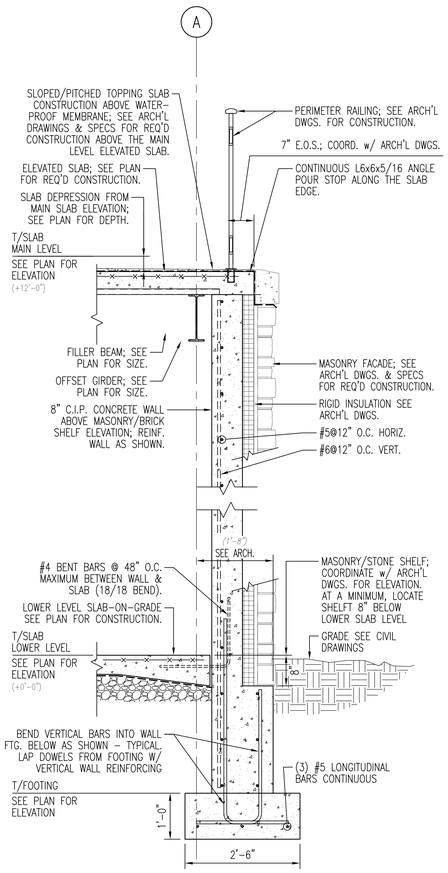
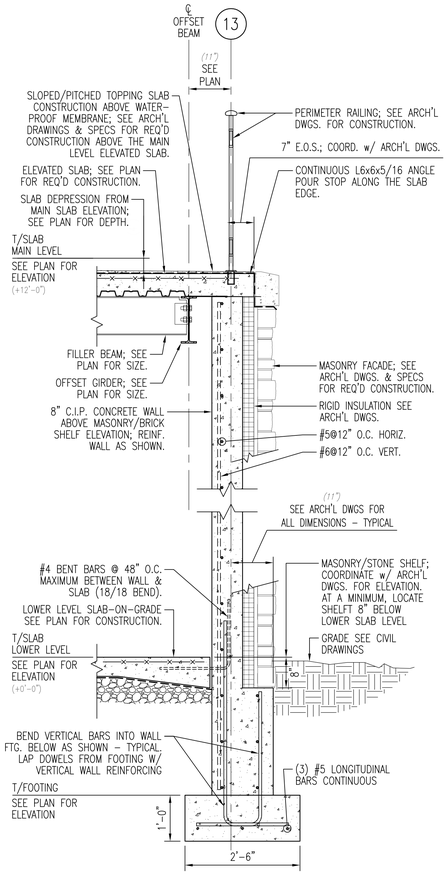
02.22.17	REBID SET			CHKD BY	
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	S-302



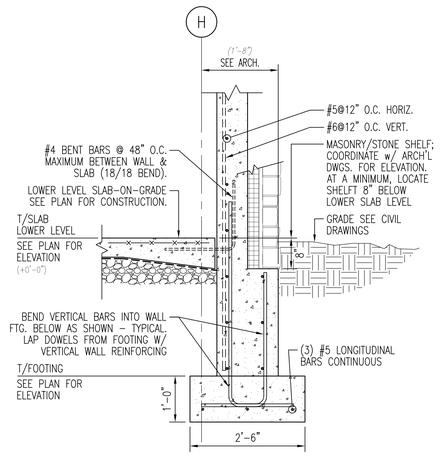
1 S-303 **COMMON/TYPICAL FROST/FOUNDATION WALL SECTION ALONG COLUMN LINE A**

SCALE: 3/4" = 1'-0"



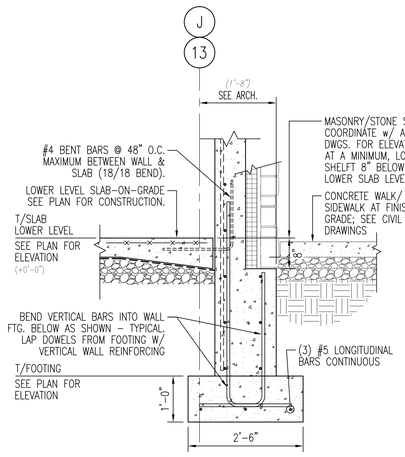
2 S-303 **COMMON/TYPICAL FROST/FOUNDATION WALL SECTION ALONG COLUMN LINE 13**

SCALE: 3/4" = 1'-0"



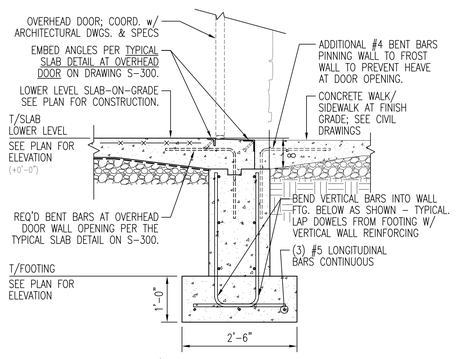
3 S-303 **COMMON/TYPICAL FROST/FOUNDATION WALL SECTION ALONG COLUMN LINE H**

SCALE: 3/4" = 1'-0"



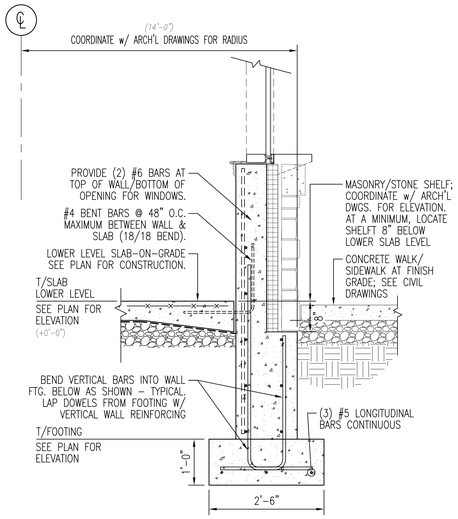
4 S-303 **COMMON/TYPICAL FROST/FOUNDATION WALL SECTION**

SCALE: 3/4" = 1'-0"



5 S-303 **COMMON/TYPICAL FROST WALL SECTION AT OVERHEAD DOOR**

SCALE: 3/4" = 1'-0"



6 S-303 **LOW WALL SECTION AT TURNSTAND**

SCALE: 3/4" = 1'-0"

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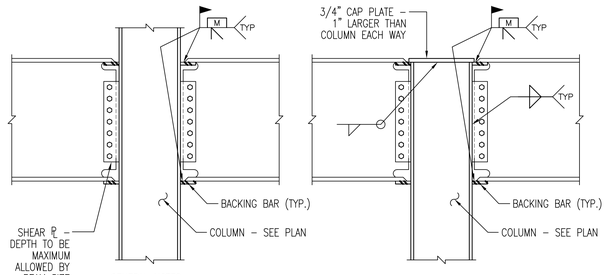
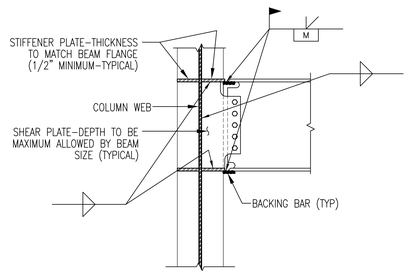
CHKD BY	
JOB NO	2161228
SHEET:	OF:
DRWG NO	S-303



GENERAL NOTES:
1. MOMENT CONNECTIONS DESIGNED TO DEVELOP 80% OF BEAM MOMENT CAPACITY
2. COLUMNS ARE SIZED TO ELIMINATE STIFFENERS AND WEB DOUBERS AT LOCATIONS WHERE COLUMN CONTINUES THROUGH CONNECTION. PROVIDE 3/4" CAP PLATE AT LOCATIONS WHERE COLUMN ENDS AT TOP OF CONNECTION (I.E. ROOF AREAS).

TYPICAL FULLY WELDED BEAM MOMENT CONNECTION – BEAM TO COLUMN FLANGE

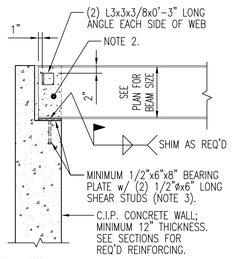
SCALE: N.T.S.



GENERAL NOTES:
1. MOMENT CONNECTIONS DESIGNED TO DEVELOP 80% OF BEAM MOMENT CAPACITY
2. SEE PLANS FOR BEAM SIZES AND COORDINATE WITH COLUMN SCHEDULE FOR COLUMN SIZES.

TYPICAL FULLY WELDED BEAM MOMENT CONNECTION–BEAM TO COLUMN WEB

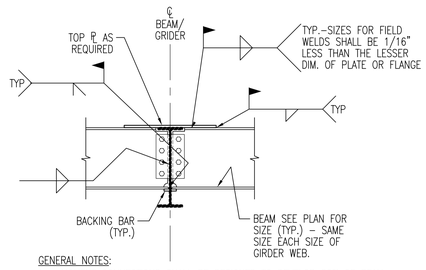
SCALE: N.T.S.



GENERAL NOTES:
1. FORM POCKET/BLOCK–OUT IN C.I.P. CONCRETE WALL FOR BEAM.
2. FILL POCKET SOLID WITH GROUT AFTER BEAM IS SET AND BEFORE BEAM IS LOADED.
3. MINIMUM 6" BEARING. MINIMUM PLATE WIDTH SHOULD BE FLANGE WIDTH + 4" (2" EACH SIDE).

TYPICAL DETAIL OF BEAM BEARING ON NEW CONCRETE WALL

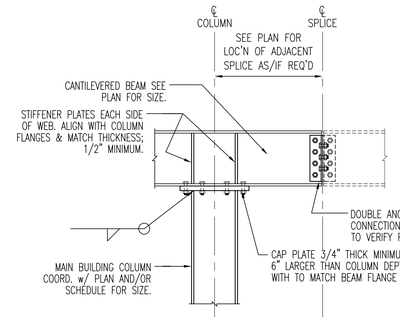
SCALE: N.T.S



GENERAL NOTES:
1. MOMENT CONNECTIONS SHALL BE DESIGNED TO DEVELOP 80% OF BEAM MOMENT CAPACITY.
2. COORDINATE WITH PLANS FOR THE LOCATION(S) OF REQUIRED CONNECTION.

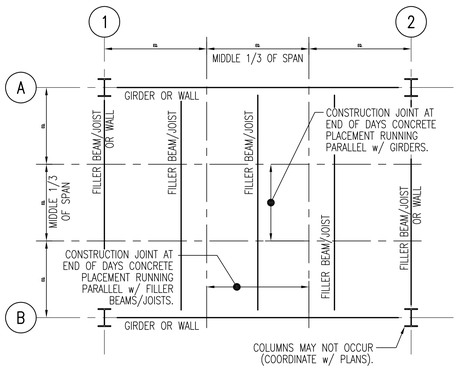
TYPICAL THRU–MOMENT CONNECTION DETAIL – FULLY RESTRAINED ACROSS GIRDER

SCALE: N.T.S.



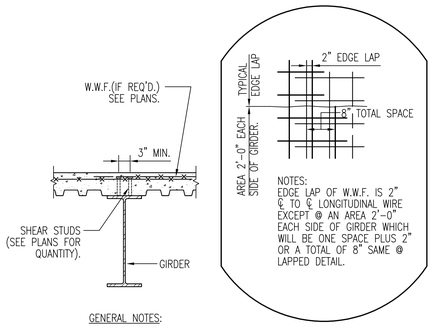
TYPICAL CANTILEVER BEAM AT COLUMN BEAM PARALLEL TO COLUMN WEB

SCALE: N.T.S.



PARTIAL PLAN OF TYPICAL CONSTRUCTION JOINT SCHEMATIC FOR ELEVATED SLAB/FLOOR FRAMING

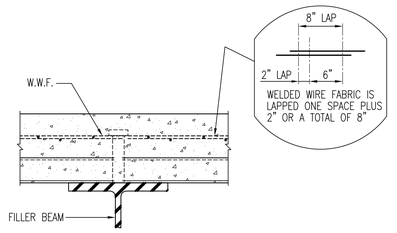
SCALE: N.T.S.



GENERAL NOTES:
1. SHEAR STUDS BY FABRICATOR
2. CHAIRS AND W.W.F. BY SLAB CONTRACTOR
3. SEE PLANS FOR SLAB CONSTRUCTION.
4. PROVIDE CHAIRS AS REQUIRED TO HOLD WIRE FABRIC IN CORRECT POSITION DURING POURING OPERATION.

TYPICAL COMPOSITE GIRDER DETAIL

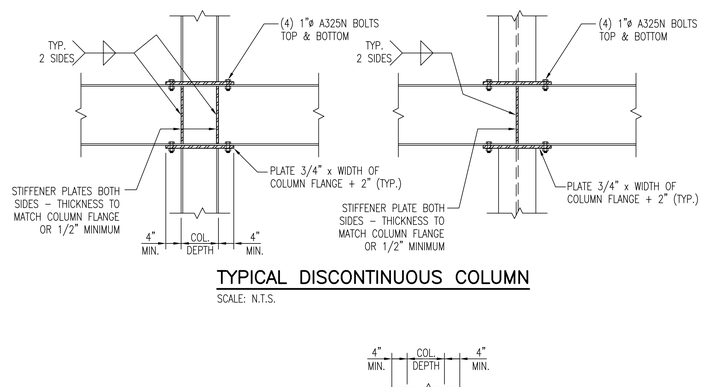
SCALE: N.T.S.



GENERAL NOTES:
1. SHEAR STUDS BY STEEL FABRICATOR; COORDINATE w/ PLANS FOR SIZE AND NUMBER.
2. REBAR AND WWF BY SLAB CONTRACTOR.
3. SEE PLAN FOR SLAB CONSTRUCTION.
4. PROVIDE CHAIRS AS REQUIRED TO HOLD WIRE FABRIC IN CORRECT POSITION DURING POURING OPERATION.

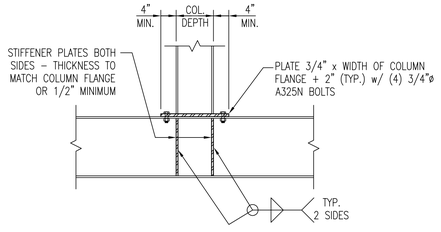
TYPICAL COMPOSITE FILLER BEAM DETAIL

SCALE: N.T.S.



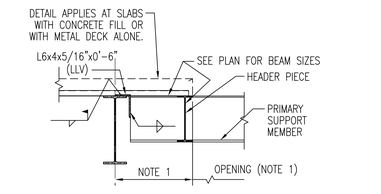
TYPICAL DISCONTINUOUS COLUMN

SCALE: N.T.S.



TYPICAL COLUMN ON BEAM DETAIL

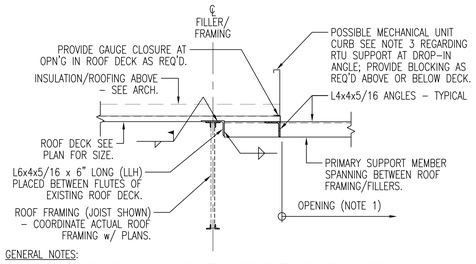
SCALE: N.T.S.



NOTES:
1. GENERAL CONTRACTOR SHALL COORDINATE ALL OPENING SIZES AND LOCATIONS WITH RESPECTIVE TRADE CONTRACTOR AND ARCHITECTURAL PLANS PRIOR TO SUBMITTAL OF STRUCTURAL STEEL SHOP DRAWINGS.
2. DECK CLOSURE REQUIRED AT SLABS WITH CONCRETE FILL AROUND EDGE OF OPENING.

TYPICAL DROP–IN BEAM FRAME DETAIL

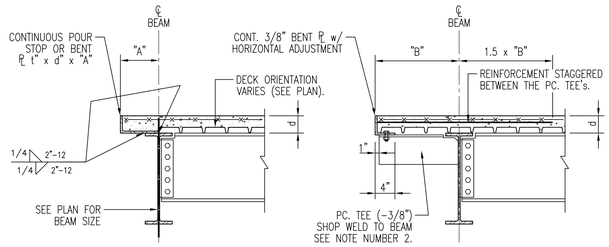
SCALE: N.T.S.



GENERAL NOTES:
1. GENERAL CONTRACTOR SHALL COORDINATE NUMBER OF FRAMES, OPENING SIZES AND LOCATIONS WITH RESPECTIVE TRADE CONTRACTORS AND ARCHITECTURAL PLANS PRIOR TO SUBMITTAL OF STRUCTURAL STEEL SHOP DRAWINGS.
2. CONSULT ENGINEER WHEN SPAN OF PRIMARY SUPPORT OR HEADER EXCEEDS 8'–0".
3. CONTRACTOR OPTION: PROVIDE DROP–IN ANGLE FRAME BELOW EXISTING ROOF DECK IN LIEU OF C6 CHANNELS ABOVE DECK PER THE TYPICAL NEW ROOFTOP MECHANICAL UNIT SUPPORT DETAIL.

TYPICAL DROP–IN ANGLE FRAME DETAIL

SCALE: N.T.S.



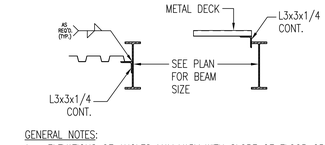
TYPE I	
DIMENSION "A"	PLATE (t)
A<6"	16 gage
6"≤A<9"	1/4"
9"≤A<12"	3/8"

TYPE II		
DIMENSION "B"	PC. TEE/SPA.	REBAR
12"≤B<16"	WT6x11/40"O.C.	#5 @ 40"
16"≤B<20"	WT6x11/32"O.C.	#5 @ 32"
20"≤B<30"	WT6x11/24"O.C.	#5 @ 24"

GENERAL NOTES:
1. SLAB EDGE ATTACHMENTS ARE CUSTOM FABRICATED U.O.N.
2. IF EDGE OF SLAB SUPPORTS CMU WALL CONSTRUCTION THEN USE FULL DEPTH 3/8" STIFFENER PLATE IN LIEU OF TEE.

TYPICAL SLAB EDGE DETAILS

SCALE: N.T.S.



GENERAL NOTES:
1. ELEVATIONS OF ANGLES MAY VARY WITH SLOPE OF FLOOR OR ROOF. COORDINATE TOP OF ANGLE WITH PLANS.
2. STEEL FABRICATOR SHALL PROVIDE DECK SUPPORT ANGLES AS REQUIRED TO ENSURE DIRECT SUPPORT FOR ALL STEEL DECK AT ELEVATIONS ABOVE OR BELOW TOP FLANGE OF PRIMARY SUPPORT BEAMS.
3. COORDINATE LOCATIONS FOR DECK SUPPORT ANGLES WITH DECK SUPPLIER.

TYPICAL DECK SUPPORT ANGLE DETAIL

SCALE: N.T.S.

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LAURENCE K. UHER, AIA, LEED, AP
NJ License No. AI 14394

NAME: Marc Bowen, PE
NJ Professional Engineer
LICENSE NO.: 44024
DATE: 08.05.16

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
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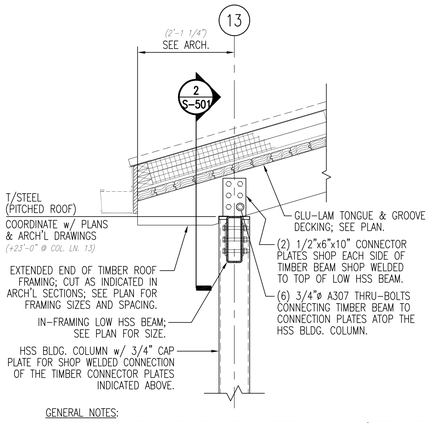
SHEET CONTENTS:

TYPICAL STEEL FRAMING DETAILS

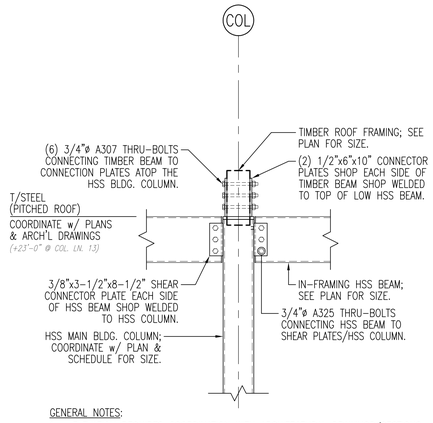
SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS NOTED
10.17.16	BID SET			DRWN BY	TPM
02.22.17	REBID SET			CHKD BY	
				JOB NO	2161228
				SHEET:	OF:
				DRWG NO	S-500



GENERAL NOTES:

1. SECTION REQUIRES COORDINATION WITH ARCHITECTURAL DRAWINGS/SECTIONS FOR NON-STRUCTURAL ITEMS NOT SHOWN/CALLED OUT IN SECTION FOR CLARITY.
2. SECTION LOCATION AND INFORMATION SHALL BE COORDINATED WITH THE FRAMING PLANS. CONTRACTOR SHALL NOTIFY A/E OF ANY DISCREPANCIES BETWEEN INFORMATION IN SECTION AND WHAT IS INDICATED IN THE PLANS.

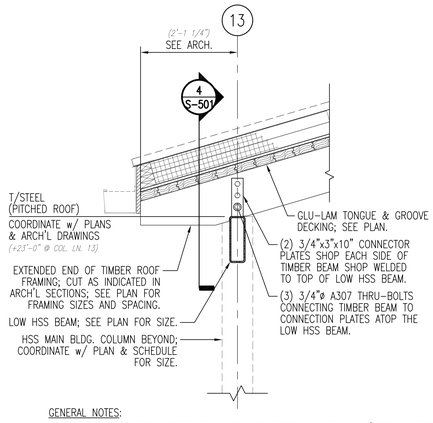
1 S-501 (LOW END OF ROOF)
PITCHED ROOF CONNECTION AT COLUMN
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

1. ELEVATION REQUIRES COORDINATION WITH ARCHITECTURAL DRAWINGS/SECTIONS FOR NON-STRUCTURAL ITEMS NOT SHOWN/CALLED OUT IN SECTION FOR CLARITY.
2. SECTION/ELEVATION CUT LOOKING INTO THE BUILDING AND THROUGH THE TYPICAL TIMBER MEMBER; COORDINATE w/ SECTION 1/S-501 FOR EXACT LOCATION OF CUT.

2 S-501
CONNECTION ELEVATION WOOD FRAMING-TO-HSS COLUMN
SCALE: 3/4" = 1'-0"



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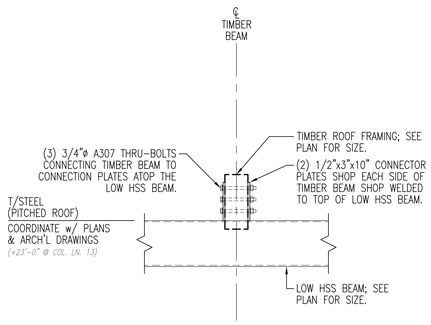
3 S-501 (LOW END OF ROOF)
PITCHED ROOF CONNECTION AT HSS BEAM
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

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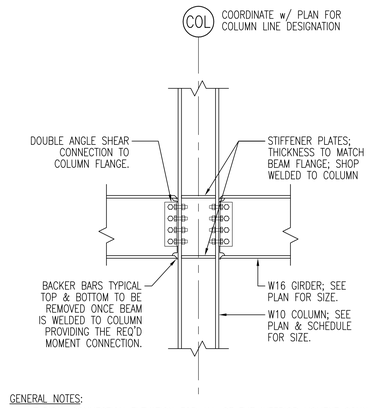
2. SECTION/ELEVATION CUT LOOKING INTO THE BUILDING AND THROUGH THE TYPICAL TIMBER MEMBER; COORDINATE w/ SECTION 3/S-501 FOR EXACT LOCATION OF CUT.

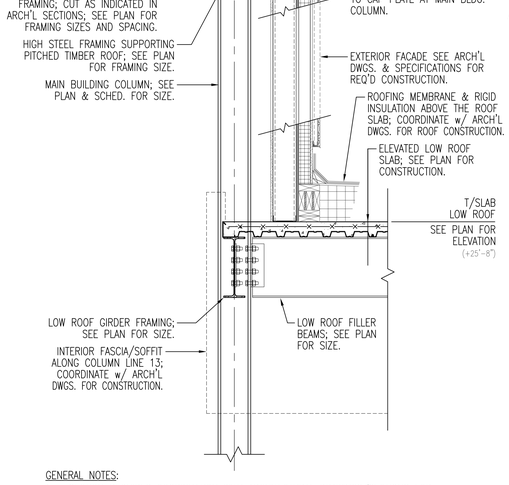
4 S-501
CONNECTION ELEVATION WOOD FRAMING-TO-HSS BEAM
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

1. TYPICAL CONNECTION ELEVATION FOR ALL OF THE INTERIOR MOMENT CONNECTIONS WITHIN THE MAIN HALL. CONNECTIONS ARE VISIBLE TO PUBLIC VIEW AND THE FRAMING (BEAMS AND COLUMNS) ALONG WITH THE CONNECTION SHALL TO BE ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (A.E.S.S.). BACKER BARS ARE TO BE REMOVED AND WELDS GROUND SMOOTH.
2. COORDINATE WITH PLAN FOR LOCATION OF SECTION/ELEVATION CUT.

5 S-501
MAIN HALL CONNECTION ELEVATIONS
SCALE: 3/4" = 1'-0"



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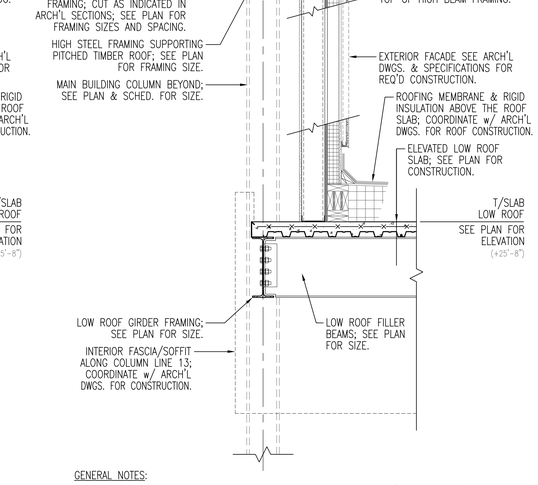
6 S-501 (HIGH END OF ROOF)
PITCHED ROOF CONNECTION AT COLUMN
SCALE: 3/4" = 1'-0"



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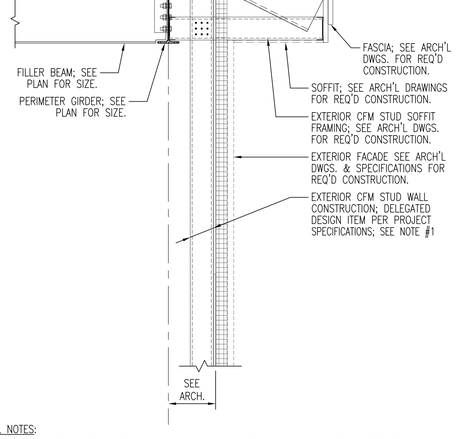
7 S-501 (HIGH END OF ROOF)
PITCHED ROOF CONNECTION AT STEEL BEAM
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

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8 S-501
LOW ROOF SECTION AT CFM STUD OVER-BUILD
SCALE: 3/4" = 1'-0"

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
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1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

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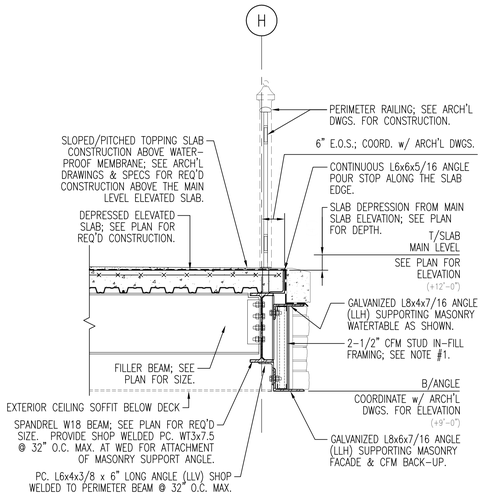
				SHEET:	OF:
				DRWG NO	S-501



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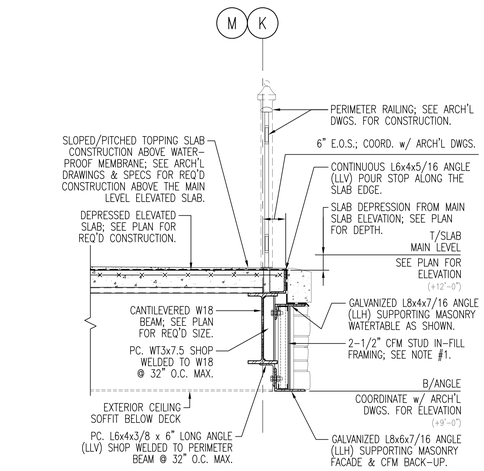
1 / S-502 **PERIMETER DECK SECTION AT CANTILEVERED EDGE**
SCALE: 3/4" = 1'-0"



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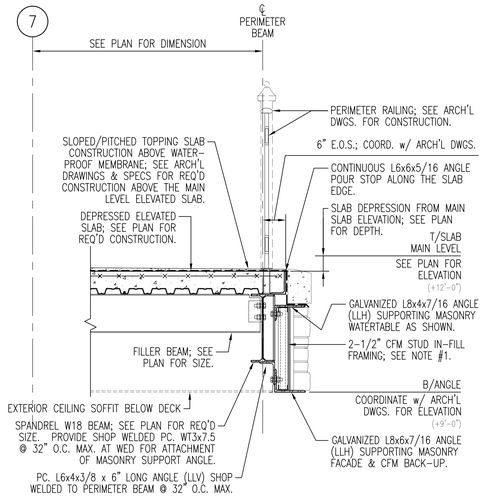
2 / S-502 **PERIMETER DECK SECTION AT CANTILEVERED EDGE**
SCALE: 3/4" = 1'-0"



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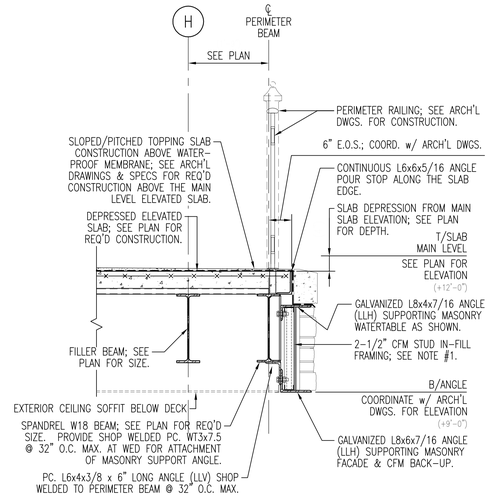
3 / S-502 **PERIMETER DECK SECTION AT CANTILEVERED EDGE**
SCALE: 3/4" = 1'-0"



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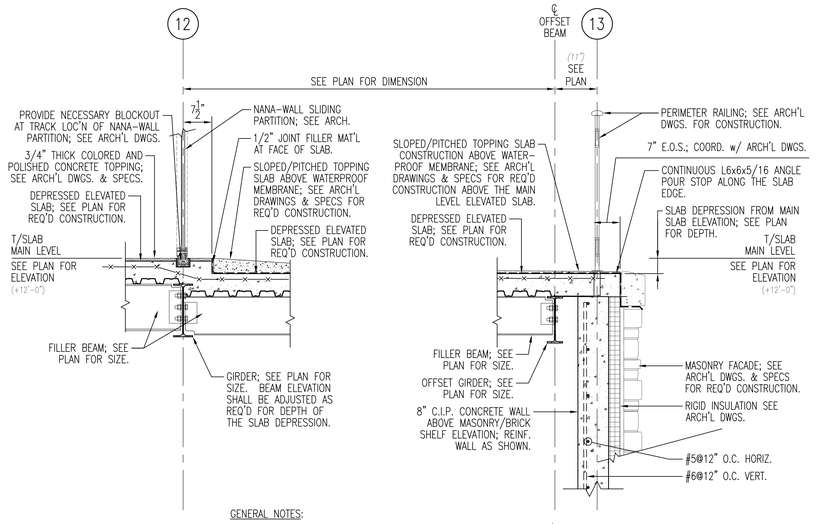
4 / S-502 **PERIMETER DECK SECTION AT CANTILEVERED EDGE**
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

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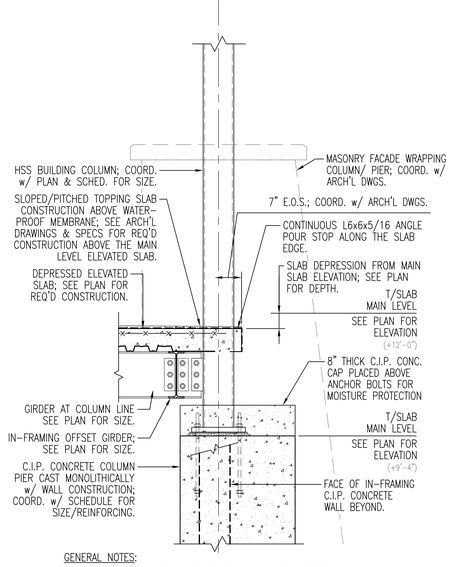
2. CONCRETE WALL CONSTRUCTION CONTINUES DOWN TO PERIMETER FROST FOOTING. WALL THICKENS TO 16" IN WIDTH BELOW THE ELEVATION OF THE MASONRY/ BRICK SHELF AND REQUIRES REINFORCING EACH FACE.

5 / S-502 **DECK SECTION AT DEPRESSED SLAB CONSTRUCTION**
SCALE: 3/4" = 1'-0"



GENERAL NOTES:

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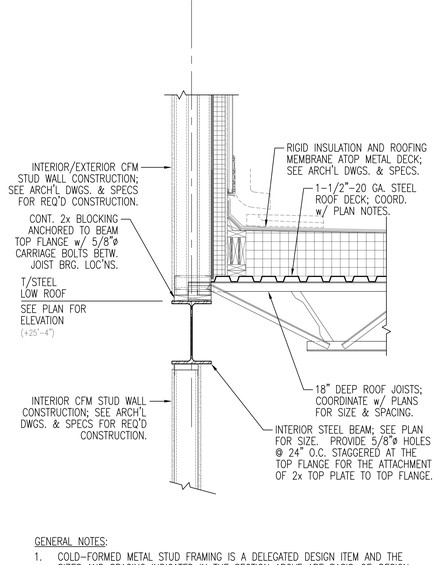
2. CONCRETE CAP INDICATED IN SECTION IS TO BE PLACED ONCE STEEL FRAMING HAS BEEN PLUMBED & LEVELED. CAP PROVIDES MOISTURE PROTECTION FOR ANCHOR BOLTS AND BASE PLATE.

6 / S-502 **DECK SECTION AT COLUMN/PIER**
SCALE: 3/4" = 1'-0"



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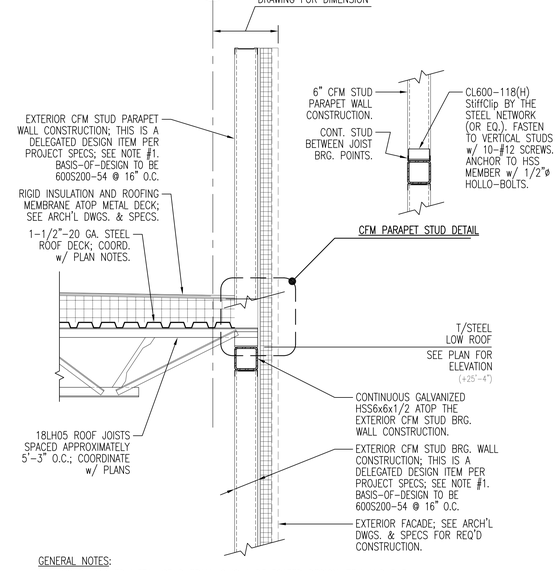
2. ELEVATION REQUIRES COORDINATION WITH ARCHITECTURAL DRAWINGS/SECTIONS FOR NON-STRUCTURAL ITEMS NOT SHOWN/CALLED OUT IN SECTION FOR CLARITY.

7 / S-502 **LOW ROOF SECTION ALONG COLUMN LINE M**
SCALE: 3/4" = 1'-0"



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8 / S-502 **LOW ROOF SECTION ALONG COLUMN LINE N**
SCALE: 3/4" = 1'-0"

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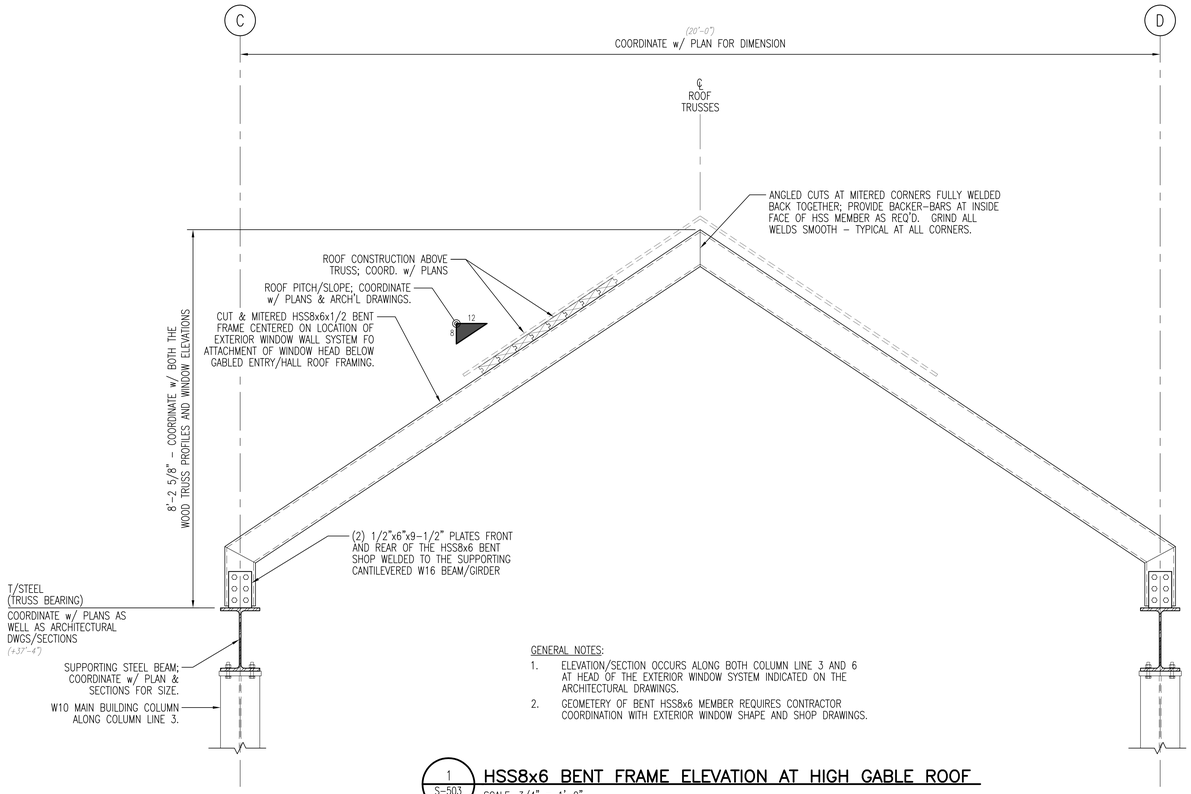
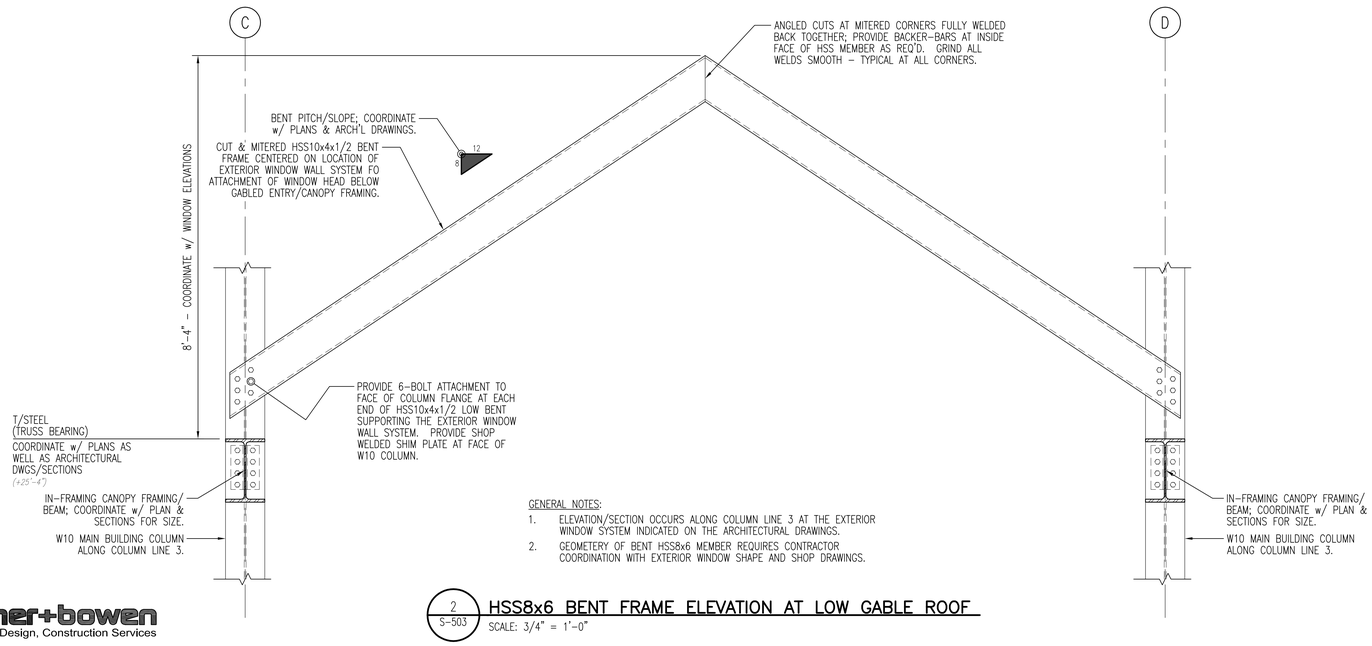


GENERAL NOTES:

1. ELEVATION/SECTION OCCURS ALONG BOTH COLUMN LINE 3 AND 6 AT HEAD OF THE EXTERIOR WINDOW SYSTEM INDICATED ON THE ARCHITECTURAL DRAWINGS.
2. GEOMETERY OF BENT HSS8x6 MEMBER REQUIRES CONTRACTOR COORDINATION WITH EXTERIOR WINDOW SHAPE AND SHOP DRAWINGS.

1 / S-503 HSS8x6 BENT FRAME ELEVATION AT HIGH GABLE ROOF

SCALE: 3/4" = 1'-0"



GENERAL NOTES:

1. ELEVATION/SECTION OCCURS ALONG COLUMN LINE 3 AT THE EXTERIOR WINDOW SYSTEM INDICATED ON THE ARCHITECTURAL DRAWINGS.
2. GEOMETERY OF BENT HSS8x6 MEMBER REQUIRES CONTRACTOR COORDINATION WITH EXTERIOR WINDOW SHAPE AND SHOP DRAWINGS.

2 / S-503 HSS8x6 BENT FRAME ELEVATION AT LOW GABLE ROOF

SCALE: 3/4" = 1'-0"

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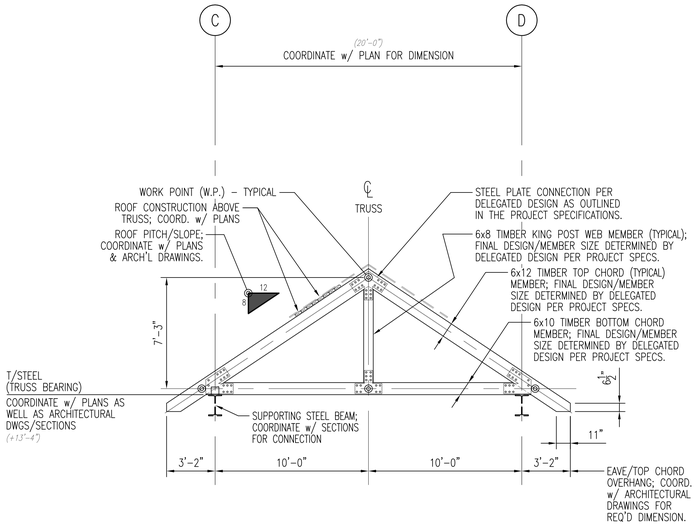
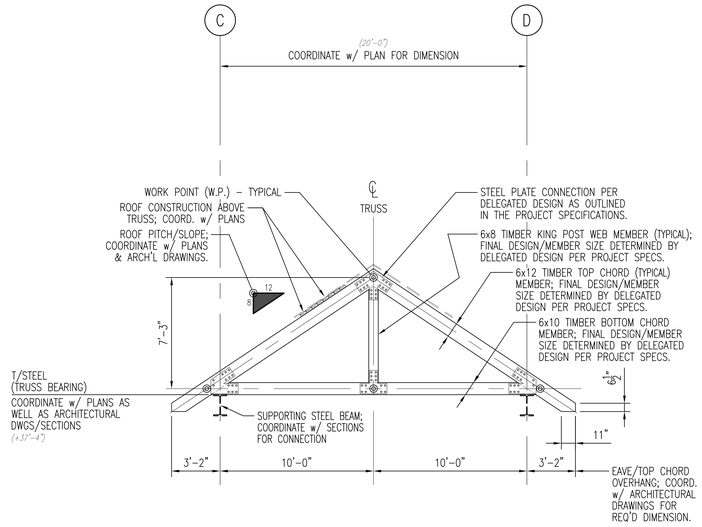


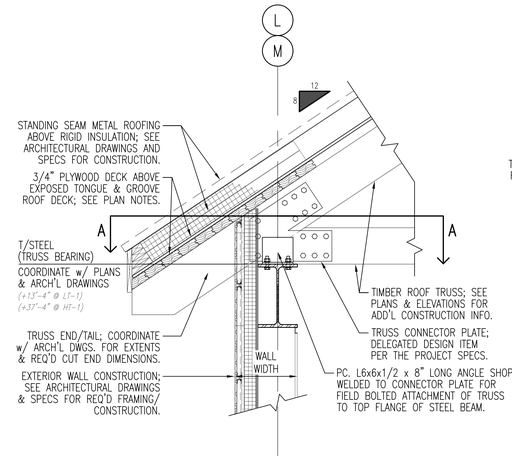
LT–1 TRUSS ELEVATION (LOW ROOF TRUSS)

SCALE: 1/4" = 1'–0"



HT–1 TRUSS ELEVATION (HIGH ROOF TRUSS)

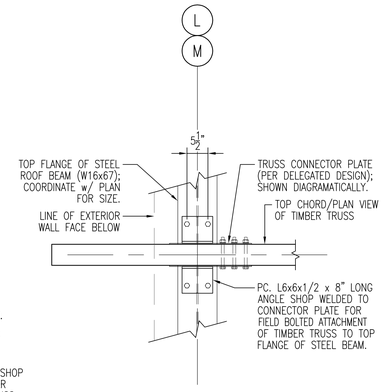
SCALE: 1/4" = 1'–0"



1 S–600

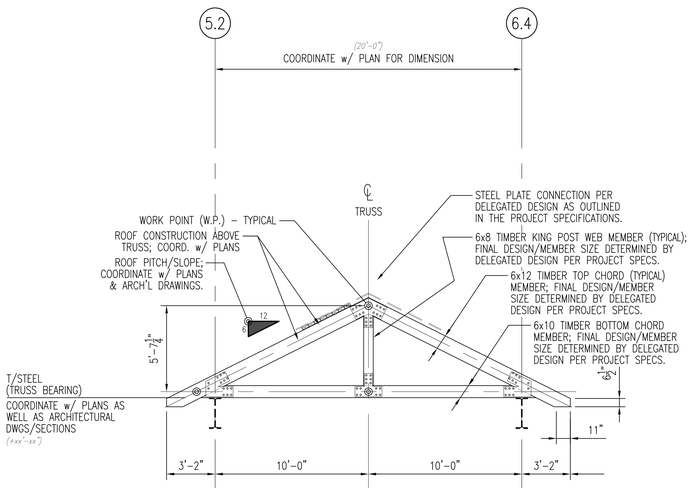
COMMON/TYPICAL ROOF TRUSS CONNECTION AT BEAM

SCALE: 3/4" = 1'–0"



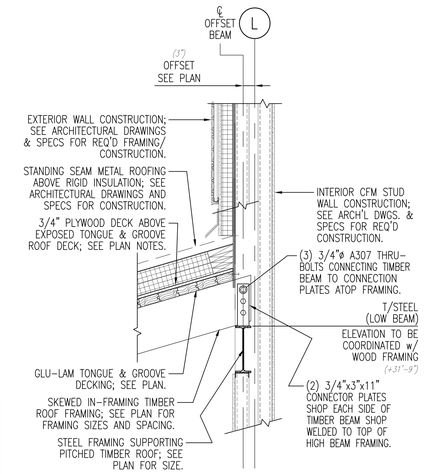
PLAN DETAIL A–A

(LOOKING DOWN AT CONNECTION)



LT–2 TRUSS ELEVATION (LOW ROOF TRUSS)

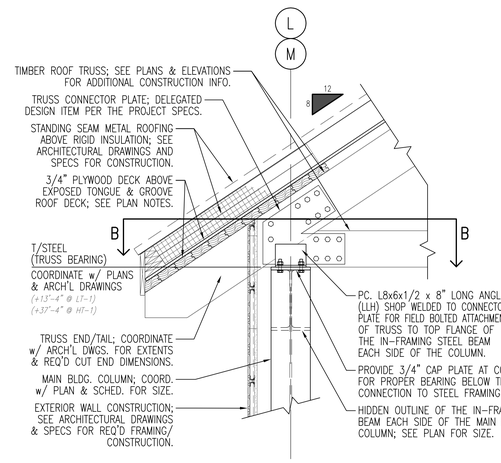
SCALE: 1/4" = 1'–0"



3 S–600

BEAM SUPPORTING LOW PITCHED ROOF

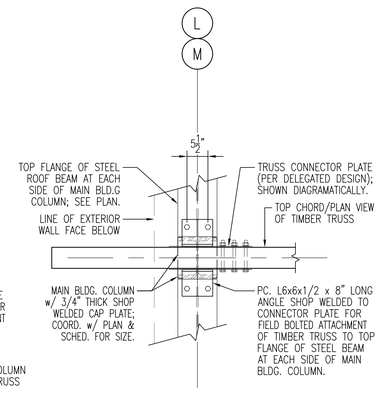
SCALE: 3/4" = 1'–0"



2 S–600

COMMON/TYPICAL ROOF TRUSS CONNECTION AT COLUMN

SCALE: 3/4" = 1'–0"

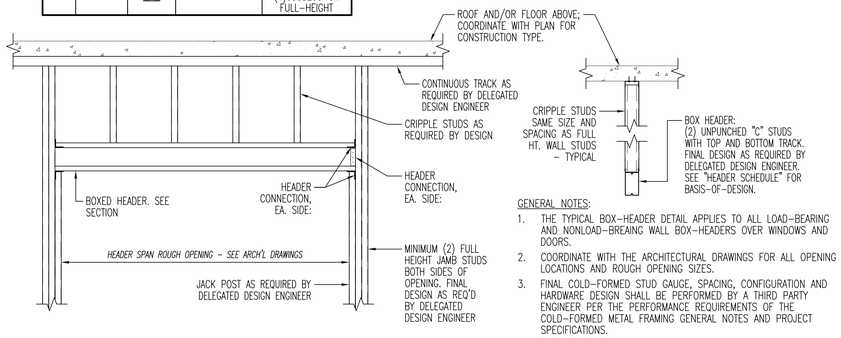


PLAN DETAIL B–B

(LOOKING DOWN AT CONNECTION)

HEADER SCHEDULE

MARK	SPAN	SECTION	SIZE	JAMB STUDS
WH1	10'–0" MAX.		(2)1200S250–118	(3)600S200–54 JACK + (1)600S200–54 FULL–HEIGHT
WH2	6'–8" MAX.		(2)1200S250–118	(2)600S200–54 JACK + (1)600S200–54 FULL–HEIGHT

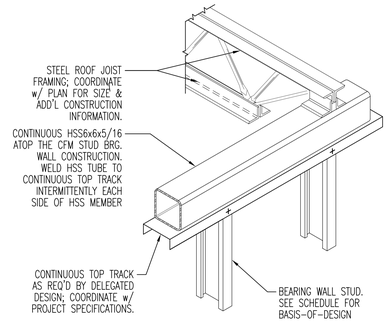


GENERAL NOTES:

1. THE TYPICAL BOX–HEADER DETAIL APPLIES TO ALL LOAD–BEARING AND NONLOAD–BREAING WALL BOX–HEADERS OVER WINDOWS AND DOORS.
2. COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR ALL OPENING LOCATIONS AND ROUGH OPENING SIZES.
3. FINAL COLD–FORMED STUD GAUGE, SPACING, CONFIGURATION AND HARDWARE DESIGN SHALL BE PERFORMED BY A THIRD PARTY ENGINEER PER THE PERFORMANCE REQUIREMENTS OF THE COLD–FORMED METAL FRAMING GENERAL NOTES AND PROJECT SPECIFICATIONS.

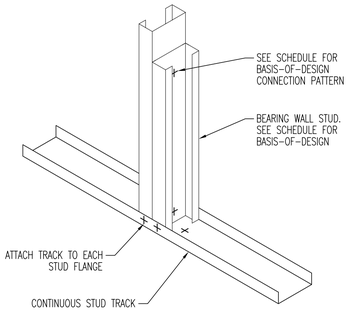
TYPICAL COLD–FORMED METAL STUD BOX–HEADER ELEVATION AND DETAILS

SCALE: N.T.S.



DIAGRAMMATIC DETAIL JOIST FRAMING BEARING ON STUD WALL

SCALE: N.T.S.



DIAGRAMMATIC DETAIL BACK–TO–BACK LOADING BEARING STUDS

SCALE: N.T.S.

GENERAL TRUSS ELEVATION NOTES

(UNLESS OTHERWISE NOTED OR SHOWN ON PLAN, THE FOLLOWING NOTES SHALL APPLY)

1. ALIGN CENTER OF GRAVITY OF CHORDS AND WEB MEMBERS TO CREATE COMMON WORK POINTS (W.P.).
2. COORDINATE WITH THE ROOF FRAMING PLANS FOR TRUSS DESIGNATIONS/TYPES, LOCATIONS, AND ALL COLUMN CENTERLINE DIMENSIONS.
3. SEE GENERAL NOTES ON S–001 AND S–002 FOR SEISMIC AND WIND (LATERAL) DESIGN CRITERIA.
4. COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR VERIFICATION OF ALL DIMENSIONS.
5. CONTRACTOR SHALL COORDINATE WITH THE PROJECT SPECIFICATIONS REGARDING THE DELEGATED DESIGN OF ALL TIMBER ROOF TRUSSES. SHOULD THERE BE DISCREPANCIES BETWEEN THE SPECIFICATIONS AND THE INFORMATION ON THE DRAWINGS, THE STRICTER CRITERIA SHALL APPLY.
6. TRUSS MEMBERS SHALL BE TIMBER CONSTRUCTION; BASIS–OF–DESIGN SHAPES/SIZES INDICATED ABOVE ARE THE PREFERED SIZES FOR THE TRUSS MEMBERS. ALL TIMBER CONSTRUCTION SHALL BE SOUTHERN PINE NO.1/SELECT STRUCTURAL.

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NOT FOR CONSTRUCTION
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2-22-2017

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TEL: 973.379.0066 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

TYPICAL WOOD CONSTRUCTION DETAILS & TRUSS ELEVATIONS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	TPM
CHKD BY	NJN
JOB NO	2161228
SHEET:	OF:
DRWG NO	S-600

New Club House

Ash Brook Golf Course

1210 Raritan Road
Scotch Plains, NJ 07076

KEY PARTICIPANTS & THEIR ROLES

Client

Ash Brook Golf Course
1210 Raritan Road
Scotch Plains, NJ 07076

Architect

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Mountainside, NJ, 07092

Contact: Hong Jin
Tel: 973-379-0006

Mechanical / Electrical / Plumbing / Prime Engineer

DLB Associates, PC
One Penn Plaza, Suite 2601
New York, NY 10119

Contact: Robert Jankowski
Tel: (732) 927-5158

PROJECT INTRODUCTION

General

1. These Drawings Are For The MEP&FP Design Of A New 20,800 Square Foot Two-Level Club House At The Ash Brook Golf Course. The Demolition Of The Existing Club House And All Associated Existing Incoming Utilities Are Not Included In This Drawing Set. The Premises Shall Contain A Full Commercial Kitchen And Bar.
2.

Fire Protection

1. A New Fire Water Service Shall Be Provided For Complete Sprinkler Coverage Of The New Club House. The Water Meter And Backflow Prevention Device Shall Be In Outdoor Enclosures. Refer To Civil Site Drawings For Location.
2. Unheated Areas Shall Be Protected By A Dry Sprinkler System.

Plumbing

1. A New Domestic Water Service Shall Be Provided With The Water Meter And Backflow Prevention Device In Outdoor Enclosures. Refer To Civil Site Drawings For Location.
2. A New Natural Gas Service Shall Be Provided For Heating Equipment, Water Heaters, And For The Emergency Generator. Meter Shall Be Located Outdoors Near The Loading Dock Area And Shall Be Protected From Possible Vehicular Damage.
3. Greasy Waste From Upper Level Shall Be Conveyed To Outdoor Sub-Grade Grease Interceptor. Greasy Waste From Lower Level Shall Require Local Small Grease Interceptors. Sanitary Piping Shall Be Collected And Conveyed Out Of The Building Below The Lower Level On The East Side Of The Building.

Mechanical

1. A Combination Of Air-Cooled Packaged Rooftop And Split DX Systems Shall Be Used For Air Conditioning. An Automatic Temperature Control System Shall Be Provided.
2. Natural Gas Shall Be The Fuel Source For Heat In The Majority Of The Building. Electric Unit Heaters Shall Be Used For Utility Rooms, Storage Rooms, Etc On The Lower Level.
3. All Exposed Ductwork Shall Be Spiral Round With Internal Lining. The Pro Shop Area Shall Use Unico System Diffusers Due To Tight Ceiling Clearance. Ductwork And Outlets Shall Be Strictly Coordinated With Other Trades And Architectural Features.

Electrical

1. A New 480V/277V 3-Phase Electrical Service Shall Be Provided To The Building From A Pad Mounted Transformer Near The Loading Dock Area. 480V/277V Shall Be Used For Majority Of Lighting And Equipment Loads. Transformers Inside The Building Shall Step The Voltage Down To 208V/120V For Receptacles And Smaller Equipment.
2. A Natural Gas Powered Emergency Generator Shall Be Provided With Automatic Transfer Switches For Life Safety Equipment And For Walk-In Coolers.
3. Power For Site Lighting, Hot Box Heaters, Water Fountain And Conduit For Site Cameras Shall Be Provided From The Building. Requirements And Locations To Be Coordinated With Civil Drawings And Site Contractor.
4. A Fire Alarm System Shall Be Provided For The Building.
5. A Lightning Protection System Shall Be Furnished And Installed Per NFPA 780.

DOCUMENT ORGANIZATION

Drawing Organization

The Primary Organization And Order Of The Project Drawing Set Is Determined By The Trade. The Preface Letter(s) Of The Drawing Name Indicates The Trade.

1. General (G Series)
2. Fire Protection (SP Series)
3. Plumbing (P Series)
4. Mechanical (M Series)
6. Energy (EN Series)
7. Fire Alarm (FA Series)
8. Electrical (E Series)

Drawing Sequence

1. Within Each Trade, Drawings Start With Overview "Big Picture" Information, Then Plan Views, Followed By All Other Pertinent Information. Where Effective, Supplemental Information Is Included Directly On The Plan View Drawings To Improve The Reader's Understanding.

Miscellaneous

1. The Terms 'Sheet', 'Plan', And 'Drawing' Are Used Interchangeably.
2. For Items That Are Plans, Details, And Other Graphic Items, Titles Are At The Bottom Of The Item Described. For Items That Are Predominately Text Such As Schedules, Titles Are At The Top Of The Item Described.
3. Shading Of An Area Often Is Used To Emphasize An Area To The Reader. Some Of The Possible Purposes Of This Emphasis Can Be:
   A. Identify Major Pieces Of Equipment
   B. Defining A Topics Boundary Without Conflicting With Other Linework
   C. Help To Emphasize The Existence Of A Part Plan Of The Area
   D. Differentiate Line Work In Congested Areas
4. Printing Of The Plans Is Often Reduced, So A Graphic Scale Is Provided On Each Sheet.

How Notes Are Used

1. General Notes Are One Or More Notes In List Form Which Are Not Indicated Specifically On A Plan, Section, Elevation, Or Detail.
2. Key Notes Are Used In Lieu Of Standard Notes Where They Improve Readability, Key Notes Are Gathered Together And Listed Collectively On The Drawings On Which They Are Located.

Addenda & Revisions

Some Addenda And Revisions Are Identified On The Drawings Using A 1. The Number In The Triangle Links To The Revision Block In The Title Block Section.

Sometimes The Most Recent Change Is Clouded To Provide Increased Clarity.

DESIGN CRITERIA & ADDITIONAL PROJECT REQUIREMENTS

Applicable Codes And References

The Entire Installation Shall Comply With All Local And State Codes, Including Amendments To Said Codes, And Other Authorities Having Jurisdiction.

1. International Building Code, 2015 Edition
2. International Mechanical Code, 2015 Edition
3. National Standard Plumbing Code, 2015 Edition
4. National Electrical Code, 2014 Edition
5. ASHRAE 90.1 Energy Standards, 2013 Edition
6. NFPA No. 90A - Air Conditioning And Ventilating Systems, Latest Edition
7. ASHRAE (American Society Of Heating, Refrigerating & Air Conditioning Engineers) Handbooks
8. SMACNA Handbook For Duct Construction

Seismic Requirements

1. The Design And Application Of Seismic Restraints Shall Be In Accordance With The Following Criteria, As Listed In Chapter 16 Of The 2015 International Building Code.
   A. Determination Of Design Spectral Response Acceleration:
      Short Periods: 0.292
      One-second Periods: 0.116
   B. Seismic Occupancy Category:
      Section 1604.5: Group III
      Seismic Design Category: B
2. Mechanical And Electrical Components / Systems In Buildings That Are Assigned To Seismic Design Category A or B (ASCE 13.1.4.2) Are Exempt From Seismic Requirements.

Design Conditions

Summer Outdoor Design Conditions	Summer Indoor Design Conditions:
Dry Bulb: 94 Deg. F.	Dry Bulb: 75 Deg. F.
Wet Bulb: 75 Deg. F.	Relative Humidity 50%
Winter Outdoor Design Conditions	**Winter Indoor Design Conditions**
10 Deg. F. Dry Bulb	72 Deg. F. Dry Bulb

Ventilation: Outside Air Ventilation Design Air Quantity Will Be Provided As Required By International Mechanical Code, 2015 Edition.

1. Domestic Water:
   A. All Piping Shall Be Copper.
   B. Piping Sizes Are Based On The N.S.P.C With A Maximum Velocity Of 8 Ft. Per Second For Flush Valves And 4 Ft. Per Second For Non-Flush Valves.
   C. All Water Piping Shall Be Insulated.
2. Sanitary And Vent:
   A. Sanitary Drainage Including Complete Venting, Connections To Fixtures, Drains And Cleanouts Shall Be Provided.
   B. Pipe Sizes Are Based On The N.S.P.C.
   C. Sanitary Drain Lines Shall Have A Minimum 1/4" Pitch Per Foot For 3" And Smaller, 1/8" Pitch For 4" Or Larger.
3. Natural Gas:
   A. New Gas Piping Shall Be Fed From New Gas Service.
   B. All New Gas Piping Will Be Installed Complete With Hangers, Fittings And Valves.
   C. Gas Sized In Accordance With The 2015 International Fuel Gas Code Pipe Sizing Table 402.4(1) For Pressure Under 2 Pound Approximate Capacity Of Pipes With Pressure Drop Of 0.3 Inches Water Column And 0.60 Specific Gravity Total Equivalent Length Of Pipe 100'.
4. Water Conservation:
   A. All New Plumbing Fixtures Shall Meet The Requirements Of And Be Installed In Accordance With The N.S.P.C.

BACKGROUND ON CERTAIN DECISIONS

Background On Certain Decisions:

1. Fire Protection
   A. A New Fire Water Service Shall Be Provided For A Sprinkler System For The Clubhouse.
   B. The Sprinkler System Shall Consist Of Wet And Dry Sprinkler Zones. Unheated Areas Shall Be Protected By Dry Sprinkler Piping.
   C. The Golf Cart Storage Area Will Minimal Heating However Will Be Susceptible To Exposure To Cold Ambient Conditions In The Event The Overhead Doors Are Left Open Or Prolonged Temperatures Below The Design Condition Of 10 Degrees F Therefore DLB Recommend The Golf Cart Area Be Protected By Dry Sprinkler Piping.
2. Plumbing
   A. An Outdoor Grease Trap Shall Be Provided For Greasy Waste From The Clubhouse Kitchen. The Location Of The Grease Trap Was Coordinated To Be Buried In The Outdoor Loading Dock Area. Greasy Waste From Lower Level Plumbing Fixtures Shall Be To A Local Floor Mounted Grease Interceptor Since The Loading Dock Area Is Higher Than The Lower Level Floor.
   B. A New Natural Gas Service Shall Be Provided To Serve Kitchen Equipment, Heating Equipment, And A Natural Gas Powered Generator.
3. Mechanical
   A. The Main Level Of The Golf Course Club House Will Be Predominately Conditioned By (3) DX Packaged Rooftop Units With Natural Gas Heat.
      1) Main Level Restaurant, Kitchen And Bar - (1) 20-Ton Variable Volume Rooftop Unit Will Serve The Restaurant, Kitchen And Bar With Independent Temperature Control For Each Space Via VAV Boxes.
      2) Main Level Hall And Vestibule - (1) 12.5 Ton Constant Volume Rooftop Unit Will Serve The Main Hall / Vestibule.
      3) Main Level Pro-Shop And Supporting Offices - (1) 12.5 Ton Variable Volume Rooftop Unit Will Serve The Pro-Shop And Supporting Offices With Independent Temperature Control For Designated Zones Via VAV Boxes.
   B. The Lower Level Rooms Will Be Mostly Conditioned By Split-Type Heat Pump Air Conditioning Units Which Can Provide Heating And Cooling To The Space. Condensing Units Will Be Mounted On The Roof.
      1) Lower Level Kitchen Storage / Service Corridor / Office - (1) Ducted Split-Type Heat Pump System Will Serve The Lower Level Kitchen Storage And Service Corridor. Fresh Air Will Be Introduced Via Outdoor Air Louver And Motorized Backdraft Damper Ducted To The Return Of The Unit
      2) Lower Level Elevator Machine Room - (1) Ductless Split-Type Heat Pump Air Conditioning Unit.
      3) Lower Level Mechanical, Fire Sprinkler, Electrical, Storage - These Rooms Will Not Receive Any Air Conditioning. They Will Be Provided With A Constant 50CFM Exhaust And A Fresh Air Louver With Motorized Backdraft Damper For Fresh Air Introduction Into The Space. Supplemental Heat Will Be Provided Via Wall Hung Electric Unit Heaters.
      4) Lower Level Cart Storage - Heating And Ventilation Only. Cart Storage Is Provided With 5ACH Exhaust And Fresh Air And Will Be Conditioned To No More Than 50 Degrees.
      5) Lower Level Break Room / Office - (1) Ducted Split-Type Heat Pump System Will Provide Heating And Cooling To The Space. . Fresh Air Will Be Introduced Via Outdoor Air Louver And Motorized Backdraft Damper Ducted To The Return Of The Unit
   C. Exhaust
      1) The Kitchen Will Be Provided With A Continuous Centrifugal Upblast Exhaust Fan And Make-Up Air Unit Serving The Kitchen Hood.
      2) Exhaust Requirements For Restrooms, Locker Rooms And Cart Storage Are Being Met By Roof Mounted Centrifugal Downblast Fans.
   D. Ventilation
      1) Ventilation Is Being Provided As Required By IMC 2015 Via Outdoor Air Louvers Or Outdoor Air Dampers On Rooftop Units.
   E. Ductwork
      1) All Exposed Ductwork Shall Be Spiral Round With 1" Internal Lining. External Insulation Is Not Required.
      2) Supply Diffusers Will Be Round And Will Be Provided With Vanes Suitable For High Ceiling Installation.
   F. Controls
      1) A BMS System Shall Be Provided.
4. Electrical
   A. Power
      1) A New Electrical Service Shall Be Provided From PSE&G With An Anticipated Total Load Of 500kw.
      2) A 100kw Natural Gas Powered Generator Shall Be Provided.
         a. The Generator Shall Provide Backup Power For Emergency Loads Such As Emergency Lighting And Fire Alarm.
         b. The Generator Shall Also Provide Backup Power For Refrigeration Equipment.
      3) The Electrical Room In The Lower Level Shall Contain The Electric Meter And Main Distribution Panels For The Building.
         c. Local Power Panels Shall Also Be Provided On The Ground Floor Level To Minimize Voltage Drop And Length Of Wiring Required For Circuits For General Power And Lighting.
      4) The Cart Storage Area Shall Have A Hydrogen Detection System To Monitor The Level Of Hydrogen Produced By Battery Charging Equipment And In The Event Of Unsafe Levels, Shall Shunt The Circuits Powering The Charging Equipment.
   B. Lighting
      1) The Lighting Control System Shall Contain A Lighting Control Panel For Time Based And Photo Cell Input Lighting Control.
         a. The Time Clock Control With Automatic Override Via Occupancy Censors Shall Be Used For Lights In Common Areas.
         b. The Override Functionality Shall Be Triggered During Non-Occupied Programmed Times.
         c. Occupancy Sensors Shall Be Provided Which Will Act As Override Switches For The Lighting Control Panel In The Lighting Zones Shown.
         d. The Occupant Shall Be Able To Override The Scheduled Shutoff Control For No More Than Two Hours.
         e. Within Designated Daylighting Zones The Occupancy Sensors Shall Operate With Auto Dimming Daylight Sensors; Sensors Shall Not Be Mounted More Than 10' From Windows.
      2) Outdoor Lighting Shall Be Controlled Via Time Clock And Photo Cell.
   C. Lightning Protection: Contractor Shall Furnish & Install Lightning Protection System Per NFPA780. Refer To Specifications. **Deduct Alternate**: Electrical - Lightning Protection To Be Provided And Installed "By Others".
   D. Fire Alarm
      1) A Fire Alarm System Shall Be Provided For The Clubhouse Building.

DRAWING LIST

No.	Drawing Title	100% Issue 10/3/2016	Bid Set 10/17/2016	Rebid Set 2/22/2017
GENERAL INFORMATION FOR ALL TRADES				
G-000	General Information Sheet	X	X	X
FIRE PROTECTION				
FP-001	Fire Protection Notes & Riser Diagram	X	X	X
FP-101	Lower Level - Fire Protection	X	X	X
FP-102	Clubhouse Level - Fire Protection	X	X	X
PLUMBING				
P-001	Plumbing Information Sheet	X	X	X
P-002	Plumbing Riser Diagrams	X	X	X
P-101	Lower Level - Sanitary	X	X	X
P-102	Clubhouse Level - Sanitary	X	X	X
P-103	Clubhouse Level Part Plans - Sanitary	X	X	X
P-104	Roof Plan - Plumbing	X	X	X
P-201	Lower Level - Domestic Water And Gas	X	X	X
P-202	Clubhouse Level - Domestic Water And Gas	X	X	X
P-203	Clubhouse Level Part Plans - Domestic Water And Gas	X	X	X
P-501	Plumbing Details	X	X	X
P-502	Plumbing Details	X	X	X
P-601	Plumbing Schedules	X	X	X
MECHANICAL				
M-001	Mechanical Information Sheet	X	X	X
M-101	Lower Level - Mechanical	X	X	X
M-102A	Clubhouse Level - Mechanical Part Plan A	X	X	X
M-102B	Clubhouse Level - Mechanical Part Plan B	X	X	X
M-103	Roof Plan - Mechanical	X	X	X
M-401	Mechanical Details		X	X
M-501	Mechanical Details	X	X	X
M-502	Mechanical Details	X	X	X
M-601	Mechanical Schedules	X	X	X
M-701	Kitchen Hoods, Fans & Makeup Air Units	X	X	X
M-702	Kitchen Hoods, Fans & Makeup Air Units	X	X	X
ELECTRICAL				
E-001	Electrical Oneline Diagram	X	X	X
E-101	Lower Level - Lighting	X	X	X
E-102	Clubhouse Level - Lighting	X	X	X
E-201	Lower Level - Power	X	X	X
E-202	Clubhouse Level - Power	X	X	X
E-203	Roof Level - Power	X	X	X
E-301	Lower Level - Fire Alarm	X	X	X
E-302	Clubhouse Level - Fire Alarm	X	X	X
E-303	Roof Level - Fire Alarm	X	X	X
E-501	Electrical Details - 1	X	X	X
E-502	Electrical Details - 2	X	X	X
E-503	Fire Alarm Details & Riser Diagram	X	X	X
E-601	Lighting Schedules - 1	X	X	X
E-602	Panel Schedules - 2	X	X	X
E-603	Panel Schedules - 3	X	X	X
E-604	Panel Schedules - 4		X	X

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

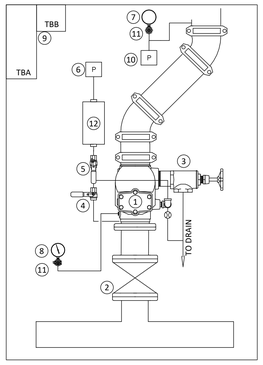
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

GENERAL INFORMATION SHEET

SUBMISSIONS DATE	DESCRIPTION	REVISIONS DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	G-000



(1) Alarm Check Valve

(2) Main Water Supply Valve With Supervisory Switch

(3) Main Drain Valve

(4) Alarm Line Test Valve

(5) Alarm Shut-Off Valve

(6) Alarm Switch

(7) System Presure Gauge (Water - 0 To 300 PSI)

(8) Water Supply Pressure Gauge (Water - 0 To 300 PSI)

(9) Electrical Junction Box C/W Terminals

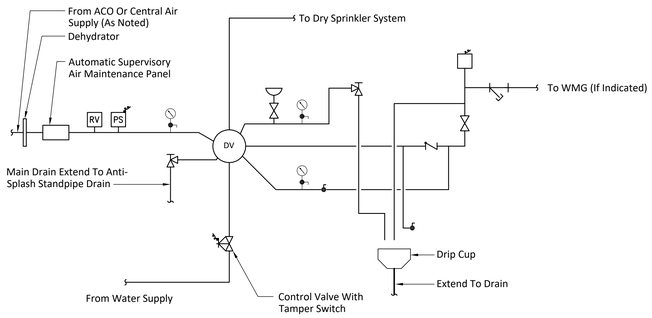
(10) High-Low Pressure Switch

(11) Pressure Gauge Bypass Valve

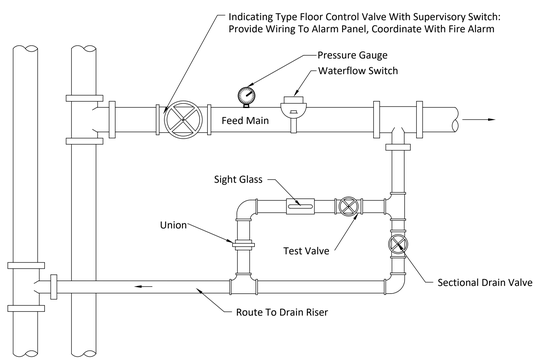
(12) Retard Chamber

NOTES:
1. Control Panel Not Included. All Fire Alarm Controls By Bldg Fire Alarm Panel.

ALARM CHECK VALVE DETAILS | Scale: NTS | Drawing: **FP-001** | Detail: **01**



DRY PIPE VALVE SCHEMATIC | Scale: NTS | Drawing: **FP-001** | Detail: **02**



NOTES:
1. Size Drain At 1 1/4" For Pipe Sized 3" And Less. Fitting Sized at 2" For Pipe Sized 4" And More.

FLOOR CONTROL VALVE ASSEMBLY DETAILS | Scale: NTS | Drawing: **FP-001** | Detail: **03**

GENERAL NOTES

General

1. Furnish All Labor, Materials And Equipment Required For A Complete Fire Suppression System Where Shown On Drawings And Required By The Appropriate Building Codes, Including, But Not Limited To NFPA 13[, And 14].
2. The Contractor Shall Submit For Approval, Detailed Construction Drawings And Hydraulic Calculations To The Engineer And Fire Sub-Code Official, Prior To The Installation Of Any Equipment. Obtain Certificate Of Inspection And Approval From The Same Agency Having Jurisdiction After Installation. Fire Suppression Construction Drawings Shall Be Signed And Sealed By An Engineer Licensed In The Area Where The Project Is Located.
3. Numbers And Locations Of Sprinkler Heads, Shown On These Plans, Are For Illustration Purposes Only. Exact Number And Locations Shall Be Shown On Sprinkler Construction Shop Drawings Which Shall Be Provided By The Contractor.
4. All New Sprinkler Piping And Heads Shall Be Located Only As Indicated On Approved Shop Drawings. Shop Drawings Must Be Submitted And Approved Before Starting Work. Any Deviations Approved By Engineer Made To Approved Layout Must Be Submitted To Engineer As "As-Built" Drawings. Coordinate With RCP And When Applicable, Architectural Elevations To Avoid Obstructions.
5. All Sprinkler System Components To Be Approved By The Engineer And General Contractor And Installed By The Fire Protection Contractor.
6. Coordinate Interlocks, Signaling And Alarm Contacts With Fire Alarm And Electrical Contractors. Coordinate Duct Smoke Detection With Mechanical Contractor.
7. Contractor To Design Per FM Global Standards Unless Otherwise Indicated.

Piping

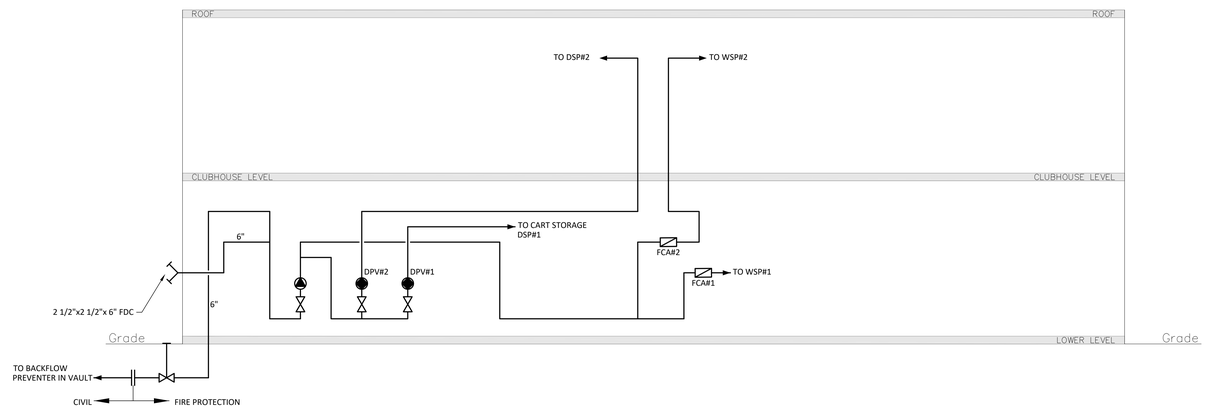
1. All Piping And Equipment Shall Be Substantially Supported From The Building Structure. Hanger And Supports Shall Be Specifically Approved For Use In Sprinkler Systems.
   A. Where Overhead Construction Does Not Permit Fastening Of Hanger Rods In Required Locations, Provide Additional Steel Framing As Required And Approved.
   B. No Piping Shall Be Hung From The Piping Of Other Trades Or Ductwork. Hangers Shall Be Of Heavy Construction, Suitable For The Size Of Pipe To Be Supported.
2. All Sprinkler Piping In Critical Areas Must Be Schedule 40 Steel With Threaded Fittings Or Victaulic-Type Fittings Where Permitted.
3. Fire Protection Piping Layout Is Schematic In Nature And Does Not Indicate All Required Fittings, Drain Valves, Etc.
4. All Sprinkler Piping Shall Be Installed So That The System Can Be Drained. Provide Drains For Trapped Piping In Accordance With NFPA 13.
5. All Pipes Passing Through Foundation Walls To Be Protected.

Sprinklers

1. In Areas Without Suspended Ceilings, Locate Sprinkler Heads Above And Below All Ducts Over 48" In Width.
2. Stock Of Extra Sprinklers Shall Be Furnished As Required For Each Temperature Rating.
3. Distance Of Sprinklers From Heat Sources Shall Be In Accordance With NFPA 13.
4. Coordinate Sprinkler Head Locations With Architectural Reflected Ceiling Plans. Changes Are Subject To Approval By Architect And Shall Be Made At No Additional Cost To The Owner.

DESIGN CRITERIA

1. Wet Sprinkler System: Light Hazard Occupancies: Office Areas, Restaurant, Seating Area: Density 0.10 GPM/Sq. Ft. Over Most Hydraulically Remote 1500 Sq. Ft. Maximum Coverage Per Sprinkler Head 225 Sq. Ft.
2. Wet Sprinkler System: Ordinary Hazard Group 1 Occupancies: Storage Areas, Mechanical Rooms, Kitchen: Density 0.15 GPM/Sq. Ft. Over Most Hydraulically Remote 1500 Sq. Ft. Maximum Coverage Per Sprinkler Head 130 Sq. Ft.
3. Dry Sprinkler System: Ordinary Hazard Group 1 Occupancies: Outdoor Seating, Density 0.15 GPM/Sq. Ft. Over Most Hydraulically Remote 1950 Sq. Ft. Maximum Coverage Per Sprinkler Head 130 Sq. Ft.
4. Dry Sprinkler System: Ordinary Hazard Group 2 Occupancies: Cart Storage, Density 0.2 GPM/Sq. Ft. Over Most Hydraulically Remote 1950 Sq. Ft. Maximum Coverage Per Sprinkler Head 130 Sq. Ft.
5. Minimum Pressure At Sprinkler Head 7 PSI.
6. Whenever Roll Grooved Connections Are Used For Wet Systems Only, Allowance For Additional Pressure Loss At Grooves Shall Be Made As Follows:
   A. For Each Coupling On Straight Run Including Straight Flow Through Tee Or Cross: Add 1 Equivalent Feet Of Pipe.
   B. For Each Coupling At Elbow, Tee Or Cross Where Direction Of Flow Changes: Add 2 Equivalent Feet Of Pipe.
5. Equivalent Fitting Lengths Used In Hydraulic Calculations Shall Be In Accordance With NFPA Standard No.13.
   A. Schedule 10 And/Or Lightwall Pipe Are Permitted For 2-1/2" And Larger Pipe Sizes Only.
6. Discharge From Each Sprinkler Head Shall Not Be Less Than Required For Area Covered By This Head. Area Coverage Per Head Shall Be Determined In Accordance With NFPA Standard No. 13.
7. Contractor Shall Order Hydrant Flow Test And Base All Hydraulic Calculations On Results Of Test.
   A. Hydrants Tested Shall Be Located As Close As Possible To Point Of Fire Service Connection To Yard Main.
   B. Test Data Shall Indicate Static Pressure, Residual Pressure At Test Flow And Grade Elevation At Hydrant Tested.
   C. Hydrant Test Data Shall Be Submitted For Review Along With Shop Drawings And Hydraulic Calculations.
8. Hydraulic Calculations Shall Be Brought Back To Connection To Water Supply.
9. Result Of Hydraulic Calculations Shall Indicate Minimum 10% Pressure Safety Margin. I.E. Excess Of Pressure Available Over Pressure Required.



SPRINKLER & STANDPIPE SYSTEM RISER DIAGRAM | Scale: NTS | Drawing: FP-001 | Detail: 04

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02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

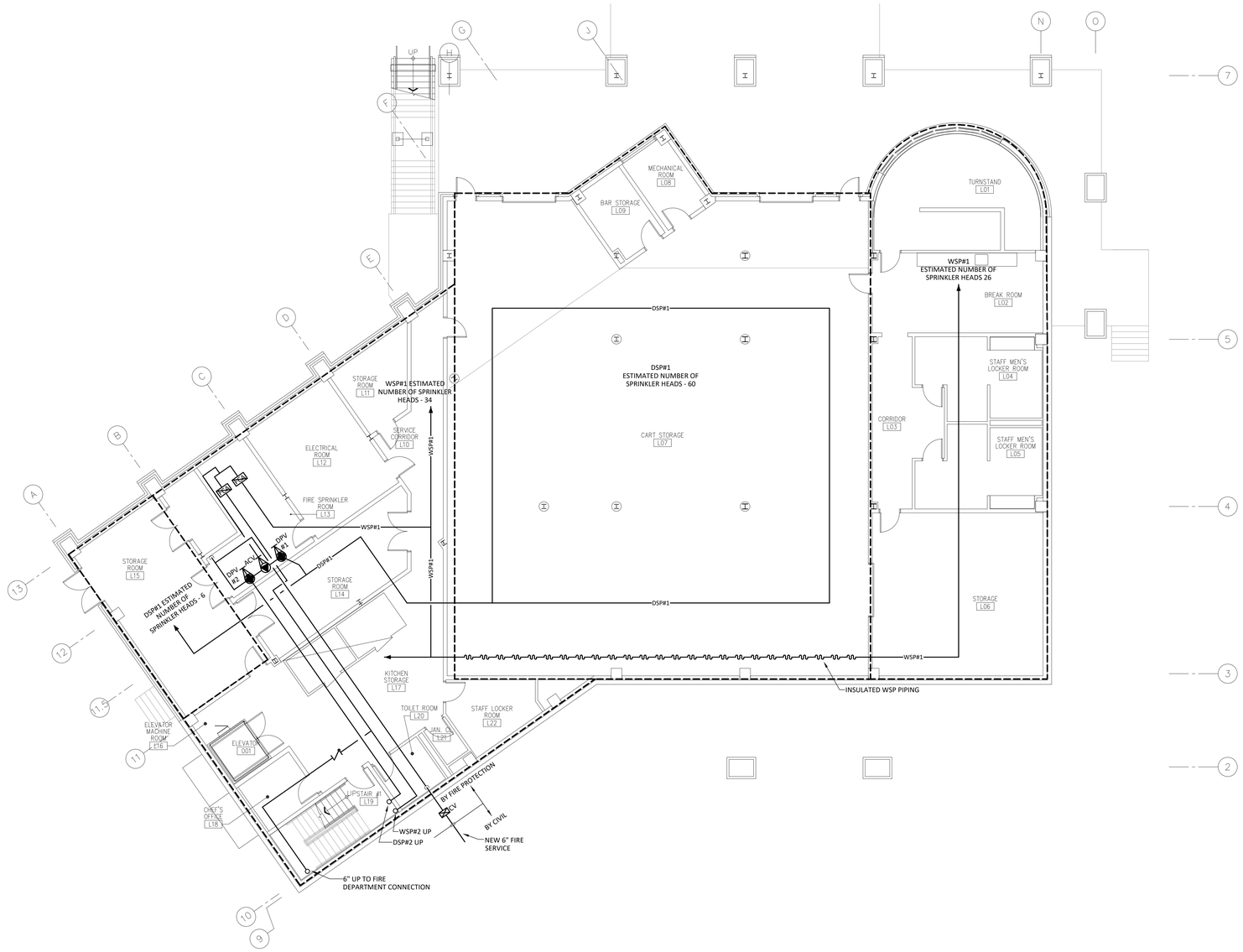
PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

FIRE PROTECTION NOTES & RISER DIAGRAM

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS NOTED
10.17.16	BID SET			DRWN BY	CAD
02.22.17	REBID SET			CHKD BY	DLB
				JOB NO	12285
				SHEET:	OF:
				DRWG NO	FP-001



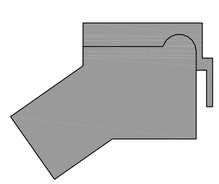
LOWER LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **FP-101** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Floor Control Valve Assembly
	New Sprinkler Piping
	Alarm Check Valve
	Dry Pipe Valve
	Check Valve W/ ABD
	Fire Protection Zone
	Curb Valve

Identifier	Description
ABD	Auto Ball Drip
ACV	Alarm Check Valve
CV	Curb Valve
DSP	Dry Sprinkler System
FCA	Floor Control Valve Assembly
WSP	Wet Sprinkler System

KEY PLAN



ROOF
CLUBHOUSE
LOWER LEVEL

Keyplan | **Vertical Plan**

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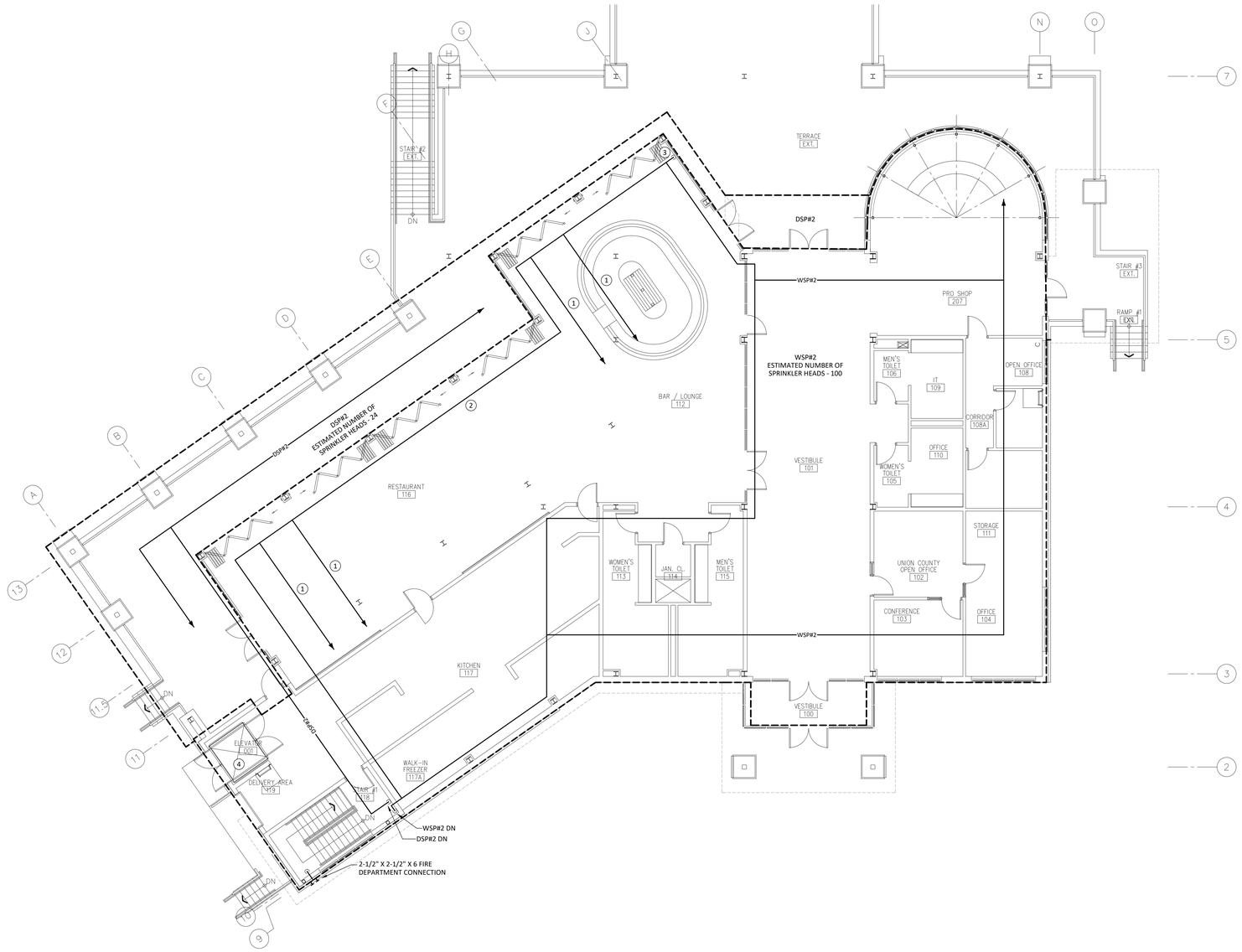
SHEET CONTENTS:

LOWER LEVEL - FIRE PROTECTION

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	FP-101



CLUBHOUSE LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **FP-102** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

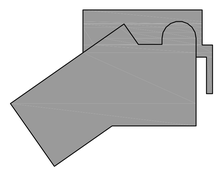
Identifier	Description
——→	New Sprinkler Piping
- - - →	Fire Protection Zone

Identifier	Description
DN	Down
DSP	Dry Sprinkler System
WSP	Wet Sprinkler System

KEY NOTES (SYMBOLS ①, ②, ETC.)

1. Typical Sprinkler Branch Pipe Under Pitched Roof. The Pipe Shall Follow The Pitch.
2. Location Of Sprinkler Main Loop Piping At The Lowest Point Of The Pitched Roof.
3. Pipe Down To Auxiliary Drain At The End Of The Main. Spill Drain To Outside.
4. Provide Sprinkler Head At Top Of Elevator Shaft.

KEY PLAN



Keyplan

Vertical Plan

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02-22-2017

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NEW CLUB HOUSE
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SHEET CONTENTS:

CLUBHOUSE LEVEL - FIRE PROTECTION

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
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DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	FP-102

PLUMBING GENERAL NOTES

Contract Requirements

1. All Plumbing Work Shall Be Prepared In Strict Accordance With The Specifications And With The Currently Adopted Edition Of The Prevailing State Code As Well As All Local Regulations That May Apply. In Case Of Conflict Between The Contract Documents And A Governing Code Or Ordinance The More Stringent Standard Shall Apply.

2. Contractor Shall Provide All Required Labor, Materials, Equipment, And Services Necessary To Accomplish A Safe And Complete Installation Of The Systems Indicated On The Drawings. All Material And Methods Shall Be In Strict Accordance With All Authority Having Jurisdiction Requirements. Work Shall Be Performed In A Neat And Workmanlike Manner.

3. Contractor Shall Obtain All Necessary Permits, Licenses, And Certificates Required By The Authority Having Jurisdiction. This Shall Include, But Is Not Limited To All Required Building Department Filing, Inspections, And Final Closeout Of Permits.

4. The Scope Of Work As Outlined In These Documents Ends At A Distance Of 5 Feet Outside The Building Wall. Coordinate Connection With Civil Engineer And Local Utility Provider.

5. The Contractor Shall Furnish A Written Guarantee To Replace Or Repair Promptly And Assume Responsibility For All Expenses Incurred For Any Workmanship And Equipment In Which Defects Develop Within One Year From The Date Of Acceptance By Owner, This Work Shall Be Done As Directed By The Owner. The Contractor Shall Incur All Expenses That Result From Such Work.

6. Contractor Shall Visit The Site Prior To Submitting A Bid To Verify Existing Conditions And Confirm Sizes And Locations Of Existing Services.

7. Provide All As-Built Drawings To GC To Verify Completion Of Work And For Owner's Record.

Coordination

1. Existing Site Utility Connections, Invert Elevations, And Locations Shall Be Verified Prior To Beginning Installation.

2. Materials Approved By The Architect Or Engineer To Be Stored On Site Shall Be Stored In An Owner Designated Location. Off Site Storage Must Be Arranged For Materials And Equipment Not Suitable For On Site Storage Or Items Not Applicable To The Current System Installation.

3. At The End Of Each Work Day The Contractor Shall Leave The Job Site In A Neat Condition And Remove All Construction Debris From The Site.

4. All Plumbing Work Shall Be Coordinated With All Other Trades Before Proceeding With The Installation. No Changes Are To Be Made In Plumbing Layout Without Written Permission by The Architect or Engineer.

5. Drawings Are Diagrammatic As Shown. Exact Routing And Arrangements Of Systems Shall Be Coordinated With All Other Trades, The Structural Drawings, Architectural Drawings, And All Existing Field Conditions.

6. Exact Dimensions And Locations Of Plumbing Fixture Rough-In Must Be Coordinated With The Architect And General Contractor.

General Installation

1. All Exposed Piping Penetrations Through Walls, Floors, And Ceilings Shall Be Sealed With Approved Fire Proofing Method and Escutcheons By Plumbing Contractor.

2. Provide And Install Water Tight Piping Sleeves And Seal Systems At Exterior Concrete Walls And Slabs On Grade For Service Piping Entries Into Building. Provide For Additional Waterproofing At Exterior Of POEs, Surrounding Piping / Sleeves As Necessarily With Approved Product.

3. No Piping Shall Be Run Exposed In Finished Areas Unless Specifically Stated Otherwise In These Documents.

4. Provide Dielectric Fittings, Couplings, Or Spacers Whenever Dissimilar Materials Are Joined Or Otherwise Come Into Contact With Each Other.

5. Where Overhead Construction Does Not Permit Fastening Of Supports The Contractor Shall Provide Supplementary Steel Required For Supporting Piping Materials.

6. Any Piping Exposed To Freezing Conditions Shall Be Insulated And Heat Traced, This Includes Any Sanitary Drainage Piping And Traps Installed In Unheated Spaces. Heat Traced To Be Installed By Plumbing Contractor And Coordinated With Electrical Contractor For Service.

7. For Water and Gas Piping: Expansion Loops Or Fittings Shall Be Provided At All Building Expansion Joints And For Every 100 Feet Of Straight Piping Run. Provide Anchor Points And Restraints As Required By Manufacturer Installation Guidelines.

Plumbing Fixtures & Equipment

1. All Fixtures Shall Be Provided With Standard Trap And Cleanout.

2. All Plumbing Fixture Flow Rates Shall Meet Minimum Flow Requirements As Outlined By Governing Plumbing Code And Local Jurisdiction Amendments.

3. Federal Lead Free Legislation Effective January 4, 2014 Mandates That The Wetted Surface Of Every Pipe, Fixture, And Fitting Sold Or Installed In Potable Water Applications Shall Not Contain More Than 0.25% Lead By Weight. All Products Submitted Shall Be Certified Lead-Free.

4. Trap Primers Shall Be Furnished For All Drains Not Receiving Continuous Discharge. Where Practical, Flow Type Trap Primers Shall Be Installed On The Cold Water Supply To Lavatory Sinks. Electronic Trap Primers Shall Be Used In All Other Locations. Differential Pressure Trap Primers Are Not Permitted For Use Under Any Circumstances.

Domestic Water Systems

1. All Work Shall Be Properly Tested, Balanced And Cleaned And Disinfected.

2. Completely Insulate All Water Piping Except Where Exposed To Fixtures With Fiberglass Insulation With Non-Combustible UL Rated Vapor Barrier Or Closed Cell Flexible Insulation Equal To Armaflex II. Breaks In Insulation At Hangers Will Not Be Acceptable.

3. Provide Shut-Off Valves On Hot And Cold Water Supply Pipes At Each Fixture, At Each Branch Take-Off, And At All Connections To Water Heaters And Plumbing Equipment.

4. At Each Hot Water Return Piping Connection To The Hot Water Supply Piping The Contractor Shall Furnish And Install Isolation, Balancing And Check Valves. Balance to 1 GPM Unless Otherwise Noted.

5. Provide Bellows Type Water Hammer Arrestors At Each Flush Valve Or Bank Of Flush Valves, Dishwashers, And All Fast Closing Valves. Where Installation Is Not Accessible Coordinate Location Of Access Panels With The Architect.

6. Access Panels Shall Be Provided As Necessary To Allow For Access To Valves, Trap Primers And Water Hammer Arrestors. All Access Panels Shall Be Provided And Installed By The General Contractor. Plumbing Contractor Shall Be Responsible For Their Location.

PLUMBING GENERAL NOTES

Sanitary / Storm Systems

1. No PVC Or ABS Piping Shall Be Used In Any Above Grade Plumbing Installations.

2. Cleanouts In Horizontal Drainage Lines Shall Be Spaced At Intervals Not To Exceed The Following:

   A. 2-1/2" Or Less: 25 Feet
   B. 3" and 4": 50 Feet
   C. More Than 4": 85 Feet

3. Install All Required Cleanouts To Clear Equipment And Fixtures. Cleanouts Shall Not Be Installed In Electrical Closets, IT Rooms, Or Any Similar Critical Or Water Sensitive Space.

4. Sanitary Piping 3" And Greater Shall Have A Minimum Slope Of 1/8 Inch Per Foot. Sanitary Piping Less Than 3" Shall Have A Minimum Slope Of 1/4 Inch Per Foot.

5. Fixture Vent And Branch Vent Piping Shall Be Installed Free Of Sags And Drops And Be Sloped Toward The Connection To The Sanitary Drainage System. All Fixtures Shall Be Vented In Accordance With Governing State And Local Plumbing Code.

6. All Horizontal Storm Drainage Piping Shall Be Insulated To Prevent Condensation On The Pipes. Insulation Shall Extend Vertically To The Underside Of The Drain Body.

Natural Gas Systems

General Requirements

1. Natural Gas Piping 2-1/2" And Greater Shall Be Schedule 40 Welded Pipe And Fittings. Piping 2" And Smaller Shall Be Schedule 40 Threaded Pipe And Fittings.

2. All Natural Gas Piping Installed Outdoors Or In Corrosive Environments Shall Be Protected With An Approved Corrosion Resistant, UV Resistant Enamel Coating Or Wrapping.

3. All Corrugated Flexible Natural Gas Connections Shall Be Properly Grounded.

4. All Natural Gas Piping Shall Be Pressure Tested And Leak Tested With Approved Non-Corrosive Leak-Detecting Fluid Or Other Approved Leak-Detection Method Prior To System Startup.

5. Kitchen Installations Shall Include A Natural Gas Shut Off Valve Wired To Emergency Push Button Shut Off Switches At All Paths Of Egress. Shut Off Valve Shall Be For Natural Gas Supply To Kitchen.

Installation Requirements

1. Install Sediment Traps (Dirt Or Drip Legs) Prior To The Gas Shutoff Valve On All Connections To Gas Fired Equipment.

2. Natural Gas Piping Shall Not Be Installed In Or Through Return Air Plenums, Supply Or Exhaust Ducts, Clothes Chutes, Chimneys, Or Elevator Shafts.

3. Whenever Possible Gas Piping Shall Not Be Installed In Concealed Locations. If Installation In Concealed Locations Cannot Be Avoided, Piping Shall Not Have Unions Or Fittings Unless Fittings Are Listed For Use In Concealed Locations.

4. Piping Installed Under The Building Slab Shall Be Installed In An Approved Conduit Or Sleeve System. The Conduit Must Be Vented At Both Ends And Terminate In An Occupiable Portion Of The Building At A Minimum Of 2 Inches Above The Finished Floor.

NOT FOR CONSTRUCTION

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PLUMBING INFORMATION SHEET

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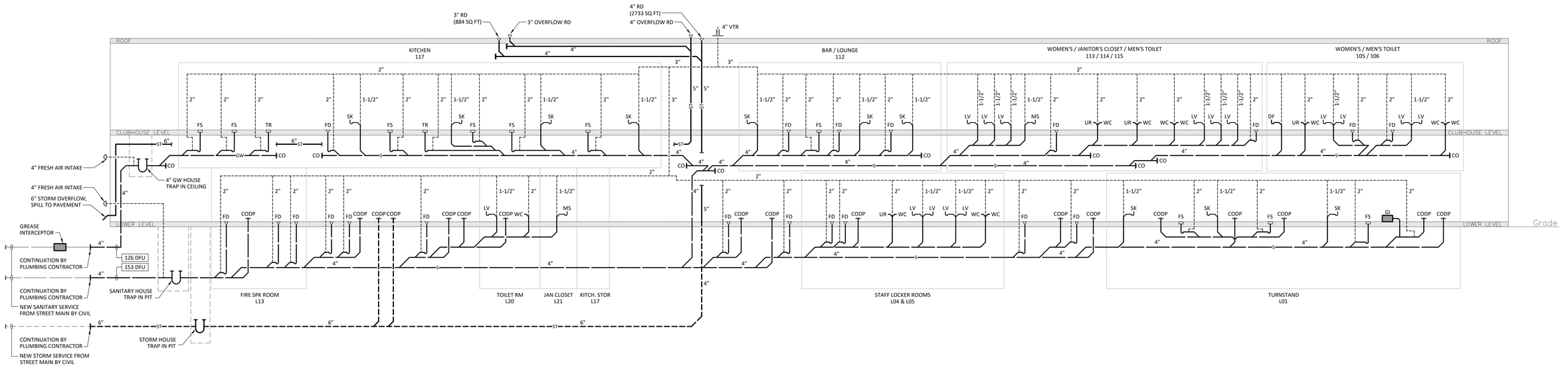
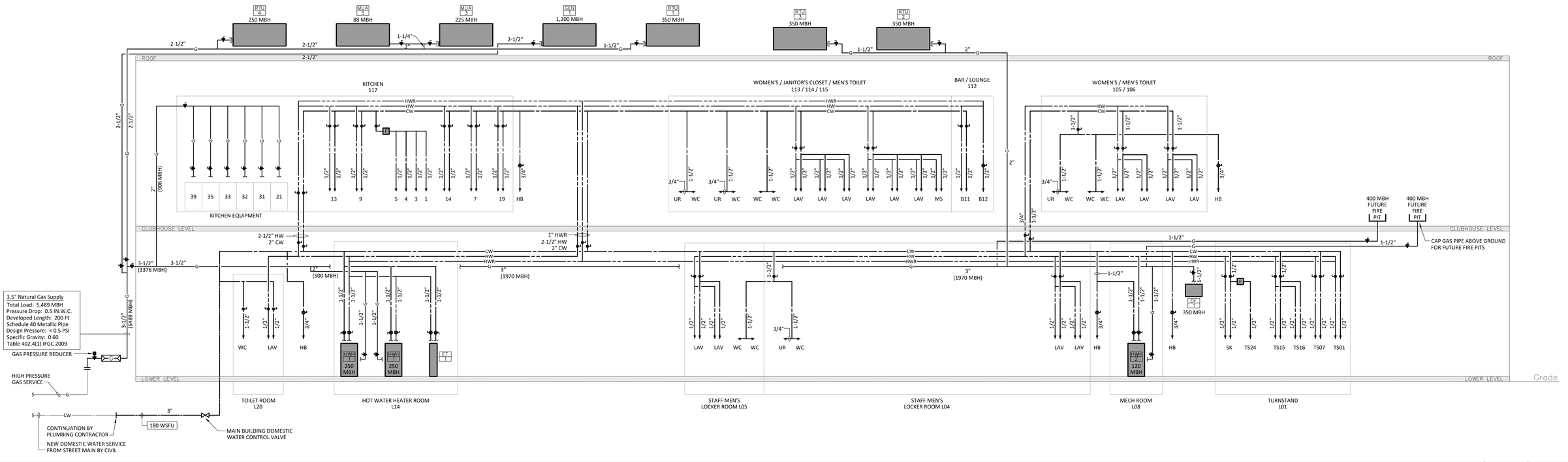


SANITARY & STORM RISER DIAGRAM | Scale: NTS | Drawing: **P-002** | Detail: **01**



WATER & GAS RISER DIAGRAM | Scale: NTS | Drawing: **P-002** | Detail: **02**

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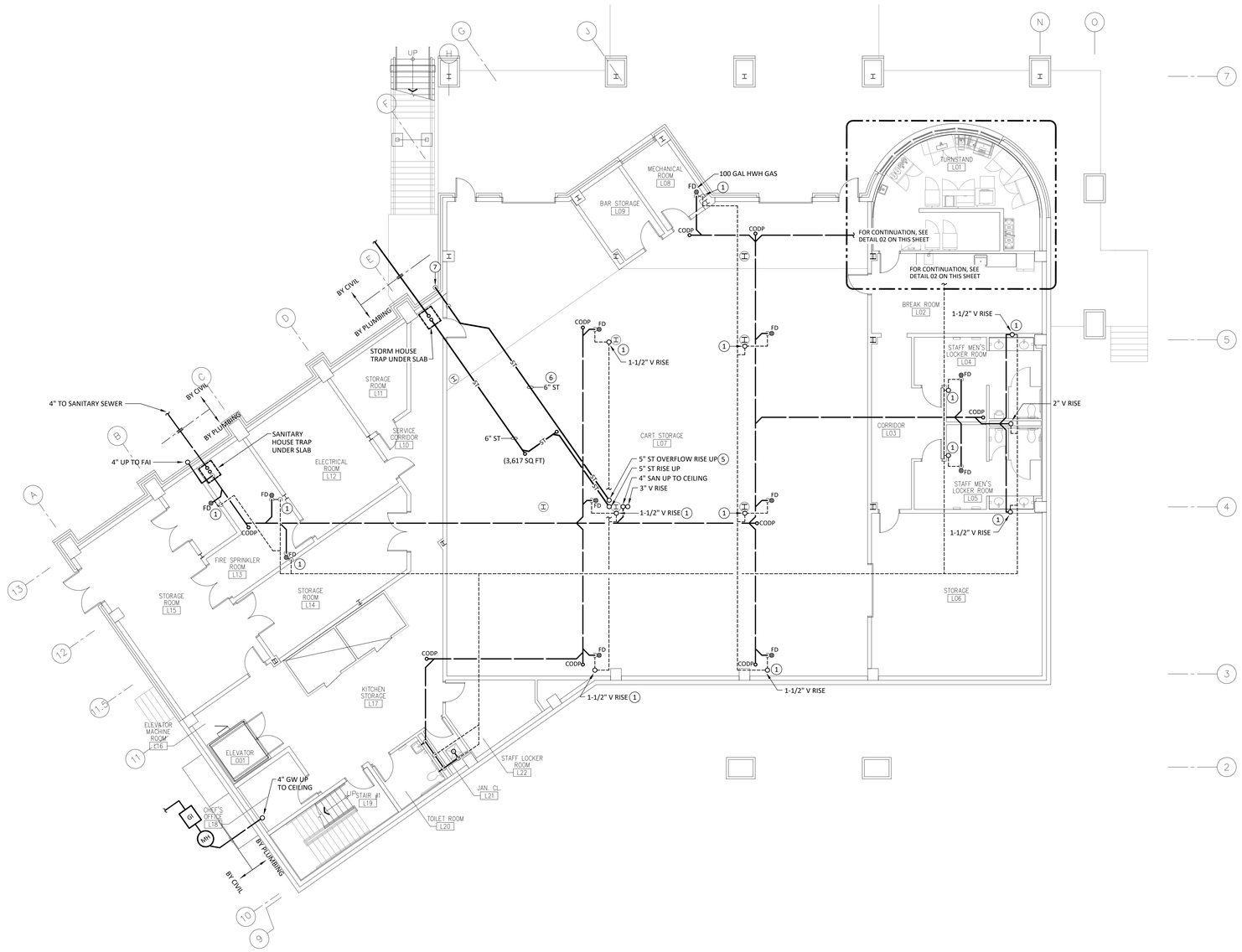
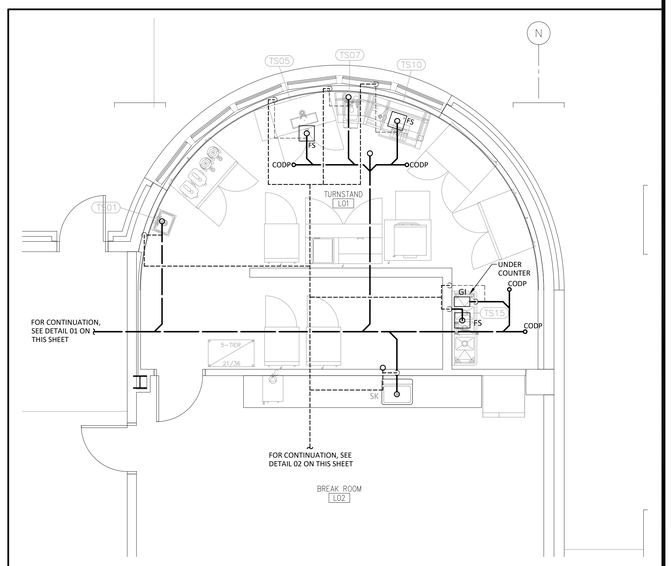
DRWG NO	P-002





LOWER LEVEL — Scale: 1/8"=1'-0" (2' 4" 8" 16') — Drawing: **P-101** Detail: **01**

TURNSTAND PART PLAN — Scale: 1/4"=1'-0" (1' 2' 4' 8') — Drawing: **P-101** Detail: **02**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
———	Sanitary Piping Below Floor
- - - - - - -	Vent Piping
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
CODP	Cleanout Deck Plate
	Floor Drain

Identifier	Description
CODP	Cleanout Deck Plate
DN	Down
FAI	Fresh Air Intake
FD	Floor Drain
FS	Floor Sink
GI	Grease Intercepter
GW	Grease Waste
MH	Manhole
SAN	Sanitary
ST	Storm
V	Vent

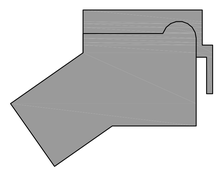
GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
3. All Pipe Penetrations Of Fire And/ Or Smoke Rated Assemblies Shall Be Fire Stopped As Required To Restore Assembly To Original Integrity.
4. Refer To Architectural Drawings For Exact Locations And Elevations Of All Plumbing Fixtures, Drains And Equipment. Provide Water Hammer Arrestors With Access Doors Adjacent To All Water Hammer Arrestors. Provide Shut-Off Valves At Each Fixture On Water Supply Pipes Hot And Cold.
5. Architect To Provide Clear Floor Space Accessibility Requirements For All Showers and ADA Plumbing Fixtures.
6. Install Work So As To Be Readily Accessible For Operation, Maintenance, And Repair. Minor Deviations From The Drawings May Be Made To Accomplish This Without Additional Cost To The Owner. Changes With Cost Impact Shall Not Be Made Without Approval.
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. 1-1/2" Vent Riser.
2. Not Used.
3. Not Used.
4. Not Used.
5. 4" Up To Secondary (Overflow) Roof Drain.
6. 6" Storm Pipe At Ceiling Of This Level From Overflow Roof Drain.
7. Overflow Storm Drain Elbow Down To Spill On Pavement.

KEY PLAN



ROOF
CLUBHOUSE
LOWER LEVEL

Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
CONSULTING ENGINEERS, P.C.
One Penn Plaza, Suite 2601, New York, NY 10119

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DLB Project ID: 12285

Rob Jankowski
Phone: (646) 381-6721

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

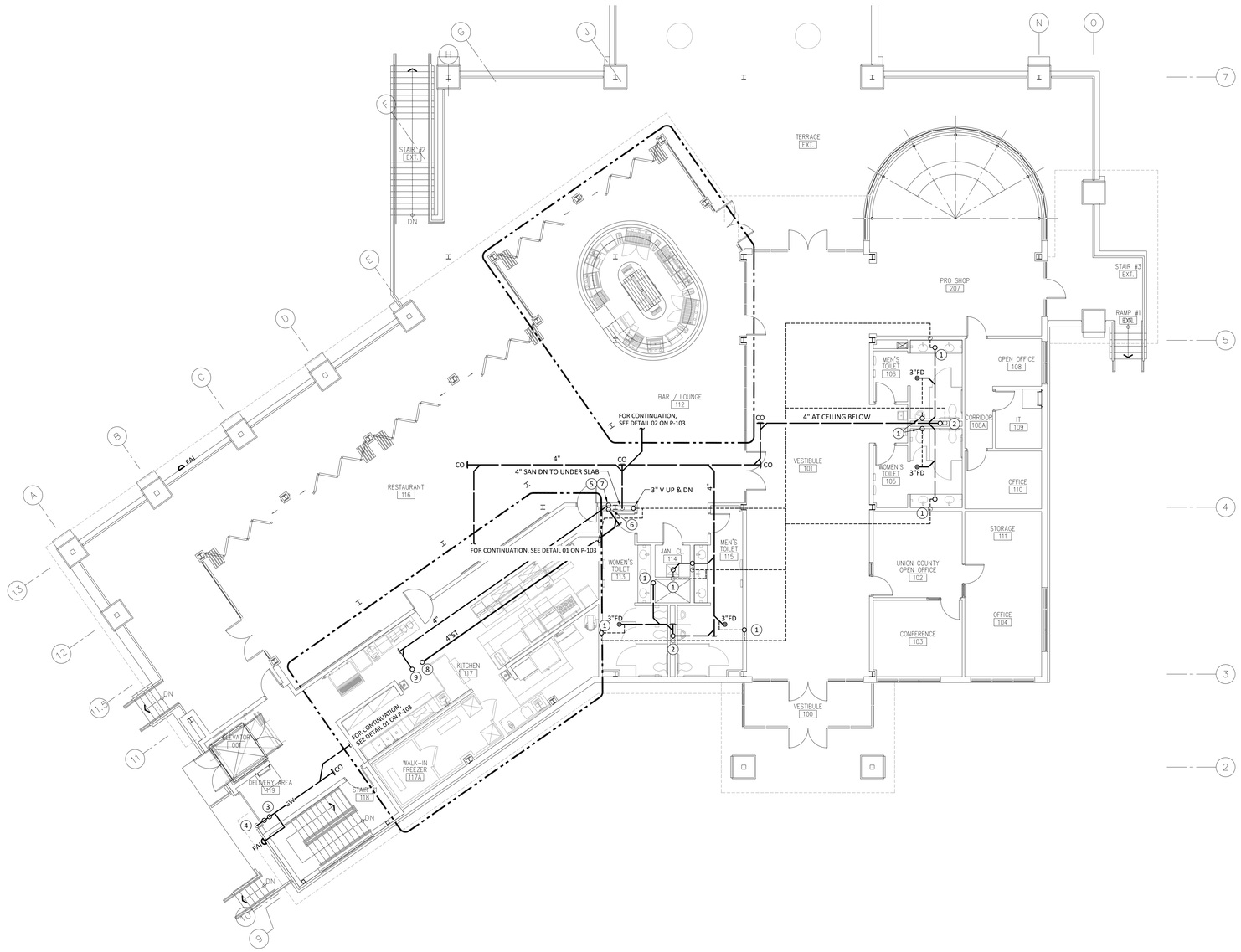
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL - SANITARY

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-101



CLUBHOUSE LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **P-102** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Sanitary Piping Below Floor
	Vent Piping
	Storm Piping
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
CO	Sanitary Clean Out
	Floor Drain

Identifier	Description
CO	Cleanout
DN	Down
FAI	Fresh Air Intake
FD	Floor Drain
GW	Grease Waste
V	Vent

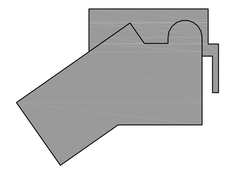
GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
3. All Pipe Penetrations Of Fire And/ Or Smoke Rated Assemblies Shall Be Fire Stopped As Required To Restore Assembly To Original Integrity.
4. Refer To Architectural Drawings For Exact Locations And Elevations Of All Plumbing Fixtures, Drains And Equipment. Provide Water Hammer Arrestors With Access Doors Adjacent To All Water Hammer Arrestors. Provide Shut-Off Valves At Each Fixture On Water Supply Pipes Hot And Cold.
5. Architect To Provide Clear Floor Space Accessibility Requirements For All Showers and ADA Plumbing Fixtures.
6. Install Work So As To Be Readily Accessible For Operation, Maintenance, And Repair. Minor Deviations From The Drawings May Be Made To Accomplish This Without Additional Cost To The Owner. Changes With Cost Impact Shall Not Be Made Without Approval.
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. 1-1/2" Vent Rise.
2. 2" Vent Rise.
3. 4" GW House Trap At Ceiling Below.
4. 4" GW Down To Below Slab.
5. 4" Up To Overflow Roof Drain & Down To Lower Level Ceiling.
6. Connect To 5" Storm Leader.
7. Connect To 5" Overflow Storm Riser.
8. 3" Up To Roof Drain.
9. 3" Up To Overflow Roof Drain.

KEY PLAN



Keyplan

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

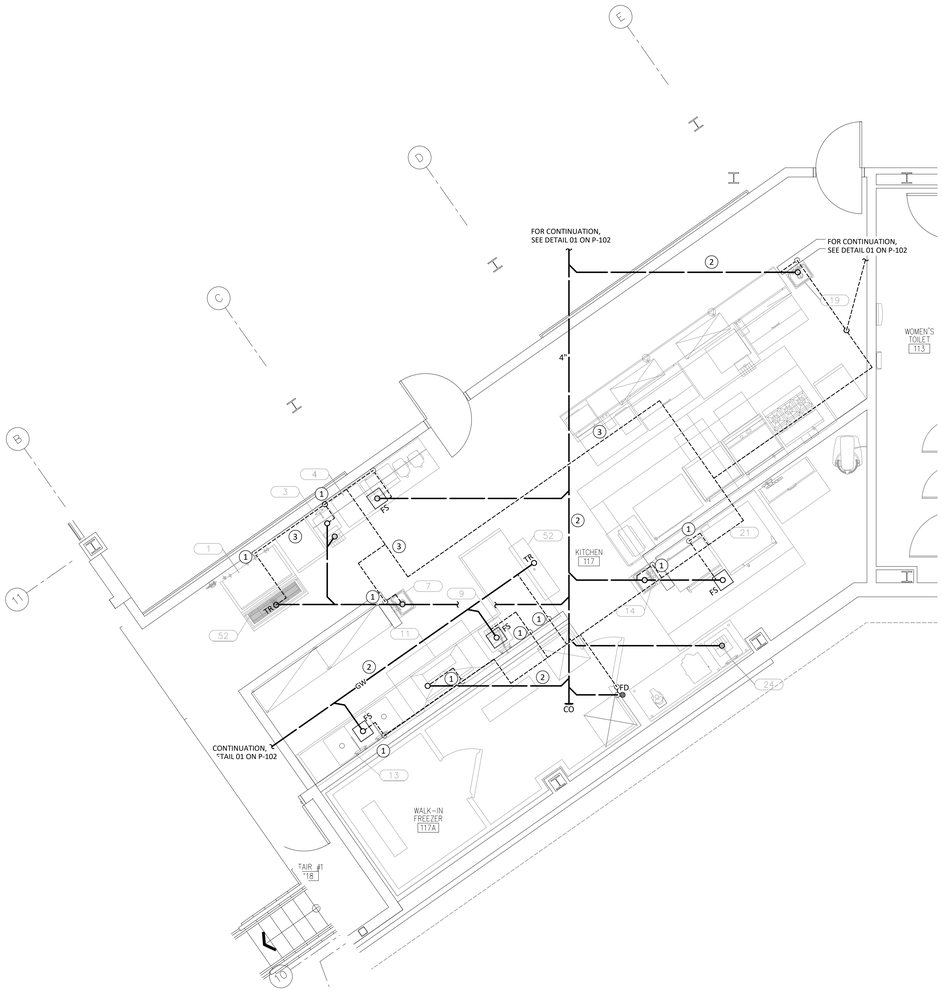
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

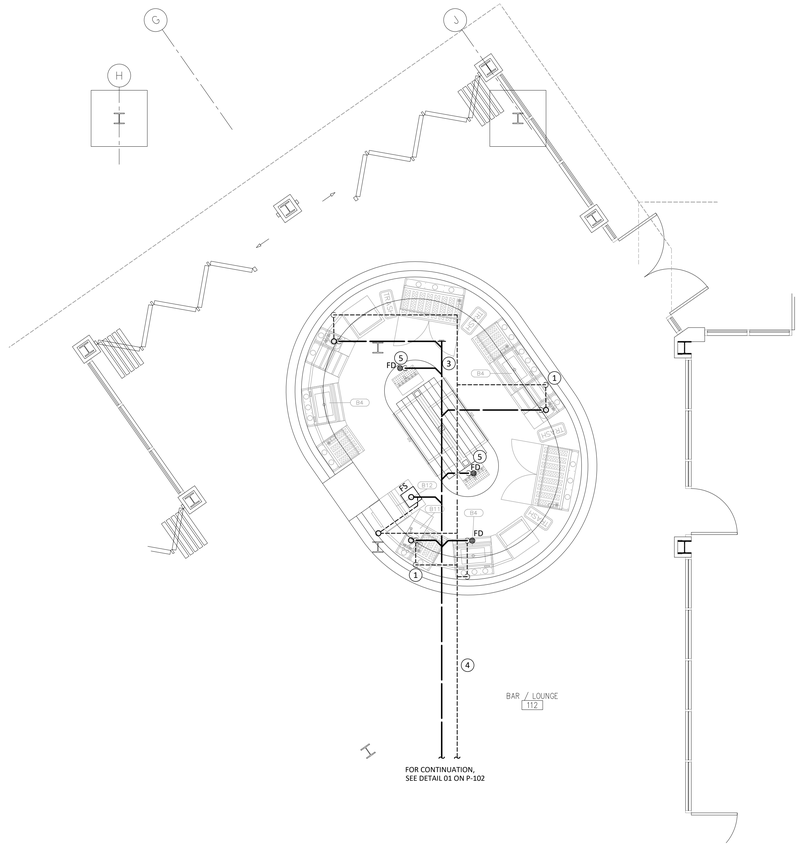
CLUBHOUSE LEVEL - SANITARY

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-102



KITCHEN PART PLAN — Scale: 1/8"=1'-0" — Drawing: P-103 — Detail: 01



BAR / LOUNGE PART PLAN — Scale: 1/8"=1'-0" — Drawing: P-103 — Detail: 02

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Sanitary Piping Below Floor
	Vent Piping
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
CO	Sanitary Clean Out
	Floor Drain

Identifier	Description
CO	Cleanout
DN	Down
FAI	Fresh Air Intake
FD	Floor Drain
GW	Grease Waste
TR	Trap
V	Vent

GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
3. All Pipe Penetrations Of Fire And/ Or Smoke Rated Assemblies Shall Be Fire Stopped As Required To Restore Assembly To Original Integrity.
4. Refer To Architectural Drawings For Exact Locations And Elevations Of All Plumbing Fixtures, Drains And Equipment. Provide Water Hammer Arrestors With Access Doors Adjacent To All Water Hammer Arrestors. Provide Shut-Off Valves At Each Fixture On Water Supply Pipes Hot And Cold.
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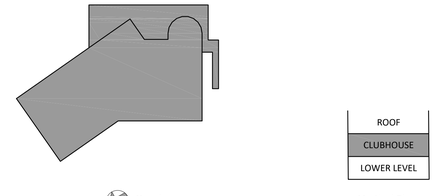
6. Install Work So As To Be Readily Accessible For Operation, Maintenance, And Repair. Minor Deviations From The Drawings May Be Made To Accomplish This Without Additional Cost To The Owner. Changes With Cost Impact Shall Not Be Made Without Approval.
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. 1-1/2" Vent Rise.
2. Sanitary Piping At Ceiling Below.
3. Vent Piping At Ceiling Of Clubhouse Level.
4. All Bar Vents Shall Be Via Island Venting And Piping At Ceiling Of Level Below.
5. Floor Drains Under Beer Dispenser.

KEY PLAN



Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

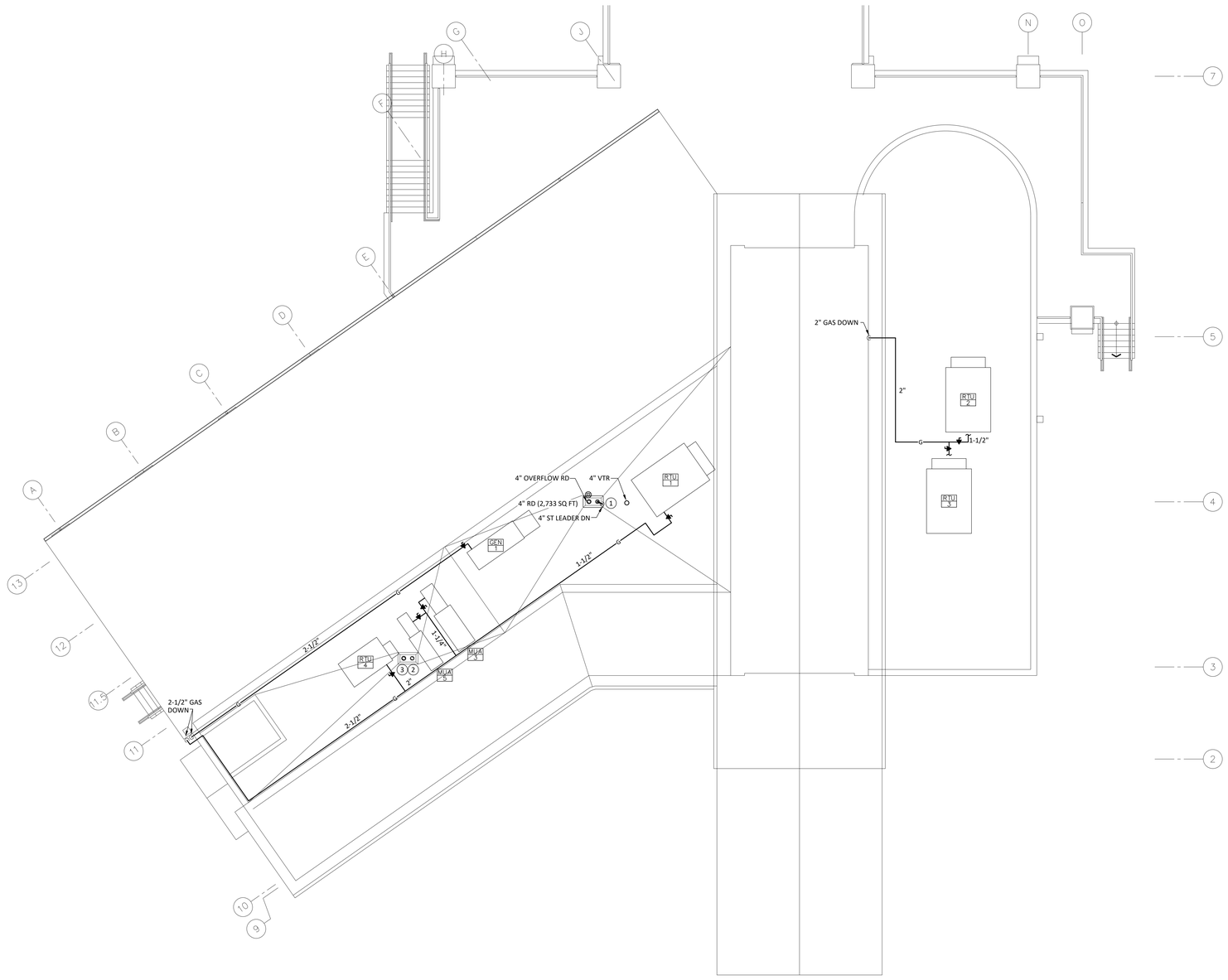
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - SANITARY PART PLANS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-103



ROOF PLAN | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **P-104** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
⟿o	Pipe Up Through Floor Above Or Through Section Cut Line
◎	Roof Drain
⟿G⟿	Gas Piping
▭	New Equipment

Identifier	Description
G	Gas
GEN	Generator
MUA	Make Up Air Unit
RD	Roof Drain
RTU	Roof Top Unit
ST	Storm
VTR	Vent Thru Roof

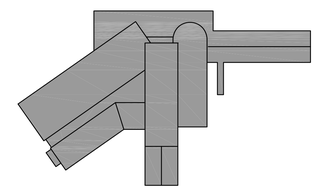
GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
3. All Pipe Penetrations Of Fire And/ Or Smoke Rated Assemblies Shall Be Fire Stopped As Required To Restore Assembly To Original Integrity.
4. Refer To Architectural Drawings For Exact Locations And Elevations Of All Plumbing Fixtures, Drains And Equipment. Provide Water Hammer Arrestors With Access Doors Adjacent To All Water Hammer Arrestors. Provide Shut-Off Valves At Each Fixture On Water Supply Pipes Hot And Cold.
5. Architect To Provide Clear Floor Space Accessibility Requirements For All Showers and ADA Plumbing Fixtures.
6. Install Work So As To Be Readily Accessible For Operation, Maintenance, And Repair. Minor Deviations From The Drawings May Be Made To Accomplish This Without Additional Cost To The Owner. Changes With Cost Impact Shall Not Be Made Without Approval.
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS ①, ②, ETC.)

1. 4" Storm Pipe Along Underside Of Roof, From Roof Drain To Storm Leader.
2. 3" Roof Drain (884 SQ FT).
3. 3" Overflow Drain.

KEY PLAN



N **Keyplan** — **Vertical Plan**

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

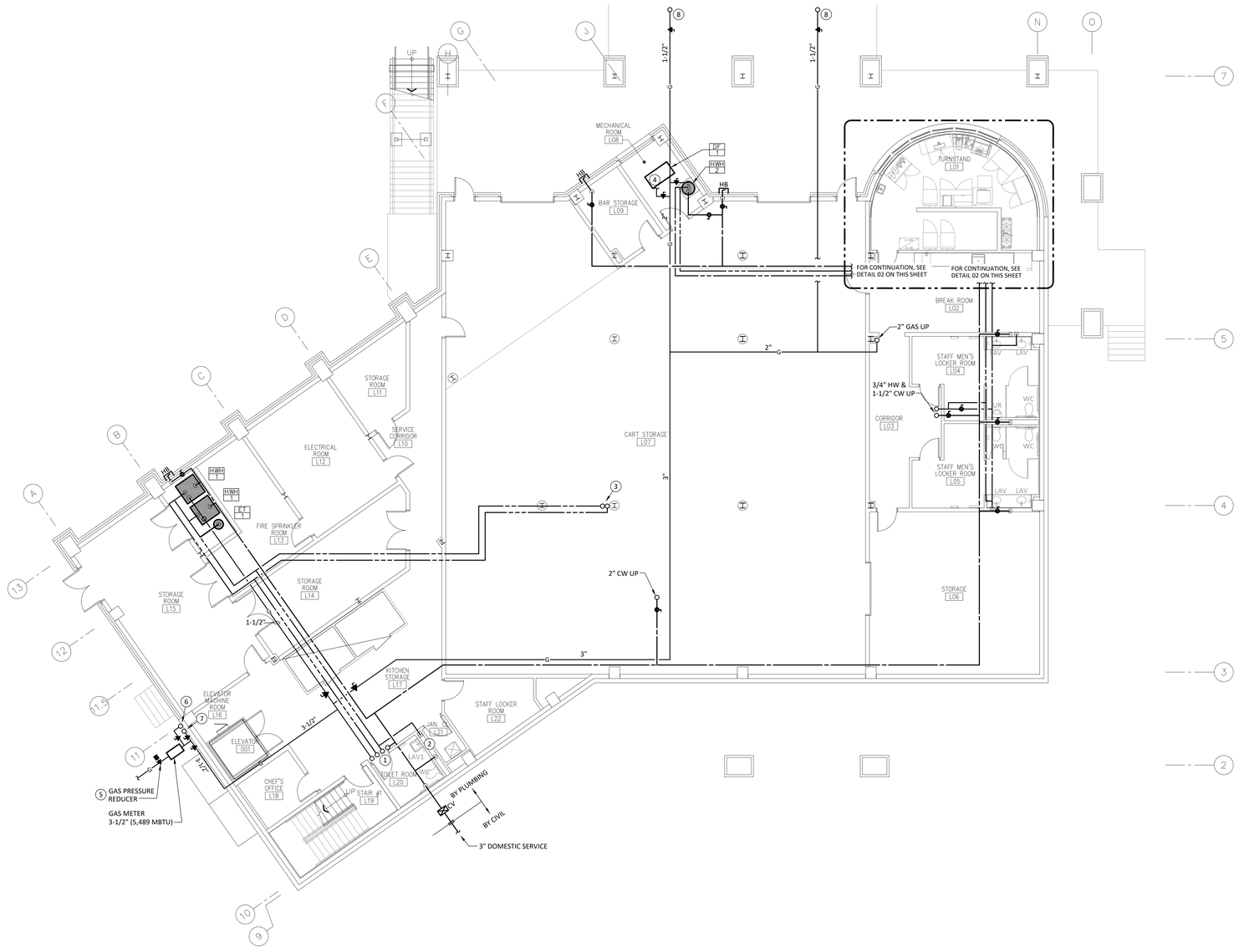
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

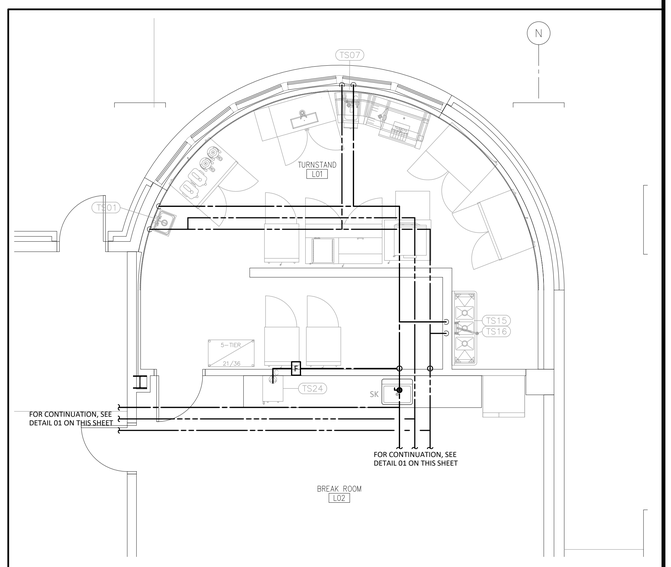
SHEET CONTENTS:

ROOF PLAN - PLUMBING

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-104





LOWER LEVEL — Scale: 1/8"=1'-0" (2' 4' 8' 16') — Drawing: P-201 — Detail: 01

TURNSTAND PART PLAN — Scale: 1/4"=1'-0" (1' 2' 4' 8') — Drawing: P-201 — Detail: 02

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Cold Water Piping
	Hot Water Piping
	Hot Water Return Piping
G	Gas Piping
	Ball Valve
	Gas Cock
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
F	Under Cabinet Filter
HB	Hose Bibb In Freeze Proof Enclosure

Identifier	Description
CW	Cold Water
DF	Duct Furnace
DN	Down
G	Gas
HB	Hose Bibb
HW	Hot Water
HWH	Hot Water Heater
HWR	Hot Water Return
MUA	Make Up Air Unit
RTU	Roof Top Unit

GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
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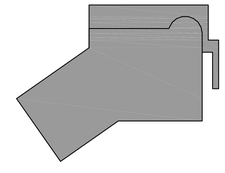
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS ①, ②, ETC.)

1. 2" G, 2" CW, 2-1/2" HW & 1" HWR Risers Up.
2. 1" CW Drop & 3/4" HW Drop.
3. 1" HW & 3/4" HWR Up To Bathroom Above.
4. 1-1/2" Gas To DF-1.
5. Gas Pressure Shall Be Reduced To 14" WC.
6. 2-1/2" Gas Pipe Up To Emergency Generator.
7. 2-1/2" Gas Pipe Up To RTU's And MUA's.
8. 1-1/2" Gas Up To Future Fire Pits. Cap Gas Pipe Above Ground.

KEY PLAN



Keyplan

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
CONSULTING ENGINEERS, P.C.
One Penn Plaza, Suite 2601, New York, NY 10119
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

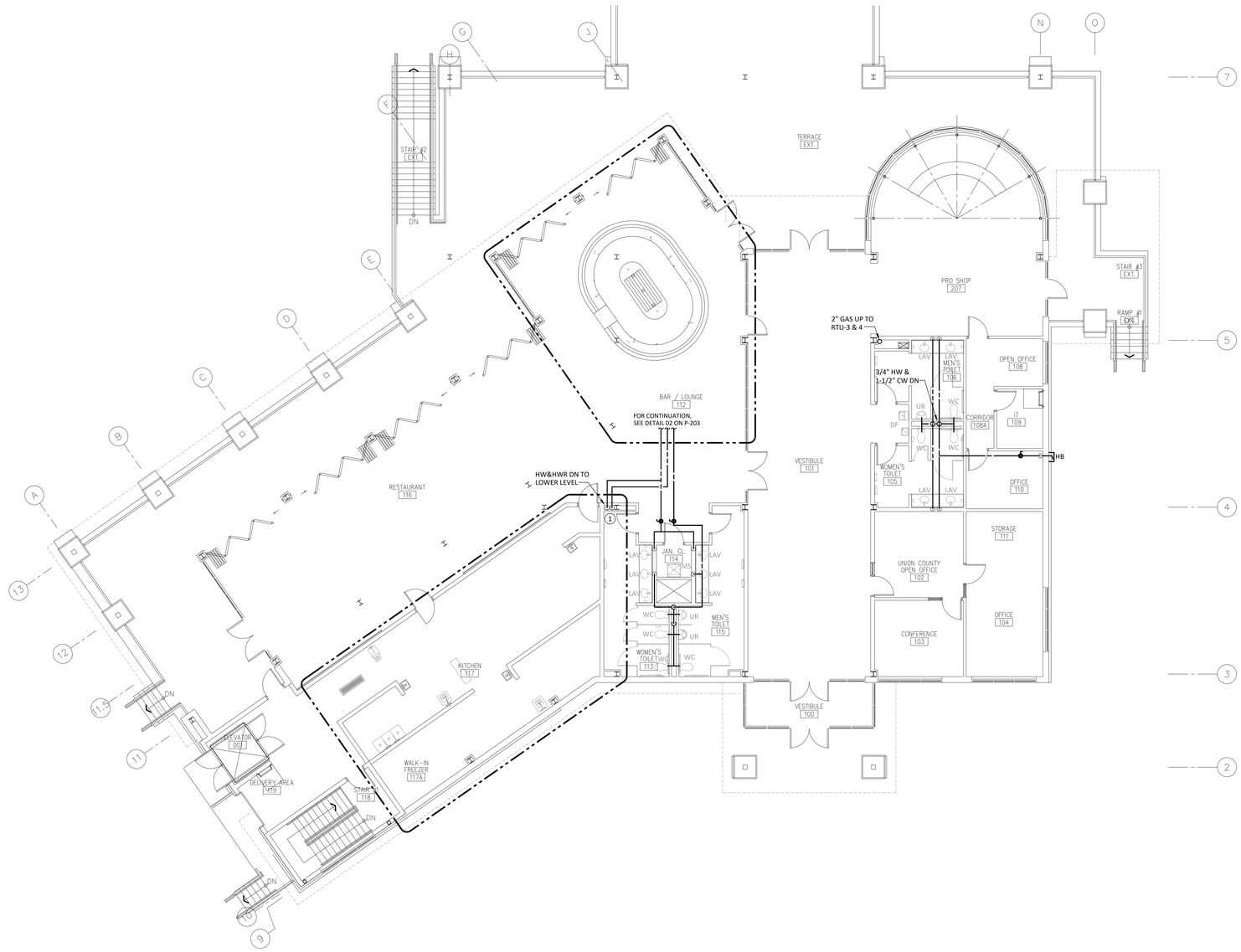
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL - DOMESTIC WATER AND GAS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-201



CLUBHOUSE LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **P-202** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Cold Water Piping
	Hot Water Piping
	Hot Water Return Piping
G	Gas Piping
	Ball Valve
	Gas Cock
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
F	Under Cabinet Filter
HB	Hose Bibb In Freeze Proof Enclosure

Identifier	Description
CW	Cold Water
DN	Down
G	Gas
HB	Hose Bibb
HW	Hot Water
HWH	Hot Water Heater
HWR	Hot Water Return

GENERAL NOTES

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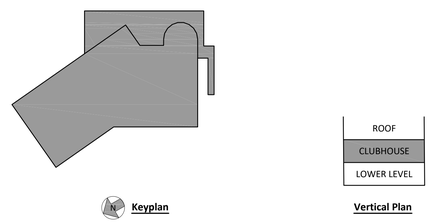
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. HW & HWR From Lower Level.

KEY PLAN



Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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1084 ROUTE 22 WEST, MOUNTAINSIDE, NEW JERSEY 07092
TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

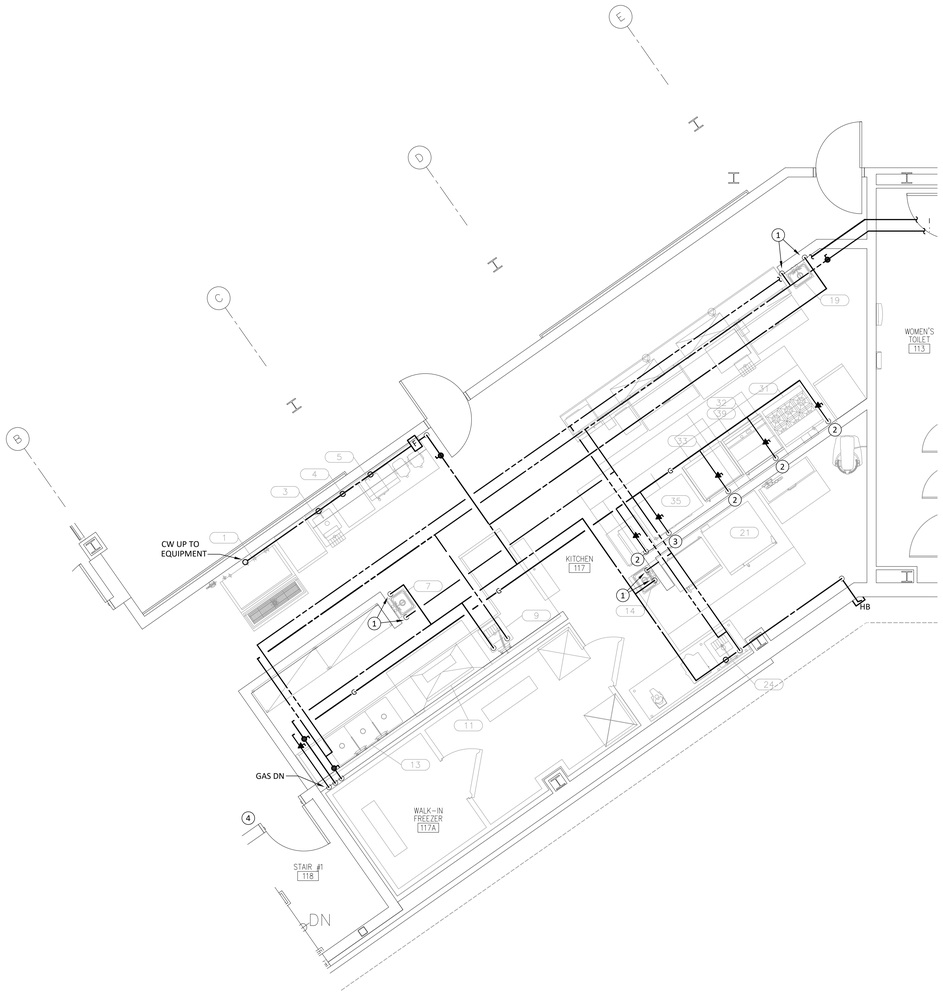
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

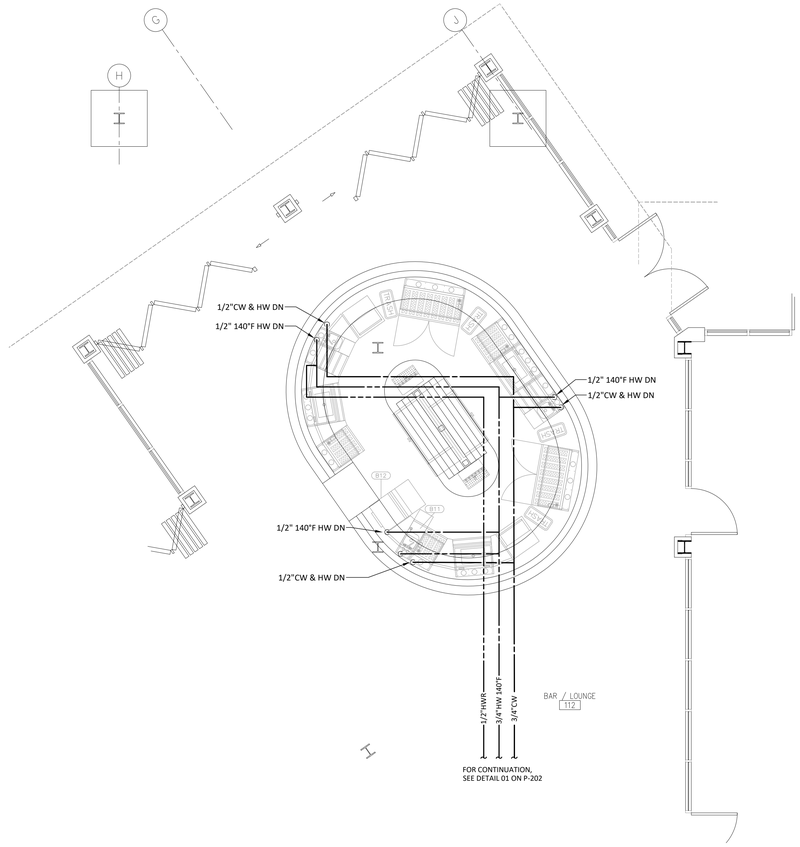
CLUBHOUSE LEVEL - DOMESTIC WATER AND GAS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-202



KITCHEN PART PLAN — Scale: 1/4"=1'-0" (1' 2' 4' 8') — Drawing: P-203 — Detail: 01



BAR / LOUNGE PART PLAN — Scale: 1/4"=1'-0" (1' 2' 4' 8') — Drawing: P-203 — Detail: 02

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Cold Water Piping
	Hot Water Piping
	Hot Water Return Piping
G	Gas Piping
	Ball Valve
	Gas Cock
	Pipe Up Through Floor Above Or Through Section Cut Line
	Pipe Drop / Offset Down
F	Under Cabinet Filter
HB	Hose Bibb In Freeze Proof Enclosure

Identifier	Description
CW	Cold Water
DN	Down
G	Gas
HB	Hose Bibb
HW	Hot Water
HWH	Hot Water Heater
HWR	Hot Water Return

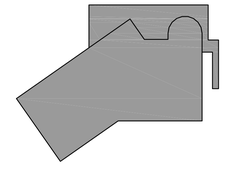
GENERAL NOTES

1. It Is The Responsibility Of The Plumbing Contractor To Verify All Equipment Rough-Ins With The Appropriate Supplier And To Determine The Most Feasible And Economical Location To Install Piping And Valve Services.
2. Pipes Passing Under Or Through Any Walls, Including Foundation Walls Shall Be Installed Through Pipe Sleeves One Size Larger Than Pipe. Seal Around Pipe.
3. All Pipe Penetrations Of Fire And/ Or Smoke Rated Assemblies Shall Be Fire Stopped As Required To Restore Assembly To Original Integrity.
4. Refer To Architectural Drawings For Exact Locations And Elevations Of All Plumbing Fixtures, Drains And Equipment. Provide Water Hammer Arrestors With Access Doors Adjacent To All Water Hammer Arrestors. Provide Shut-Off Valves At Each Fixture On Water Supply Pipes Hot And Cold.
5. Architect To Provide Clear Floor Space Accessibility Requirements For All Showers and ADA Plumbing Fixtures.
6. Install Work So As To Be Readily Accessible For Operation, Maintenance, And Repair. Minor Deviations From The Drawings May Be Made To Accomplish This Without Additional Cost To The Owner. Changes With Cost Impact Shall Not Be Made Without Approval.
7. Provide All Necessary Piping Offsets And Changes In Direction Required To Complete The Installation.

KEY NOTES (SYMBOLS ①, ②, ETC.)

1. 1/2" CW & 1/2" HW Down.
2. 3/4" Gas Down.
3. 1-1/4"Gas Down.
4. Emergency Gas Shut Off Button For Kitchen Gas Supply.

KEY PLAN



Keyplan — Vertical Plan

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SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
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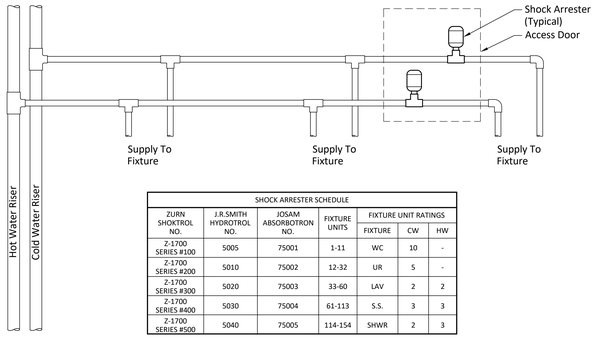
02.22.17	REBID SET		

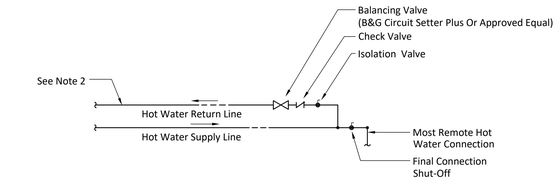
DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	P-203



SHOCK ARRESTER SCHEDULE						
ZURN SHOKTROL NO.	J.R.SMITH HYDROTROL NO.	JOSAM ABSORBOTRON NO.	FIXTURE UNITS	FIXTURE UNIT RATINGS		
				FIXTURE	CW	HW
Z-1700 SERIES #100	5005	75001	1-11	WC	10	-
Z-1700 SERIES #200	5010	75002	12-32	UR	5	-
Z-1700 SERIES #300	5020	75003	33-60	LAV	2	2
Z-1700 SERIES #400	5030	75004	61-113	S.S.	3	3
Z-1700 SERIES #500	5040	75005	114-154	SHWR	2	3

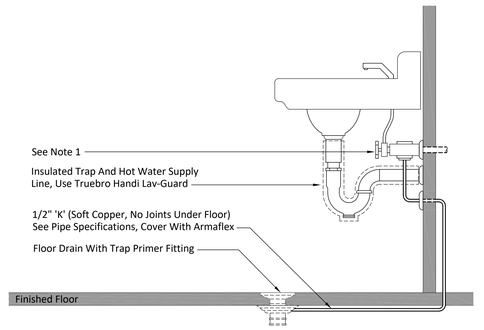
NOTES:
1. Arresters Shall Be Accessible For Replacement By Way Of Access Door.
2. Approved Arresters Shall Be Installed On Water Distribution Systems In Which Quick Closing Valves Are Installed. Multiple Arrestor Installations Shall Be As Per P.D.I. Standards.

DETAIL OF SHOCK ARRESTER INSTALLATION | Scale: NTS | Drawing: **P-501** | Detail: **01**



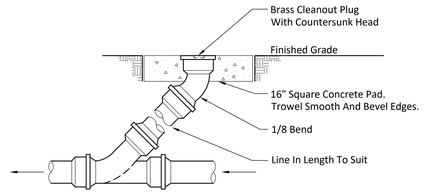
NOTES:
1. Tag All Piping And Valves.
2. Connect To Hot Water Return System Piping In Mechanical Room With Valved Connection As Required.

BALANCING VALVE ASSEMBLY (BVA) DETAIL | Scale: NTS | Drawing: **P-501** | Detail: **02**

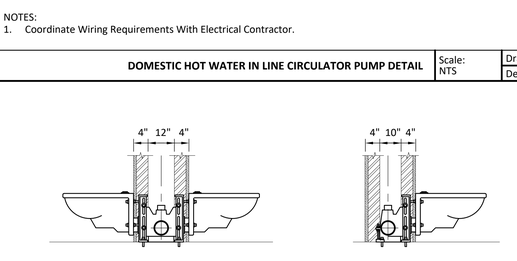


NOTES:
1. Cold Water Supply With Shut-Off Valve And Automatic Trap Primer, Wade #W-2400 Or Jay R. Smith #2699 With Vacuum Breaker.

DETAIL OF FLOOR DRAIN AND TRAP PRIMER | Scale: NTS | Drawing: **P-501** | Detail: **03**



DETAIL OF CLEANOUT TO GRADE | Scale: NTS | Drawing: **P-501** | Detail: **04**



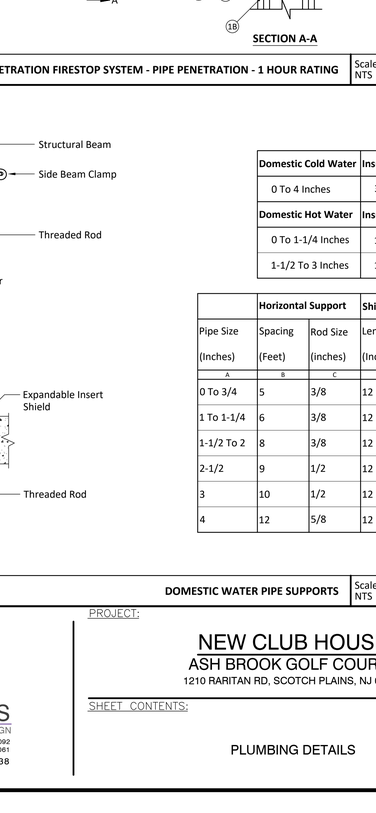
NOTES:
1. Coordinate Wiring Requirements With Electrical Contractor.

DOMESTIC HOT WATER IN LINE CIRCULATOR PUMP DETAIL | Scale: NTS | Drawing: **P-501** | Detail: **05**

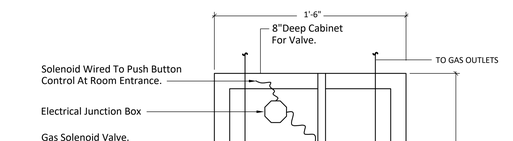
1. Wall Assembly — The 1 Or 2 Hour Fire Rated Gypsum Board/Stud Wall Assembly Shall Be Constructed Of The Materials And In The Manner Specified In The Individual U300, U400, V400 Or W400 Series Wall And Partition Design In The UL Fire Resistance Directory And Shall Include The Following Construction Features:
   A. Studs — Wall Framing May Consist Of Either Wood Studs Or Steel Channel Studs. Wood Studs To Consist Of Nominal 2 Inch By 4 Inch (51 mm By 102 mm) Lumber Spaced 16 Inch (406 mm) On Center. Steel Studs To Be Minimum 3-1/2 Inch (89 mm) Wide And Spaced Maximum 24 Inch (610 mm) On Center.
   B. Gypsum Board* — 5/8 Inch (16 mm) Thick, 4 Foot (122 cm) Wide, With Square Or Tapered Edges. Thickness, Type, Number Of Layers And Fasteners As Specified In The Individual Wall And Partition Design. Maximum Diameter Of Opening Is 8 Inch (203 mm).
   The Hourly F And FH Ratings Of The Firestop System Are Equal To The Hourly Fire Rating Of The Wall Assembly In Which It Is Installed. The Hourly T, FT And FTH Ratings Of The Firestop System Are 1 Hour For 2 Hour Fire Rated Walls And 0 Hour For 1 Hour Fire Rated Walls.
2. Through Penetrant — One Metallic Pipe Or Tube To Be Installed Eccentrically Or Concentrically Within The Firestop System. Pipe Or Tube To Be Rigidly Supported On Both Sides Of The Wall Assembly. The Following Types And Sizes Of Metallic Pipes And Tubes May Be Used:
   A. Steel Pipe — Nominal 4 Inch (102 mm) Diameter (Or Smaller) Schedule 5 (Or Heavier) Steel Pipe.
   B. Iron Pipe — Nominal 4 Inch (102 mm) Diameter (Or Smaller) Cast Or Ductile Iron Pipe.
   C. Copper Pipe — Nominal 4 Inch (102 mm) Diameter (Or Smaller) Regular (Or Heavier) Copper Pipe.
   D. Copper Tube — Nominal 4 Inch (102 mm) Diameter (Or Smaller) Type L (Or Heavier) Copper Tube.
3. Pipe Covering* — Minimum 1 Inch (25 mm) To Maximum 1-1/2 Inch (38 mm) Thick Hollow Cylindrical Heavy Density (3.5 pcf Or 24 Kg/m3) Glass Fiber Units Jacketed On The Outside With An All Service Jacket. Longitudinal Joints Sealed With Metal Fasteners Or Factory-Applied Self-Sealing Lap Tape. Transverse Joints Secured With Metal Fasteners Or With Butt Tape Supplied With The Product. The Annular Space Between The Insulated Pipe And The Periphery Of The Opening Shall Be Minimum 0 Inch (Point Contact) To Maximum 7/8 Inch (22 mm). When Pipe Covering Material Thickness Is Less Than 1-1/2 Inch (38 mm), The T, Ft And FTH Ratings Are 0 Hour.
   See Pipe Equipment Covering — Materials— (BRGU) Category In The Building Materials Directory For Names Of Manufacturers. Any Pipe Covering Material Meeting The Above Specifications And Bearing The UL Classification Marking With A Flame Spread Index Of 25 Or Less And A Smoke Developed Index Of 50 Or Less May Be Used.
4. Fill, Void Or Cavity Material* — Sealant — Minimum 5/8 Inch (16 mm) Thickness Of Fill Material Applied Within Annulus, Flush With Both Surfaces Of Wall Assembly. At Point Contact Location, Minimum 1/2 Inch (13 mm) Diameter Bead Of Fill Material Applied At Insulated Metallic Pipe/Wall Interface On Both Surfaces Of Wall. L Ratings Apply Only When FS-One Sealant Is Used.
   Hilti Construction Chemicals, Division Of Hilti Inc — FS-One Sealant, FS-One Max Intumescent Sealant, CFS-S-SIL GG Sealant, CP 606 Sealant Or CP 601S Sealant.

* Indicates Such Products Shall Bear The UL Or cUL Certification Mark For Jurisdictions Employing The UL Or cUL Certification (Such As Canada), Respectively.

System Number W-L-5257	
ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 And 2 Hour (See Item 1)	F Ratings — 1 And 2 Hour (See Item 1)
T Ratings — 0 And 1 Hour (See Items 1 And 3)	FT Ratings — 0 And 1 Hour (See Items 1 and 3)
L Rating At Ambient — 4 CFM/sq 4 ft (See Item)	FH Ratings — 1 And 2 Hour (See Item 1)
L Rating At 400 F — Less Than 1 CFM/sq ft (See Item)	FTH Ratings — 0 And 1 Hour (See Items 1 and 3)
	L Rating At Ambient — 4 CFM/sq ft (See Item)
	L Rating At 400 F — Less Than 1 CFM/sq ft (See Item)

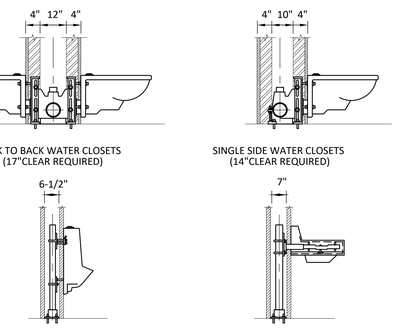


THROUGH PENETRATION FIRESTOP SYSTEM - PIPE PENETRATION - 1 HOUR RATING | Scale: NTS | Drawing: **P-501** | Detail: **06**

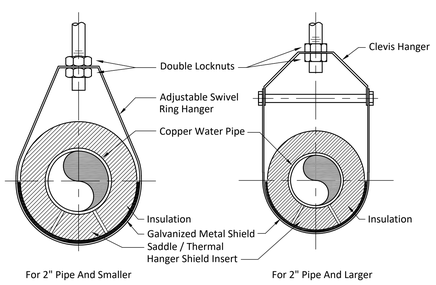


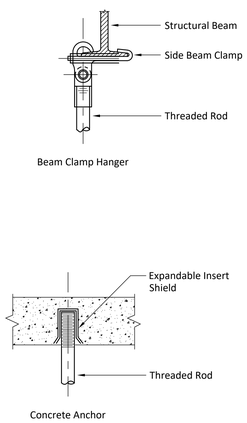
Size Of Cleanout	
Nominal Piping Size (Inches)	Nominal Cleanout Size (Inches)
1-1/4	1-1/4
1-1/2	1-1/2
2	2
3	3
4 And 6	4
8 And 10	6

DETAIL OF FLOOR AND WALL CLEANOUTS | Scale: NTS | Drawing: **P-501** | Detail: **07**



PLUMBING CHASE REQUIREMENTS IN STUD WALL | Scale: NTS | Drawing: **P-501** | Detail: **08**

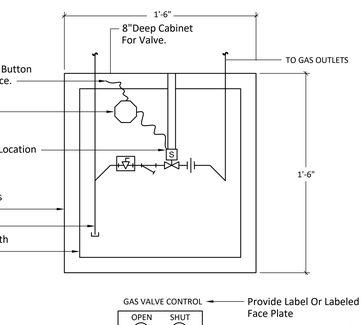




Domestic Cold Water	Insulation Thickness
0 To 4 Inches	3/4 Inch
Domestic Hot Water	**Insulation Thickness**
0 To 1-1/4 Inches	1 Inch
1-1/2 To 3 Inches	1-1/2 Inches

	Horizontal Support		Shield Data	
Pipe Size (Inches)	Spacing (Feet)	Rod Size (inches)	Length (Inches)	Thickness (USSG)
A	B	C	D	E
0 To 3/4	5	3/8	12	18
1 To 1-1/4	6	3/8	12	18
1-1/2 To 2	8	3/8	12	18
2-1/2	9	1/2	12	18
3	10	1/2	12	16
4	12	5/8	12	16

DOMESTIC WATER PIPE SUPPORTS | Scale: NTS | Drawing: **P-501** | Detail: **09**



MASTER GAS CONTROL VALVE | Scale: NTS | Drawing: **P-501** | Detail: **10**

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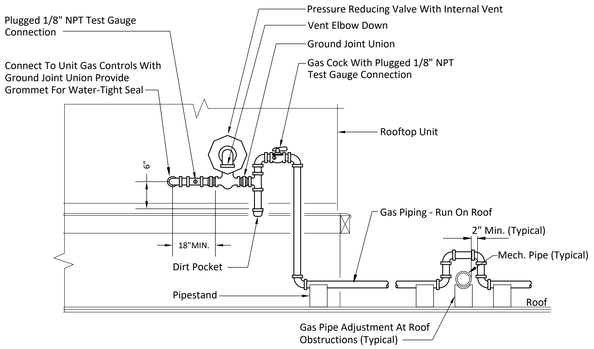
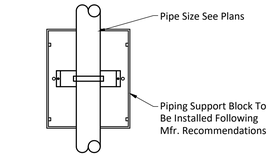
				SHEET:	OF:
				DRWG NO	P-501



NOTES:
1. Contractor Shall Verify All Mechanical Gas Fired Equipment Connection Locations In The Field Prior To Installing Any Gas Pipe Mains Or Branches.
2. Plumbing Contractor To Install Pipestands And Roofing Contractor To Install Waterproofing / Membrane As Required To Maintain Warranty.

TYPICAL GAS PIPING CONNECTION DETAIL | Scale: NTS | Drawing: **P-502** | Detail: **01**



PLAN

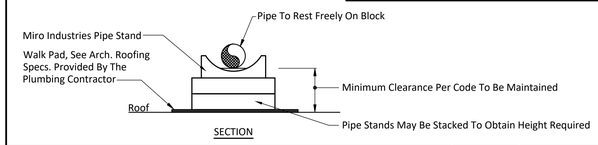
PIPE SUPPORT SCHEDULE		
PIPE SIZE	MODEL NO.	MAX SPACING
3/4"	02	4'
1"	02	6'
1 1/4"	02	6'
1 1/2"	02	6'
2"	02	6'
2 1/2"	24-R	8'
3"	24-R	8'
4"	24-R	8'
6"	48-R-2	8'
8"	48-R-2	8'

NOTES: Piping Shall Be Supported At All Elbows And Tees And At Spacing Specified In Table.

Piping Shall Be Sloped And Routed To Prevent Trapping Condensate (Except At Dirt Legs) And To Facilitate Condensate Drainage.

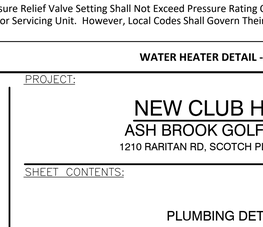
Do Not Attach Pipestands To Roof.

Miro Industries, Inc. 7050 SO.
Union Park Ave., Suite 570
Midvale, Utah 84047
(801) 566-3680



SECTION

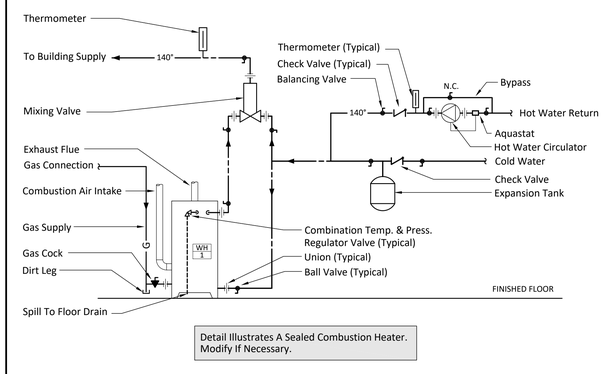
PIPING ON ROOF SUPPORT DETAILS | Scale: NTS | Drawing: **P-502** | Detail: **02**



Copper Expansion Loop Spacing And Developed Lengths Of Expansion Offsets											
Lowest Ambient Temp To Max Design Temp	**Expected Expansion (Inches)**	**Length "L" For Nominal Or Standard Tube Sizes Shown (Inches)**									
		3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5
A	B	C	D	E	F	G	H	I	J	K	L
50° F	1/2	60	70	75	80	95	105	115	120	130	145
51° - 95° F	1	85	95	105	115	130	145	160	170	180	205
96° - 140° F	1 1/2	105	115	130	140	160	180	195	210	220	245

NOTES:
1. A Double Offset "U" Bent Pipe Loop May Be Used Provided Its Developed Length Is Equal To That Given For The Length "L".
2. Loop Length Designed For Maximum Of 1 1/2" Expansion.
3. Loops Should Be Placed Every 100 Feet.
4. H ≥ 2xW.

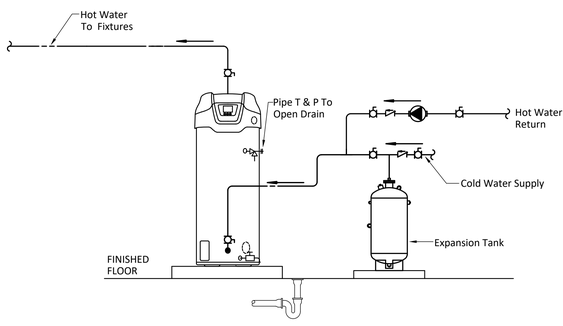
FOUR ELBOW COPPER EXPANSION LOOP | Scale: NTS | Drawing: **P-502** | Detail: **03**



Detail Illustrates A Sealed Combustion Heater. Modify If Necessary.

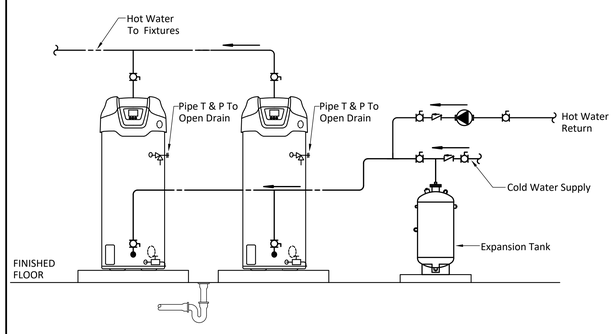
NOTES:
1. Temperature / Pressure Relief Valve To Discahrge To Local Floor Drain With Air Gap In Accordance With IMC 2009 And NSPC 2009.

GAS FIRED WATER HEATER DETAIL | Scale: NTS | Drawing: **P-502** | Detail: **04**



NOTES:
1. Preferred Piping Diagram.
2. The Temperature And Pressure Relief Valve Setting Shall Not Exceed Pressure Rating Of Any Any Component In The System.
3. Service Valves Are Shown For Servicing Unit. However, Local Codes Shall Govern Their Usage.

WATER HEATER DETAIL - 1 | Scale: NTS | Drawing: **P-502** | Detail: **05**



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1. Preferred Piping Diagram.
2. Tthe Temperature And Pressure Relief Valve Setting Shall Not Exceed Pressure Rating Of Any Any Component In The System.
3. Service Valves Are Shown For Servicing Unit. However, Local Codes Shall Govern Their Usage.

WATER HEATER DETAIL - 2 | Scale: NTS | Drawing: **P-502** | Detail: **06**

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02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

PLUMBING DETAILS

SUBMISSIONS		REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION	DATE	02.22.2017
10.03.16	100% ISSUE			SCALE	AS NOTED
10.17.16	BID SET			DRWN BY	CAD
02.22.17	REBID SET			CHKD BY	DLB
				JOB NO	12285
				SHEET:	OF:

DRWG NO

P-502

WATER HEATER SCHEDULE

ITEM	QUANTITY	DESCRIPTION	MFG	MODEL	REMARKS	ITEM
HWH-1	2	Cyclone MXI Commercial Gas Water Heater	A.O. SMITH	BTR 250 (A)	250 MBH, 100 Gallon, Recovery: 242 GPH Rise @100 degrees F, Include Amtrol Expansion Tank For System Volume.	HWH-1
HWH-2	1	Cyclone MXI Commercial Gas Water Heater	A.O. SMITH	BTR 120	120 MBH, 71 Gallon, Recovery: 116 GPH Rise @ 100 Degrees F.	HWH-2

EQUIPMENT SCHEDULE

Item No.	Quantity	Equipment	Connection Sizes				Manufacturer	Model Number	Comments
			CW	HW	SAN	NG			
A	B	C	D	E	F	G	H	I	J
TURNSTAND									
TS01	1	Hand Sink, Wall Mount	1/2"	1/2"	1-1/2"		Adance Tabco	7-PS-60	
TS05	1	Dispenser, Beer			3/4"		Perlick	DDS60	
TS07	1	Underbar Handsink	1/2"	1/2"	1-1/2"		Perlick	TS12HSN	
TS10	1	Underbar Ice Chest			1/2"		Perlick	TS30IC10	
TS15	1	Sink, 3 Compartment	1/2"	1/2"	1-1/2"		SPG	MS-3N1014-2D12	
TS16	1	Pre-Rinse Faucet	1/2"	1/2"					
TS24	1	Coffee Maker, Automatic	3/8"				Bunn	23400.0047	
BAR / LOUNGE									
B4	3	Underbar Ice Chest			1/2"		Krowne	KR18-30-10	
B11	1	Underbar Handsink, Soap & Towel	1/2"	1/2"	1-1/2"		Krowne	KR18-12DST	
B12	1	Glasswasher		1/2"	5/8"		Krowne	GWD-24	
KITCHEN									
1	1	Ice Maker W/ Bin	1/2"		(2)3/4"		Hoshizaki America	KM-1601SAH	W/ Filter
1	-	Ice Maker Dew Drain			3/8"				
3	1	Beverage Counter W/ Sink	1/2"	1/2"	1"		SPG	BC-72L	
4	1	Soda Dispenser	3/8"		3/4"		Cornelius	2323 Universal	By Coca Cola
5	1	Coffee Maker, Automatic	3/8"				Douwe Egberts	C-700	By Others
7	1	Hand Sink	1/2"	1/2"	1-1/2"		SPG	EHS-1RL	
9	1	Pre-Rinse Faucet, Wall Mount	1/2"	1/2"			T & S Brass	B-0133-B	
11	1	Warewasher, Rack Conveyor		1/2"	1-1/2"		Ecolab	EC-44	
13	1	Clean Dish Table/3 Comp Sink	1/2"	1/2"	1-1/2"		SPG	Custom Fabrication	
14	1	Hand Sink	1/2"	1/2"	1-1/2"		SPG	EHS-1RL	
19	1	Hand Sink	1/2"	1/2"	1-1/2"		SPG	EHS-1RL	
21	1	Oven-Steamer, Combi., Gas	(2)3/4"		1-1/2"	(2)3/4"	Alto-Shaam	CTC7-20G	
24	1	Table, Work	1/2"	1/2"	1-1/2"		Universal Stainless	Custom Fabrication	W/ Sink
31	1	Range, Restaurant, Gas				3/4" Vulcan		36C-6B-N	On Top Of Item #23.1
32	1	Griddle, Gas				3/4" Vulcan		MSA36	
33	1	Broiler, Gas, Counter				3/4"	Vulcan	VACB36	
35	1	Fryer Battery, Gas W/Filter				1-1/4"	Vulcan	3GR45MF	
39	1	Salamander Broiler				3/4"	Vulcan	36RB	
52	2	Floor Trough			4"		Eagle Group/Metal Masters	FT-1248-SG	
GENERAL									
DF	1	Bottle Filling Station	3/8"		1-1/4"		Elkay	EZH20, LZS8WSSP	Filtered
WC	11	Toilet	1-1/2"		2"		Kohler	Kingston, K-4325	1.28 GPF, Elongated
UR	4	Urinal	3/4"		2"		Kohler	Bardon, K-4991-ET	1/8 GPF
LAV	14	Bathroom Sink	3/8"	3/8"	1-1/4"		Kohler	Caxton, K-2210	Under Mount
LAV1	1	Bathroom Sink	3/8"	3/8"	1-1/4"		Kohler	Kingston, K-2007	Wall Mounted
SK	1	Kitchen Sink	1/2"	1/2"	1-1/2"		Kohler	Vault, K-3822-1	Top Mount / Under Mount, SS
MS	1	Service Sink	1/2"	1/2"	3"		Kohler	Bannon, K-6714	Cast Iron
FS	5	Floor Sink			4"		Josam	49320A-LF	Cast Iron
HWH-1	2	Hot Water Heater	1-1/2"		3/4"	3/4"	AO Smith	BTH-250 Mxi	100 Gallons, Natural Gas, 140°F
HWH-2	1	Hot Water Heater	1-1/2"			1/2"	AO Smith	BTR-199	
GI	2	Grease Interceptor			3"		Retroceptor	RC 25LP	Low Profile
FD		Floor Drain			4"		Josam	E Series	Cast Iron Strainer

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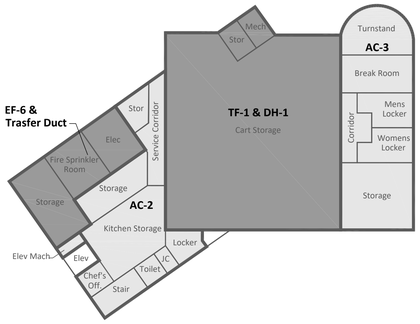
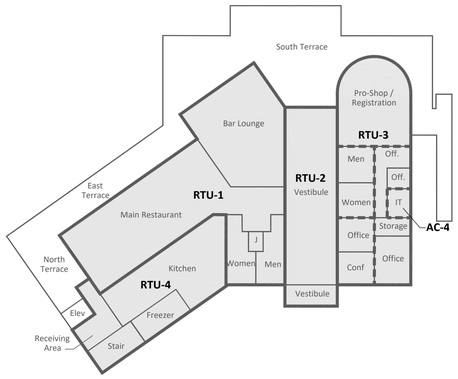
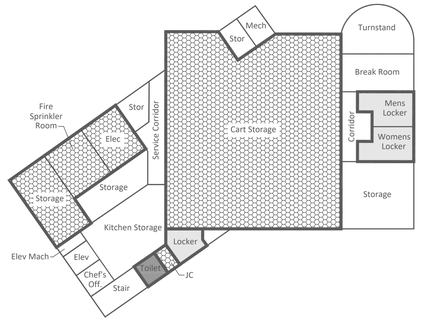
DRWG NO	P-601



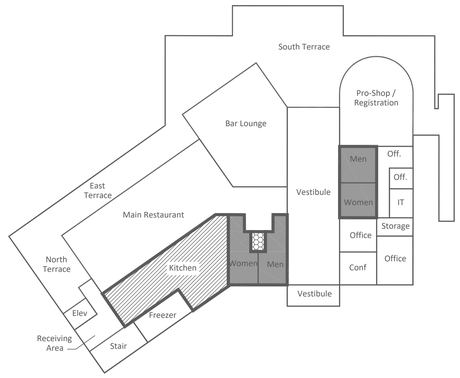
Lower Level



Clubhouse Level



Lower Level



Clubhouse Level

LEGEND:

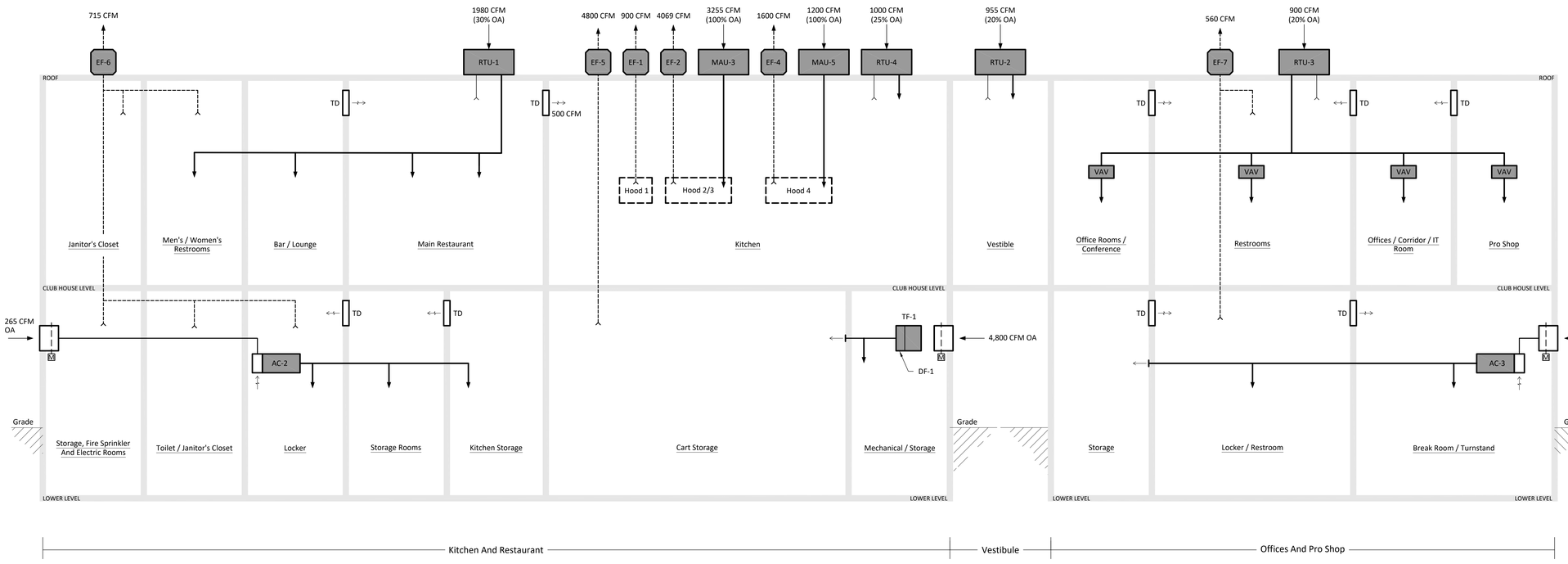
- Heating & Air Conditioning
- Heating & Ventilation
- XXX HVAC System ID
- Temperature Control Zone

HVAC SYSTEM ZONING | Scale: NTS | Drawing: **M-001** | Detail: **01**

LEGEND:

- Toilet Exhaust: 75 CFM Per Water Closet / Urinal
- Locker Exhaust: 0.25 CFM / SF
- General Exhaust: Room Specific
- Kitchen Exhaust: 0.7 CFM / SF Minimum

EXHAUST ZONING | Scale: NTS | Drawing: **M-001** | Detail: **02**



AIR FLOW RISER DIAGRAM | Scale: NTS | Drawing: **M-001** | Detail: **03**

MECHANICAL GENERAL NOTES

General

1. Test, Balance And Certify All Air And Water Systems. Refer To Drawings For Flow Requirements.
2. Exact Location Of Diffusers To Be Coordinated With Architectural Plans And Ceiling Mounted Devices.
3. Border Type, Color, Finishes And Method Of Attachment For All Diffusers, Grills And Registers Shall Be Coordinated With The Architectural Ceiling Detail And Specifications.
4. No Piping Shall Be Run Exposed In Finish Area.
5. Worksmanship Covered Within One (1) Year; A Minimum Of One (1) Year, Unless Manufacturer's Warranty Exceeds One (1) Year, For Equipment, Where Equipment Shall Be Replaced Under The Corresponding Warranty.
6. Mechanical Contractor To Provide Equipment Signage4 To Identify All Equipment Installed On Site. Contractor To Further Coordinate With Electrical Contractor Panel Testing And Equipment Shutdowns Accordingly.

Equipment

1. Contractor Shall Change Filters In All Air Handling Units Every 3 Months During Course Of Construction And Prior To Delivery Of System To Owner.
2. Unless Otherwise Noted On The Drawings, All Mechanical Equipment Shall Be Mounted On Vibration Isolators To Prevent The Transmission Of Sound To The Building Structure. Vibration Isolators Shall Be In Accordance With The Specifications And On Actual Weight Distribution Of The Equipment Furnished. Deflections Shall Be As Noted On The Equipment Shop Drawing Submittals. The Vibration Isolation Requirements Shall Be Coordinated With The Seismic Controls.
3. Contractor Shall Ensure That All Mechanical Devices Will Be Installed In A Location Which Affords Accessibility For Maintenance And Repair. Coordinate Installation Among All Trades To Avoid Interferences, And Locate Equipment To Provide Clearances Which Exceed Those Recommended By The Equipment Manufacturer. Prior To Project Completion, Representatives Of DLB Associates Will Review Each Installation And Will Direct Changes Whenever Access Or Serviceability Is, In Their Opinion, Unacceptable.
4. All Air Moving Devices, Including But Not Limited To, Air Handling Units, Air Conditioning Units, And Unit Ventilators Must Comply With AMCA Standard 210 And ASHRAE Standard 62-1989.

Controls

1. All Mechanical Controls (Thermostats, Etc.) Shall Be Furnished And Installed As Per Barrier-Free Subcode Of Governing Code.
2. Thermostat Wiring Shall Be Run In Concealed Spaces Of Walls Or Chases.
3. Coordinate Exact Location Of All Thermostats And Humidistats With Architect Prior To Installation. Mounting Height Shall Be Per ADA Requirements (At 48" AFF Unless Mandated Otherwise).
4. Duct Mounted Smoke Detectors Shall Be Provided In All Air Handling Units Supplying Air Quantities Greater Than Or Equal To 2000 CFM. Duct Smoke Detectors Shall Be Installed In Main Return Duct.
5. Coordinate Any Electrical Control Equipment For Integration With Building Management System As Required. Provide For Training On Usage And Maintenance Of Equipment.

Air Side Requirements

1. Air Side - Ductwork:
   - A. Ductwork Shall Be In Accordance With SMACNA Low And Medium Pressure "HVAC Duct Construction Standards - Metal And Flexible".
   - B. Duct Sizes Shown Are Clear Inside Dimensions. Internally Lined Ducts Shall Be Increased In Size To Maintain The Same Internal Size.
   - C. Provide 1-Inch Thick Acoustical Lining In The Supply And Return Duct Of All Air Handling Units Up To 20-Feet From The Fan Discharge.
   - D. Provide 1-Inch Thick Acoustical Lining In The Supply Duct Downstream Of All Variable Air Volume Units Up To 5-Feet From The Unit Discharge.
   - E. All Rectangular Ductwork Within 20 Feet Of Air Handling Units And All Fans Shall Be Fabricated From Sheet Metal Two Gauges Thicker Than SMACNA Standard Gauges. Maximum Duct Section Length Within 20 Feet Of Equipment Shall Be 48-Inches.
   - F. Flexible Ducts Connected To Diffusers, Etc. Shall Not Exceed 6-Feet In Length.
   - G. Grease Exhaust Ducts Shall Be 16-Gauge Steel, Have Overlapping Welded Or Flanged Joints And Be Pitched At 1/4" Per Linear Foot Towards Hood With Air Velocity No Less Than 500 Feet Per Minute. Provide Bolted Access Doors With Gasketed Frame On 20'-0" Centers. Access Doors Are Required At All Change In Directions Of Ductwork.
   - H. Grease Exhaust Ducts Shall Be Insulated With 2" Of Magnesium or Calcium Silicate Block, With Staggered Joints Attached With Galvanized Steel Wire Or Two Layers Of 1-1/2 inch Thick Ceramic Enclosure Material, System. For Rectangular Ducts Over 18" Wide, Duct Wrap Shall Be Additionally Secured To The Bottom Of The Ductwork With Mechanical Fasteners And Washers On 18" Centers To Reduce Sagging.
2. Air Side - Duct Accessories:
   - A. Provide 1/4"x1/4" Woven Wire Mesh On Open End Return Air And Exhaust Air Ducts.
   - B. Provide Double Thickness Turning Vanes In All Square Elbows.
   - C. Provide Volume Damper On Each Branch Take Off From Duct Main, And On Each Diffuser Take Off From Branch Duct Or Main.
   - D. Provide And Install Fire Dampers In All Ductwork Penetrating Fire Rated Walls. All Installed Fire Dampers Must Be Accessible For Inspection And / Or Testing By The Local Authorities. If Fire Dampers Are Not Accessible From A Grille Or Register, An Access Door In The Ductwork Is Required. All Access Doors Shall Be 12"X 12" Unless Otherwise Noted Or When Duct Size Cannot Accommodate A 12x12. Contractor To Coordinate And Note All Access Doors On Sheet Metal Shop Drawings.
   - E. All Fire Dampers Shall Be "Type B" With Blades Located Out Of The Air Stream. If There Are Areas Of Limitation Due To Unforeseen Building And Structural Elements The Contractor Shall Note Areas Of Conflict And Submit For Architect's / Engineer's Approval Of Substitutions.
   - F. Provide Vibration Isolation On All Duct Connections To Fans And Other Equipment With Rotary Parts.
   - G. Paint All Items Visible Through Return Air Grilles Flat Black

Water Side Requirements

1. Water Side - General:
   - A. Where Piping Connections For The Equipment Such As Pumps, AC Units, Coils Etc. Differ From The Line Size, It Shall Be The Responsibility Of The Mechanical Contractor To Furnish And Install The Necessary Reducers Or Expander Fitting To Enable Connection Between The Piping System And The Equipment.
   - B. Provide Capped Hose Drains At All System Low Points, So As To Enable The Complete Downdrain Of The System.
   - C. Piping Supports On The Roof Shall Be Spaced At Maximum 10'-0" Intervals. Coordinate Flashing, Wood Blocking And Walking Pads With The General Contractor. Supports Shall Be Installed Level In All Directions. All Supports Shall Be A Minimum 18" High For Future Re-Roofing.
2. Water Side - AC Condensate:
   - A. AC Condensate Shall Be Routed To An Approved Place Of Disposal And Shall Not Discharge Across The Ground Or A Paved Area Where It Will Cause A Nuisance.
   - B. A 1/8-Inch Per Foot Slope Shall Be Maintained In The Direction Of Discharge And The Minimum Piping Sizes Shall Be As Scheduled Below:

1)	Up To 20 Tons Of Refrigeration:	1 Inch
2)	Over 20 Tons To 100 Tons Of Refrigeration:	1-1/4 Inch
3)	Over 100 Tons To 125 Tons Of Refrigeration:	1-1/2 Inch
4)	Over 125 Tons To 600 Tons Of Refrigeration:	2 Inch

   - C. Provide Traps As Required At Each Cooling Coil To Maintain Atmospheric Pressure In The Condensate Drain Piping.
   - D. Where Damage To Any Building Components Could Occur As A Result Of Overflow From The Equipment Condensate Removal System, Provide An Auxiliary Drain Pan Equipped With A UL 508-Listed Water-Level Detection Device Which Shall Shut Off Equipment When Activated.
     1) The Equipment And Any Insulation Shall Be Supported Above The Rim Of The Auxiliary Drain Pan; Any Supports Within The Pan Must Be Water Resistant

Refrigerant Keynotes

1. Refrigerant Piping Quantities, Sizes And Number Of Circuits Shall Be Per Manufacturer's Requirements.
2. Refrigerant Piping Shall Be Copper:
   a. Up To 5/8" OD, Type L Soft Temper With Compression Fittings.
   b. 7/8" OD And Over, Type L Hard Temper With High Temperature Brazed Joints.
3. Refrigerant Piping Shall Be Insulated With 1" Thick AP/Armaflex Pipe Insulation, Sealed With Armaflex 520 Adhesive. Paint All Exterior Applications With WB Finish To Protect Against UV Degradation. Equivalent Substitutions Acceptable.

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MECHANICAL OVERVIEW

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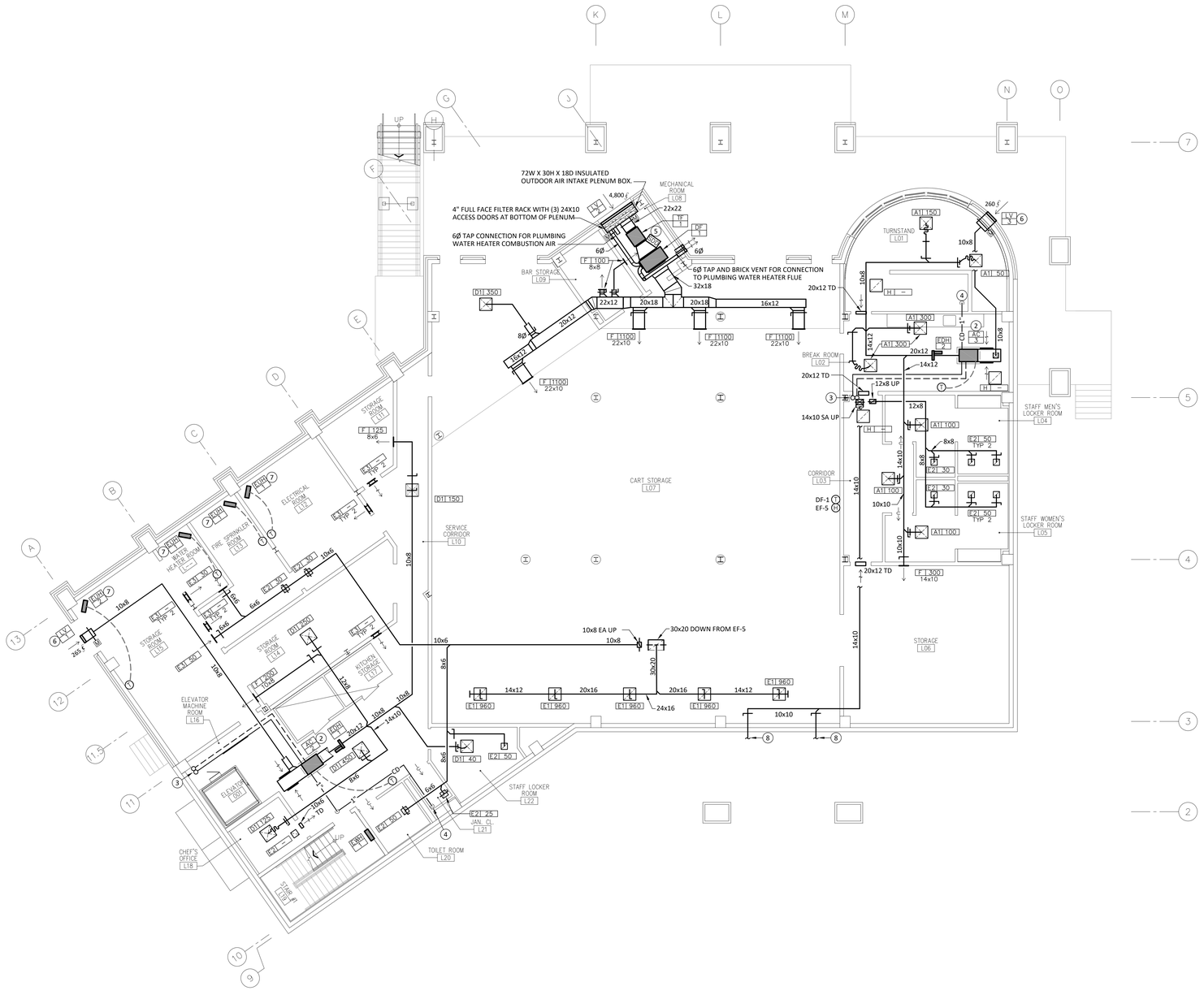


KEY NOTES (SYMBOLS 1, 2, ETC.)

1. New Wall Mounted Mini-Split Indoor Air Handling Unit. Provide Condensate Pump And Discharge To Nearest Floor Sink.
2. New Split-Type Air Conditioning Unit Ceiling Hung With Threaded Rods Anchored To Structure Complete With Vibration Isolators. Provide With Filter Box And Return Air Plenum To Match Unit Connection And Drain Pan Per Details. Provide (2) Titus 355RL 14x8 Return Grilles Mounted To Plenum Box.
3. Route New Liquid And Suction Refrigerant Lines Up To Roof In Approximate Location Shown. Piping Shall Be Sized Per Manufacturer's Requirements.
4. Route Condensate Piping To Approved Discharge Location. Coordinate With Plumbing Drawing. Piping Shall Be Sloped 1/8" Per Linear Foot In Direction Of Flow. AC Condensate Line Shall Be 3/4" Copper Tubing Type L Complete With 1/2" Thick Armaflex Insulation. Wall Penetration Shall Be Above Ceiling.
5. New Louver, Motorized Backdraft Damper, Fan And Duct Furnace Assembly. Unit Shall Be Hung With Threaded Rods Anchored To Structure Complete With Vibration Isolators.
6. New Louver With Motorized Backdraft Damper. Coordinate Exact Location With Architectural Plans. Interlock Damper With AC Unit Operation.
7. Wall Mounted Electric Unit Heater And Remote Mounted Thermostat. Install 1'-0" Below Underside Of Floor Above. Provide Factory Mounting Brackets.
8. 10Ø Fiberglass Ductwork Below Slab (Spunstrand R6 Underslab Duct Or Equal). Transition Sheet Metal Ductwork To Fiberglass In Ceiling Of Basement And Provide Water Tight Sheet Metal Sleeve At Basement Wall Penetration. Coordinate Exact Location With Architectural Blockout In Slab.

GENERAL NOTES

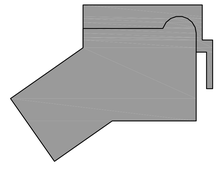
1. All Duct Sizes Stated On Plans Are Internal Clear Dimensions. Outer Dimensions Of Internally Lined Ductwork Shall Be Updated Accordingly.
2. All Supply Air And Return Air Ductwork For A Distance of 20'-0" Downstream Of Air Handling Units Shall Be Acoustically Lined Per Specifications (Except For Units Serving Data Halls)
3. Contractor Shall Provide Flexible Duct Connectors At The Connection Points To Rooftop Units.
4. Ducts Penetrating Fire Rated Walls And Floors Shall Have Fire Dampers And Access Doors As Necessary Whether Shown Or Not On This Drawing.
5. All Offsets And Transitions Necessary To Successfully Construct The Duct Distribution System Are Not Shown On These Plans, But Are Still Included In The Scope Of Work, Some Of These Areas Are Connections At Curbs, Fans, Equipment And Offsets At Transition
6. All Open Ended Ducts Shall Be Terminated With 1/4" x 1/4" Aluminum Woven Wire Mesh Screen Unless Noted Otherwise.
7. The Contractor Shall Coordinate The Location Of Ceiling Grilles, Registers And Diffusers With The Architectural Reflected Ceiling Plans.
8. Coordinate Exact Location Of All Thermostats With Architect Prior To Installation. Mounting Height Shall Be Per ADA Requirements (At 48" AFF Unless Mandated Otherwise). Thermostat Wiring Shall Be Run In Concealed Spaces Of Walls Or Chases.
9. The Contractor Shall Coordinate And Provide Access Doors In Hard Ceilings For All Equipment Which Requires Access, Such As: Fire And Smoke Dampers, Smoke Detectors, Balancing Dampers, Etc.
10. Piping Shall Not Be Installed Above Any Electrical Equipment. Route All Condensate And Refrigerant Piping To Avoid Installation Above Electrical Equipment.
11. Contractor Shall Size Refrigerant Piping As Per Manufacturer Recommendations And Verify Pipe Quantities.

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	New Equipment
XXX / XX	Equipment Type / Equipment Number
	New Ductwork
	New Ductwork With Acoustical Lining
	Insulated Flexible Duct
	Volume Damper
	Fire Damper And Access Door
M	Motorized Damper
	Supply Air Flow
	Exhaust Air Flow
	Undercut Door

Identifier	Description
X | XXX	Diffuser / Register / Grille Number, CFM
	4 Way Ceiling Diffuser
	Exhaust Grille / Return Register
	Supply Duct Up
	Return / Exhaust Duct Up
T	Thermostat
H	Hydrogen Sensor
SDD	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator
CFM	Cubic Feet Per Minute
EA	Exhaust Air
MBH	Thousand BTU Per Hour
SDD	Smoke Duct Detector
TD	Transfer Duct

KEY PLAN



Keyplan — Vertical Plan

LOWER LEVEL Scale: 1/8"=1'-0" (2' 4' 8' 16')

Drawing: **M-101**
Detail: **01**

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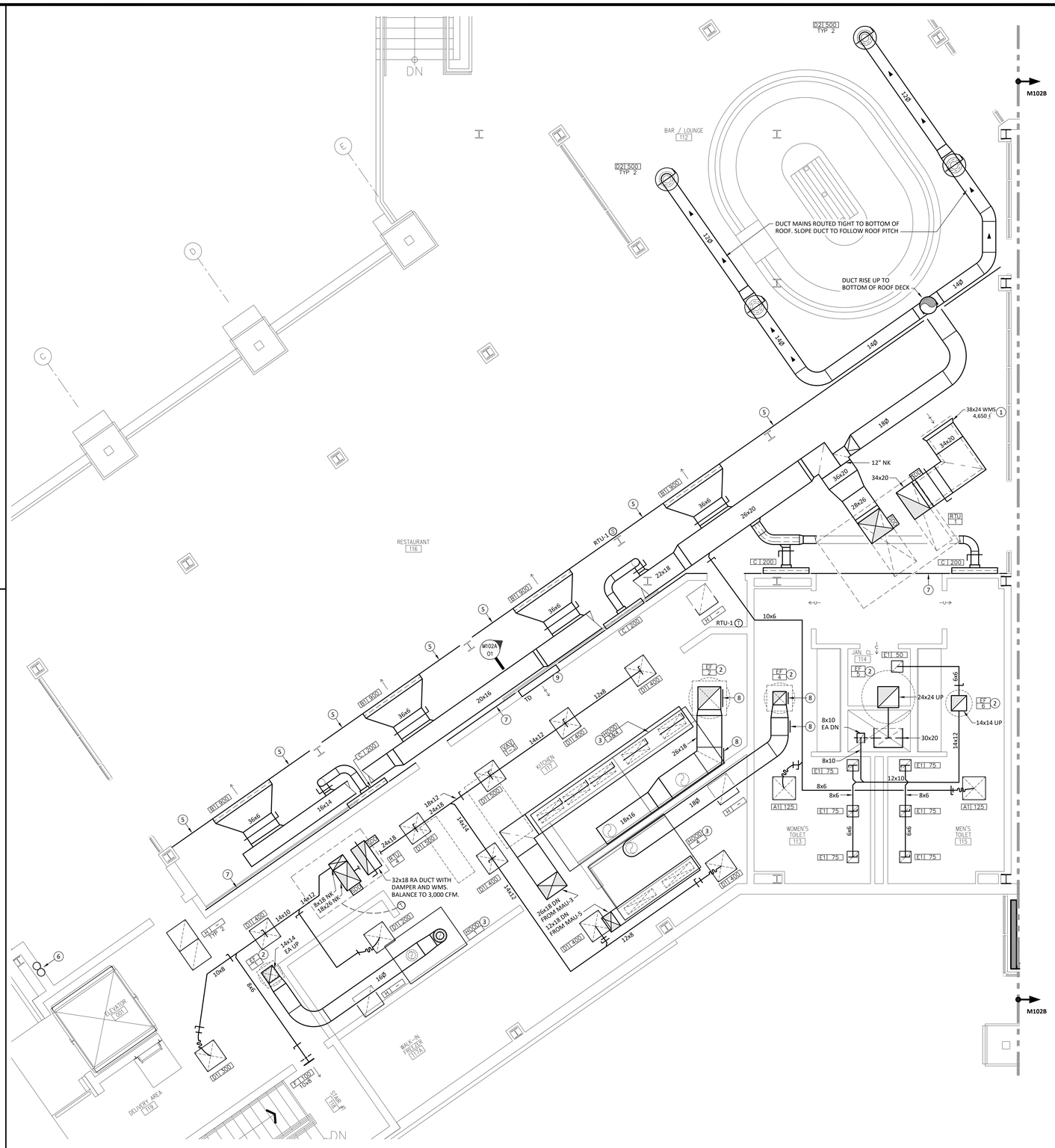
10.17.16	BID SET			
02.22.17	REBID SET			

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-101

KITCHEN CORRIDOR SECTION | Scale: 1/4"=1'-0" (1' 2' 4' 8') | Drawing: M-102A | Detail: 01



KITCHEN & RESTAURANT PART PLAN | Scale: 1/4"=1'-0" (1' 2' 4' 8') | Drawing: M-102A | Detail: 02

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. Terminate Return Air Duct With A Bellmouth Fitting. Cover The Open End With 1/4"x1/4" Woven Wire Mesh And Balance To CFM Indicated.
2. Exhaust Fan On Roof. Coordinate Ductwork Drop And Final Location With Structural Steel. Do Not Install Within 10-Feet Of Any Fresh Air Intakes.
3. Kitchen Exhaust Hood. Install Hood, Exhaust Fan, And Make-up Air Unit In Accordance With CaptiveAire Drawings. Grease Exhaust Ductwork Shall Be 18-Gauge Stainless Steel, Welded Fittings, With Cleanouts At All Offsets And Risers In Accordance With 2015 International Mechanical Code.
4. Not Used.
5. Continuous Linear Bar Return Grille Opening. Slot Shall Appear Continuous With Unducted Portions Used As Return To Ceiling Plenum.
6. Route New Liquid And Suction Refrigerant Lines Up To Roof In Approximate Location Shown. Piping Shall Be Sized Per Manufacturer's Requirements.
7. 1-1/2" Continuous Return Air Slot To Ceiling Plenum.
8. High Temperature Access Door. Provide Access Door On All Grease Ductwork At Direction Changes.
9. Provide 48x6 Titus CT-480 Bar Grille Transfer On Restaurant Side And 48x6 Titus 355RL On Kitchen Side For Transfer Of Air To Kitchen.

GENERAL NOTES

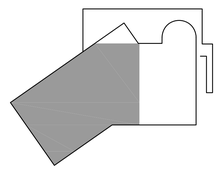
1. All Duct Sizes Stated On Plans Are Internal Clear Dimensions. Outer Dimensions Of Internally Lined Ductwork Shall Be Updated Accordingly.
2. All Supply Air And Return Air Ductwork For A Distance of 20'-0" Downstream Of Rooftop Units Shall Be Acoustically Lined Per Specifications (Except For Units Serving Data Halls)
3. Contractor Shall Provide Flexible Duct Connectors At The Connection Points To Rooftop Units.
4. Ducts Penetrating Fire Rated Walls And Floors Shall Have Fire Dampers And Access Doors As Necessary Whether Shown Or Not On This Drawing.
5. All Offsets And Transitions Necessary To Successfully Construct The Duct Distribution System Are Not Shown On These Plans, But Are Still Included In The Scope Of Work, Some Of These Areas Are Connections At Curbs, Fans, Equipment And Offsets At Transition
6. All Open Ended Ducts Shall Be Terminated With 1/4" x 1/4" Aluminum Woven Wire Mesh Screen Unless Noted Otherwise.
7. The Contractor Shall Coordinate The Location Of Ceiling Grilles, Registers And Diffusers With The Architectural Reflected Ceiling Plans.
8. Coordinate Exact Location Of All Thermostats With Architect Prior To Installation. Mounting Height Shall Be Per ADA Requirements (At 48" AFF Unless Mandated Otherwise). Thermostat Wiring Shall Be Run In Concealed Spaces Of Walls Or Chases.
9. The Contractor Shall Coordinate And Provide Access Doors In Hard Ceilings For All Equipment Which Requires Access, Such As: Fire And Smoke Dampers, Smoke Detectors, Balancing Dampers, Etc.
10. Piping Shall Not Be Installed Above Any Electrical Equipment. Route All Condensate And Refrigerant Piping To Avoid Installation Above Electrical Equipment.
11. Contractor Shall Size Refrigerant Piping As Per Manufacturer Recommendations And Verify Pipe Quantities.

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	New Equipment
XXX / XX	Equipment Type / Equipment Number
	New Ductwork
	New Ductwork With Acoustical Lining
	Insulated Flexible Duct
	Volume Damper
	Fire Damper And Access Door
M	Motorized Damper
	Supply Air Flow
	Exhaust Air Flow
	Undercut Door
X | XXX	Diffuser / Register / Grille Number, CFM

Identifier	Description
	4 Way Ceiling Diffuser
	Exhaust Grille / Return Register
	Supply Duct Up
	Return / Exhaust Duct Up
T	Thermostat
S	Remote Temperature Sensor
SDD	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator
CFM	Cubic Feet Per Minute
EA	Exhaust Air
NK	Neck
RA	Return Air
SDD	Smoke Duct Detector
SA	Supply Air
TD	Transfer Duct

KEY PLAN



N Keyplan

ROOF
CLUBHOUSE
LOWER LEVEL

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - MECHANICAL

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
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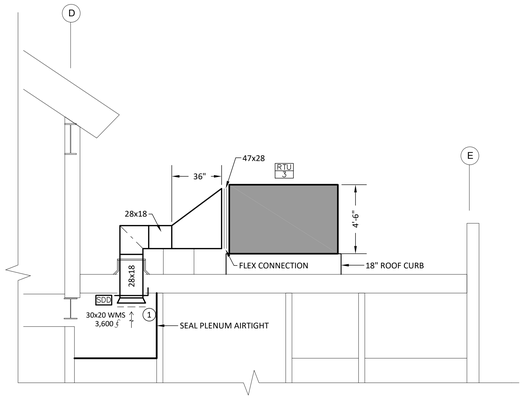
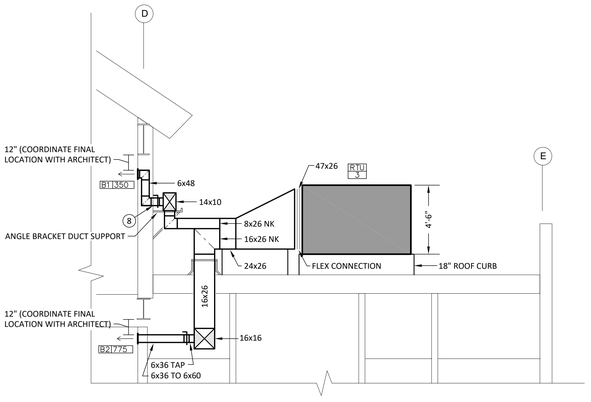
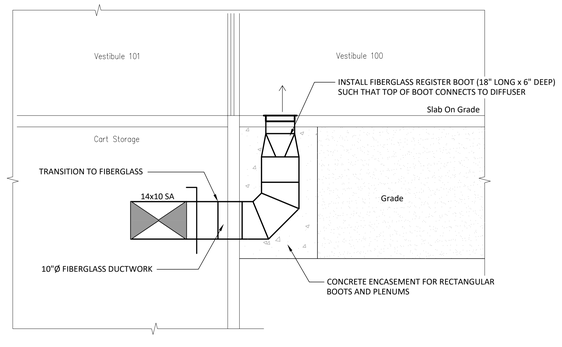
JOB NO	12285
SHEET:	OF:
DRWG NO	M-102A



RTU-3 SECTION - RETURN DUCTWORK | Scale: 1/4"=1'-0" | Drawing: **M-102B** | Detail: **01**

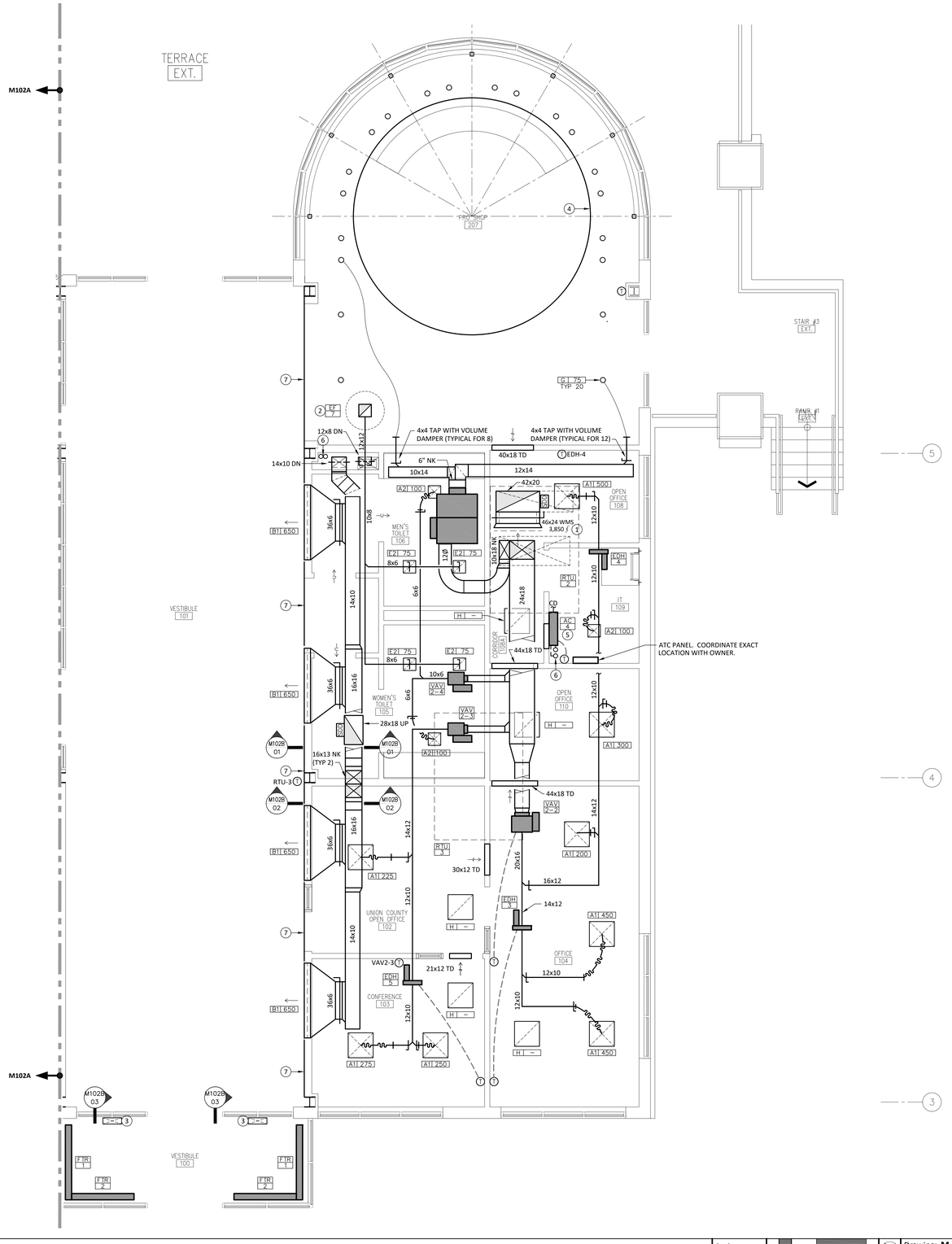


RTU-3 SECTION - SUPPLY DUCTWORK | Scale: 1/4"=1'-0" | Drawing: **M-102B** | Detail: **02**



NOTES:
1. All Fiberglass Ductwork And Fittings Shall Be SpunStrand R-6 Underslab Ductwork Or Approved Equal. Install In Accordance With Manufacturer's Recommendations Including All Joints.
2. Coordinate Grille Location With Architectural Drawings And Slab Boxout.

UNDERGROUND FIBERGLASS DUCTWORK DETAIL | Scale: 1/4"=1'-0" | Drawing: **M-102B** | Detail: **03**



OFFICE AREA PART PLAN | Scale: 1/4"=1'-0" | Drawing: **M-102B** | Detail: **04**

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. Terminate Return Air Duct With A Bellmouth Fitting. Cover The Open End With 1/4"x1/4" Woven Wire Mesh And Balance To CFM Indicated.
2. Exhaust Fan On Roof. Coordinate Ductwork Drop And Final Location With Structural Steel. Do Not Install Within 10-Feet Of Any Fresh Air Intakes.
3. Provide 18x6 Titus CT-580 Linear Bar Diffuser Mounted In Slab Balanced To 250 CFM Each. Transition Round Fiberglass Ductwork To Sheet Metal Full Size Of Diffuser. Transition Shall Be At Least 12" in Length.
4. 1-1/2" Continuous Open Slot In Cove For Return Air
5. New Wall Mounted Mini-Split Indoor Air Handling Unit. Provide Condensate Pump And Discharge To Nearest Floor Sink.
6. Route New Liquid And Suction Refrigerant Lines Up To Roof In Approximate Location Shown. Piping Shall Be Sized Per Manufacturer's Requirements.
7. Continuous Linear Bar Return Grille Opening. Slot Shall Appear Continuous With Unducted Portions Used As Return To Ceiling Plenum.
8. Sidewall Duct Penetration Typical For All Supply Diffusers Tapped Off Of Roof Mounted Ductwork.

GENERAL NOTES

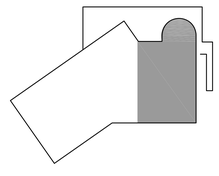
1. All Duct Sizes Stated On Plans Are Internal Clear Dimensions. Outer Dimensions Of Internally Lined Ductwork Shall Be Updated Accordingly.
2. All Supply Air And Return Air Ductwork For A Distance of 20'-0" Downstream Of Rooftop Units Shall Be Acoustically Lined Per Specifications (Except For Units Serving Data Halls)
3. Contractor Shall Provide Flexible Duct Connectors At The Connection Points To Rooftop Units.
4. Ducts Penetrating Fire Rated Walls And Floors Shall Have Fire Dampers And Access Doors As Necessary Whether Shown Or Not On This Drawing.
5. All Offsets And Transitions Necessary To Successfully Construct The Duct Distribution System Are Not Shown On These Plans, But Are Still Included In The Scope Of Work, Some Of These Areas Are Connections At Curbs, Fans, Equipment And Offsets At Transition
6. All Open Ended Ducts Shall Be Terminated With 1/4" x 1/4" Aluminum Woven Wire Mesh Screen Unless Noted Otherwise.
7. The Contractor Shall Coordinate The Location Of Ceiling Grilles, Registers And Diffusers With The Architectural Reflected Ceiling Plans.
8. Coordinate Exact Location Of All Thermostats With Architect Prior To Installation. Mounting Height Shall Be Per ADA Requirements (At 48" AFF Unless Mandated Otherwise). Thermostat Wiring Shall Be Run In Concealed Spaces Of Walls Or Chases.
9. The Contractor Shall Coordinate And Provide Access Doors In Hard Ceilings For All Equipment Which Requires Access, Such As: Fire And Smoke Dampers, Smoke Detectors, Balancing Dampers, Etc.
10. Piping Shall Not Be Installed Above Any Electrical Equipment. Route All Condensate And Refrigerant Piping To Avoid Installation Above Electrical Equipment.
11. Contractor Shall Size Refrigerant Piping As Per Manufacturer Recommendations And Verify Pipe Quantities.

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	New Equipment
XXX / XX	Equipment Type / Equipment Number
	New Ductwork
	New Ductwork With Acoustical Lining
	Insulated Flexible Duct
	Volume Damper
	Fire Damper And Access Door
M	Motorized Damper
	Supply Air Flow
	Exhaust Air Flow
	Undercut Door
T	Thermostat
SDD	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator

Identifier	Description
X \ XXX	Diffuser / Register / Grille Number, CFM
	4 Way Ceiling Diffuser
	Exhaust Grille / Return Register
	Supply Duct Up
	Return / Exhaust Duct Up
CFM	Cubic Feet Per Minute
EA	Exhaust Air
MBH	Thousand BTU Per Hour
NK	Neck
RA	Return Air
SDD	Smoke Duct Detector
SA	Supply Air
TD	Transfer Duct

KEY PLAN



Keyplan | Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

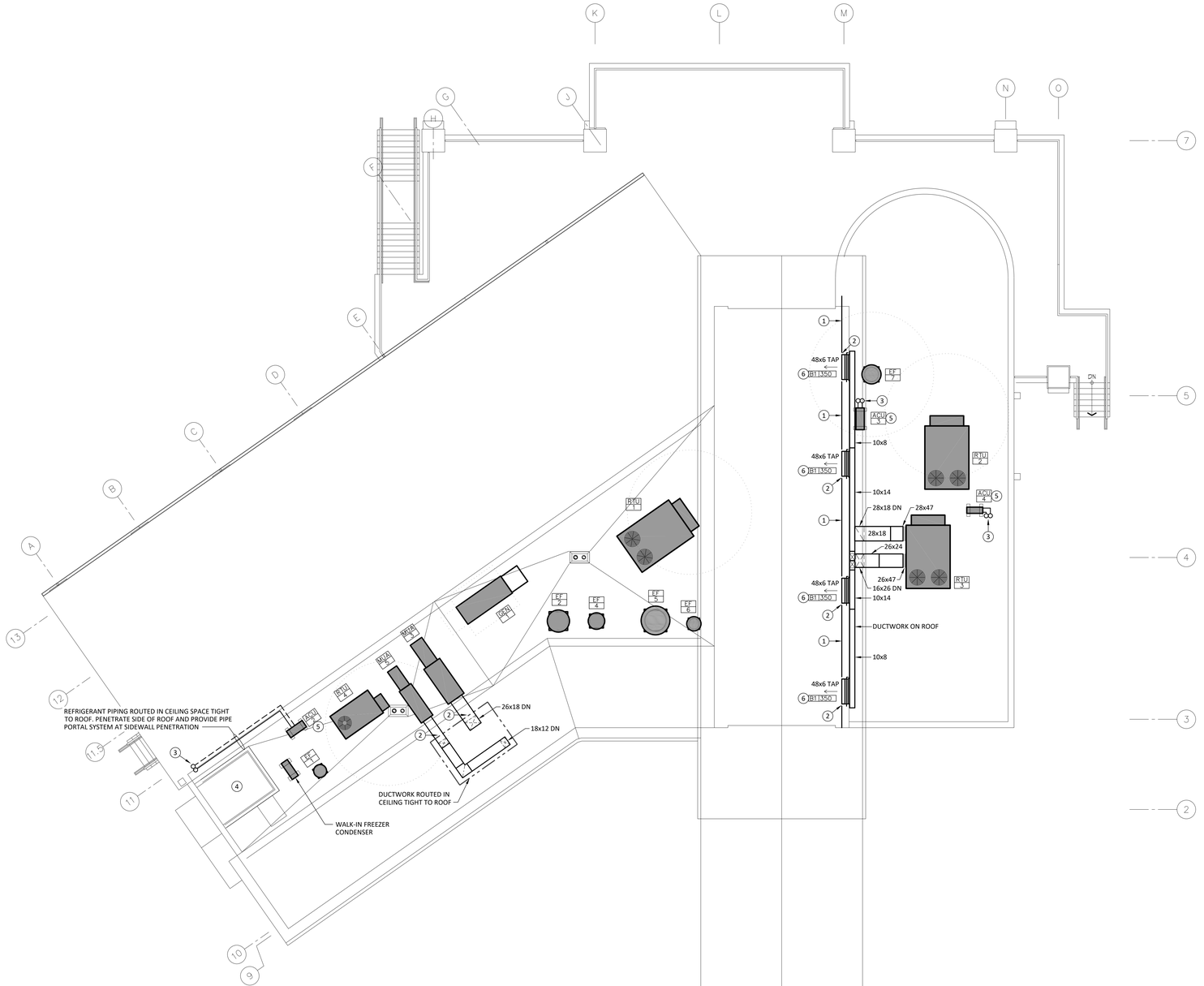
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - MECHANICAL

SUBMISSIONS		REVISIONS		
DATE	DESCRIPTION	DATE	DESCRIPTION	
10.03.16	100% ISSUE			
10.17.16	BID SET			
02.22.17	REBID SET			

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-102B



KEY NOTES (SYMBOLS 1, 2, ETC.)

1. Install Continuous Linear Bar Grille Flush Mounted To Wall With No Ductwork Or Openings To Roof For Decorative Purposes.
2. Sidewall Duct Penetration. Seal Per Details.
3. Refrigerant Piping From Condensing Unit. Provide Pipe Portal System Complete With Roof Curb And Pipe Flashing As Manufactured By RPS Pipe Portal System Or Approved Equal.
4. Install Elevator Shaft Vent. Coordinate With Architect.
5. New Air-Cooled Condenser To Be Installed On Equipment Rails Flashed To Roof.
6. Linear Bar Grille Installed Within Building. See Detail M-102B / 02.

GENERAL NOTES

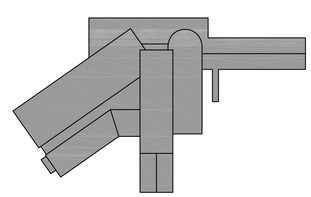
1. Coordinate Exact Locations Of All Roof Mounted Equipment With Architect And Structural Engineer.
2. All Rooftop Equipment Mounted On Steel Dunnage Or Support Rails Shall Be Provided With Spring Type Vibration Isolators And Designed To Resist All Gravity, Seismic And Wind Loads.
3. Seal All Roof Penetrations As Per Details.
4. All Roof Equipment Shall Be A Minimum Of 10'-0" From Edge Of Roof And All Exhaust Air Or Venting Discharge Shall Be Located A Minimum Of 10'-0" From Any Fresh Air Intake.
5. All Curbs And Rails To Be Secured Directly To Metal Deck And Flashed Into Roofing Membrane. Coordinate With Installing Roofing Contractor To Ensure All Roof Warranties Remain In Effect.
6. Contractor Shall Provide Flexible Duct Connectors At The Connection Points To Rooftop Units.
7. All Duct Sizes Stated On Plans Are Internal Clear Dimensions. Outer Dimensions Of Internally Lined Ductwork Shall Be Updated Accordingly. All Supply Air And Return Air Ductwork For A Distance of 20'-0" Downstream Of Rooftop Units Shall Be Acoustically Lined Per Specifications.
8. All Outdoor Air Supply And Return Ductwork Shall Be Provided With External Insulation And Provided With Oudoor Jacketing Similar To VentureClad 1577CW. All External Insulation Joints Shall Be Sealed Watertight. Provide Finished Painting And Coordinate Color Finishes With Architect.
9. Contractor Shall Size Refrigerant Piping As Per Manufacturer Recommendations And Verify Pipe Quantities.

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	New Equipment
XXX / XX	Equipment Type / Equipment Number
	New Ductwork
	New Ductwork With Acoustical Lining
	Insulated Flexible Duct
	Volume Damper
M	Motorized Damper
	Supply Air Flow

Identifier	Description
X | XXX	Diffuser / Register / Grille Number, CFM
	4 Way Ceiling Diffuser
	Exhaust Grille / Return Register
	Supply Duct Up
	Return / Exhaust Duct Up
T	Thermostat
CFM	Cubic Feet Per Minute
SDD	Smoke Duct Detector

KEY PLAN



Keyplan

Vertical Plan

ROOF LEVEL Scale: 1/8"=1'-0" (2' 4' 8' 16')

Drawing: M-103
Detail: 01

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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PROJECT:

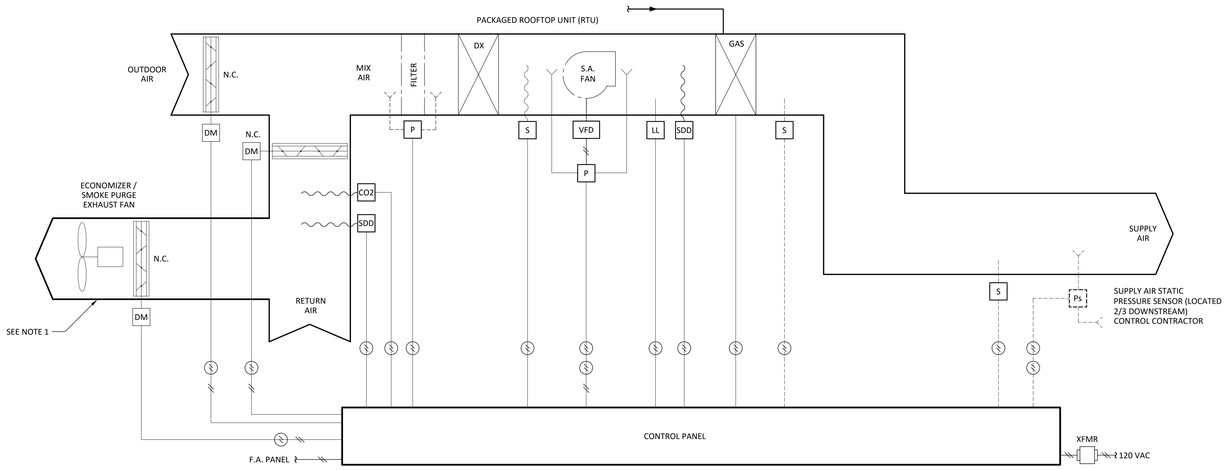
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

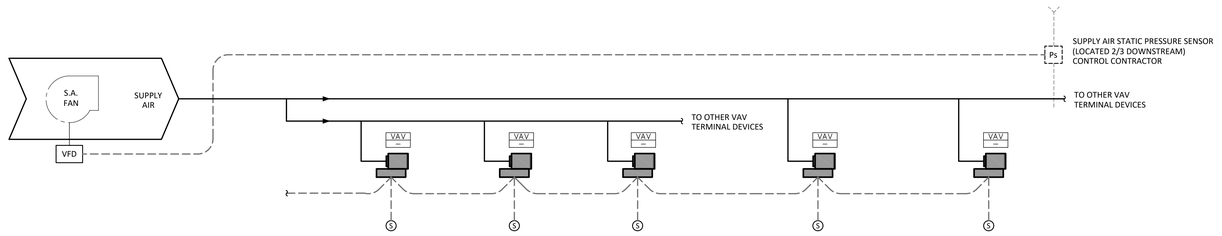
ROOF PLAN - MECHANICAL

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

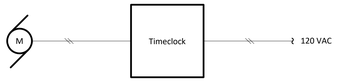
DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-103



RTU TEMPERATURE CONTROL DIAGRAM | Scale: NTS | Drawing: **M-401** Detail: **01**

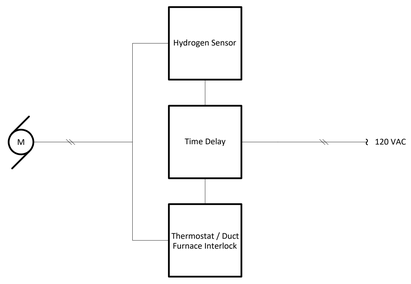


VARAIABLE AIR VOLUME CONTROL DIAGRAM | Scale: NTS | Drawing: **M-401** Detail: **02**



EXUAST FAN WITH SPACE TIMECLOCK | Scale: NTS | Drawing: **M-401** Detail: **03**

CONTROL DETAIL SPLIT AC UNITS | Scale: NTS | Drawing: **M-401** Detail: **04**



EXHAUST FAN WITH HYDROGEN SENSOR & THERMOSTAT | Scale: NTS | Drawing: **M-401** Detail: **05**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Control Point
	Control Wire
	New Equipment
T	Thermostat
S	Space Temperature Sensor
TS	Duct Temperature Sensor
PS	Duct static Pressure Sensor
M	Motorized Damper
SDD	Smoke Duct Detector

Identifier	Description
ACU	Air Conditioning Unit
CO2	Carbon Dioxide
DM	Damper Motor
FZ	Freezestat
H	Humidistat
LL	Low Limit Switch
P	Differential Pressure
S	Temperature Sensor
SDD	Smoke Duct Detector
VFD	Variable Frequency Drive

NOT FOR CONSTRUCTION

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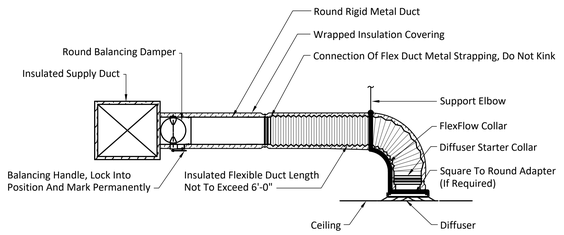
SHEET:	OF:

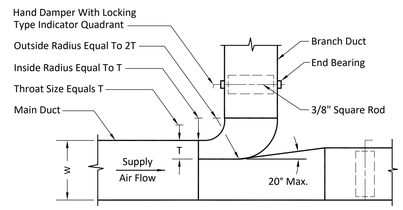
DRWG NO

M-401



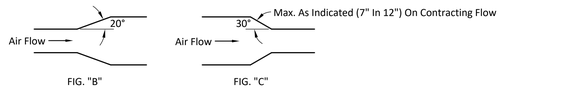
NOTES:
1. Provide At Flexible Duct Connection Metal Or "Panduit" Drawband On The Interior Flexible Duct Helix. Secure The Insulation Over The Draw Band With An Additional Drawband.
2. Provide Beading On Round Metal Duct 12" Or Larger In Diameter.
3. Provide Minimum 2" Collars For Attachment Of The Flex Duct To Round Duct, Dampers And Diffusers.
4. Band Rigid Round Duct Insulation To Duct And Provide Tape For Insulation Overlap.

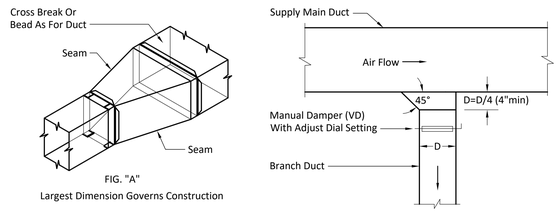
FLEXIBLE DUCT INSTALLATION | Scale: NTS | Drawing: **M-501** | Detail: **01**



NOTES:
1. Furnish This Type Connection ⌟ For Branches With More Then 200 CFM.
2. Must Be Used When W Is Greater Than, Or Equal To 36".
3. Minimum T = 4".

RECTANGULAR DUCT BRANCH WITH THROAT AND VOLUME DAMPER | Scale: NTS | Drawing: **M-501** | Detail: **02**



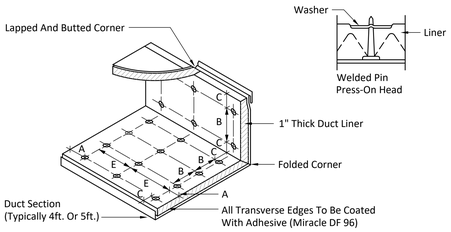


DUCT TRANSITIONS

TAP-IN TAKE-OFF

NOTES:
1. Duct Transitions Typical After Each Take-Off(s) Where Change In Duct Size Is Indicated.

DUCT TRANSITION DETAILS | Scale: NTS | Drawing: **M-501** | Detail: **03**

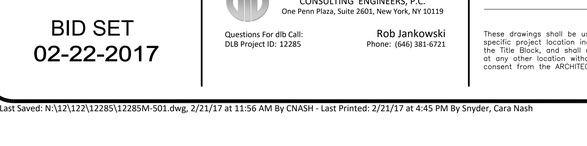


Velocity	Dimensions			
	A	B	C	E
0-2500 FPM	3"	12"	4"	18"
2501-6000 FPM	3"	6"	4"	16"

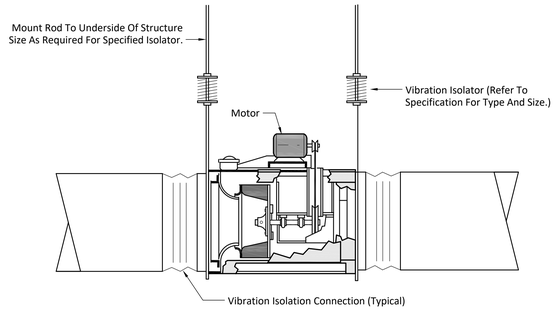
NOTES:
1. Maximum Spacing For Fasteners. Actual Intervals Are Approximate.
2. The Velocity Rated Side Of Liner Must Face The Air Flow.
3. Liner Adhered To The Duct With 90% Minimum Area Coverage Of Adhesive.

DUCT LINER INSTALLATION DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **04**

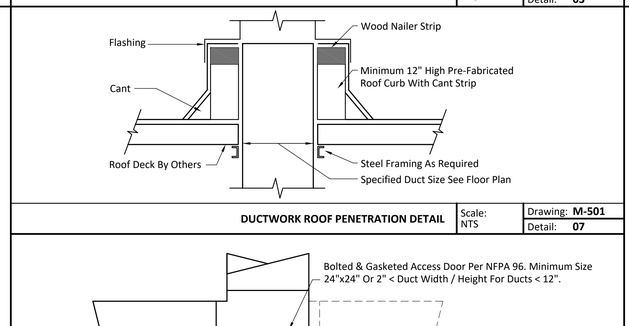
Rectangular Duct Hanger Schedule (Minimum Sizes)								
Half Duct Perimeter Range	Pair At 10' Spacing		Pair At 8' Spacing		Pair At 5' Spacing		Pair At 4' Spacing	
	Strap	Wire/Rod	Strap	Wire/Rod	Strap	Wire/Rod	Strap	Wire/Rod
P/2 < 30"	1" x 22 GA.	10 GA.	1" x 22 GA.	10 GA.	1" x 22 GA.	12 GA.	1" x 22 GA.	12 GA.
P/2 < 72"	1" x 18 GA.	3/8"	1" x 20 GA.	1/4"	1" x 22 GA.	1/4"	1" x 22 GA.	1/4"
P/2 < 96"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"	1" x 20 GA.	3/8"	1" x 22 GA.	1/4"
P/2 < 120"	1-1/2" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"	1" x 20 GA.	1/4"
P/2 < 168"	1-1/2" x 16 GA.	1/2"	1" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 18 GA.	3/8"
P/2 < 192"	-	1/2"	1-1/2" x 16 GA.	1/2"	1" x 16 GA.	3/8"	1" x 16 GA.	3/8"



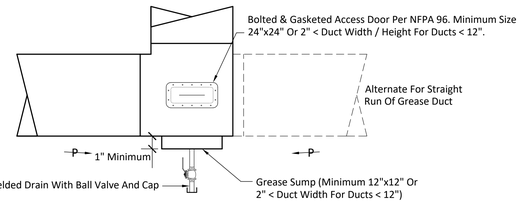
DUCT STRAP HANGER DETAILS | Scale: NTS | Drawing: **M-501** | Detail: **05**



INLINE CENTRIFUGAL FAN DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **06**

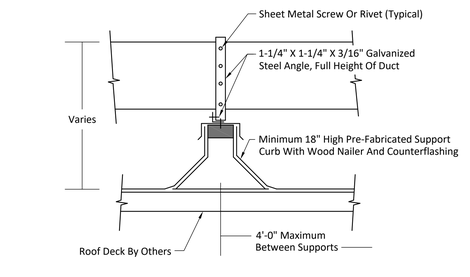


DUCTWORK ROOF PENETRATION DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **07**

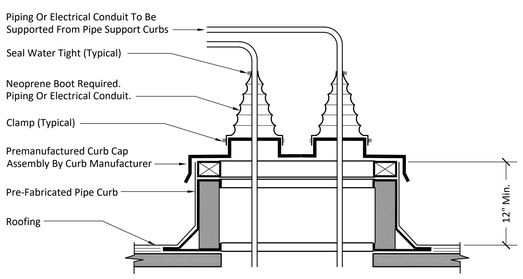


NOTES:
1. Pitch Grease Duct Towards Sump At 2% Slope Minimum.

INTERMEDIATE SUMP & ACCESS DOORS FOR GREASE DUCTS | Scale: NTS | Drawing: **M-501** | Detail: **08**

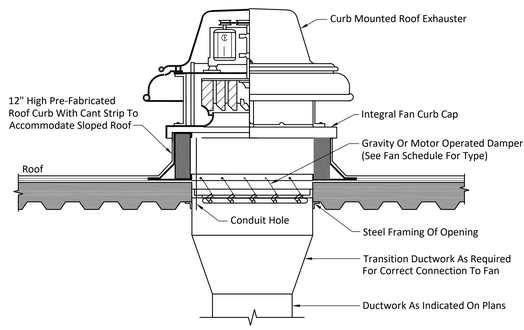


ROOFTOP DUCT SUPPORT CURB DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **09**



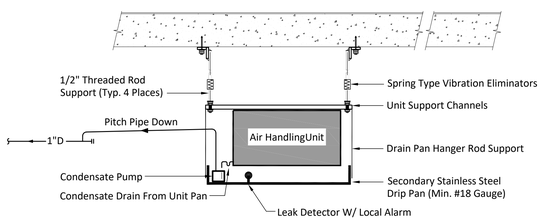
NOTES:
1. Contractor Shall Be Responsible To Remove Existing Roofing Where New Equipment And Pipe Curbs Are To Be Set And Where New Pipe Penetrations Through The Roof Occur. Contractor Shall Be Responsible To Cut New Roof Openings For New Piping, Etc. After Setting Of The Pipe And Equipment Curbs, Provide New Roof Flashing And Counter Flashing. Contractor Shall Hire The Services Of The Roofing Contractor Responsible For The Existing Roof Warranty / Guarantee To Install All Curbs And Duct Penetrations So Not To Void Roof Warranty and Guaranties. Coordinate The Above With The Owner And The Architect Structural Engineer.

PIPE CURB DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **10**



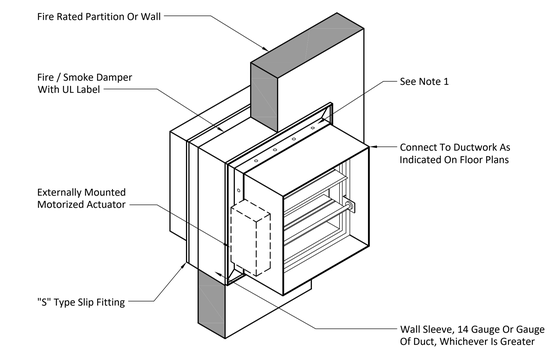
NOTES:
1. Mechanical Contractor Shall Retain The Services of A Seismic Consultant To Provide Additional Mounting And Restraint Details. See Specifications Section Titled "Vibration Isolation And Seismic Restraints For HVAC" For Additional Requirements.

ROOF MOUNTED EXHAUST FAN | Scale: NTS | Drawing: **M-501** | Detail: **11**



NOTES:
1. Contractor To Repair Any Damaged To Fireproofing.
2. Provide Supplementary Angles & Supported Rods. Supplementary Angle Shall Be Sized To Carry 150% Of The Total Operating Weight Of The Unit.
3. Provide Additional Drain Pan Under Entire Each Unit As Shown On This Detail With Leak Detectors And Condensate Pump. Leak Detector Shall Be Wired To Sound An Alarm And Send Signal To BMS. Actual Size Of Drain Pan As Required By Inspector.

SUSPENDED AIR HANDLING UNIT SUPPORT | Scale: NTS | Drawing: **M-501** | Detail: **12**



NOTES:
1. 1-1/2" X 1-1/2" X 1/8" Sleeve Retaining Perimeter Angles. Rivet, Bolt, Or Screw To Wall Sleeve. Typical Both Sides Of Partition Or Wall.
2. Installation Shall Be Performed In Accordance With Manufacturer's Instructions To Maintain UL Listing. UL Instructions Take Precedence Over Information Provided In Detail.

MOTORIZED FIRE / SMOKE DAMPER DETAIL | Scale: NTS | Drawing: **M-501** | Detail: **13**

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02-22-2017

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PROJECT:

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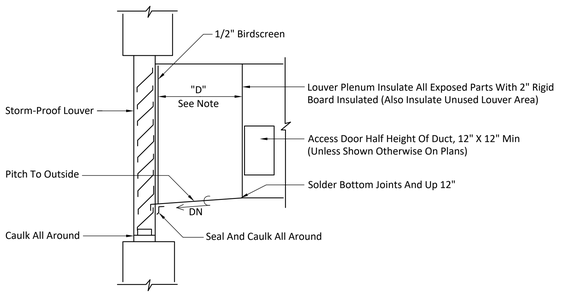
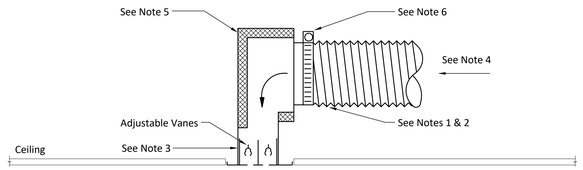
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-501



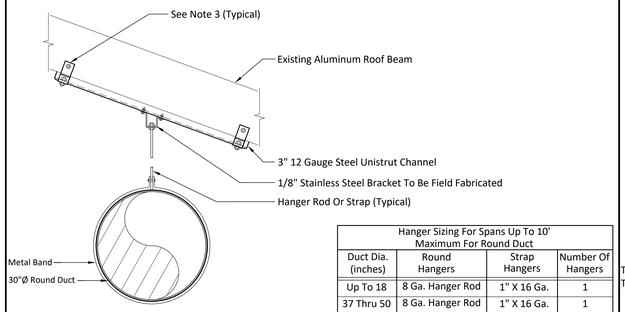
NOTES:
1. When "D" Is Over 24" Provide 3/4" Drain At 5'-0" Centers 6" From Louver With Trap.

LOUVER CONNECTION | Scale: NTS | Drawing: **M-502** | Detail: **01**



NOTES:
1. Offsets With Flex Duct Shall Not Exceed 30° And Shall Be Gradual. Offsets In Excess Of 30° Shall Be Hard Ducted.
2. Flex Duct Shall Not Have More Than 1/2" Sag / FT.
3. For Perimeter Diffusers Locate Distance From Outside Wall Shown On Architect's Plans.
4. Connection To Main Duct Shall Be Hard Duct Transition And Volume Damper.
5. Internally Insulated Plenum With Integral (Not Field Fabricated) Linear Diffuser By Diffuser Manufacturer (Use Non-Insulated Boot For Application, See Spec).
6. See Specs For Sealing And Using Nylon Ty-Wrap Tightened With Ty-Wrap Tool Or Reusable SS Draw Band.

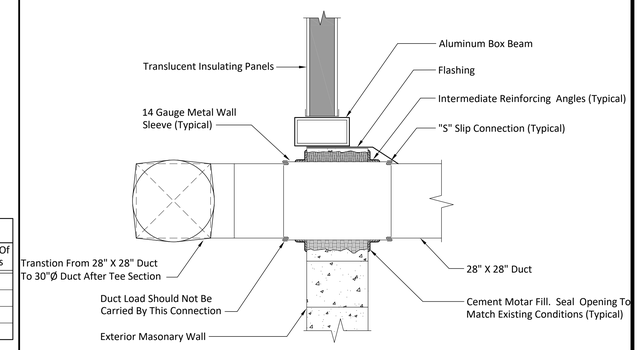
LINEAR DIFFUSER CONNECTION | Scale: NTS | Drawing: **M-502** | Detail: **02**



Hanger Sizing For Spans Up To 10' Maximum For Round Duct			
Duct Dia. (inches)	Round Hangers	Strap Hangers	Number Of Hangers
Up To 18	8 Ga. Hanger Rod	1" X 16 Ga.	1
37 Thru 50	8 Ga. Hanger Rod	1" X 16 Ga.	1
19 Thru 36	8 Ga. Hanger Rod	1" X 16 Ga.	1
51 Thru 84	8 Ga. Hanger Rod	1" X 16 Ga.	2

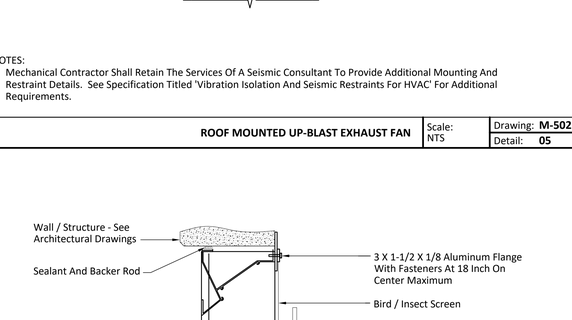
NOTES:
1. Duct Supports Shall Not Be Placed Over Duct Diffuser Openings.
2. All Hardware Used Shall Be Stainless Steel (No Exceptions).
3. 1/8" Stainless Steel "u" Shaped Plate. Anchor Through Aluminum Beam With 1/2" Dia. Stainless Steel Bolt. Provide Coating On All Steel In Contact With Aluminum Structure Or Provide Slip Sheets (Typical).

ROUND DUCT SUPPORT DETAIL | Scale: NTS | Drawing: **M-502** | Detail: **03**



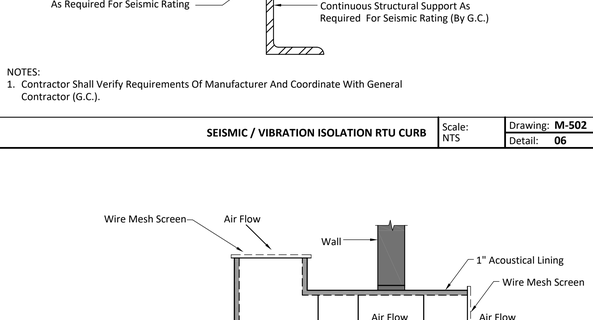
NOTES:
1. Penetration Through Wall Shall Be Weathertight And Allow For Expansion And Contraction.

DUCT WALL PENETRATION | Scale: NTS | Drawing: **M-502** | Detail: **04**



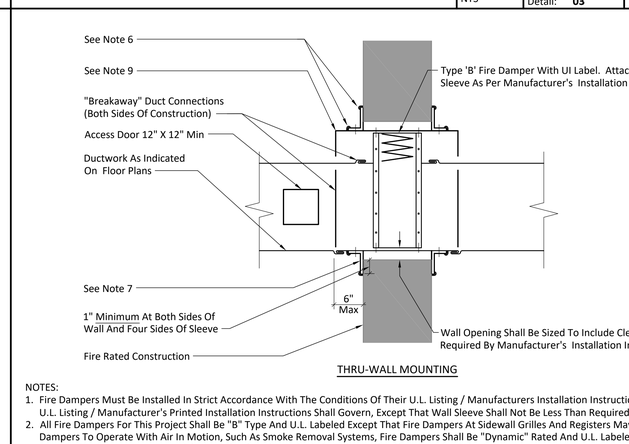
NOTES:
1. Mechanical Contractor Shall Retain The Services Of A Seismic Consultant To Provide Additional Mounting And Restraint Details. See Specification Titled 'Vibration Isolation And Seismic Restraints For HVAC' For Additional Requirements.

ROOF MOUNTED UP-BLAST EXHAUST FAN | Scale: NTS | Drawing: **M-502** | Detail: **05**



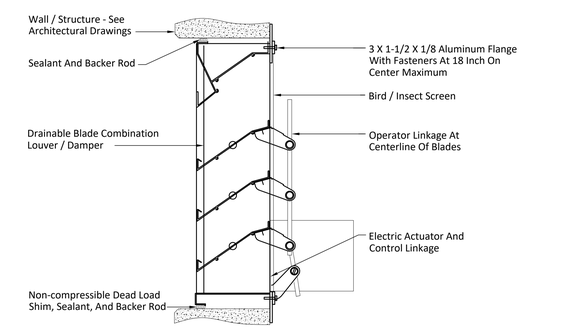
NOTES:
1. Contractor Shall Verify Requirements Of Manufacturer And Coordinate With General Contractor (G.C.).

SEISMIC / VIBRATION ISOLATION RTU CURB | Scale: NTS | Drawing: **M-502** | Detail: **06**

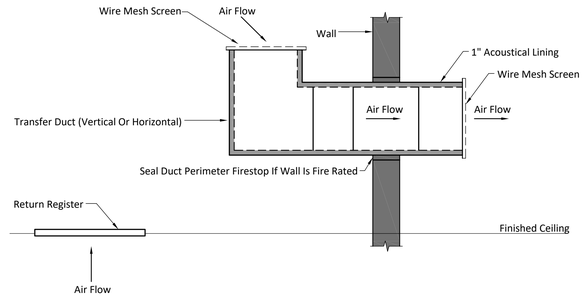


NOTES:
1. Fire Dampers Must Be Installed In Strict Accordance With The Conditions Of Their U.L. Listing / Manufacturers Installation Instructions. Where Conflict Occurs Between This Detail And The Requirements Of U.L. Listing / Manufacturer's Installation Instructions, The U.L. Listing / Manufacturer's Printed Installation Instructions Shall Govern, Except That Wall Sleeve Shall Not Be Less Than Required By NFPA 90a (See Above).
2. All Fire Dampers For This Project Shall Be "B" Type And U.L. Labeled Except That Fire Dampers At Sidewall Grilles And Registers May Be "A" Type, U.L. Labeled If Grille Or Register Size Is Increased To Account For Head Of Fire Damper. In Systems Requiring Fire Dampers To Operate With Air In Motion, Such As Smoke Removal Systems, Fire Dampers Shall Be "Dynamic" Rated And U.L. Labeled For Closure While Air Is Flowing At Design Pressures And Velocities. Comply With Fire Damper Manufacturer's Limitations On Fire Damper Size Versus Pressure / Velocity - Clearly Indicate Such Compliance On Shop Drawing Submissions.
3. Access Doors For Fire Dampers In Floor Shall Be Above Floor. Access Panels (Fire Rated As Required) Shall Be Provided In General Construction By The Contractor Responsible For General Construction. (Refer To Architectural Drawings And Specification). Coordinate Access Panel Requirements (Quantities And Locations) With The Contractor Responsible For General Construction.
4. Refer To PME Sheets For Any Symbols Not Identified Hereon.
5. Unless Specifically Noted Otherwise, Elements Of Sidewall Mounting And Floor / Roof Mounting Shall Be The Same As For Thru-Wall Mounting.
6. Firestop Between Edge (Only) Of Angles And Duct And Between Edge (Only) Of Angles And Fire Rated Construction (And Between Abutting Angles) With Non-Hardening Caulk As Indicated In Manufacturer's Installation Instructions. Typical All Around And At Both Sides Of Fire Rated Construction.
7. Perimeter Retaining Angles Sized As Per The Manufacturer's Installation Instructions And To Allow A Minimum Of 1" Bearing On Fire Rated Construction. Attach To Wall Sleeve Only, And In Method / With Materials As Indicated In Manufacturer's Installation Instructions. Typical For Both Sides Of Fire Rated Construction.
8. Fill In Flutes Of Metal Deck With Fireproof Materials Recommended By Architect. Firestop All Edges With The Same Non-Hardening Caulk As Indicated In Fire Damper Manufacturer's Installation Instructions. Typical All Around And At Both Sides Of Fire Rated Construction.
9. Wall Sleeve. Provide Duct Gauge As Per UI555 But In No Case Less Than Required By NFPA 90a (1989) Paragraph 3-4.6.3.
10. Be Careful When Designing Systems W/ Dynamic Rated Dampers - See Air Balance Technical Manual On Dynamic Fire Dampers-in Detail Book.
11. This Required & Coordinated With Grille / Register Specifications.

TYPICAL FIRE DAMPER DETAILS | Scale: NTS | Drawing: **M-502** | Detail: **09**



INTAKE LOUVER DETAIL | Scale: NTS | Drawing: **M-502** | Detail: **07**



NOTES:
1. Duct Size As Indicated On Floor Plan. Transfer Duct Size Based On 300 Fpm.

TRANSFER DUCT ASSEMBLY | Scale: NTS | Drawing: **M-502** | Detail: **08**

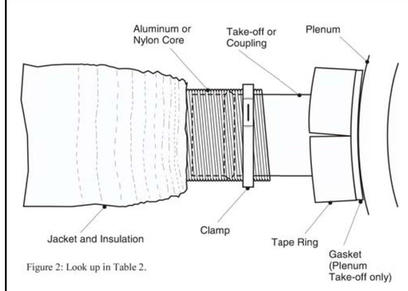


Figure 2: Look up in Table 2.

Plenum Connection Detail

Table 2: Clamp Look-up Table

Used With		Clamp Unico P/N	Color	Code (Stamped)
2 ½ inch	Supply Tubing	UPC-252	Black	725
	Sound Attenuator	UPC-253	Silver	680

Table 3: Plenum Take off Table

Duct Size	Plenum	
	Round Metal	Flat Metal
2 ½ Inch	UPC-228	UPC-228F

Unico Tubing Installation Instructions / Requirements

STEP 1. Cut a length of tubing long enough to reach both ends without stretching or placing undue stress on the tubing or connections. The minimum bend radius of the tubing is 6-inches (152-mm).

STEP 2. Pull back the insulation of the tubing about 4-inches (102-mm) to expose the inner aluminum or nylon core. Slip a supply or scrim core clamp over the outside of the core. Then slip the core over the end of the take-off or coupling.

NOTE: "605, 575, 725, and 680" is stamped on the outer rim of the clamp for the supply tubing or the sound attenuator, respectively. See Table 2

STEP 3. Position the clamp and tubing over the ridge or dimple before tightening clamp to prevent the duct from slipping off. Using the clamp pliers, crimp the clamp "ear" to tighten the clamp. Be sure that the pliers reach under the clamp so that the flat portion of the ear is not bent. Crimp with sufficient force to close the clamp but not so much as to cut the clamp.

ALTERNATE (for supply tubing installation only): If clamps are not available, use two self-tapping screws to secure the aluminum core to the take-off or coupling.

STEP 4. (for supply tubing installation only) Seal the core by wrapping with aluminum tape listed and labeled in accordance with UL-181A and marked "181A-P".

STEP 5. Stuff the insulation and outer jacket under the tape ring as best you can. Then seal the outer jacket to the tape ring with tape listed and labeled in accordance with UL-181B and marked "UL-181B-FX".

STEP 6. Each duct run should be supported at a minimum of every 6 feet to prevent sagging and bunching of the tube. This will help to reduce restriction within the duct and allow for the most efficient air flow.

INSTALLATION OF UPC-26CR6 AND UPC-26CR8

The R-6.0 duct will not compress enough to push through the 4-inch hole for the supply outlet. Connect a 2 ft. (610 mm) length of R-4.2 duct to the outlet and couple it to the R-6.0 duct. The R-4.2 duct will pass through the 4-inch hole. If R-6.0 duct is to be maintained throughout the entire length of attenuator, wrap an additional 1-inch fiberglass blanket around the R-4.2 duct after the supply outlet has been attached to the surface.

UNICO SYSTEM DETAILS | Scale: NTS | Drawing: **M-502** | Detail: **10**

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SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-502

ROOM VENTILATION SCHEDULE

UNIT ID	SYSTEM ZONE TYPE	ROOM NAME	RP (OA CFM / PERSON)	PZ (PEOPLE QTY.)	RA (OA CFM / SQFT)	AZ (AREA) (SQFT)	VBZ (CFM)	EZ	VOZ (CFM)	VPZ (MIN CFM)	ZP	NOTES
AC-2	Multiple	Kitchen Storage L17	0	0	0.06	1103	66	0.8	83	425	0.19	1
		Service Corridor L10	0	0	0.06	331	20	0.8	25	150	0.17	1
		Storage Room L11	0	0	0.06	128	8	0.8	10	225	0.04	1
		Storage Room L14	0	0	0.06	346	21	0.8	26	150	0.17	1
		Chef's Office L18	5	1	0.06	65	9	0.8	11	125	0.09	1
		Toilet Room L20										1,2
		Jan. Cl. L21										1,2
		Staff Locker L22								50	0.00	1,2
	SUMMARY		PZ = 1		EV = 0.96	PS = 1	D = 1.00		ZP = 0.19	VOU = 123		VOT = 129 CFM
												DESIGN OA = 130 CFM
AC-3	Multiple	Turnstand L01	5	2	0.06	271	26	0.8	33	150	0.22	1
		Break Room L02	5	4	0.06	325	40	0.8	49	600	0.08	1
		Staff M. Locker L04								100	0.00	1,2
		Staff W. Locker L05								100	0.00	1,2
		Corridor L03	0	0	0.06	210	13	0.8	16	200	0.08	1
		Storage L06	0	0	0.06	675	41	0.8	51	400	0.13	1
	SUMMARY		PZ = 6		EV = 0.93	PS =	D = 0.00		ZP = 0.22	VOU = 89		VOT = 95 CFM
												DESIGN OA = 100 CFM
SINGLE SYSTEMS EXHAUST & OA TRANSFERS	Single	Storage Room L15	0	0	0.06	500	30	1.0	30			1,3
		Fire Sprinkler Room L13	0	0	0.06	300	18	1.0	18			1,3
		Electrical Room L12	0	0	0.06	307	18	1.0	18			1,3
		Cart Storage L07	0	0	0.06	4715	283	1.0	283			1,3
		Bar Storage L09	0	0	0.06	100	6	1.0	6			1,3
		Mechanical Room L08	0	0	0.06	100	6	1.0	6			1,3
	SUMMARY											VOZ = VOT = 361 CFM
												DESIGN OA = 370 CFM
RTU-1	Multiple	Bar / Lounge 112	7.5	27	0.18	950	374	0.8	467	1000	0.47	1
		Restaurant 116 (west)	7.5	47	0.18	662	472	0.8	590	1210	0.49	1
		Restaurant 116 (east)	7.5	47	0.18	662	472	0.8	590	1210	0.49	1
		Women's Toilet 113								125	0.00	1,2
		Men's Toilet 115								125	0.00	1,2
		Janitors Closet 114										1,2
	SUMMARY		PZ = 121		EV = 0.66	PS = 120	D = 0.99		ZP = 0.49	VOU = 1,309		VOT = 1976 CFM
												DESIGN OA = 1980 CFM
RTU-2	Multiple	Pro Shop 207	5	6	0.06	629	68	0.8	85	450	0.19	1
		Open Office 108	5	1	0.06	190	16	0.8	21	120	0.17	1
		Open Office 109	5	1	0.06	126	13	0.8	16	90	0.17	1
		IT 110	0	0	0.06	113	7	0.8	8	30	0.28	1
		Storage 111	0	0	0.06	237	14	0.8	18	60	0.30	1
		Men's Toilet 106				169		0.8		100	0.00	1,2
		Women's Toilet 105				168		0.8		100	0.00	1,2
		Corridor 108A	0	0	0.06	83	5	0.8	6	30	0.21	1
		Union County Off 102	5	1	0.06	177	16	0.8	20	68	0.29	1
		Conference 103	5	4	0.06	172	30	0.8	38	158	0.24	1
		Office 104	5	1	0.06	238	19	0.8	24	270	0.09	1
	SUMMARY		PZ = 14		EV = 0.85	PS = 10	D = 0.71		ZP = 0.30	VOU = 168		VOT = 197 CFM
												DESIGN OA = 200 CFM
RTU-3	Single	Vestibule 100	5	2	0.06	196	22	0.8	27			1
		Vestibule 101	5	20	0.06	1144	169	0.8	211			1
	SUMMARY											VOZ = VOT = 238 CFM
												DESIGN OA = 240 CFM
RTU-4	Multiple	Delivery Area 119	0	1	0.12	336	40	0.8	50	300	0.17	1
		Stair 118	0	0	0.06	175	11	0.8	13	100	0.13	1
		Kitchen 117 (West)	0	10	0	1355	0	0.8	0	1800	0.00	1,2
		Kitchen 117 (East)	0	10	0	1355	0	0.8	0	1800	0.00	1,2
	SUMMARY		PZ = 21		EV = 0.98	PS = 120	D = 5.71		ZP = 0.17	VOU = 51		VOT = 52 CFM
												DESIGN OA = 60 CFM

NOTES:
1. From 2015 International Mechanical Code & Ashrae 62.1-2013, Section 403.
2. No Ventilation Requirements, Only Exhaust. Air Is Provided For Exhaust Air Make-up Only.
3. Ventilation Provided Via Continuous Exhaust And Direct Outdoor Air Louver For Exhaust Make-up Air.

LEGEND:
RP = People Outdoor Air Rate: Outdoor Airflow Rate Required Per Person
PZ = Zone Population: Number Of People In The Space Or Spaces In The Zone
RA = Area Outdoor Air Rate: Outdoor Airflow Rate Required Per Unit Area
AZ = Zone Floor Area: Net Occupiable Floor Area Of The Space Or Spaces In The Zone
VBZ = Breathing Zone Outdoor Airflow = [Rp X Pz] + [Ra X Az]
EZ = Zone Air Distribution Effectiveness: From Table
VOZ = Zone Outdoor Airflow Rate = Vbz / Ez
VPZ = Primary Airflow: Lowest Expected Primary Airflow To The Zone When Fully Occupied
ZP = Primary Outdoor Air Fraction = Voz / Vpz
EV = System Ventilation Effectivenes
PS = System Population: Total Number Of Occupants In The Area Served By System
D = Occupant Diversity = Ps / Σpz
VOU = Uncorrected Outdoor Air = [D X Σ[Rp X Pz]] + Σ[Ra X Az]
VOT = Corrected Outdoor Air = Vou / Ev
OA = Outdoor Air

GAS-FIRED DUCT FURNACE SCHEDULE

UNIT ID	MODEL NO.	SERVICE	TYPE	SPACE VOLUME (CU FT)	AIR CHANGES PER HOUR	AIRFLOW (CFM)	SIZE (LxWxH) (IN)	DUCT SIZE (WxH) (IN)	FACE VELOCITY (IN)	WINTER EDB (°F)	LAT (°F)	GAS HEAT SECTION INPUT (MBH)	GAS HEAT SECTION OUTPUT (MBH)	NOTES
DF-1	SC-350	Cart Storage	Duct Furnace	56,650	5	4,800	26x50x36	40x18	960	0	50	350	280	ALL

NOTES:
1. Selection Based On Equipment Manufactured By Reznor.
2. Units Shall Have Built-In Thermal Overload Protection.
3. Provide Remote Thermostat.
4. Interlock Heater Operation With Supply Fan Operation.

DIFFUSER SCHEDULE

UNIT ID	MODEL	SIZE	DESCRIPTION	NOTES
A1	OMNI	24x24	Steel, 3 Cone Full Face, Volume Control Damper And Opposed Blade Damper.	ALL
A2	OMNI	12x12	Steel, 3 Cone Full Face, Volume Control Damper And Opposed Blade Damper.	ALL
B1	CT-480	72x6	1-1/2" Single Slot Diffuser, Highthrow Option. Complete With Continuous Acoustically Lined Supply Air Plenum.	1,3,4,6
B2	CT-480	48x6	1-1/2" Double Slot Diffuser, Highthrow Option. Complete With Continuous Acoustically Lined Supply Air Plenum.	1,3,4,6
C	FL-15	5x48	1-1/2" Double Slot Diffuser, Highthrow Option. Complete With Continuous Acoustically Lined Supply Air Plenum.	1,2,3,4,6
D1	TMS	24x24	Steel, 3 Cone Full Face, Volume Control Damper And Opposed Blade Damper.	ALL
D2	TMR	14"Ø	Steel, 3 Cone Full Face, Round Diffuser Witrh Opposed Blade Damper.	ALL
E1	355 RL	24x24	Aluminum, 1/2" Spacing Full Louvered Face, 35 Degree Fixed Deflection Blades, Opposed Blade Damper And Front Blades Parallel To The Long Dimension.	1,3,4,6
E2	355 RL	12x12	Aluminum, 1/2" Spacing Full Louvered Face, 35 Degree Fixed Deflection Blades, Opposed Blade Damper And Front Blades Parallel To The Long Dimension.	1,3,4,6
E3	355 RL	SEE PLANS	Aluminum, 1/2" Spacing Full Louvered Face, 35 Degree Fixed Deflection Blades, Opposed Blade Damper And Front Blades Parallel To The Long Dimension.	1,3,4,6
F	272RL	SEE PLANS	Steel Supply Grille, Adjustable Double Deflection Blades, 3/4" Blade Spacing, And Opposed Blade Damper.	1,2,3,4,6,7
G	UNICO	2-1/2"Ø	Diffuser Based On Equipment Manufactured By The Unico System Supply Outlet, 2-1/2", Threaded End.	2,3,4
H	PXP	24x24	Steel Perforated Lay-In Return Panel.	1,3,4,6

NOTES:
1. Selection Based On Equipment Manufactured By Titus.
2. Flexible Ducts Connecting The Diffusers Shall Be Full Size Of Neck Diameter.
3. Maximum Noise Criterion Rating < 30 NC.
4. Baked Enamel Finish, Color To Be Selected By Architect.
5. Diffusers Shall Be 4-Way Blow Unless Otherwise Indicated On Plans.
6. Mounting Frame Type Shall Be Coordinated With Ceiling Construction Type.
7. Neck Diameter Shall Be As Scheduled In Table 1.

TABLE 1 - ROUND NECK SIZE SCHEDULE
UP TO 150 CFM - 6" DIAMETER
151 TO 275 CFM - 8" DIAMETER
276 TO 380 CFM - 10" DIAMETER
381 TO 500 CFM - 12" DIAMETER
501 TO 700 CFM - 14" DIAMETER
701 TO 900 CFM - 16" DIAMETER

VARIABLE AIR VOLUME (VAV) SCHEDULE

UNIT ID	MODEL NO.	AREA SERVED	INLET SIZE (IN)	AIRFLOW MAX (CFM)	AIRFLOW MIN (CFM)	TURNDOWN RATIO	ELECTRICAL VOLTAGE (V)	PHASE (°)	FLA (A)	ELECTRIC HEATER HAS HEATER	CAPACITY (MBH)	CAPACITY (KW)
Not Used												
Not Used												
Not Used												
Not Used												
VAV-2-1	DTFS	Pro-Shop	12	1,500	450	0.30	208	1	3.6	Yes	19,000	5.6
VAV-2-2	DESV	Offices	14	2,000	600	0.30	120	1	-		-	-
VAV-2-3	DESV	Offices / Conference	8	750	225	0.30	120	1	-		-	-
VAV-2-4	DESV	Offices Restroom Make-up	6	200	200	1.00	120	1	-		-	-

NOTES:
1. Selection Based On Equipment Manufactured By Titus.
2. Unless Otherwise Noted, Box Minimum CFM Shall Be At 50% Of The Maximum CFM Indicated.
3. Indicated Terminal Boxes Shall Be Complete With Hot Water Coil, Furnished And Installed By The Box Manufacturer At The Factory.
4. Boxes Shall Be Pressure Independent Type, Suitable For Direct Digital Control And Complete With Disconnect Switch, Cross Flow Sensors, Factory Mounted And Wired 24V AC Transformer.
5. Maximum Water P.D. Through Coil Shall Be 5' WC.
6. The Automatic Temperature Control Contractor Will Supply The Direct Digital Control Package (Including Actuator) To The Box Manufacturer's Factory For Factory Mounting.
7. VAV Boxes Shall Be Single Duct Type.

ELECTRIC DUCT MOUNTED HEATER

UNIT ID	MODEL NO.	SERVICE	TYPE	AIRFLOW (CFM)	SIZE (IN WG)	WINTER EDB (°F)	LAT (°F)	CAPACITY (BTUH)	CAPACITY (KW)	ELECTRICAL VOLTAGE V/PH/Hz	NOTES
EDH-1	G1GS105N	AC-2 System	Flange / Duct	1,340	20x12	58	96	54,000	16	208 / 3 / 60	1 Thru 5
EDH-2	G1GS105N	AC-3 System	Flange / Duct	1,340	20x12	58	96	54,000	16	208 / 3 / 60	1 Thru 5
EDH-3	G1GS105N	Office 104	Flange / Duct	900	14x12	55	85	29,000	8	208 / 3 / 60	1 Thru 5
EDH-4	G1GS105N	Office 108	Flange / Duct	500	12x10	55	85	16,000	5	208 / 3 / 60	1 Thru 5
EDH-5	G1GS105N	Conference 103	Flange / Duct	525	12x10	55	85	16,200	5	208 / 3 / 60	1 Thru 5

NOTES:
1. Selection Based On Equipment Manufactured By Indeeco
2. Units Shall Have Built-In Thermal Overload Protection.
3. Maximum Velocity Through Coil Shall Be 650 FPM.
4. Provide Remote Thermostat.
5. Provide SCR Control.

FIN TUBE RADIATION

UNIT ID	MODEL NO.	SERVICE	TYPE	LENGTH FT	WINTER EDB (°F)	LAT (°F)	CAPACITY (BTUH)	CAPACITY (KW)	ELECTRICAL VOLTAGE V/PH/Hz	NOTES
FTR-1	DPH-07A	Main Supply	Flange / Duct	5	65	85	6,400	1.9	208 / 3 / 60	1 Thru 5
FTR-2	DPH-07A	Main Supply	Flange / Duct	4	65	85	3,400	1	208 / 3 / 60	1 Thru 5

NOTES:
1. Selection Based On Equipment Manufactured By QMARK.
2. Units Shall Have Built-In Thermal Overload Protection.
3. Provide Integral Thermostat.
4. Provide SCR Control.
5. Coordinate Finish With Architect.

ROOFTOP UNIT SCHEDULE

UNIT ID	MODEL	AREA SERVED	SUPPLY FAN AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN WG)	MOTOR (HP)	GAS HEAT SECTION INPUT (MBH)	GAS HEAT SECTION OUTPUT (MBH)	NO. OF STAGES	DIRECT EXPANSION COOLING COIL TOTAL (MBH)	SENS (MBH)	EAT (DB / WB °F)	LAT (DB / WB °F)	FILTERS TYPE QTY / TYPE	ELECTRICAL VOLTAGE (V)	MCA (A)	MOCP (A)	WEIGHT (LBS)	EER	NOTES	ACCESSORIES
RTU-1	YHD240	Restaurant	6,650	1,980	1.00	5.0	350	280	SCR	237.0	187.0	79.8 / 65.7	56 / 54.54	8 / MERV 9	480	46	60	2,500	11.0	ALL	ALL
RTU-2	YHD180	Pro Shop / Offices	4,750	950	1.00	3.0	350	280	SCR	168.0	130.0	78.2 / 64.7	54.7 / 53.21	8 / MERV 9	480	33	45	2,500	12.0	ALL	ALL
RTU-3	YHD180	Vestibule / Main Hall	4,500	900	1.00	3.0	350	280	SCR	166.0	127.8	78.2 / 64.7	53.88 / 52.62	8 / MERV 9	480	33	45	2,500	12.0	ALL	ALL
RTU-4	YHC120	Kitchen	4,000	1,000	1.00	3.6	250	200	3	110.9	93.5	77.9 / 64.5	58.35 / 55.7	3 / MERV 9	480	21.9	30	1,750	12.4	ALL	ALL

NOTES:
1. Selection Is Based On Package Rooftop Unit With DX Cooling And Gas Heat As Manufactured By Trane.
2. Unit To Be Complete Package Including Microprocessor Based DDC Controls.
3. Static Pressure Indicated Above Is The External Static Pressure Which Excludes Any P.D. Within The Unit.
4. Units Shall Be Complete With Side Outlet Drain And Hinged Access Doors.
5. Electrical Connection To Be Single Point. Provide Disconnect Switch And 115 Volt GFI Convenience Receptacle And Light.
6. Unit Shall Have Hermetically Sealed Scroll Compressors.
7. Units Shall Have Full UL Listing.
8. Refrigerant - R410a.
9. Unit Shall Be Provided With CO2 Sensor And Motorized Modulating Outside Air Damper For Demand Controlled Ventilation.
10. Unit Shall Be Provided With Low Ambient Controls And Hard Start Kit.
11. Unit Shall Be Provided With Airside Economizer. Power Exhaust Shall Also Be Configured For Smoke Evacuation.

ACCESSORIES:
1. Provide Phase And Brownout Protection.
2. Power Convenience Outlet.
3. Condensing Unit Hail Guards

SPLIT TYPE AIR CONDITIONING UNIT SCHEDULE

INDOOR UNIT												OUTDOOR UNIT											
UNIT ID	MODEL NO.	AREA SERVED	SUPPLY FAN AIRFLOW (HIGH CFM)	SUPPLY FAN E.S.P. (IN. W.G.)	DX COOLING COIL TOTAL (MBH)	HEATING TOTAL @ 47F (MBH)	ELECTRICAL MCA (A)	ELECTRICAL VOLTAGE (V)	ELECTRICAL PHASE (ϕ)	ELECTRICAL FREQ (HZ)	WEIGHT (LBS)	UNIT ID	MODEL NO.	SIZE (TONS)	COOLING CAPACITY (MBH)	ELECTRICAL VOLTAGE (V)	ELECTRICAL PHASE (ϕ)	ELECTRICAL FREQ (HZ)	ELECTRICAL MCA (A)	ELECTRICAL MOCP (A)	SEER / HSPF	COP @ 17F	WEIGHT (LBS)	SOUND LEVEL dB(A) (LOW/HIGH)	NOTES
Not Used																									
AC-2	PEFY-P48NMHU-E2	LL Kitchen Storage / Off	1,340	1.0	48.0	-	4.16	208	1	60	153	ACU-2	PUMY-P48NKMU1 (-BS)	4.00	48.0	208	1	60	31.0	40.0	16.5 / 20.2	3.3	269	51	1 Thru 9
AC-3	PEFY-P48NMHU-E2	LL Break / Storage	1,340	1.0	48.0	-	4.16	208	1	60	153	ACU-3	PUMY-P48NKMU1 (-BS)	4.00	48.0	208	1	60	31.0	40.0	16.5 / 20.2	3.3	269	51	1 Thru 9
AC-4	PKA-A18HA6	IT Room	425	-	18.0	-	Note 10	208	1	60	29	ACU-4	PUY-A18NHA6 (-BS)	1.50	18.0	208	1	60	13.0	20.0	15.3 / 8.0	2.28	89	48	1 Thru 10

NOTES:
1. Selection Based On Equipment Manufactured By Mitsubishi Electric.
2. Unit Shall Be Complete With Washable Filters & Filter Box.
3. Indicated Ratings Are As Per ARI Standard 210/240.
4. Provide TC-24 Display Type Centralized Controller With Lockable Temperature Sensors.
5. Provide Gobi Pumps To Lift Condensate Drain.
6. Condensing Unit Shall Be Of The Same Manufacturer As The Unit Mated To.
7. Condensing Units Shall Be Suitable For Low Ambient Cooling Down To 0°F, Low Ambient Hood, Wind Baffle Kit.
8. Unit Performance Based On 95°F Ambient Air Temperature.
9. Outdoor Unit Shall Be Factory Assembled With Weatherproof Cabinets And Shall Be Complete With Disconnect Switch.
10. Powered By Outdoor Condensing Unit. Indoor Unit MCA = 1.

FAN SCHEDULE

UNIT ID	BASIS OF DESIGN MFG	BASIS OF DESIGN MODEL	TYPE	LOCATION	SERVICE	AIRFLOW (CFM)	S.P. (IN WG)	SPEED (RPM)	MOTOR POWER (HP)	MOTOR ELECTRICAL (V / ϕ)	MOTOR DRIVE	INTERLOCK	WEIGHT (LB)	NOTES	ACCESSORIES
EF-1	Captivaire	(Captivair Dwgs.)	Centrifugal Upblast	Roof	Hood 1 Exhaust	900	-	-	1.50	208/1	Belt	Kitchen Hood	-	1	1,2,4
EF-2	Captivaire	(Captivair Dwgs.)	Centrifugal Upblast	Roof	Hood 2 & 3 Exhaust	4,069	-	-	1.50	208/1	Belt	Kitchen Hood	-	1	1,2,4
EF-4	Captivaire	(Captivair Dwgs.)	Centrifugal Upblast	Roof	Hood 4 Exhaust	1,600	-	-	1.50	208/1	Belt	Kitchen Hood	-	1	1,2,4
EF-5	Greenheck	GB-200	Centrifugal Downblast	Roof	Cart Storage Exhaust	4,800	0.75	1,072	1.50	208/3	Belt	Continuous	150	1,2	1,3
EF-6	Greenheck	GB-101-3	Centrifugal Downblast	Roof	Toilet / Locker/Mech Exhaust	715	1.00	1,638	0.33	120/1	Belt	Timeclock	100	1	1,3,4
EF-7	Greenheck	GB-101-4	Centrifugal Downblast	Roof	Toilet / Locker Exhaust	560	1.00	1,608	0.25	120/1	Belt	Timeclock	100	1	1,3,4
TF-1	Greenheck	BSQ-160-20	Inline Centrifugal	Cart Storage	Cart Storage Heating & Ventilation	4,800	0.50	1,764	2.00	208/3	Belt	Thermostat	150	1,2	1,2,3,5

NOTES:
1. Motors Shall Be Of Premium Efficiency.
2. Motors Shall Be Spark And Explosion Proof.

ACCESSORIES:
1. Disconnect Switch
2. Backdraft Damper
3. Spring Vibration Isolator
4. 18" Factory Roof Curb
5. Remote Mounted Speed Controller

LOUVER SCHEDULE

UNIT ID	MODEL NO.	QTY	TYPE	SERVICE	LOUVER DIMENSIONS HEIGHT (IN)	LOUVER DIMENSIONS WIDTH (IN)	LOUVER DIMENSIONS DEPTH (IN)	FREE AREA (SQFT)	AIRFLOW (CFM)	VELOCITY (FPM)	INTERLOCK	NOTES
LV-1	ESD	1	Intake	Outdoor Air Intake - AC-2	16	12	4	0.46	200	435	AC-2	ALL
LV-2	ESD	1	Intake	Room Make-up - TF-2	30	72	4	7.09	4,800	677	TF-2	ALL
LV-3	ESD	1	Intake	Outdoor Air Intake - AC-3	16	24	4	1.06	400	377	AC-3	ALL

NOTES:
1. Selection Based On Equipment Manufactured By Greenheck.
2. Louver Shall Be Drainable Type With 22 Gauge Metal Construction.
3. Louver Shall Be Complete With Mounting Frame And Bird Screen.
4. Frame Shall Be Flange Type.
5. Finish Shall Be As Per Architectural Specifications.
6. Louver To Have Motor Operated Dampers Mounted In Full Size Plenums.
7. Provide Interlock Control Wiring With Associated Equipment.
8. Coordinate With Architect For Louver Finish And Color.
9. Blank Off And Insulate All Unused Portions Of Louvers.

ELECTRIC UNIT / WALL HEATER SCHEDULE

UNIT ID	MODEL NO.	TYPE	SERVICE	AIRFLOW (CFM)	ESP (IN WG)	CAPACITY (BTUH)	CAPACITY (KW)	ELECTRICAL VOLTAGE (V)	ELECTRICAL PHASE °	ELECTRICAL MCA (A)	ELECTRICAL MOCP (A)	WEIGHT (LB)	ACCESSORIES	NOTES
EWH-1	CU935	Flush Mount	Stair #1	250	-	13,700	4	208	3	12	-	120	Integral Thermostat	ALL
EUH-1	MUH0321	Wall Hung	Lower Level Rooms	350	-	7,500	2	208	1	11	-	27	Remote Thermostat	1-3, 5
EUH-2	MUH0581	Wall Hung	Lower Level Rooms	350	-	17,000	5	208	1	24	-	27	Remote Thermostat	1-3, 5

NOTES:
1 Selection Based On Equipment Manufactured By QMARK.
2 Cabinets Shall Be Constructed Of Minimum 18 Gauge Steel. Finish And Color Shall Be As Selected By Architect.
3 Motors Shall Be Of Premimum Efficiency Provide Disconnect.
4 Configuration Shall Be Surface Mounted.
5 Units Shall Have Built-In Thermal Overload Protection.

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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SHEET CONTENTS:
MECHANICAL SCHEDULES

SUBMISSIONS DATE	SUBMISSIONS DESCRIPTION	REVISIONS DATE	REVISIONS DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-601

HOOD INFORMATION – Job#2755165

HOOD NO.	TAG	MODEL	LENGTH	MAX. COOKING TEMP.	TOTAL EXH. CFM	EXHAUST PLENUM WIDTH	LENG.	RISER(S) HEIGHT	DIA.	CFM	S.P.	TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG. END TO END	ROW
1	#11.1	4824 VHB-G	6' 0.00"	700 Deg.	900			4" / 4"	8" / 8"	450 / 450	-0.077" / -0.077"	0	430 SS 100%	ALONE	ALONE
2	#53 Left 6B	5424 ND-2-PSP-F	7' 9.00"	450 Deg.	1938			4"	14"	1938	-0.897"	1550	430 SS 100%	LEFT	ALONE
3	#53 R CB	5424 ND-2-PSP-F	7' 9.00"	600 Deg.	2131			4"	14"	2131	-1.085"	1705	430 SS 100%	RIGHT	ALONE
4	#54 Rotiss	5424 ND-2-PSP-F	8' 0.00"	450 Deg.	1600			4"	12"	1600	-0.785"	1280	430 SS 100%	ALONE	ALONE

HOOD INFORMATION

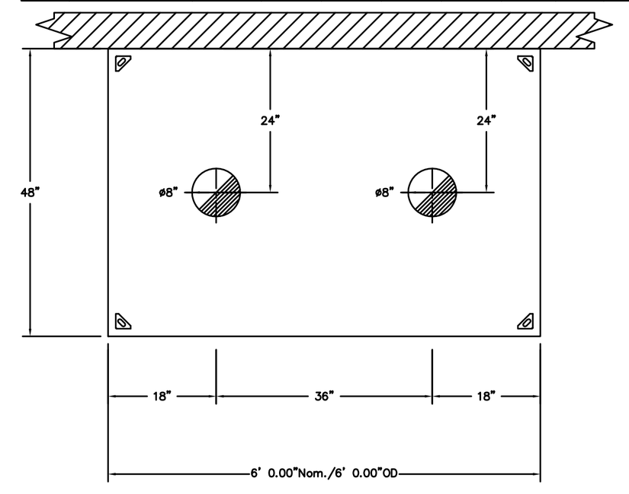
HOOD NO.	TAG	FILTER(S) TYPE	QTY.	HEIGHT	LENGTH	EFFICIENCY @ 9 MICRONS	LIGHT(S) QTY.	TYPE	WIRE GUARD	UTILITY CABINET(S) LOCATION	SIZE	FIRE SYSTEM TYPE	FIRE SYSTEM SIZE	ELECTRICAL MODEL #	SWITCHES QUANTITY	FIRE SYSTEM PIPING	HOOD HANGING WGHT
1	#11.1						0									NO	222 LBS
2	#53 Left 6B	Captrate Solo Filter	5	20"	16"	93% See Filter Spec.	1	4' LED Light	NO							YES	460 LBS
3	#53 R CB	Captrate Solo Filter	5	20"	16"	93% See Filter Spec.	1	4' LED Light	NO	Right	12"x54"x24"	Ansul R102	3.0/3.0	DCV-1111	1 Light 1 Fan	YES	619 LBS
4	#54 Rotiss	Captrate Solo Filter	6	20"	16"	93% See Filter Spec.	2	3' LED Light	NO							YES	462 LBS

HOOD OPTIONS

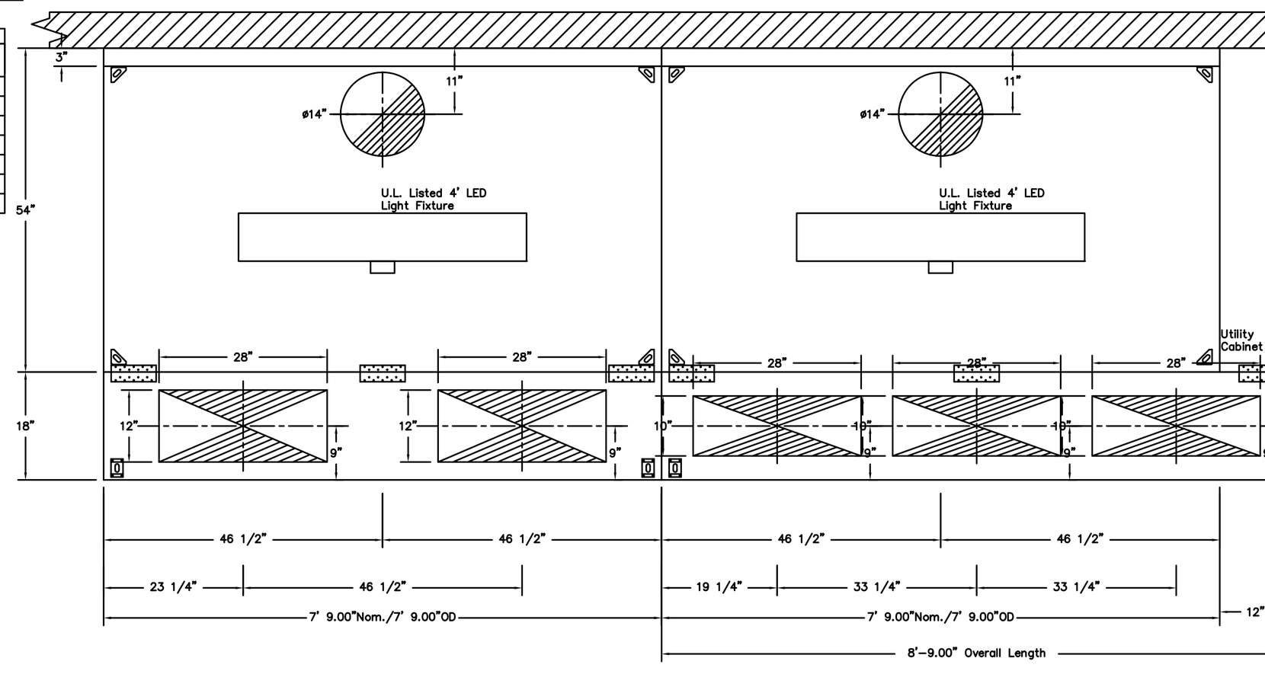
HOOD NO.	TAG	OPTION
1	#11.1	FIELD WRAPPER 18.00" High Front, Left, Right
2	#53 Left 6B	FIELD WRAPPER 18.00" High Front, Left BACKSPLASH 80.00" High X 198.00" Long 430 SS Vertical
3	#53 R CB	FIELD WRAPPER 18.00" High Front, Right
4	#54 Rotiss	FIELD WRAPPER 18.00" High Front, Left, Right BACKSPLASH 80.00" High X 97.00" Long 430 SS Vertical LEFT END STANDOFF (FINISHED) 1" Wide 54" Long Insulated

PERFORATED SUPPLY PLENUM(S)

HOOD NO.	TAG	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S) WIDTH	LENG.	DIA.	CFM	S.P.
2	#53 Left 6B	Front	93"	18"	6"	MUA	12"	28"		775	0.224"
						MUA	12"	28"		775	0.224"
3	#53 R CB	Front	105"	18"	6"	MUA	10"	28"		568	0.150"
						MUA	10"	28"		568	0.150"
						MUA	10"	28"		568	0.150"
4	#54 Rotiss	Front	97"	14"	6"	MUA	8"	36"		640	0.183"
						MUA	8"	36"		640	0.183"



PLAN VIEW – Hood #1 (#11.1)
6' 0.00" LONG 4824VHB-G



PLAN VIEW – Hood #2 (#53 Left 6B)
7' 9.00" LONG 5424ND-2-PSP-F

PLAN VIEW – Hood #3 (#53 R CB)
7' 9.00" LONG 5424ND-2-PSP-F

SPECIFICATION: CAPTRATE GREASE-STOP SOLO FILTER

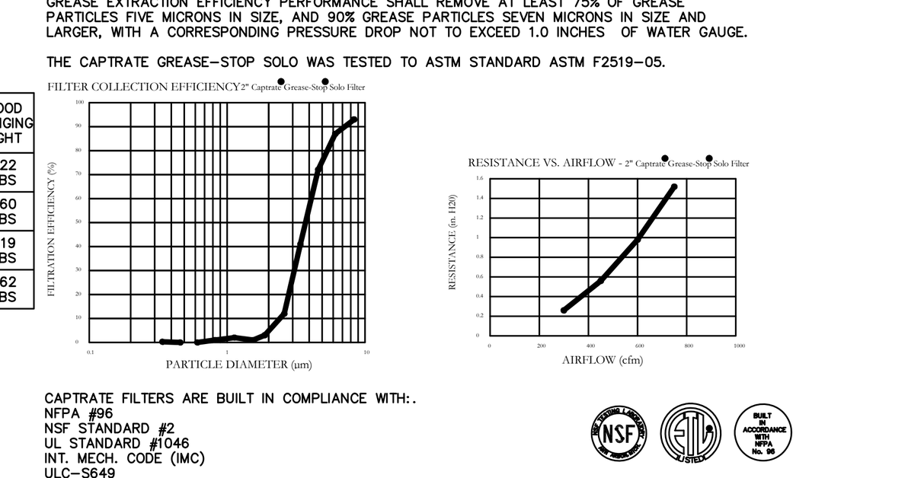
THE CAPTRATE GREASE-STOP SOLO FILTER IS A SINGLE-STAGE FILTER FEATURING A UNIQUE S-BAFFLE DESIGN IN CONJUNCTION WITH A SLOTTED REAR BAFFLE DESIGN, TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

FILTER IS STAINLESS STEEL CONSTRUCTION, AND SIZED TO FIT INTO STANDARD 2-INCH DEEP HOOD CHANNEL(S).

UNITS SHALL INCLUDE STAINLESS STEEL HANDLES AND A FASTENING DEVICE TO SECURE THE TWO COMPONENTS WHEN ASSEMBLED.

GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS IN SIZE, AND 90% GREASE PARTICLES SEVEN MICRONS IN SIZE AND LARGER, WITH A CORRESPONDING PRESSURE DROP NOT TO EXCEED 1.0 INCHES OF WATER GAUGE.

THE CAPTRATE GREASE-STOP SOLO WAS TESTED TO ASTM STANDARD ASTM F2519-05.



CAPTRATE FILTERS ARE BUILT IN COMPLIANCE WITH:.
NFPA #96
NSF STANDARD #2
UL STANDARD #1046
INT. MECH. CODE (IMC)
ULC-S649

Fire System Information – Job#2755165

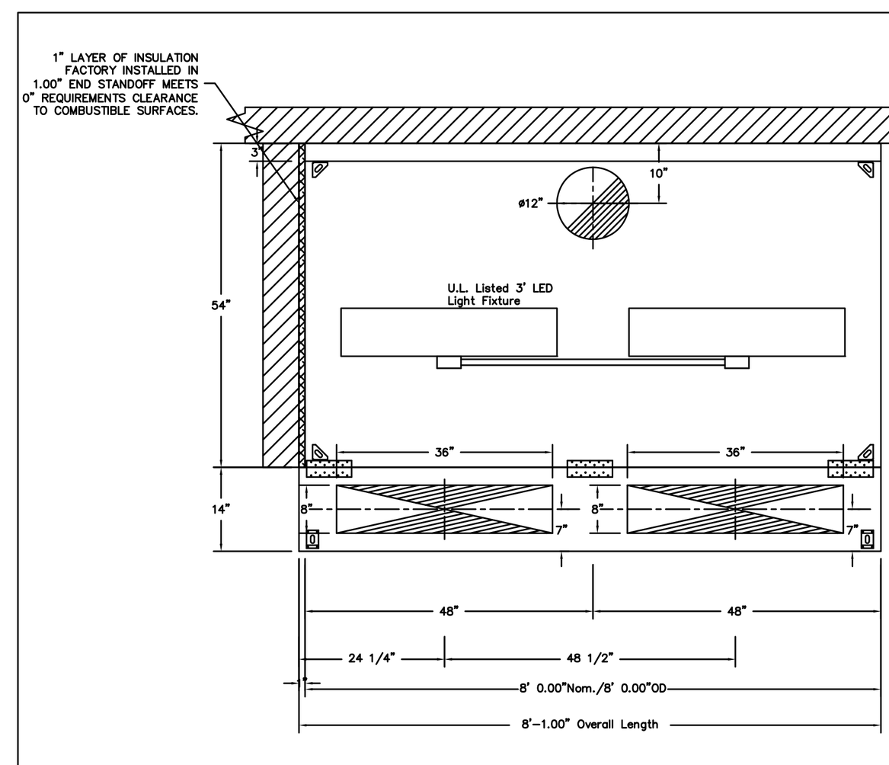
FIRE SYSTEM NO.	Tag	TYPE	SIZE	FLOW POINTS	INSTALLATION SYSTEM	LOCATION ON HOOD
1	53.1	Ansul R102	3.0/3.0	4	Fire Cabinet Right	Right
2	54.1	Ansul R102	1.5	2	Wall Mount Right	N/A

GAS VALVE(S)

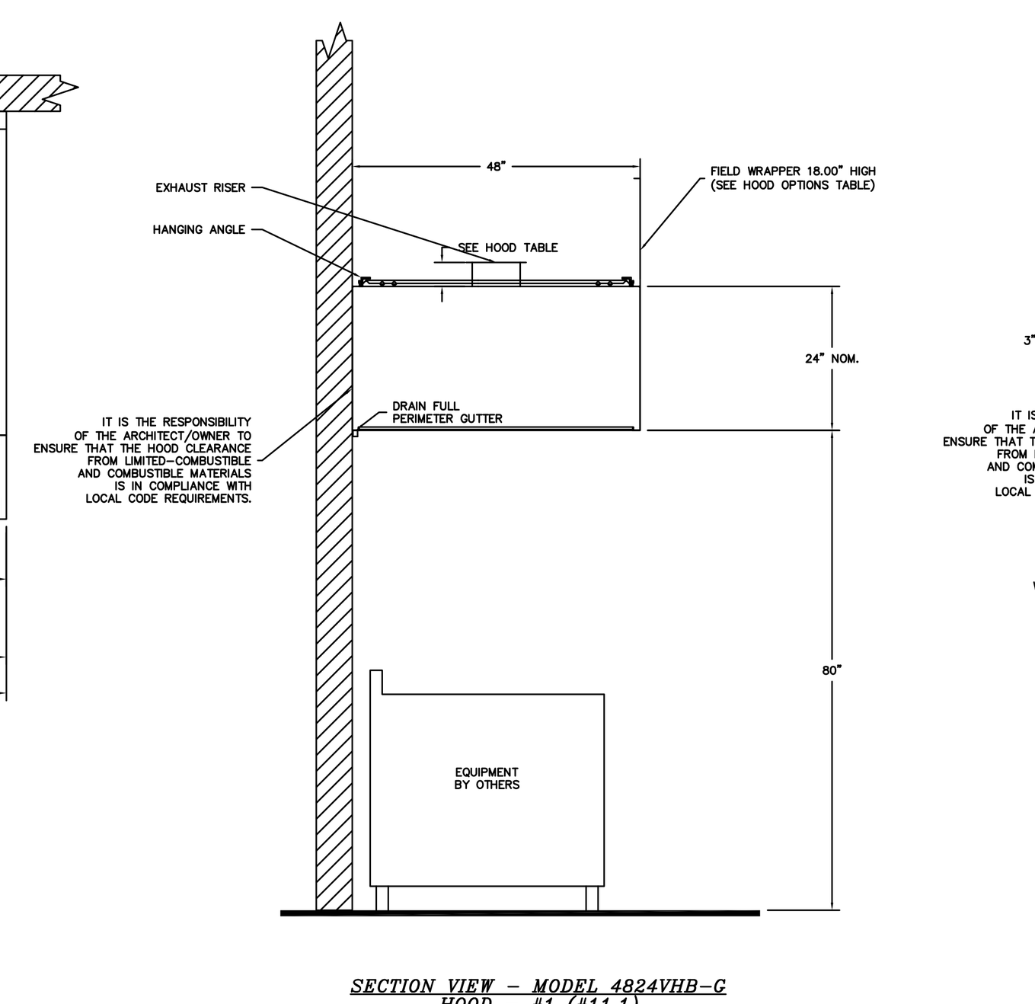
FIRE SYSTEM NO.	TAG	TYPE	SIZE	SUPPLIED BY
1	53.1	Mechanical	2.000	CaptiveAire Systems
2	54.1	Mechanical	2.000	CaptiveAire Systems

Fire System Parts List Key

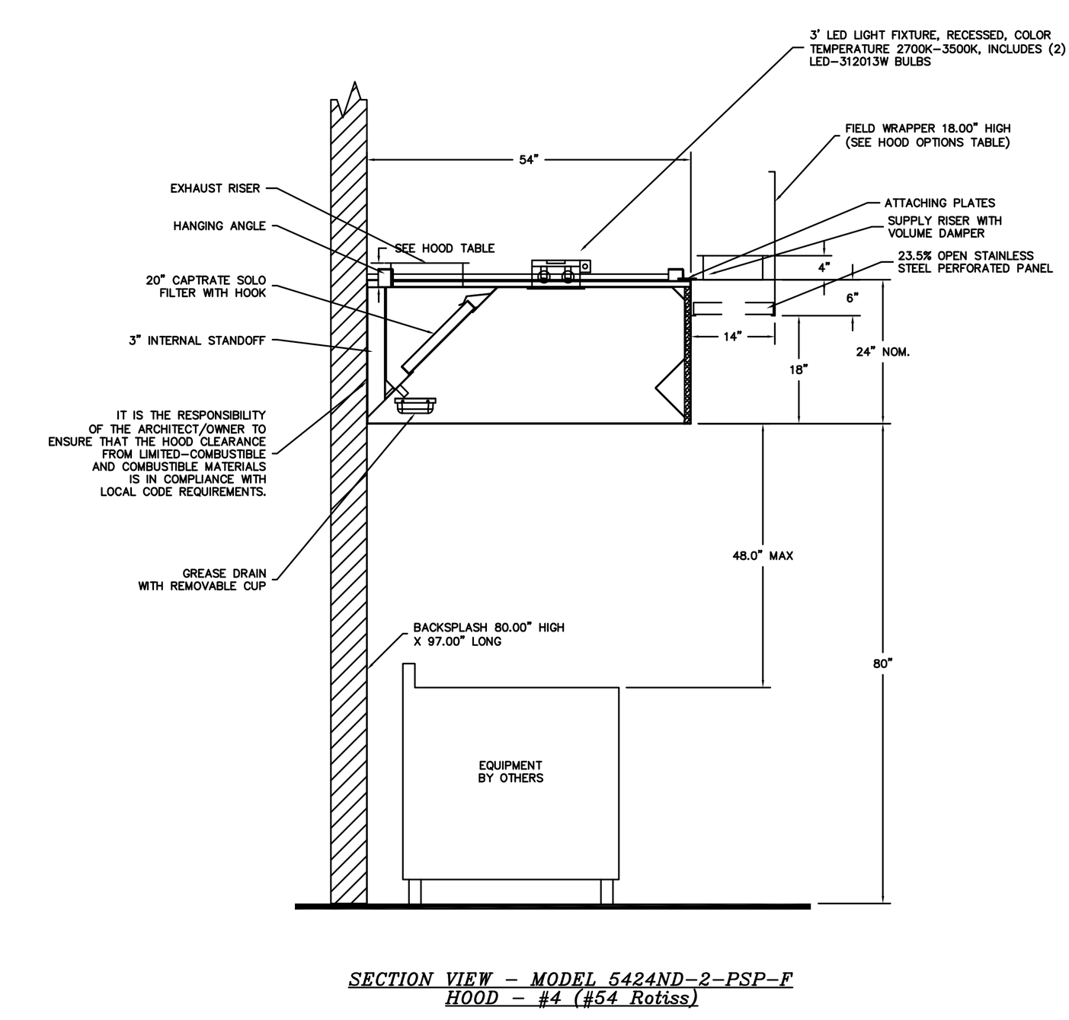
FIRE SYSTEM NO.	TAG	KEY NUMBER – PART DESCRIPTION	QTY. BY FACTORY	QTY. BY DIST.
1	53.1	0 – 0 – 43-15733 AIR CYLINDER ASSEMBLY – Air Cylinder and Tubing for Mechanical Gas Valves (Ansul)	1	0
		1 – 1 – AT – 3.0 TANK(#1B) – 3.0 Gallon SS Tank (for use with Automan Release, Actuator, or SS Enclosure (UL/ULC))	2	0
		3 – 3 – ANS-OEM REGULATED RELEASE – Ansul Regulated Mechanical Release/Bracket Assembly (79493), OEM, R-102, Cartridge Detection Included	1	0
		5 – 5 – LIQ-3.0 AGENT – Ansulex Low PH Wet Chemical Agent, 3 Gallon (UL) 79372	0	2
		9 – 9 – 101-30 CARTRIDGE – Carbon Dioxide, 101-30, Cartridge (R-102) 19-15851	0	1
		10 – 10 – TLINK LINK – Test Link (1 test link)	0	1
		11 – 11 – MICRO-SDA MICROSWITCH KIT- Includes 2 switcvhes and Mounting Hardware. Single Dual Electric Switch, One Standard Switch, One Alarm Duty Switch 437155	1	0
		12 – 12 – HOSE HOSE – Rubber Hose	1	0
		27 – 27 – QPSA-1/2 PULLEY SEAL – 1/2" Hood Seal (UL)	5	0
		34 – 34 – RPS-A REMOTE PULL STATION – Red composite (without wire rope) 434618 (Old Macola #06-4835)	1	0
		35 – 35 – PE-LT PULLEY ELBOW – Low Temp. Pulley Elbow, Set Screw Type ANSUL Part #415670	5	0
		36 – 36 – PE-HT PULLEY ELBOW – High Temp Pulley Elbow, Compression Type	4	0
2	54.1	0 – 0 – 43-15733 AIR CYLINDER ASSEMBLY – Air Cylinder and Tubing for Mechanical Gas Valves (Ansul)	1	0
		1 – 1 – AT – 1.5 TANK(#1A) – 1.5 Gallon SS Tank (for use with Automan Release, Actuator, or SS Enclosure (UL/ULC))	0	1
		2 – 2 – AP – AR AUTOMAN RELEASE – Ansul Automan Mechanical Release (UL)429853 Tank sold separately	0	1
		6 – 6 – LIQ-1.5 AGENT – Ansulex Low PH Wet Chemical Agent, 1.5 Gallon (UL) 79694	0	1
		8 – 8 – 101-10 CARTRIDGE – Carbon Dioxide, 101-10, 1.5 Gallon Cartridge (R-102, PIRANHA)	0	1
		10 – 10 – TLINK LINK – Test Link (1 test link)	0	1
		11 – 11 – MICRO-SDA MICROSWITCH KIT- Includes 2 switcvhes and Mounting Hardware. Single Dual Electric Switch, One Standard Switch, One Alarm Duty Switch 437155	0	1
		27 – 27 – QPSA-1/2 PULLEY SEAL – 1/2" Hood Seal (UL)	1	0
		34 – 34 – RPS-A REMOTE PULL STATION – Red composite (without wire rope) 434618 (Old Macola #06-4835)	0	1
		35 – 35 – PE-LT PULLEY ELBOW – Low Temp. Pulley Elbow, Set Screw Type ANSUL Part #415670	0	10
		36 – 36 – PE-HT PULLEY ELBOW – High Temp Pulley Elbow, Compression Type	1	0



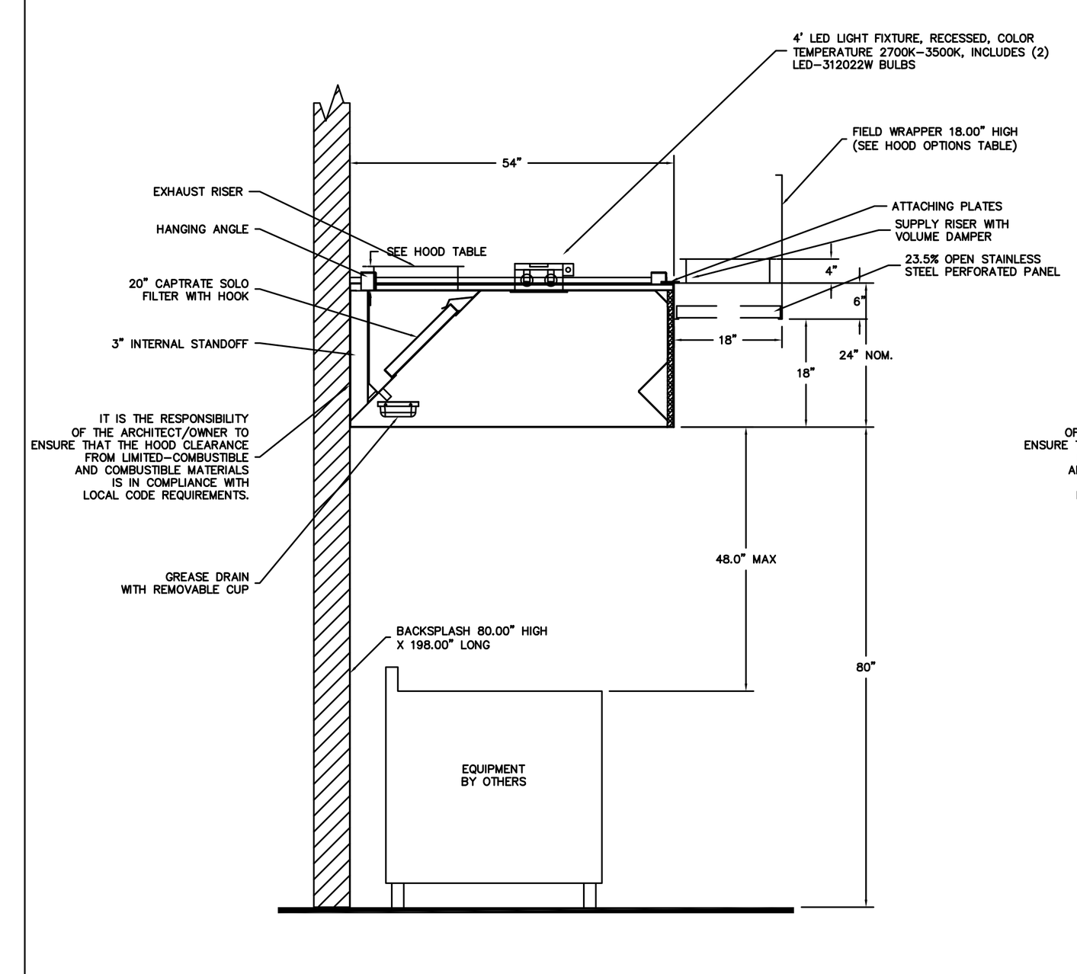
PLAN VIEW – Hood #4 (#54 Rotiss)
8' 0.00" LONG 5424ND-2-PSP-F



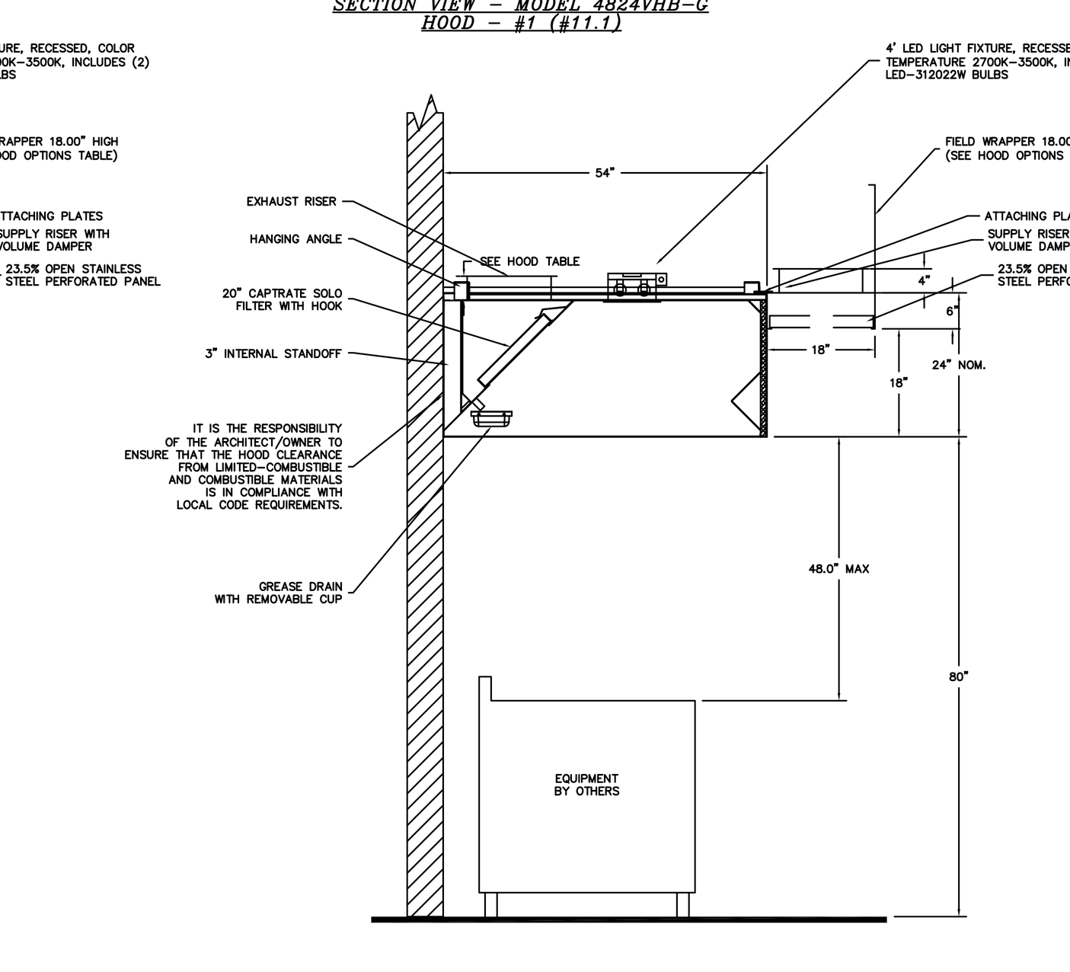
SECTION VIEW – MODEL 4824VHB-G
HOOD – #1 (#11.1)



SECTION VIEW – MODEL 5424ND-2-PSP-F
HOOD – #4 (#54 Rotiss)



SECTION VIEW – MODEL 5424ND-2-PSP-F
HOOD – #2 (#53 Left 6B)



SECTION VIEW – MODEL 5424ND-2-PSP-F
HOOD – #3 (#53 R CB)

System Design Verification (SDV)

If ordered, CAS Service will perform a System Design Verification (SDV) once all equipment has had a complete start up per the Operation and Installation Manual. Typically, the SDV will be performed after all inspections are complete.

Any field related discrepancies that are discovered during the SDV will be brought to the attention of the general contractor and corresponding trades on site. These issues will be documented and forwarded to the appropriate sales office. If CAS Service has to resolve a discrepancy that is a field issue, the general contractor will be notified and billed for the work. Should a return trip be required due to any field related discrepancy that cannot be resolved during the SDV, there will be additional trip charges.

During the SDV, CAS Service will address any discrepancy that is the fault of the manufacturer. Should a return trip be required, the general contractor and appropriate sales office will be notified. There will be no additional charges for manufacturer discrepancies.

CAPTIVEAIRE – Coastal New Jersey – 600 SALEM AVE. Newfield, NJ, 08344 PHONE: (856) 563-1970 FAX: (919) 800-4539 EMAIL: reg18@captiveaire.com – www.captiveaire.com

Ashbrook Club House Scotch Plains NJ SPEC REV A
SCOTCH PLAINS, NJ, 07076

REVISIONS | DESCRIPTION | DATE:
DATE: 8/29/2016
DWG.#: 2755165
DRAWN BY: SPD-18
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. –

EXHAUST FAN INFORMATION – Job#2755165

FAN UNIT NO.	TAG	FAN UNIT MODEL #	CFM	ESP.	RPM	H.P.	B.H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES
1	11.2 DW	DU30HFA	900	0.500	1445	0.250	0.1540	1	115	3.8	53	10.8
2	53.2 CB	DU240HFA	4069	1.500	860	5.000	2.0080	3	208	15.0	178	16.3
4	54.2 Rotiss	DU85HFA	1600	1.250	1361	0.750	0.4970	3	208	2.6	74	15.7

MUA FAN INFORMATION – Job#2755165

FAN UNIT NO.	TAG	FAN UNIT MODEL #	BLOWER	HOUSING	CFM	ESP.	RPM	H.P.	B.H.P.	ø	VOLT	FLA	WEIGHT (LBS.)	SONES	BURNER EFFICIENCY(%)
3	53.3 CB	A2-D.250-G15	G15-PB	A2-D.250	3255	0.750	910	3.000	1.7360	3	208	8.7	823	15.5	92
5	54.3 Rotiss	A1-D.250-G10	G10	A1-D.250	1280	0.500	887	0.500	0.3610	3	208	1.9	578	13	92

GAS FIRED MAKE-UP AIR UNIT(S)

FAN UNIT NO.	TAG	INPUT BTUs	OUTPUT BTUs	TEMP. RISE	REQUIRED INPUT GAS PRESSURE	GAS TYPE
3	53.3 CB	225445	207409	59 deg F	7 in. w.c. – 14 in. w.c.	Natural
5	54.3 Rotiss	87668	80655	59 deg F	7 in. w.c. – 14 in. w.c.	Natural

FAN OPTIONS

FAN UNIT NO.	TAG	OPTION (Qty. – Descr.)
2	53.2 CB	1 – Grease Box
3	53.3 CB	1 – AC Interlock Relay – 24VAC Coil 1 – Motorized Backdraft Damper for A2-D Housing 1 – Low Fire Start 1 – Inlet Pressure Gauge, 0-35" 1 – Manifold Pressure Gauge, -5 to 15" wc 1 – Separate 120V Wiring Package (Required and used only for DCV or Prewire with VFD) – Three Phase Only 1 – Size 2 Direct Fired Heater Low CFM Profile Package. Used on Heaters under 2500 cfm.
4	54.2 Rotiss	1 – Grease Box
5	54.3 Rotiss	1 – AC Interlock Relay – 24VAC Coil 1 – Motorized Backdraft Damper for A1-D Housing 1 – Low Fire Start 1 – Inlet Pressure Gauge, 0-35" 1 – Manifold Pressure Gauge, -5 to 15" wc 1 – Separate 120V Wiring Package (Required and used only for DCV or Prewire with VFD) – Three Phase Only

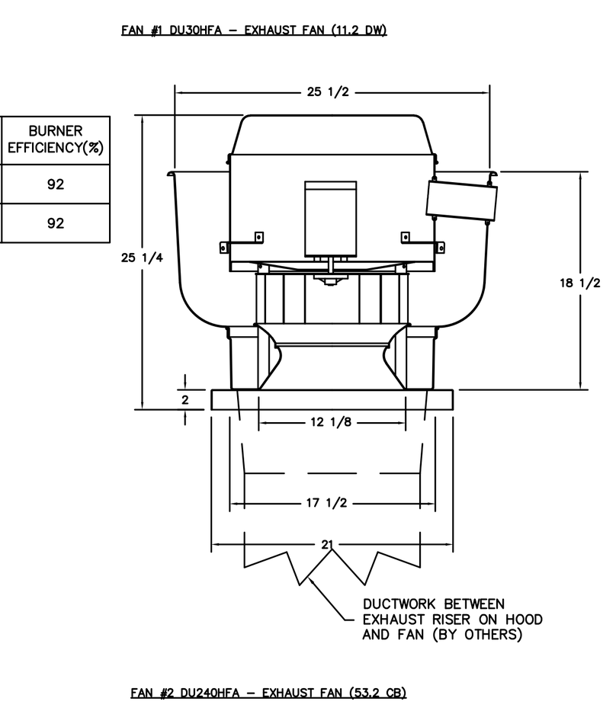
FAN ACCESSORIES

FAN UNIT NO.	TAG	EXHAUST GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SUPPLY SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1	11.2 DW							
2	53.2 CB	YES						
3	53.3 CB				YES		YES	
4	54.2 Rotiss	YES						
5	54.3 Rotiss				YES		YES	

CURB ASSEMBLIES

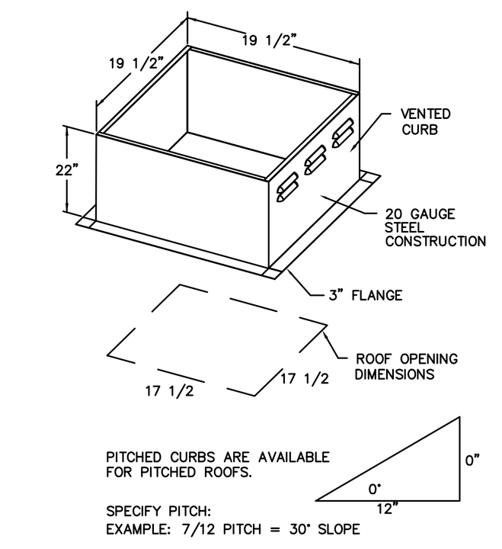
NO.	ON FAN	WEIGHT	ITEM	SIZE
1	# 1	34 LBS	Curb	19.500"W x 19.500"L x 22.000"H Vented Hinged
2	# 2	48 LBS	Curb	31.500"W x 31.500"L x 20.000"H Vented Hinged
3	# 3	76 LBS	Curb	31.000"W x 79.000"L x 20.000"H Insulated
4	# 4	36 LBS	Curb	23.000"W x 23.000"L x 20.000"H Vented Hinged
5	# 5	63 LBS	Curb	21.000"W x 71.000"L x 20.000"H Insulated

FAN #1 DU30HFA – EXHAUST FAN (11.2 DW)



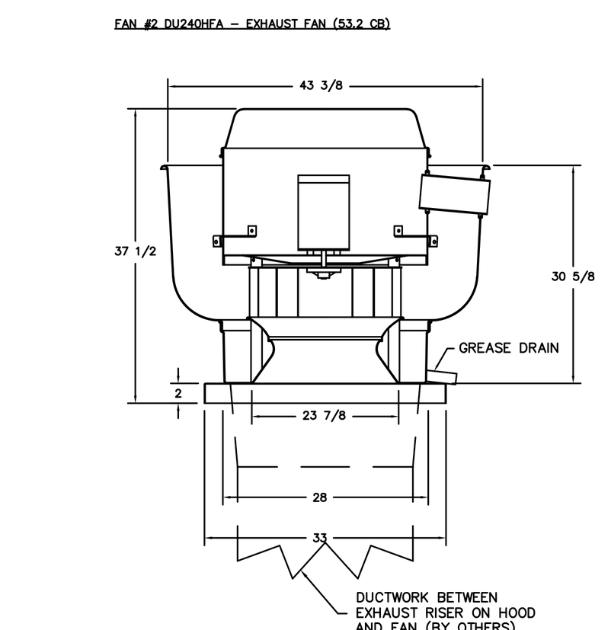
FEATURES:
- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.
SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

FAN #2 DU240HFA – EXHAUST FAN (53.2 CB)

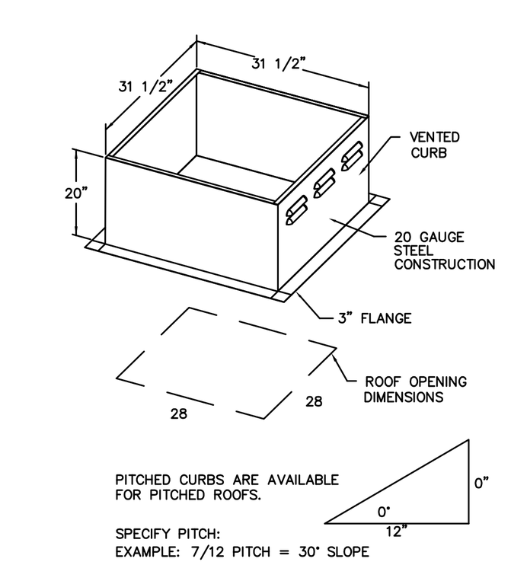


FEATURES:
- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705 AND UL762
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS
GREASE BOX



PITCHED CURBS ARE AVAILABLE FOR PITCHED ROOFS.
SPECIFY PITCH:
EXAMPLE: 7/12 PITCH = 30° SLOPE

GASVALVES AND STRAINERS

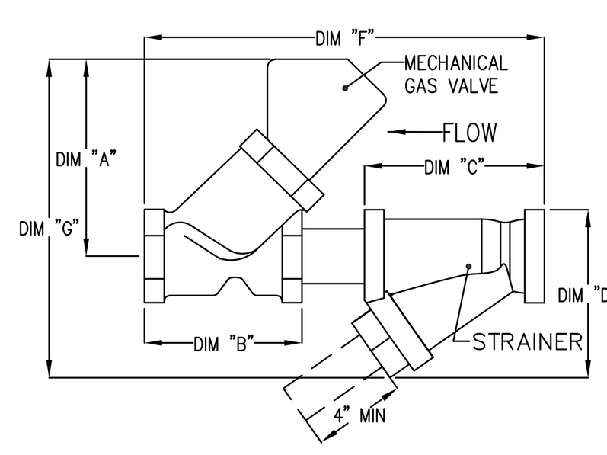
	TYPE	SIZE	VOLTAGE	MIN. INLET PRESSURE	MAX. INLET PRESSURE	FLOW AT 1 IN.W.C. DROP NATURAL GAS	FLOW AT 1 IN.W.C. DROP PROPANE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "F"	DIM "G"	MOUNTING ORIENTATION	GAS VALVE PART NUMBER	STRAINER PART NUMBER	GAS VALVE/STRAINER KIT
GAS VALVE FOR FS#1, FS#2	MECHANICAL	2"	N/A	0 PSI (0 IN.W.C.)	10 PSI (277 IN.W.C.)	4,616,000 BTU/HR	2,995,256 BTU/HR	6-11/16"	5-7/8"	7-1/4"	7-13-16"	15-1/8"	13-3/16"	HORIZONTAL	28-55610	4417K68	MGVA2

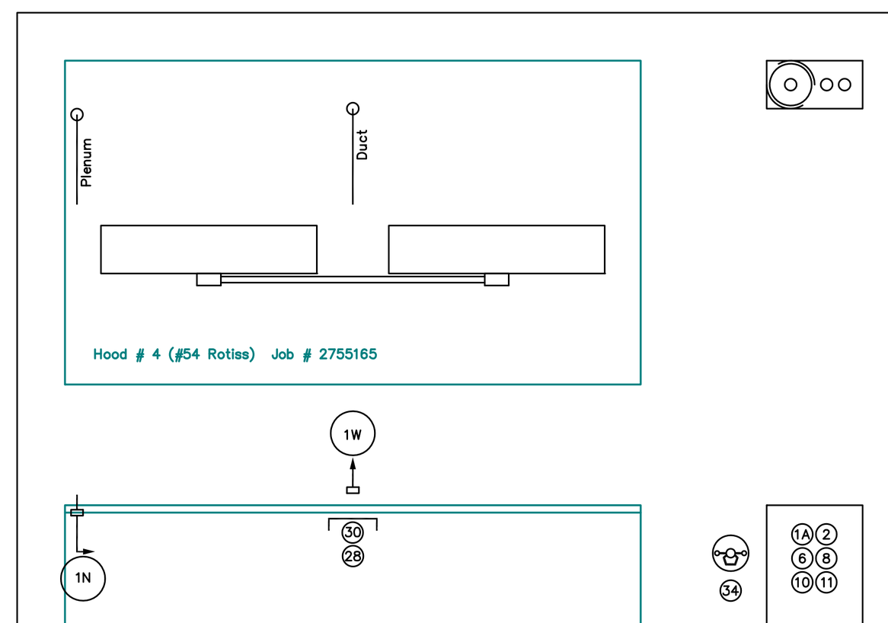
(Column groups: GAS VALVE SIZING; GAS VALVE DIMENSIONS; INSTALLATION; PART NUMBERS)

ELECTRIC GAS VALVES ONLY
3/4" THROUGH 2" VALVES CAN BE MOUNTED WITH THE SOLENOID IN ANY POSITION ABOVE HORIZONTAL
2-1/2" THROUGH 3" VALVES MUST BE MOUNTED WITH THE SOLENOID VERTICAL AND UPRIGHT

ALL GAS VALVES/STRAINERS
PROPER CLEARANCE MUST BE PROVIDED IN ORDER TO SERVICE THE STRAINERS A MINIMUM OF 4" CLEARANCE DISTANCE MUST BE PROVIDED AT THE BASE OF THE STRAINER CUSTOMER MUST VERIFY BTU CONSUMPTION AS WELL AS PRESSURE RATING SPECIFIC GRAVITY OF NATURAL GAS = 0.64, SPECIFIC GRAVITY OF LP = 1.52

CALCULATIONS
TO CALCULATE GAS FLOW FOR OTHER THAN 1 IN.W.C. PRESSURE DROP
NEW BTU/HR = (BTU/HR AT 1 IN.W.C. PRESSURE DROP) X NEW PRESSURE DROP^0.5
TO CALCULATE GAS FLOW FOR OTHER THAN 0.64 SPECIFIC GRAVITY
NEW BTU/HR = (BTU/HR AT 0.64) X (0.64 / NEW SPECIFIC GRAVITY)^0.5





NOTES
- FACTORY PIPING EXTENDS A MAXIMUM OF 6" ABOVE THE TOP OF THE HOOD.
- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.
- THIS FIRE SYSTEM COMPLIES WITH U.L. 300 REQUIREMENTS

Job #: 2755165
Job Name: Ashbrook Club House SPEC
Drawn By:
System Size: ANSUL-1.5 Total FP required: 2
Hood # 4 8' 0.00" Long x 54" Wide x 24" High
Riser # 1 Size: 12" Dia.
Hood # 4 Metal Blow-Off Caps included.

NOTES
- FIELD PIPE DROPS AS SHOWN
  SLEEVING, ELBOWS, TEES, AND NOZZLES SUPPLIED BY CAS
- RELOCATE NOZZLES IF FLOW PATTERN IS BLOCKED BY SHELVING, SALAMANDERS, ETC.
- MAXIMUM 9 ELBOWS IN SUPPLY LINE.
- MINIMUM 72 INCHES OF AGENT LINE FROM TANK TO FIRST NOZZLE.
- IF APPLICABLE, PRE-PIPED CHARBROILER DROPS ARE SHIPPED LOOSE.
- FACTORY PIPING EXTENDS A MAXIMUM OF 6" ABOVE THE TOP OF THE HOOD.
- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.
- THIS FIRE SYSTEM COMPLIES WITH U.L. 300 REQUIREMENTS

SPECIFICATIONS

THE RESTAURANT FIRE SUPPRESSION SYSTEM SHALL BE THE PRE-ENGINEERED TYPE WITH A FIXED NOZZLE AGENT DISTRIBUTION NETWORK. IT SHALL BE LISTED WITH UNDERWRITERS LABORATORIES, INC. (UL)

THE SYSTEM SHALL BE CAPABLE OF AUTOMATIC DETECTION AND ACTUATION WITH LOCAL OR REMOTE MANUAL ACTUATION. ACCESSORIES SHALL BE AVAILABLE FOR MECHANICAL OR ELECTRICAL GAS LINE SHUT-OFF APPLICATIONS.

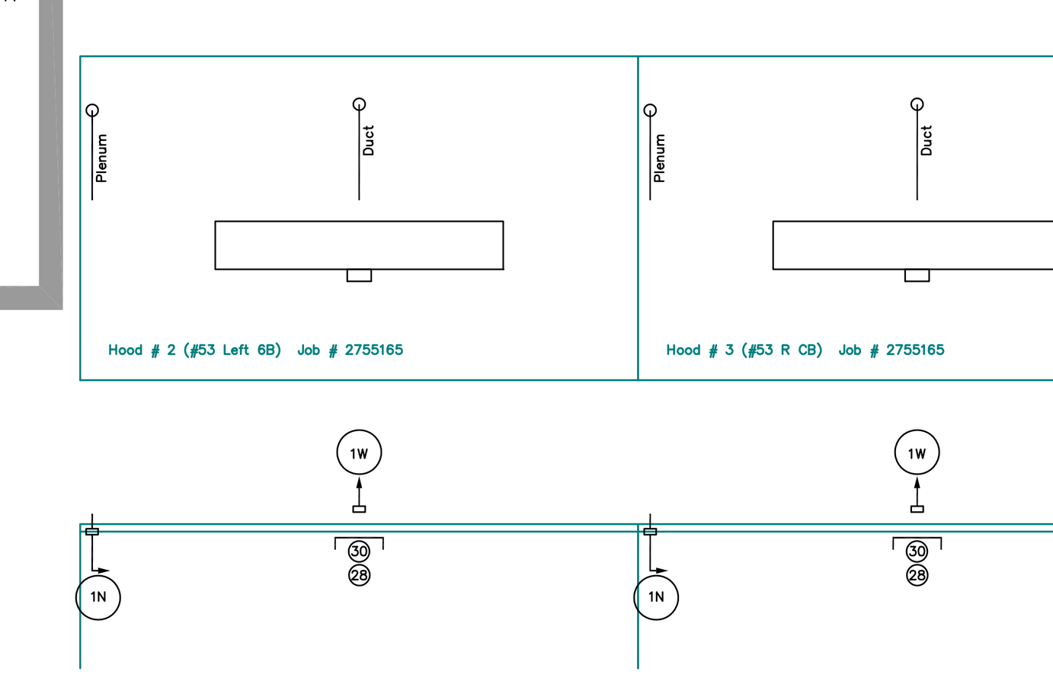
THE EXTINGUISHING AGENT SHALL BE A POTASSIUM CARBONATE, POTASSIUM ACETATE-BASED FORMULATION DESIGNED FOR FLAME KNOCKDOWN AND SECUREMENT OF GREASE RELATED FIRES. IT SHALL BE AVAILABLE IN PLASTIC CONTAINERS WITH INSTRUCTIONS FOR LIQUID AGENT HANDLING AND USAGE.

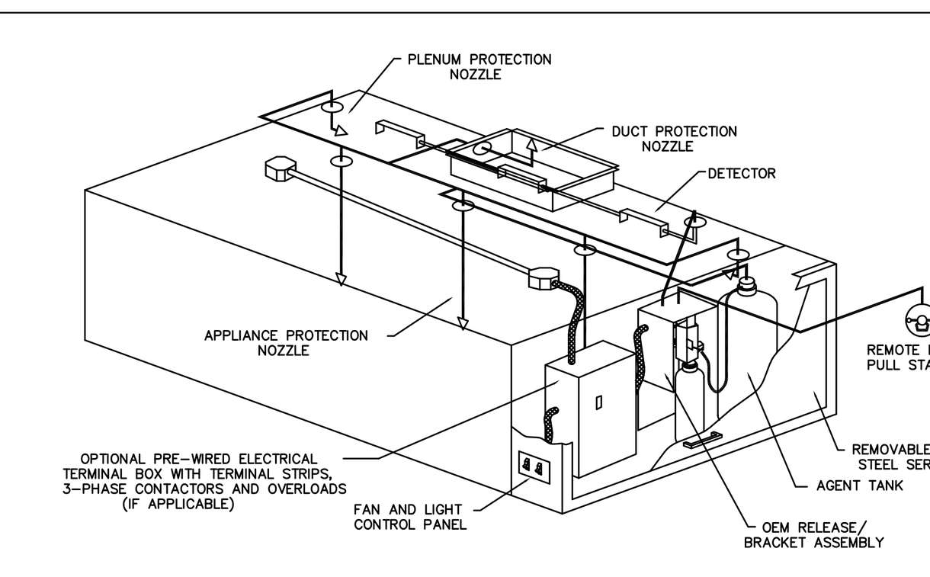
THE REGULATED RELEASE MECHANISM SHALL BE COMPATIBLE WITH A FUSIBLE LINK DETECTION SYSTEM. THE FUSIBLE LINK SHALL BE SELECTED AND INSTALLED ACCORDING TO THE OPERATING TEMPERATURE IN THE VENTILATING SYSTEM. THE FUSIBLE LINK SHALL BE SUPPORTED BY A DETECTOR BRACKET/LINKAGE ASSEMBLY.

Job #: 2755165
Job Name: Ashbrook Club House Scotch Plains NJ SPEC REV A
Drawn By:
System Size: ANSUL-3.0/3.0 Total FP required: 4
Hood # 2 7' 9.00" Long x 54" Wide x 24" High
Riser # 1 Size: 0" x 0"
Hood # 3 7' 9.00" Long x 54" Wide x 24" High
Riser # 1 Size: 0" x 0"
Drawn By:
System Size: ANSUL-1.5 Total FP required: 2
Hood # 4 8' 0.00" Long x 54" Wide x 24" High
Riser # 1 Size: 0" x 0"

NOTES
- FACTORY PIPING EXTENDS A MAXIMUM OF 6" ABOVE THE TOP OF THE HOOD.
- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.
- THIS FIRE SYSTEM COMPLIES WITH U.L. 300 REQUIREMENTS

Job #: 2755165
Job Name: Ashbrook Club House SPEC
Drawn By:
System Size: ANSUL-3.0/3.0 Total FP required: 4
Hood # 2 7' 9.00" Long x 54" Wide x 24" High
Riser # 1 Size: 14" Dia.
Hood # 2 Metal Blow-Off Caps included.
Hood # 3 7' 9.00" Long x 54" Wide x 24" High
Riser # 1 Size: 14" Dia.
Hood # 3 Metal Blow-Off Caps included.





TYPICAL ANSUL R-102 SYSTEM LAYOUT

LEGEND – FIRE CABINET ANSUL SYSTEM		LEGEND – WALL MOUNTED ANSUL SYSTEM	
1A	1.5 GALLON TANK	1A	1.5 GALLON TANK
1B	3 GALLON TANK	1B	3.0 GALLON TANK
2	OEM AUTOMAN RELEASE	2	AUTOMAN RELEASE
3	OEM REGULATED RELEASE	3	3 GALLON TANK ENCLOSURE
4	OEM REGULATED ACTUATOR	3A	6 GALLON TANK ENCLOSURE
5	ANSULEX LIQUID AGENT (3 GAL.)	4	REGULATED ACTUATOR
6	ANSULEX LIQUID AGENT (1.5 GAL.)	5	ANSULEX LIQUID AGENT (3 GAL.)
7	CARTRIDGE (101-20)	6	ANSULEX LIQUID AGENT (1.5 GAL.)
8	CARTRIDGE (101-10)	7	CARTRIDGE (101-20)
9	CARTRIDGE (101-30)	8	CARTRIDGE (101-10)
9A	CARTRIDGE (LT-A-101-30)	9	CARTRIDGE (101-30)
9B	DOUBLE TANK CARTRIDGE	9A	CARTRIDGE (LT-A-101-30)
10	TEST LINK	9B	DOUBLE TANK CARTRIDGE
11	DOUBLE MICROSWITCH	10	TEST LINK
12	HOSE ASSEMBLY	11	DOUBLE MICROSWITCH
1100	DUCT NOZZLE (430913)	2W	DUCT NOZZLE (419337)
2W	DUCT NOZZLE (419337)	1W	NOZZLE ASSEMBLY (419336)
1W	NOZZLE ASSEMBLY (419336)	1F	NOZZLE ASSEMBLY (419333)
1F	NOZZLE ASSEMBLY (419333)	1N	NOZZLE ASSEMBLY (419335)
1N	NOZZLE ASSEMBLY (419335)	1/2N	NOZZLE ASSEMBLY (419334)
1/2N	NOZZLE ASSEMBLY (419334)	3N	NOZZLE ASSEMBLY (419338)
3N	NOZZLE ASSEMBLY (419338)	245	NOZZLE ASSEMBLY (419340)
245	NOZZLE ASSEMBLY (419340)	230	NOZZLE ASSEMBLY (419339)
230	NOZZLE ASSEMBLY (419339)	2120	NOZZLE ASSEMBLY (419343)
2120	NOZZLE ASSEMBLY (419343)	290	NOZZLE ASSEMBLY (419342)
290	NOZZLE ASSEMBLY (419342)	260	NOZZLE ASSEMBLY (419341)
260	NOZZLE ASSEMBLY (419341)	28	DETECTOR BRACKET
28	DETECTOR BRACKET	29	LOW TEMP FUSIBLE LINK
29	LOW TEMP FUSIBLE LINK	30	HIGH TEMP FUSIBLE LINK
30	HIGH TEMP FUSIBLE LINK	MGV	MECHANICAL GAS VALVE
MGV	MECHANICAL GAS VALVE	EGV	ELECTRICAL GAS VALVE
EGV	ELECTRICAL GAS VALVE	34	REMOTE MANUAL PULL STATION
34	REMOTE MANUAL PULL STATION	S	SWIVEL ADAPTOR
S	SWIVEL ADAPTOR		

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
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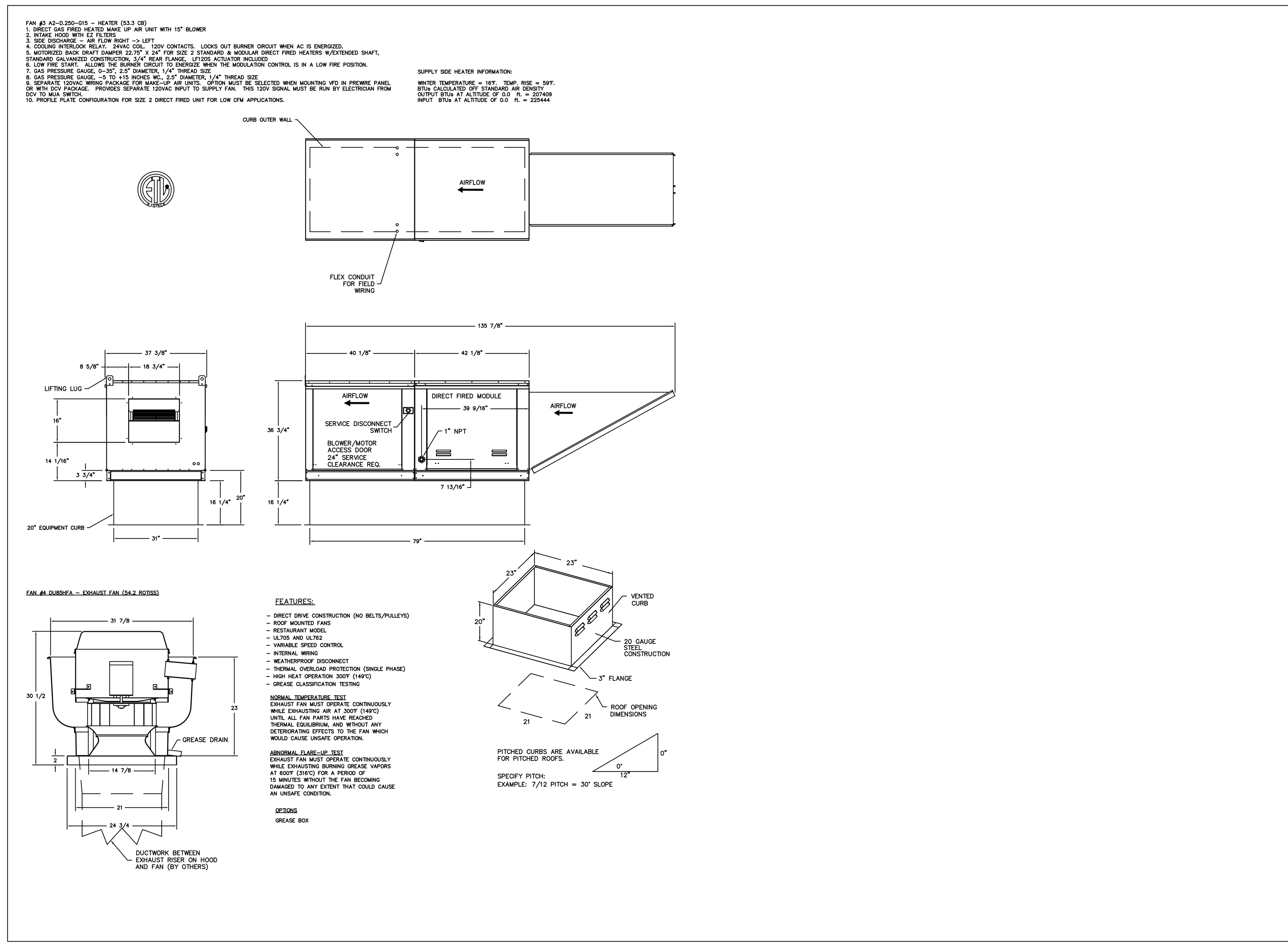
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:
KITCHEN HOODS, FANS & MAKEUP AIR UNITS

SUBMISSIONS DATE	DESCRIPTION	REVISIONS DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	M-701



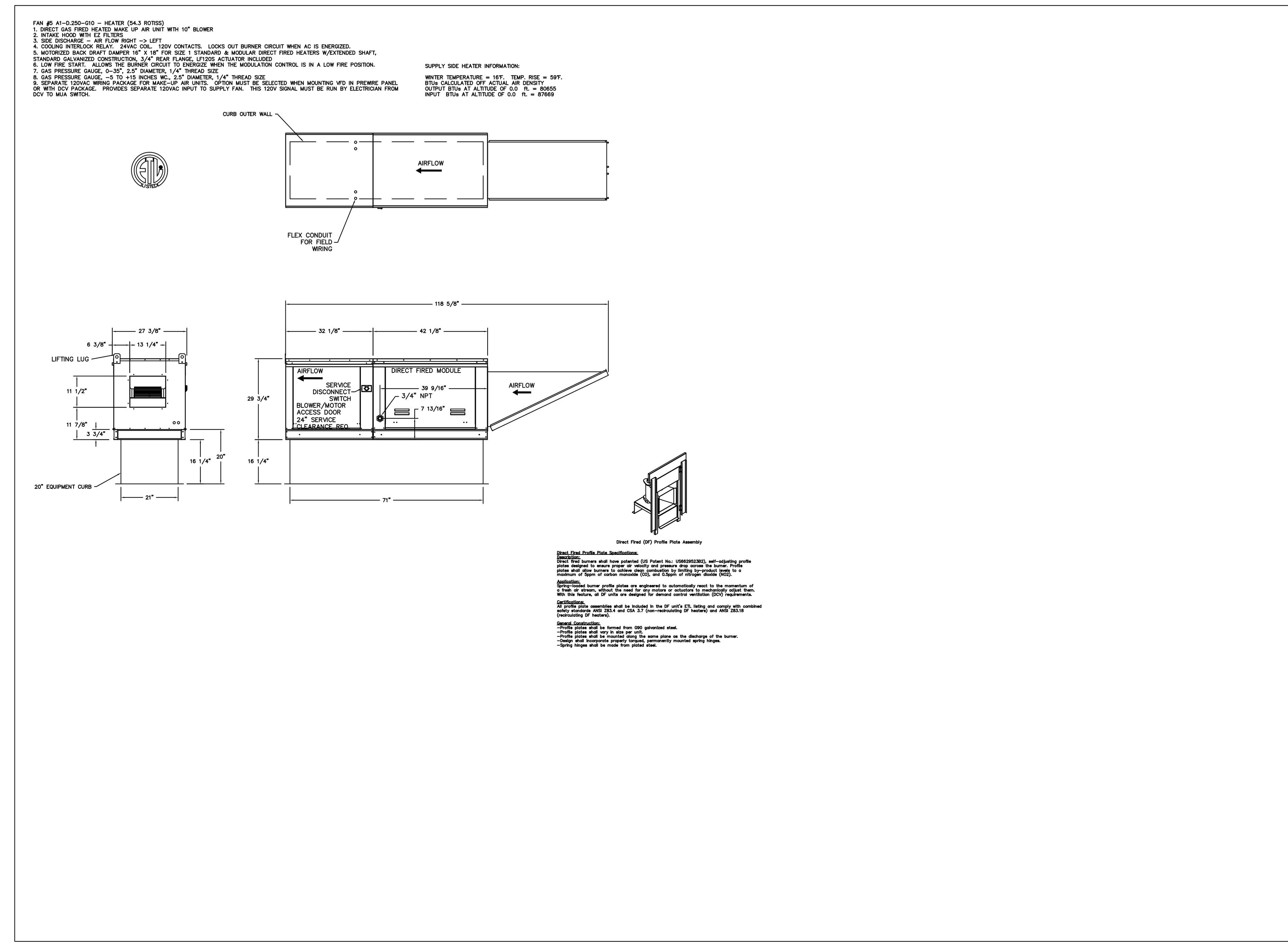
REVISIONS

DESCRIPTION	DATE:

CAPTIVEAIRE — Coastal New Jersey
600 SALEM AVE. Newfield, NJ, 08344 PHONE: (856) 563-1970 FAX: (919) 800-4539 EMAIL: reg18@captiveaire.com www.captiveaire.com

Ashbrook Club House Scotch Plains NJ SPEC REV A
SCOTCH PLAINS, NJ, 07076

DATE: 8/29/2016
DWG.#: 2755165
DRAWN BY: SPD–18
SCALE: 3/4" = 1'–0"
MASTER DRAWING
SHEET NO. 9



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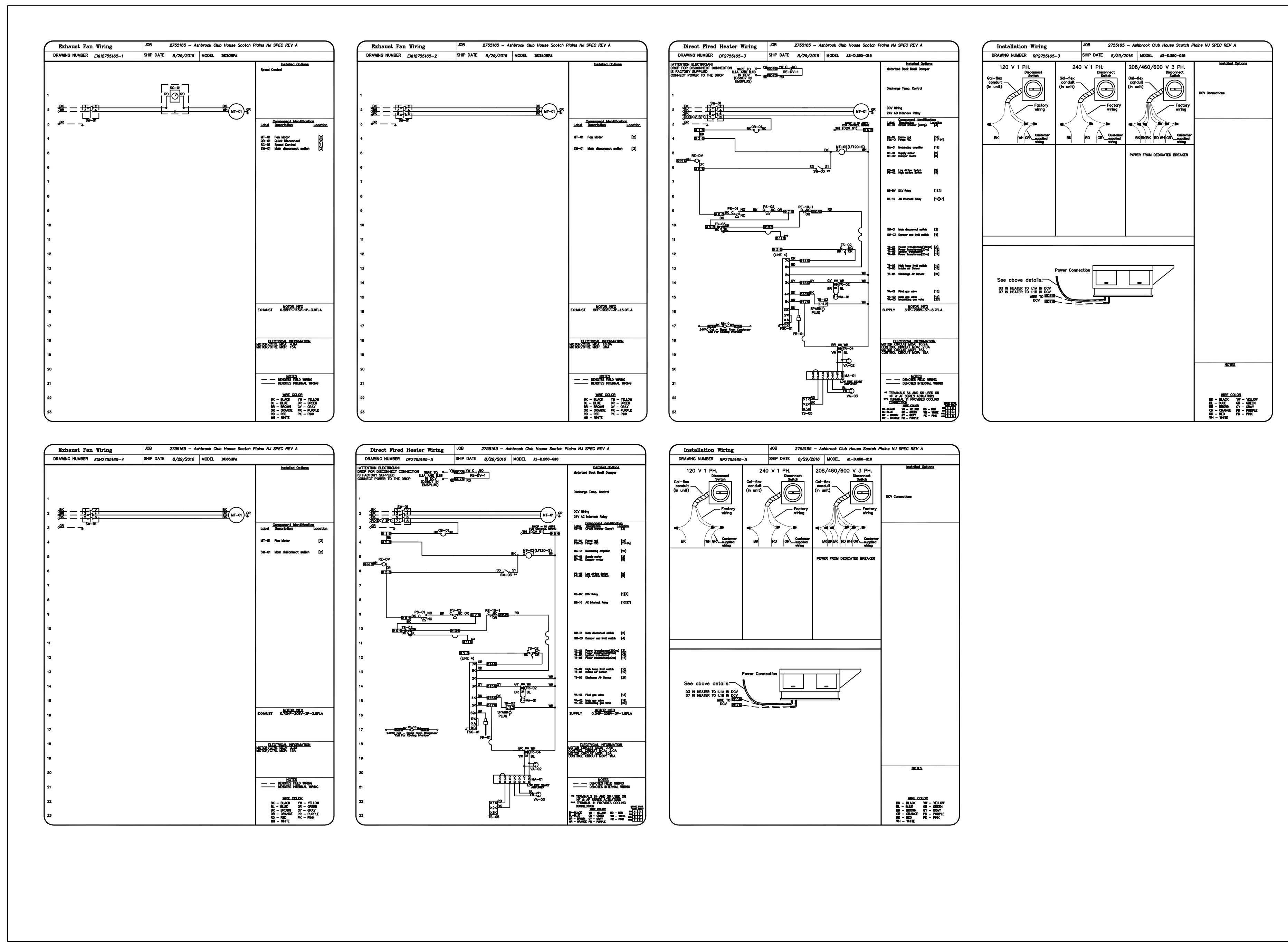
Ashbrook Club House Scotch Plains NJ SPEC REV A
SCOTCH PLAINS, NJ, 07076

DATE: 8/29/2016
DWG.#: 2755165
DRAWN BY: SPD–18
SCALE: 3/4" = 1'–0"
MASTER DRAWING
SHEET NO. 10



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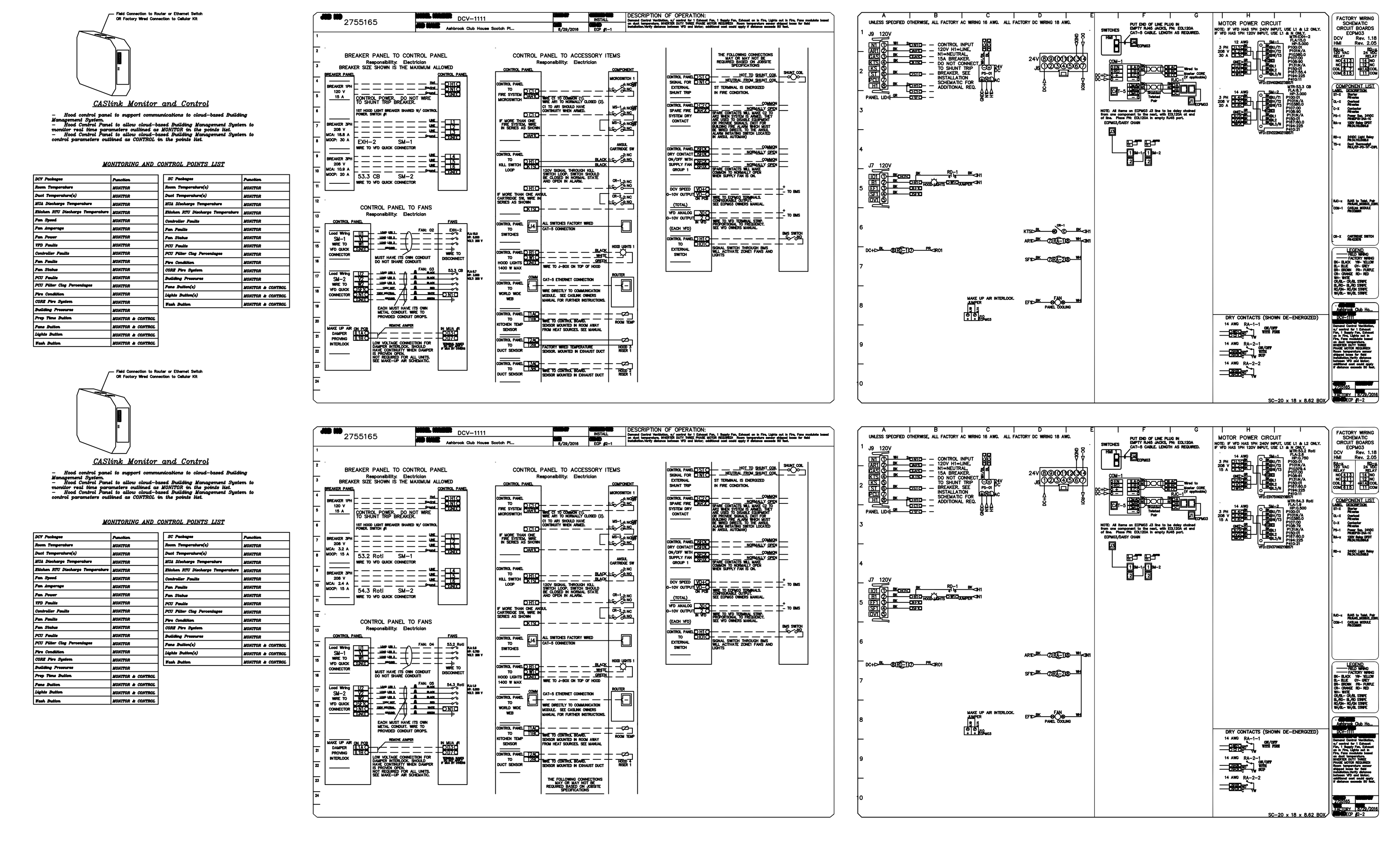
SCOTCH PLAINS, NJ, 07076

DATE: 8/29/2016
DWG.#: 2755165
DRAWN BY: SPD–18
SCALE: 3/4" = 1'–0"
MASTER DRAWING
SHEET NO. 11

ELECTRICAL PACKAGES – Job#2755165

NO.	TAG	PACKAGE #	LOCATION	SWITCHES LOCATION	SWITCHES QUANTITY	OPTION	FAN TAG	TYPE	Φ	H.P.	VOLT	FLA
1	53	DCV-1111	Utility Cabinet Right	Utility Cabinet Right	1 Light	Smart Controls DCV	53.2 CB	Exhaust	3	5.000	208	15.0
				Hood # 3	1 Fan		53.3 CB	Supply	3	3.000	208	8.7
2	54	DCV-1111	Wall Mount In SS Box	SS Wall Mount Box	1 Light	Smart Controls DCV	54.2 Rotiss	Exhaust	3	0.750	208	2.6
					1 Fan		54.3 Rotiss	Supply	3	0.500	208	1.9



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DATE: 8/29/2016
DWG.#: 2755165
DRAWN BY: SPD–18
SCALE: 3/4" = 1'–0"
MASTER DRAWING
SHEET NO. 12

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

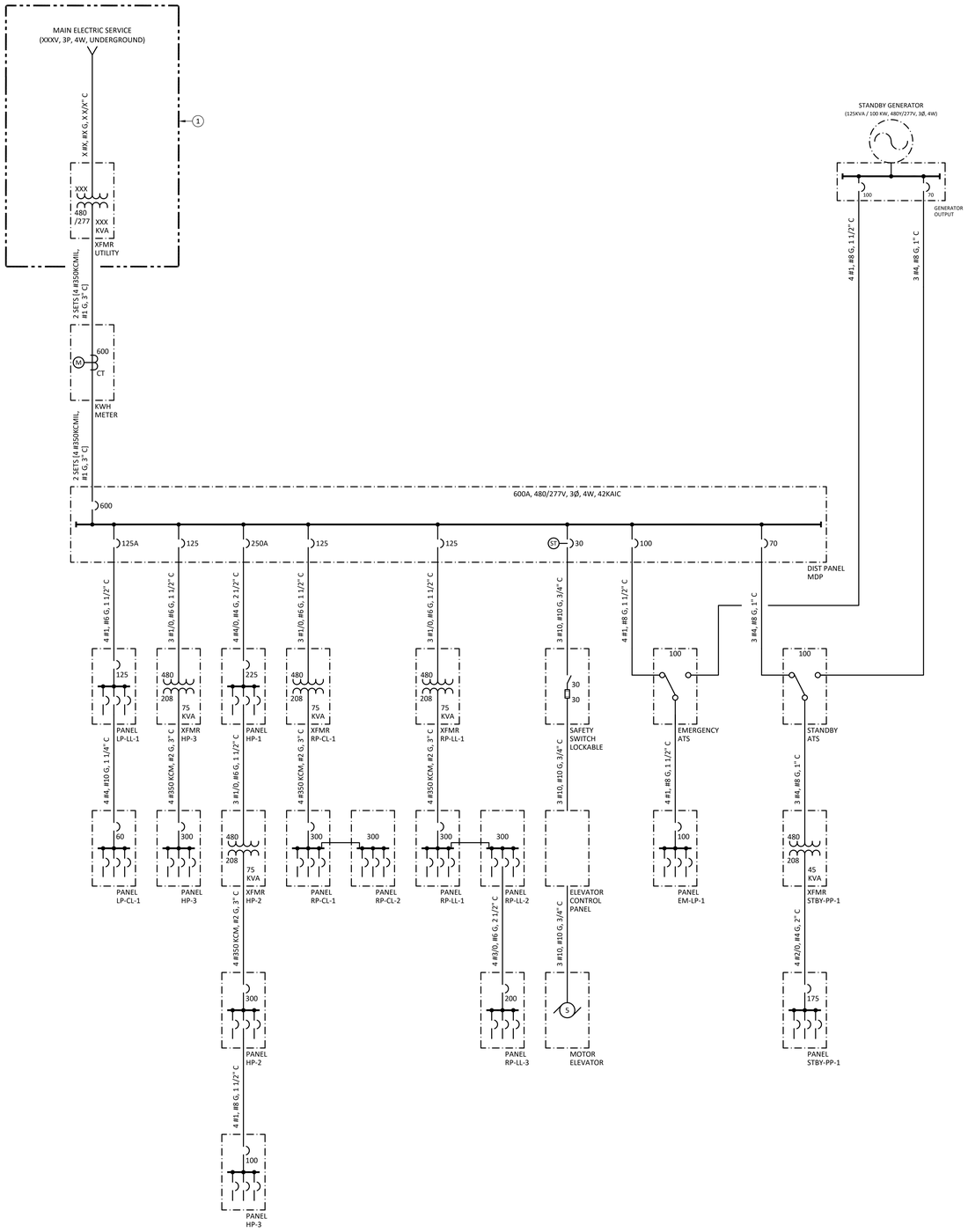
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

KITCHEN HOODS, FANS & MAKEUP AIR UNITS

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	I2285
SHEET:	OF:
DRWG NO	M-702



KEY NOTES:

1. Utility Transformer And Service Shall Be Coordinated With The Utility Company.

ONELINE DIAGRAM | Scale: NTS | Drawing: **E-001** | Detail: **01**

ELECTRICAL GENERAL NOTES

Electrical Wiring

1. In General, Branch Circuit Wiring Is Not Shown On The Plan Drawings. Numerals Adjacent To Symbols For Lighting Fixtures, Receptacles, Motors, Appliances, Etc. Indicate The Panelboard And Circuit Number To Which The Item Is To Be Connected. Provide Branch Circuit Wiring For All Items Shown In Accordance With These General Notes And The Electrical Specifications.
2. Lower Case Letters Adjacent To Lighting Fixture Symbols And Light Switch Symbols Indicate The Switching Arrangement Of Lighting Fixtures. Lower Case Letters May Not Be Shown Where Light Switches Only Control The Lighting Fixtures Within The Same Room Or Area.
3. Branch Circuit Wiring, Where Shown, Is Intended To Show Specific Routing Requirements.
4. Connect Emergency Lighting Fixtures To The Line (Unswitched) Side Of The Lighting Circuit Serving That Area. Connect Emergency Lighting Fixtures Serving Outdoor Areas To Outdoor Lighting Circuits.
5. Mechanical Equipment (Motors, HVAC Equipment, Etc.) Is Shown On Electrical Plan Drawings For Coordination And Are Only Approximate Locations. Refer To Mechanical Plans For Exact Locations.
6. All 1 Pole, 15 And 20 Amp Branch Circuits Serving Receptacles Or Lighting Shall Be 2 Wire Circuits Providing An Individual Neutral Conductor For Each Ungrounded (Hot) Circuit Conductor. Do Not Share Neutral Conductors.
7. The Minimum Branch Circuit Wiring Size Shall Be 2#12, #12 Ground In 3/4 Inch Conduit Unless Otherwise Noted.
8. Provide A Oneline Diagram Capturing Any Approved Deviations And Verifying All Installations And Connections Upon Completion Of Work.
9. Provide All "As-Built" Drawings To General Contractor To Verify Completion Of Work And For Owner's Record.
10. Electrical Contractor Shall Work With Mechanical Contractor For Integration Of BMS Where Applicable.
11. Identify A % Of Attic Stock For Additional Fixtures, Lights, Bulbs, Etc. To Be Submitted To The GC And For Owners Record.
12. Workmanship Covered Within (1) Year; A Minimum Of (1) Year, Unless Manufacturer's Warranty Exceeds (1) Year, For Equipment, Where Equipment Shall Be Replaced Under Corresponding Warranty.

Wiring Methods

1. General
   - A. In Finished Areas, Conceal All Wiring In Building Walls, Floors, And Above Finished Ceilings. Wiring May Be Run Exposed In Mechanical/Electrical Equipment Rooms, Electrical Closets, Utility Rooms, And Unfinished Basements. No Wiring Shall Be Installed Exposed On The Outside Surfaces Of The Building(s).
   - B. Final Connections To Mechanical Equipment, Lighting Fixtures, Motors, Transformers, Instruments, And Control Devices Shall Be Flexible Conduit To Minimize Vibration Transmission.
2. Indoors (Unclassified Areas)
   - A. Exposed: EMT Conduit With Steel Set Screw Fittings
   - B. In Dry Walls/Above Ceilings: EMT Conduit With Steel Set Screw Fittings (Type MC Metal Clad Cable May Be Used For 1 Pole, 15 And 20 Amp Branch Circuits)
   - C. In Concrete Walls/Floors: RGS Threaded Conduit
   - D. Final Connections: Flexible Metal Conduit (Liquid-Tight Flexible Conduit In Damp Or Wet Areas)
3. Outdoors (Including Unconditioned Covered Areas)
   - A. Above Ground: [RGS Threaded Conduit] [EMT Conduit With Rain Tight Steel Fittings]
   - B. Underground: [Schedule 40 PVC Conduit] [Schedule 40 PVC Conduit For Straight Runs, RGS Threaded Conduit For All Sweeps And Elbows] [Schedule 40 PVC Conduit Installed In Concrete Encased Ductbank] Minimum Burial Depth 24 Inches Below Finished Grade, Unless Otherwise Noted
   - C. Final Connections: Liquid-Tight Flexible Conduit
4. On Roofs
   - A. EMT Conduit With Rain Tight Steel Fittings Mounted On Supports Minimum 4" Above Roof

Equipment Grounding

1. An Insulated (Green) Equipment Ground Conductor(s) Shall Be Provided In All Feeders And Branch Circuits. Utilizing The Conduit As The Equipment Grounding Conductor Is Not Acceptable.

Lightning Protection

Contractor Shall Provide A Lightning Protection System Per NFPA 780 For The Facility. Refer To Specifications For Details. **Deduct Alternate**: Electrical - Lightning Protection To Be Provided And Installed "By Others".

Electrical Enclosures And Terminations

1. Electrical Equipment Enclosures Shall Be Provided As Listed Below Unless Otherwise Noted.
   - A. Indoors Unclassified Areas: NEMA 1
   - B. Indoors Classified 'Damp': NEMA 1
   - C. Outdoors: NEMA 3R
2. Electrical Terminations (Lugs, Terminals, Etc.) On All Equipment Shall Be Rated For Use With 75 Degree Celsius Conductors.

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

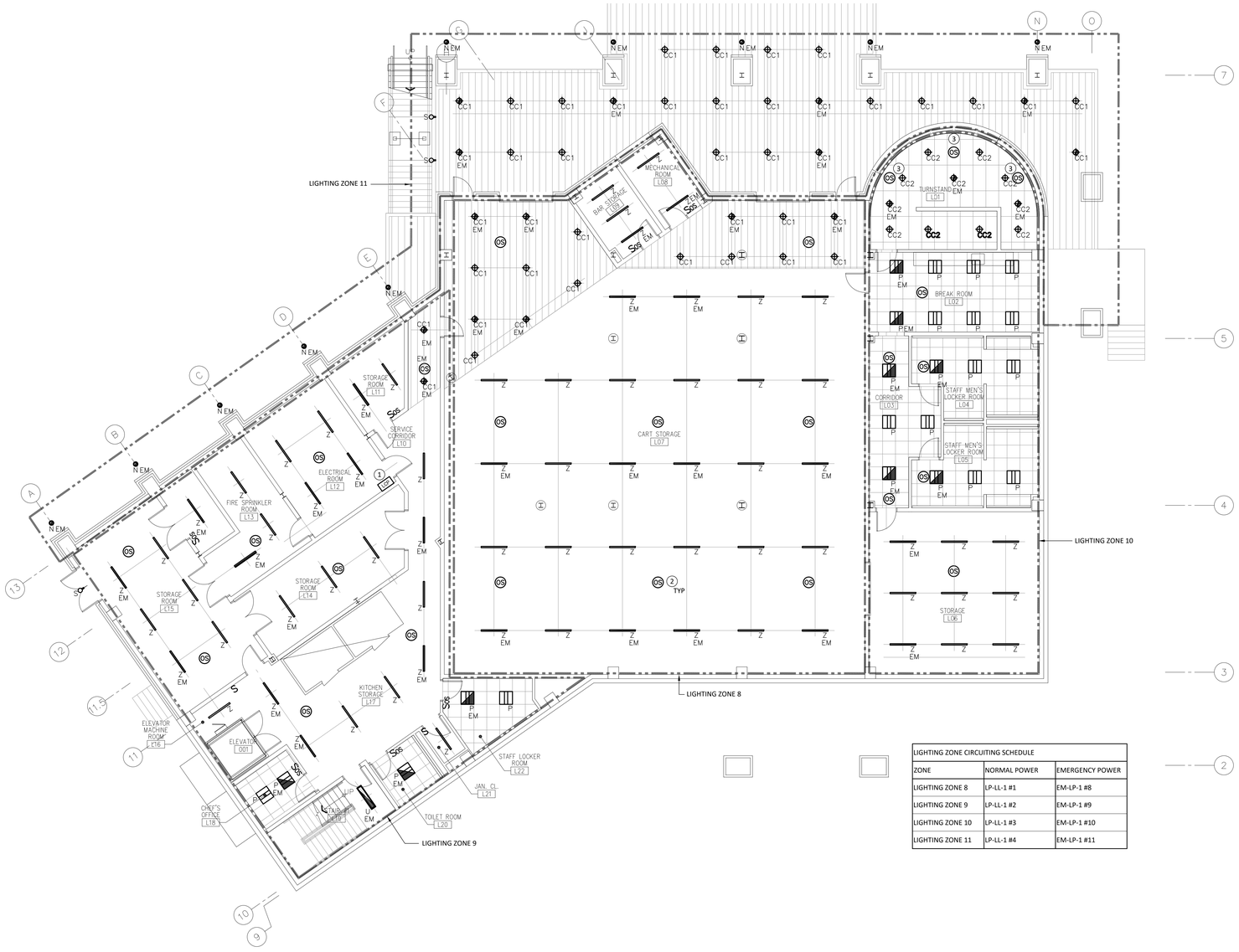
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

ELECTRICAL INFORMATION SHEET

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-001



LIGHTING ZONE CIRCUITING SCHEDULE		
ZONE	NORMAL POWER	EMERGENCY POWER
LIGHTING ZONE 8	LP-LL-1 #1	EM-LP-1 #8
LIGHTING ZONE 9	LP-LL-1 #2	EM-LP-1 #9
LIGHTING ZONE 10	LP-LL-1 #3	EM-LP-1 #10
LIGHTING ZONE 11	LP-LL-1 #4	EM-LP-1 #11

LOWER LEVEL Scale: 1/8"=1'-0" (2' 4' 8' 16') Drawing: **E-101** Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
S	AC General Use Snap Switch, 20A, 120-277 VAC - 48" AFF
S3	Three-Way Switch, 20A, 120-277 VAC - 48" AFF
SD	Dimmer Switch, 20A, 120-277 VAC - 48" AFF
OS	Ceiling Mounted Passive Infrared Occupancy Sensor
	Exit Sign, Wall Or Ceiling Mounted, Shaded Area Denotes Lighted Face, Chevrons As Shown On Plans
	Shading Indicates That Fixture Includes An Emergency Ballast
or	Panel Board, Flush Or Surface Mtd

Identifier	Description
AFF	Above Finished Floor
P	Panel

GENERAL NOTES

1. Refer To The Lighting Fixture Schedule For Detailed Information About Each Lighting Fixture.
2. Electrical Panelboards Are Repeated On The Lighting Plans For Ease Of Reference Only. See Power Plan(s) For Requirements Regarding Panelboards.
3. Coordinate The Final Lighting Fixture Locations And Trim Type With The Architect / Reflected Ceiling Plans.
4. Coordinate The Exact Location And Elevation Of Exterior Lighting Fixtures With The Architect / Building Elevations.
5. Refer To Lighting Fixture Schedule For Detailed Information About Each Lighting Fixture.
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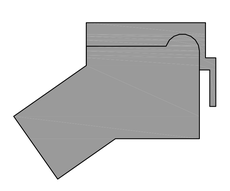
7. Coordinate The Exact Location And Elevation Of Exterior Lighting Fixtures With Architect / Building Elevations.
8. Lighting Fixtures That Provide Illumination During Normal And Emergency Operating Conditions Have Been Shown Half Shaded And Shall Include An Integral, Emergency Battery Pack.
9. All Switches, Receptacles And Outlets Shall Be Aligned Horizontally And Vertically When Adjacent To One Another.
10. All Ceiling Elements Shall Be Aligned On The Centerline.
11. All Exit Signs Shall Be Unswitched And Be Equipped With Self-Contained Emergency Batter Ballasts.
12. Time Clock Shall Control Lighting In Accordance To Schedule Provided By The Owner. Verify With Owner Prior To Scheduling Of Lighting Control Panel.
13. Daylight Sensor Multilevel Photocontrol Shall Reduce Electric Lighting In Response To Available Daylight With At Least One Control Step That Is Between 50% And 70% Of Design Lighting And Another Control Step That Is No Greater Than 35% (Including Off) Of Design Power.
14. All Combination Vacancy Sensors Shall For Staff Break Rooms, Restrooms, ATM Rooms, And Staff Work Areas Shall Be Activated By Manual Switch Operation And Deactivated Automatically Within 8 Minutes. Provide Power Packs And Accessories As Needed. Sensors And Controls May Not Have An Override Switch That Converts From Manual-On To Automatic-On Functionality.
15. All Fixtures In Daylighting Zones Shall Have Auto Dimmable Capabilities.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. Provide Lighting Control Panel, Leviton EX-MAX Plus Stand Alone Relay System, Or Approved Equivalent, For Time Based And Photo Cell Input Lighting Control. Time Clock Control With Manual Override Via Occupancy Sensors Shall Be Used For Lights In Common Areas (Corridors, Open Office Areas, Etc) .
2. Provide Occupancy Sensor Which Will Act As Override Switch For The Lighting Control Panel In Open Space Lighting At These Locations. The Occupant Shall Be Able To Override The Scheduled Shutoff Control For No More Than Two Hours.
3. Provide Occupancy Sensor Which Will Act As Override Switch For The Lighting Control Panel In Open Space Lighting At These Locations. The Occupant Shall Be Able To Override The Scheduled Shutoff Control For No More Than Two Hours, And Shall Operate With Auto Dimming Daylight Sensor. Provide Daylight Sensor, Sensor Shall Not Be Mounted More Than 10' From Window.

KEY PLAN



Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

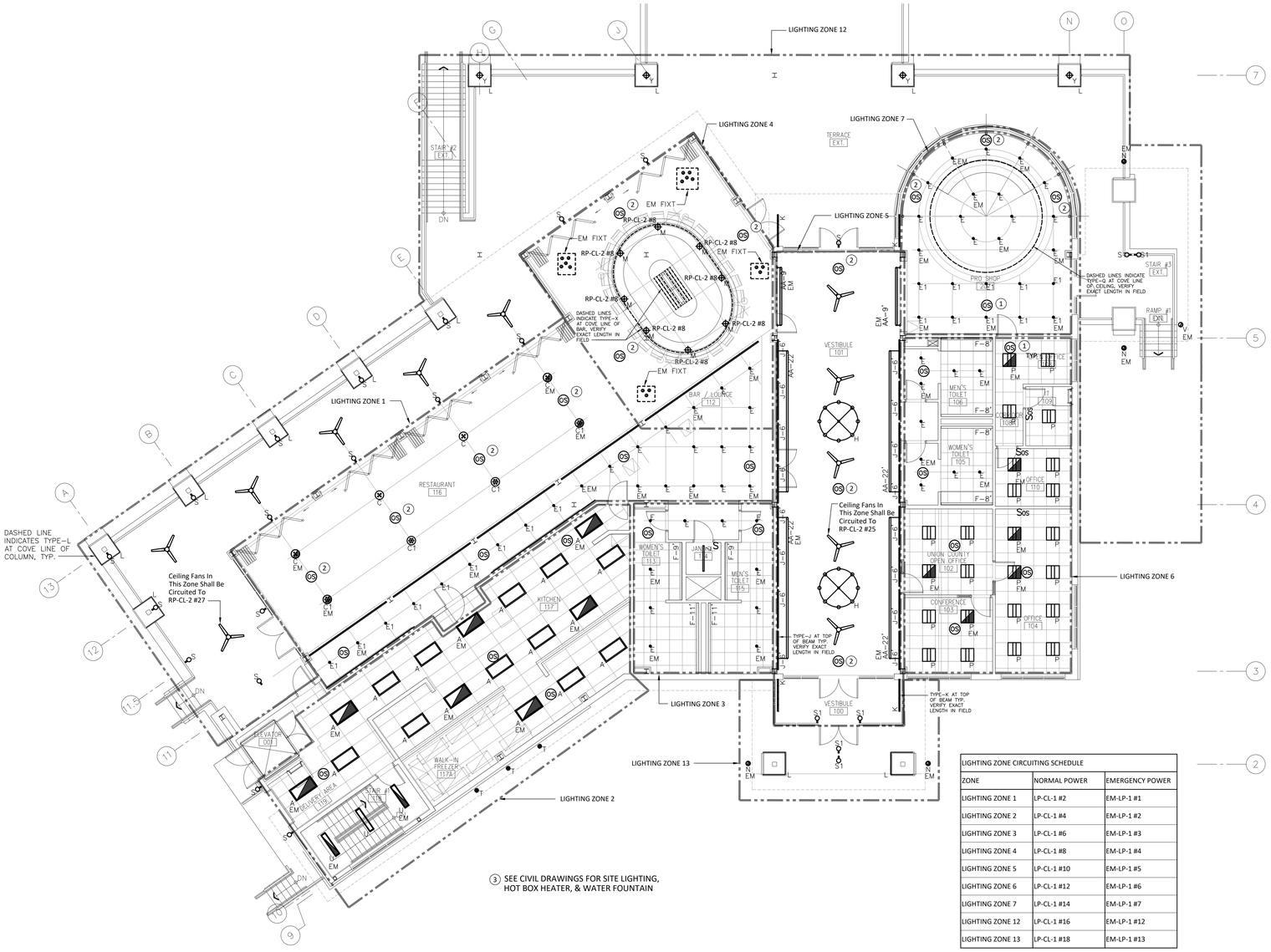
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL - LIGHTING

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-101



③ SEE CIVIL DRAWINGS FOR SITE LIGHTING, HOT BOX HEATER, & WATER FOUNTAIN

LIGHTING ZONE CIRCUITING SCHEDULE		
ZONE	NORMAL POWER	EMERGENCY POWER
LIGHTING ZONE 1	LP-CL-1 #2	EM-LP-1 #1
LIGHTING ZONE 2	LP-CL-1 #4	EM-LP-1 #2
LIGHTING ZONE 3	LP-CL-1 #6	EM-LP-1 #3
LIGHTING ZONE 4	LP-CL-1 #8	EM-LP-1 #4
LIGHTING ZONE 5	LP-CL-1 #10	EM-LP-1 #5
LIGHTING ZONE 6	LP-CL-1 #12	EM-LP-1 #6
LIGHTING ZONE 7	LP-CL-1 #14	EM-LP-1 #7
LIGHTING ZONE 12	LP-CL-1 #16	EM-LP-1 #12
LIGHTING ZONE 13	LP-CL-1 #18	EM-LP-1 #13

CLUBHOUSE LEVEL — Scale: 1/8"=1'-0" (2' 4' 8' 16') — Drawing: **E-102** — Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
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S3	Three-Way Switch, 20A, 120-277 VAC - 48" AFF
SD	Dimmer Switch, 20A, 120-277 VAC - 48" AFF
OS	Ceiling Mounted Passive Infrared Occupancy Sensor
	Exit Sign, Wall Or Ceiling Mounted, Shaded Area Denotes Lighted Face, Chevrons As Shown On Plans
	Shading Indicates That Fixture Includes An Emergency Ballast
	Panel Board, Flush Or Surface Mtd

Identifier	Description
AFF	Above Finished Floor
P	Panel

GENERAL NOTES

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10. All Ceiling Elements Shall Be Aligned On The Centerline.
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14. All Combination Vacancy Sensors Shall For Staff Break Rooms, Restrooms, ATM Rooms, And Staff Work Areas Shall Be Activated By Manual Switch Operation And Deactivated Automatically Within 8 Minutes. Provide Power Packs And Accessories As Needed. Sensors And Controls May Not Have An Override Switch That Converts From Manual-On To Automatic-On Functionality.
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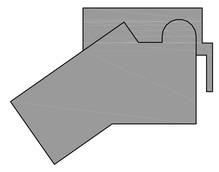
KEY NOTES (SYMBOLS ①, ②, ETC.)

1. Provide Occupancy Sensor Which Will Act As Override Switch For The Lighting Control Panel In Open Space Lighting At These Locations. The Occupant Shall Be Able To Override The Scheduled Shutoff Control For No More Than Two Hours.
2. Provide Occupancy Sensor Which Will Act As Override Switch For The Lighting Control Panel In Open Space Lighting At These Locations. The Occupant Shall Be Able To Override The Scheduled Shutoff Control For No More Than Two Hours, And Shall Operate With Auto Dimming Daylight Sensor. Provide Daylight Sensor, Sensor Shall Not Be Mounted More Than 10' From Window.
3. Refer To Civil Drawing For Additional Exterior Lighting, Water Hot Box And Fountain And Light For Pond Not Shown On This E Drawing.
   - Provide (1) 277V, 20A Branch Circuits To Feed Each Of The (4) Rows Of Exterior Lighting In The Parking Area (4 Circuits Total) From Panel LP-CL-1.
   - Provide (2) 120V, 20A Branch Circuits (Oversize The Conductors To Account For Voltage Drop And Pigtail At Each End To Terminate Into The Devices) For The Heaters Provided With The Water Hot Box Near The Street From RP-CL-2.
   - Provide (1) 120V, 15A Circuit For The Pond Fountain Pump And Light From Panel RP-CL-2.

KEY PLAN



Keyplan — Vertical Plan

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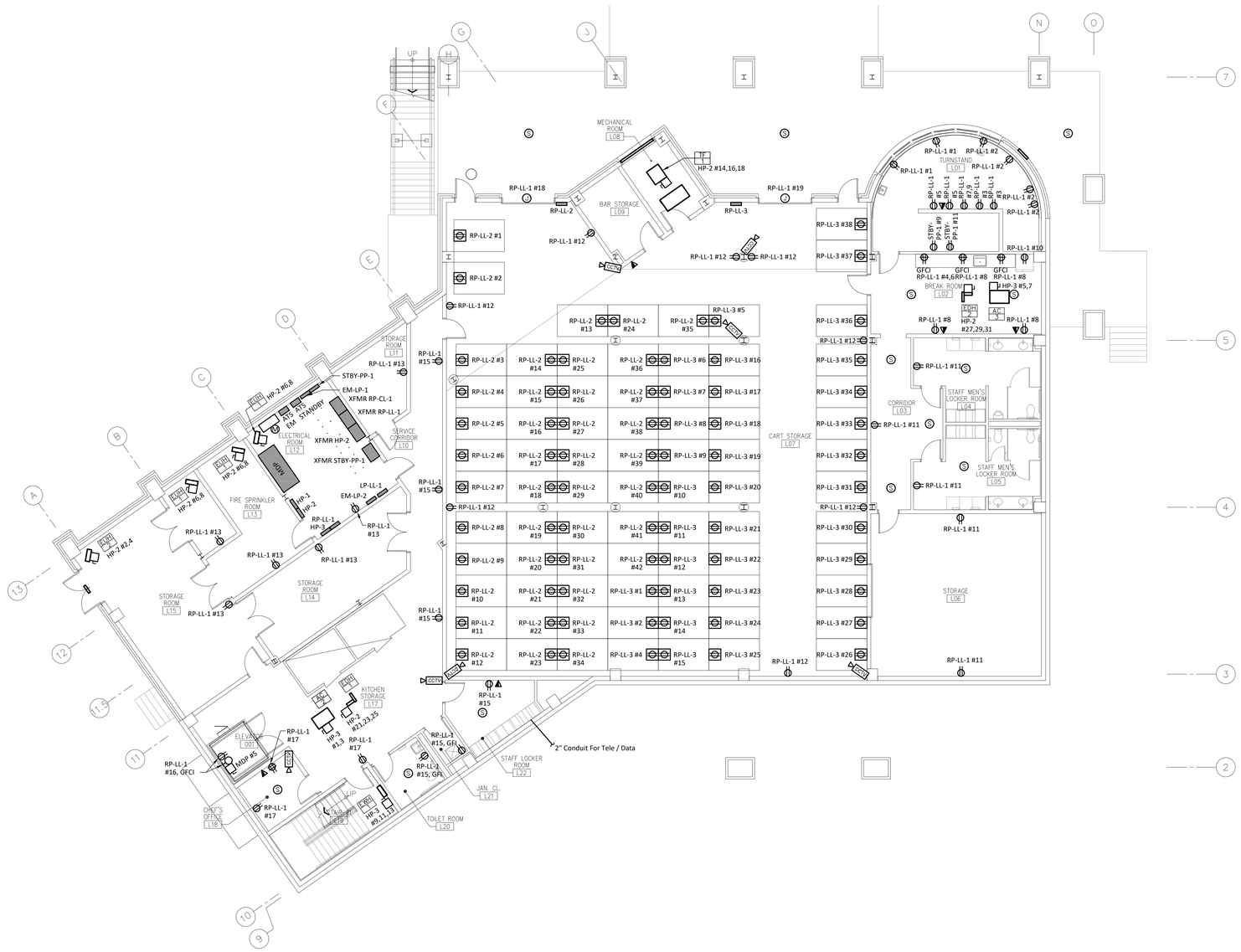
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - LIGHTING

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-102



LOWER LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **E-201** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Duplex Receptacle 20A, 120V - 18" AFF
	Mounted High Or Above Counter Duplex Receptacle, 20A, 120V
	Double Duplex (Quad) Receptacle, 20A, 120V - 18" AFF
	Junction Box, Wall Or Ceiling Mtd
or	Panel Board, Flush Or Surface Mtd
	Unfused Safety Switch - Sized Per Equipment Requirements
	Flush Mounted Floor Box With Power, Data, And Voice Outlets
	Single Gang Data & Telephone Outlet Box

Identifier	Description
	Golf Cart Charger, NEMA 15-5R Receptacle
AFF	Above Finished Floor
GFI, GFCI	Ground Fault Circuit Interrupter
JB, J	Junction Box
NEC	National Electrical Code
WP	Weatherproof
XFMR	Transformer

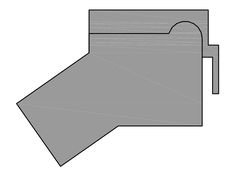
GENERAL NOTES

1. Refer To The Electrical Single Line Diagram And Panel Schedules For Additional Information.
2. Coordinate The Exact Location Of Mechanical, Plumbing, And Fire Protection Equipment With Their Respective Trades.
3. Provide Electrical Disconnecting Means And Final Power Terminations For All MEP/FP Equipment As Required By The Equipment Manufacturer And Applicable Codes. Some Equipment Has Been Specified With Integral Electrical Disconnecting Means And Weatherproof, GFCI Convenience Receptacle. Confirm That The Equipment Has Been Properly Manufactured As Such And Provide Final Connections As Required.
4. Coordinate With The Food Service / Kitchen Consultant For The Exact Quantity, Location, And Configuration Of Power Devices Serving The Kitchen Equipment Prior To Installation.
5. Service Entrance Conductors Routed Through The Building Shall Be Within An Approved, Fire Rated Raceway That Is Encased In Concrete Not Less Than 2 Inches Thick In Compliance With NEC Requirements.
6. Provide Metallic Extra Heavy Duty, Weatherproof In-Use Outlet Cover And Weather Resistant Rated / GFCI (For Personnel Protection) Receptacles In All Outdoor / Wet Locations (Not Protected From The Weather).
7. All Receptacles Located Within 6'-0" Of A Sink Or Other Source Of Water, Elevator / Escalator Pits, And Elsewhere As Required By Applicable Codes Shall Be Ground Fault Circuit Interrupter (GFCI) Protected.
8. All Splices In Conductors #6 AWG And Larger Shall Be Made With Indent Compression Connectors And Insulated With Shrink Tubing.
9. Provide Complete Telephone And Data Device Installation Including: Connectors, Cable Terminations, And Cover Plates.
10. Provide 4' x 8' x 3/4" Plywood Backboard On 1" x 2" Battens For Telephone / Security Equipment Use, Painted With Two Coats Of Gray Enamel Paint. All Plywood Backboards Shall Be Fire Rated And Grade BC Or Better.
11. All Data Cables Shall Be Of A Common Color And All Telephone Cables Shall Be Of A Different Common Color.
12. Exterior CCTV Locations Shall Include Weatherproof Junction Box, Cover, And Whips To Camera For Both Power And Data Connections. Field Coordinate Location Of Junction Boxes With Camera Locations As Directed By Owner / Facility Representative.
13. In Accordance With The New Jersey Administrative Code, 5:23-3.18 Energy Sub Code This Design Elects To Omit ASHRAE 90.1 2013 Chapter 8 - Power's Requirements For Automatic Receptacle Control.

KEY NOTES (SYMBOLS ◯,◯, ETC.)

1. Electrical Contractor Shall Supply Back Boxes And Conduit With Pull String At All Locations Shown For Audio And Security Equipment. All Audio And Security Equipment To Be Provided By Others.
2. Electrical Contractor Shall Supply Back Boxes And Conduit With Pull String For Card Readers At Doors That Require Security Devices. Refer To Architectural Door Schedule On Drawing A-311 For More Information.

KEY PLAN



Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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One Penn Plaza, Suite 2601, New York, NY 10119
Questions For dlb Call: Rob Jankowski
DLB Project ID: 12285 Phone: (646) 381-6721

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

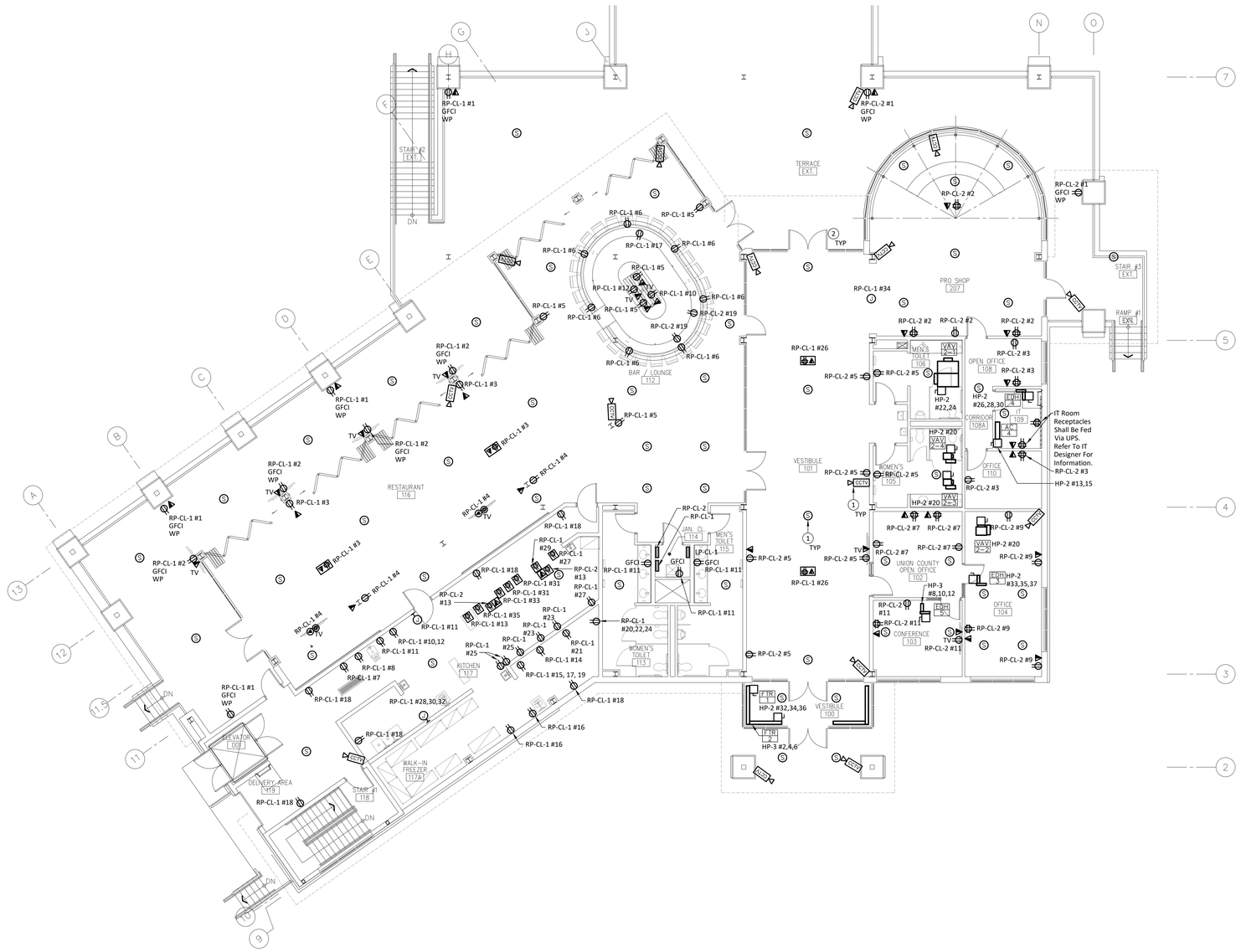
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL - POWER

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	I2285
SHEET:	OF:
DRWG NO	E-201



CLUBHOUSE LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **E-202** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
	Duplex Receptacle 20A, 120V - 18" AFF
	Mounted High Or Above Counter Duplex Receptacle, 20A, 120V
	Double Duplex (Quad) Receptacle, 20A, 120V - 18" AFF
J	Junction Box, Wall Or Ceiling Mtd
or	Panel Board, Flush Or Surface Mtd
	Unfused Safety Switch - Sized Per Equipment Requirements
	Flush Mounted Floor Box With Power, Data, And Voice Outlets
	Single Gang Data & Telephone Outlet Box

Identifier	Description
AFF	Above Finished Floor
GFI, GFCI	Ground Fault Circuit Interrupter
JB, J	Junction Box
NEC	National Electrical Code
WP	Weatherproof
XFMR	Transformer
S	Speaker

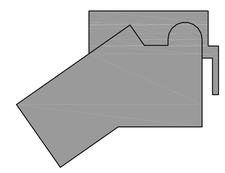
GENERAL NOTES

1. Refer To The Electrical Single Line Diagram And Panel Schedules For Additional Information.
2. Coordinate The Exact Location Of Mechanical, Plumbing, And Fire Protection Equipment With Their Respective Trades.
3. Provide Electrical Disconnecting Means And Final Power Terminations For All MEP/FP Equipment As Required By The Equipment Manufacturer And Applicable Codes. Some Equipment Has Been Specified With Integral Electrical Disconnecting Means And Weatherproof, GFCI Convenience Receptacle. Confirm That The Equipment Has Been Properly Manufactured As Such And Provide Final Connections As Required.
4. Coordinate With The Food Service / Kitchen Consultant For The Exact Quantity, Location, And Configuration Of Power Devices Serving The Kitchen Equipment Prior To Installation.
5. Service Entrance Conductors Routed Through The Building Shall Be Within An Approved, Fire Rated Raceway That Is Encased In Concrete Not Less Than 2 Inches Thick In Compliance With NEC Requirements.
6. Provide Metallic Extra Heavy Duty, Weatherproof In-Use Outlet Cover And Weather Resistant Rated / GFCI (For Personnel Protection) Receptacles In All Outdoor / Wet Locations (Not Protected From The Weather).
7. All Receptacles Located Within 6'-0" Of A Sink Or Other Source Of Water, Elevator / Escalator Pits, And Elsewhere As Required By Applicable Codes Shall Be Ground Fault Circuit Interrupter (GFCI) Protected.
8. All Splices In Conductors #6 AWG And Larger Shall Be Made With Indent Compression Connectors And Insulated With Shrink Tubing.
9. Provide Complete Telephone And Data Device Installation Including: Connectors, Cable Terminations, And Cover Plates.
10. Provide 4' x 8' x 3/4" Plywood Backboard On 1" x 2" Battens For Telephone / Security Equipment Use, Painted With Two Coats Of Gray Enamel Paint. All Plywood Backboards Shall Be Fire Rated And Grade BC Or Better.
11. All Data Cables Shall Be Of A Common Color And All Telephone Cables Shall Be Of A Different Common Color.
12. Exterior CCTV Locations Shall Include Weatherproof Junction Box, Cover, And Whips To Camera For Both Power And Data Connections. Field Coordinate Location Of Junction Boxes With Camera Locations As Directed By Owner / Facility Representative.
13. In Accordance With The New Jersey Administrative Code, 5:23-3.18 Energy Sub Code This Design Elects To Omit ASHRAE 90.1 2013 Chapter 8 - Power's Requirements For Automatic Receptacle Control.

KEY NOTES (SYMBOLS 1, 2, ETC.)

1. Electrical Contractor Shall Supply Back Boxes And Conduit With Pull String At All Locations Shown For Audio And Security Equipment. All Audio And Security Equipment To Be Provided By Others.
2. Electrical Contractor Shall Supply Back Boxes And Conduit With Pull String For Card Readers At Doors That Require Security Devices. Refer To Architectural Door Schedule On Drawing A-311 For More Information.

KEY PLAN



Keyplan — Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

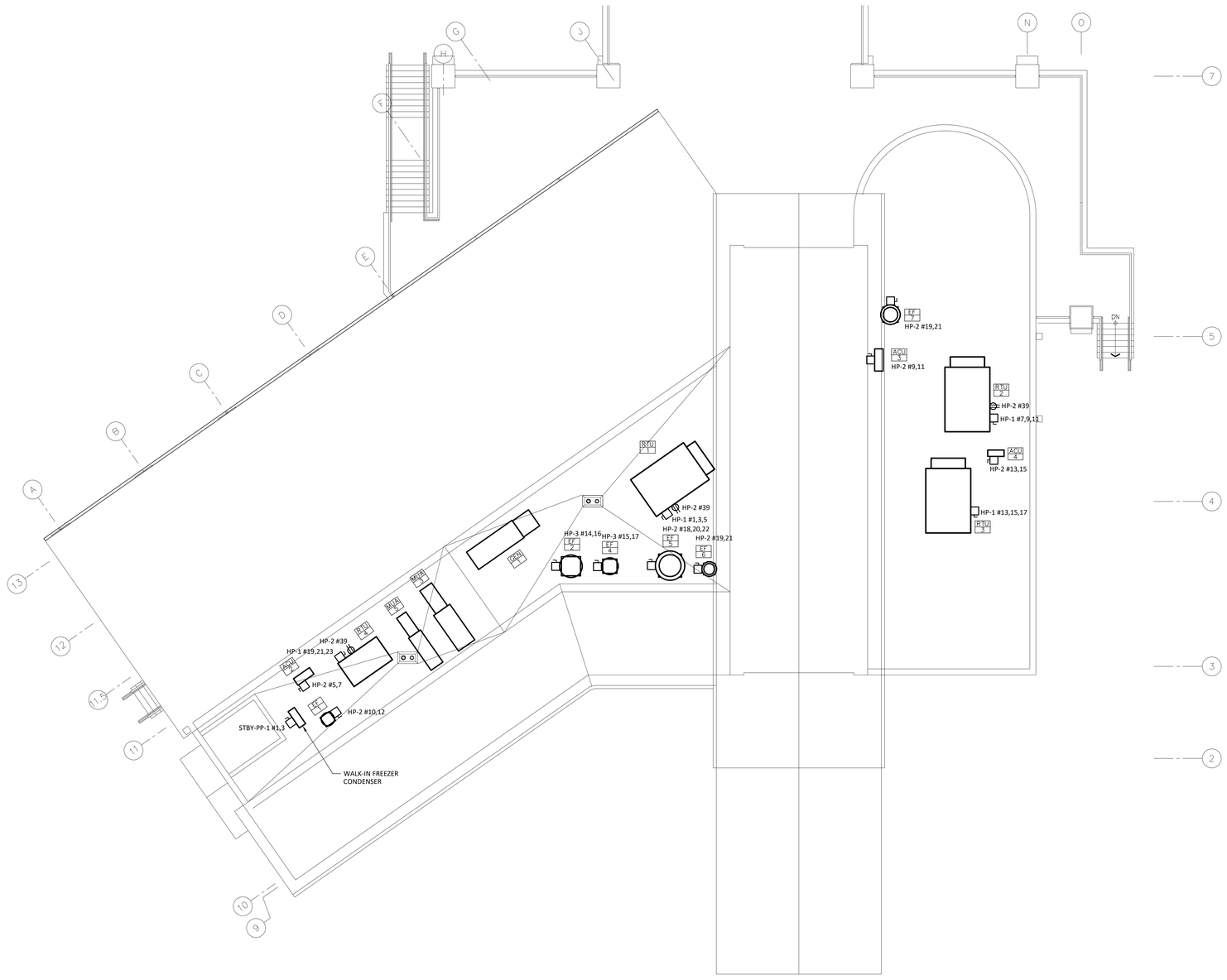
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - POWER

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-202



ROOF | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **E-203** | Detail: **01**

PARTIAL SYMBOLS & ABBREVIATIONS

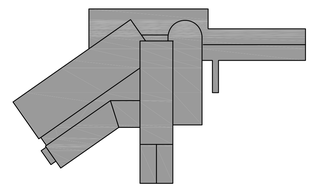
Identifier	Description
	Existing Equipment
	New Equipment
XXX / XX	Equipment Type / Equipment Number
	Unfused Safety Switch - Sized Per Equipment Requirements

Identifier	Description
AFF	Above Finished Floor
GFI, GFCI	Ground Fault Circuit Interrupter
JB, J	Junction Box
NEC	National Electrical Code
WP	Weatherproof
XFMR	Transformer

GENERAL NOTES

1. Refer To The Electrical Single Line Diagram And Panel Schedules For Additional Information.
2. Coordinate The Exact Location Of Mechanical, Plumbing, And Fire Protection Equipment With Their Respective Trades.
3. Provide Electrical Disconnecting Means And Final Power Terminations For All MEP/FP Equipment As Required By The Equipment Manufacturer And Applicable Codes. Some Equipment Has Been Specified With Integral Electrical Disconnecting Means And Weatherproof, GFCI Convenience Receptacle. Confirm That The Equipment Has Been Properly Manufactured As Such And Provide Final Connections As Required.
4. Coordinate With The Food Service / Kitchen Consultant For The Exact Quantity, Location, And Configuration Of Power Devices Serving The Kitchen Equipment Prior To Installation.
5. Service Entrance Conductors Routed Through The Building Shall Be Within An Approved, Fire Rated Raceway That Is Encased In Concrete Not Less Than 2 Inches Thick In Compliance With NEC Requirements.
6. Provide Metallic Extra Heavy Duty, Weatherproof In-Use Outlet Cover And Weather Resistant Rated / GFCI (For Personnel Protection) Receptacles In All Outdoor / Wet Locations (Not Protected From The Weather).
7. All Receptacles Located Within 6'-0" Of A Sink Or Other Source Of Water, Elevator / Escalator Pits, And Elsewhere As Required By Applicable Codes Shall Be Ground Fault Circuit Interrupter (GFCI) Protected.
8. All Splices In Conductors #6 AWG And Larger Shall Be Made With Indent Compression Connectors And Insulated With Shrink Tubing.
9. Provide Complete Telephone And Data Device Installation Including: Connectors, Cable Terminations, And Cover Plates.
10. Provide 4' x 8' x 3/4" Plywood Backboard On 1" x 2" Battens For **Telephone / Security** Equipment Use, Painted With Two Coats Of Gray Enamel Paint. All Plywood Backboards Shall Be Fire Rated And Grade BC Or Better.
11. All Data Cables Shall Be Of A Common Color And All Telephone Cables Shall Be Of A Different Common Color.
12. Exterior CCTV Locations Shall Include Weatherproof Junction Box, Cover, And Whips To Camera For Both Power And Data Connections. Field Coordinate Location Of Junction Boxes With Camera Locations As Directed By Owner / Facility Representative.
13. The Mechanical Contractor Shall Provide All Low Voltage Wiring For Mechanical Equipment and Shall Coordinate With The Electrical Contractor As Necessary.

KEY PLAN



Keyplan

ROOF
CLUBHOUSE
LOWER LEVEL

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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Questions For dlb Call:
DLB Project ID: 12285

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

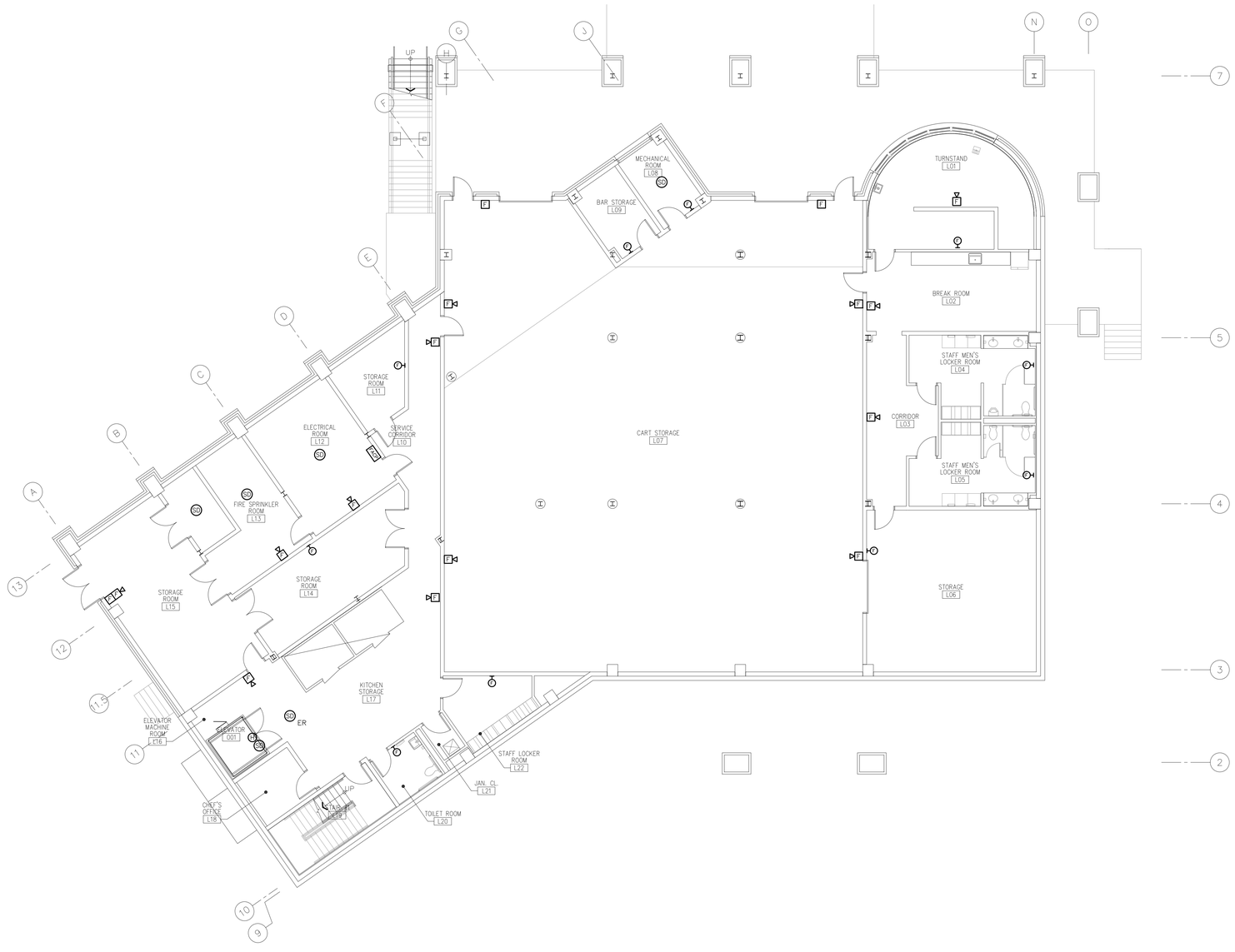
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

ROOF PLAN - POWER

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-203



LOWER LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: E-301 | Detail: 01

The FACP And Associated Devices Shall Be Siemens XLS Series. No Substitutions Shall Be Accepted.

The Remote Alarm Transmission To Central Station Shall Be Wireless Dual Radio For Transmission Of Trouble, Supervisory, And Alarms, To A Siemens Central Station (No Telephone Lines For The FACP).

PARTIAL SYMBOLS & ABBREVIATIONS

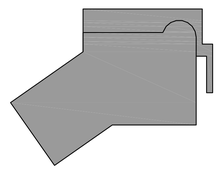
Identifier	Description
F	Manual Pull Station
	Strobe Only
F	Horn/Strobe
SD ER	Smoke Detector (ER Indicates Elevator Recall)
H	Heat Detector, Combination Fixed Temperature And Rate Of Rise
194 H	Heat Detector, Fixed Temperature (135°F Standard Or As Shown)
FACP	Fire Alarm Control Panel
FARA	Fire Alarm Remote Annunciator Panel

Identifier	Description
SDK	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator
FACP	Fire Alarm Control Panel

GENERAL NOTES

1. Fire Alarm Plans Depict The General Layout And Intent Of The Fire Alarm System. The Contractor Must Determine The Exact Quantity And Final Location Of Devices Required By Code Based Upon Actual Field / Constructed Conditions.
2. The Riser Diagram Is For Design Purposes Only. The Fire Alarm Contractor Shall Provide A Detailed Riser Diagram With All Field Wiring And Conduit Sizes Required.
3. The Fire Alarm Detection / Initiation System Consists Of Smoke Detectors And Manual Pull Stations As Well As Water Flow Switches And Tamper Switches On The Automatic Sprinkler System. The Fire Alarm Notification / Indication System Consists Of Horn / Strobe Devices To Provide Audible And Visual Annunciation Throughout The Building.
4. Visual Fire Alarm Devices (Strobes) Shall Be Synchronized And Have A Minimum 5'-0" Clearance From Any Obstructions.
5. Visual Fire Alarm Devices (Strobes) Shall Be Rated At 75 Candela Unless Noted Otherwise.
6. The Elevator Operation Includes An Elevator Recall Strategy Directed By Smoke Detectors. The Elevator Shall Also Receive Input From Fixed Temperature Heat Detectors And Shutdown Prior To Sprinkler System Discharge.
7. Water Flow And Tamper Switches Have Been Shown On These Drawings For Reference. Coordinate With Sprinkler Plans / Contractor For The Exact Location And Quantity Of Devices.
8. Provide Fire Alarm Wiring Connections To Each Non-Addressable Device Via Monitor Modules.
9. All Smoke Duct Detectors (SDD) Shall Be Monitored By The Fire Alarm Control Panel (FACP). They Have Been Shown On These Drawings For Reference. Coordinate With Mechanical Plans / Contractor For Exact Location And Quantity Of Devices.
10. Smoke Duct Detectors Shall Be Provided With An Appropriate Environmental Housing, Addressable Control Relay, Remote Indicator / Test Switch, And Sampling Tubes.
11. All Fire Alarm Wiring Shall Be Installed Within Electrical Metallic Tubing (EMT) Conduit (Painted Red) And Sized Per Code Requirements. The Minimum Conduit Size Shall Be 3/4 Inch, Unless Noted Otherwise. Fire Alarm Wiring Is Permitted To Be Installed In Open Raceways Where Concealed.
12. The Contractor Shall Provide The Required Fire Alarm Devices To Unlock All Doors With Security Devices In The Case Of A Fire Event. Refer To The Architectural Door Schedule On Drawing A-311 For More Information.

KEY PLAN



Keyplan

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
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One Penn Plaza, Suite 2601, New York, NY 10119
Questions For dlb Call: Rob Jankowski
DLB Project ID: 12285 Phone: (646) 381-6721

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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

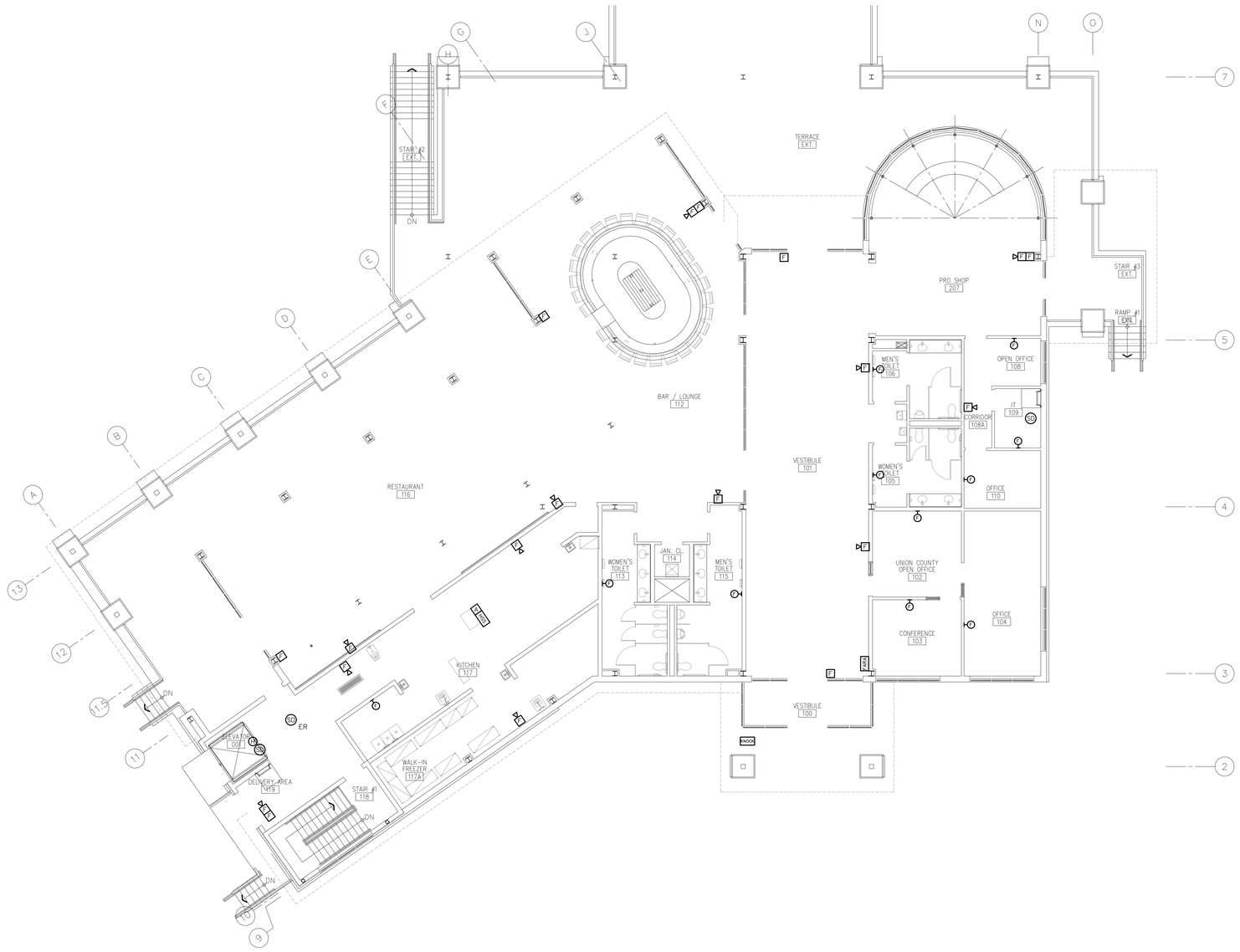
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LOWER LEVEL - FIRE ALARM

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-301



CLUBHOUSE LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: E-302 | Detail: 01

The FACP And Associated Devices Shall Be Siemens XLS Series. No Substitutions Shall Be Accepted.

The Remote Alarm Transmission To Central Station Shall Be Wireless Dual Radio For Transmission Of Trouble, Supervisory, And Alarms, To A Siemens Central Station (No Telephone Lines For The FACP).

PARTIAL SYMBOLS & ABBREVIATIONS

Identifier	Description
F	Manual Pull Station
P	Strobe Only
F	Horn/Strobe
SD ER	Smoke Detector (ER Indicates Elevator Recall)
R	Door Relay
194 H	Heat Detector, Fixed Temperature (135°F Standard Or As Shown)
FACP	Fire Alarm Control Panel
FARA	Fire Alarm Remote Annunciator Panel

Identifier	Description
SDD	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator
A	ANSUL Manual Pull Station
HRS	ANSUL Hood Suppression System Monitoring Module
KNOX	Fire Department Knock Box
FACP	Fire Alarm Control Panel

GENERAL NOTES

1. Fire Alarm Plans Depict The General Layout And Intent Of The Fire Alarm System. The Contractor Must Determine The Exact Quantity And Final Location Of Devices Required By Code Based Upon Actual Field / Constructed Conditions.
2. The Riser Diagram Is For Design Purposes Only. The Fire Alarm Contractor Shall Provide A Detailed Riser Diagram With All Field Wiring And Conduit Sizes Required.
3. The Fire Alarm Detection / Initiation System Consists Of Smoke Detectors And Manual Pull Stations As Well As Water Flow Switches And Tamper Switches On The Automatic Sprinkler System. The Fire Alarm Notification / Indication System Consists Of Horn / Strobe Devices To Provide Audible And Visual Annunciation Throughout The Building.
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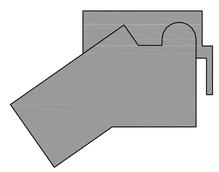
5. Visual Fire Alarm Devices (Strobes) Shall Be Rated At 75 Candela Unless Noted Otherwise.
6. The Elevator Operation Includes An Elevator Recall Strategy Directed By Smoke Detectors. The Elevator Shall Also Receive Input From Fixed Temperature Heat Detectors And Shutdown Prior To Sprinkler System Discharge.
7. Water Flow And Tamper Switches Have Been Shown On These Drawings For Reference. Coordinate With Sprinkler Plans / Contractor For The Exact Location And Quantity Of Devices.
8. Provide Fire Alarm Wiring Connections To Each Non-Addressable Device Via Monitor Modules.
9. All Smoke Duct Detectors (SDD) Shall Be Monitored By The Fire Alarm Control Panel (FACP). They Have Been Shown On These Drawings For Reference. Coordinate With Mechanical Plans / Contractor For Exact Location And Quantity Of Devices.
10. Smoke Duct Detectors Shall Be Provided With An Appropriate Environmental Housing, Addressable Control Relay, Remote Indicator / Test Switch, And Sampling Tubes.
11. All Fire Alarm Wiring Shall Be Installed Within Electrical Metallic Tubing (EMT) Conduit (Painted Red) And Sized Per Code Requirements. The Minimum Conduit Size Shall Be 3/4 Inch, Unless Noted Otherwise. Fire Alarm Wiring Is Permitted To Be Installed In Open Raceways Where Concealed.
12. The Contractor Shall Provide The Required Fire Alarm Devices To Unlock All Doors With Security Devices In The Case Of A Fire Event. Refer To The Architectural Door Schedule On Drawing A-311 For More Information.

KEY PLAN



Keyplan

Vertical Plan

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

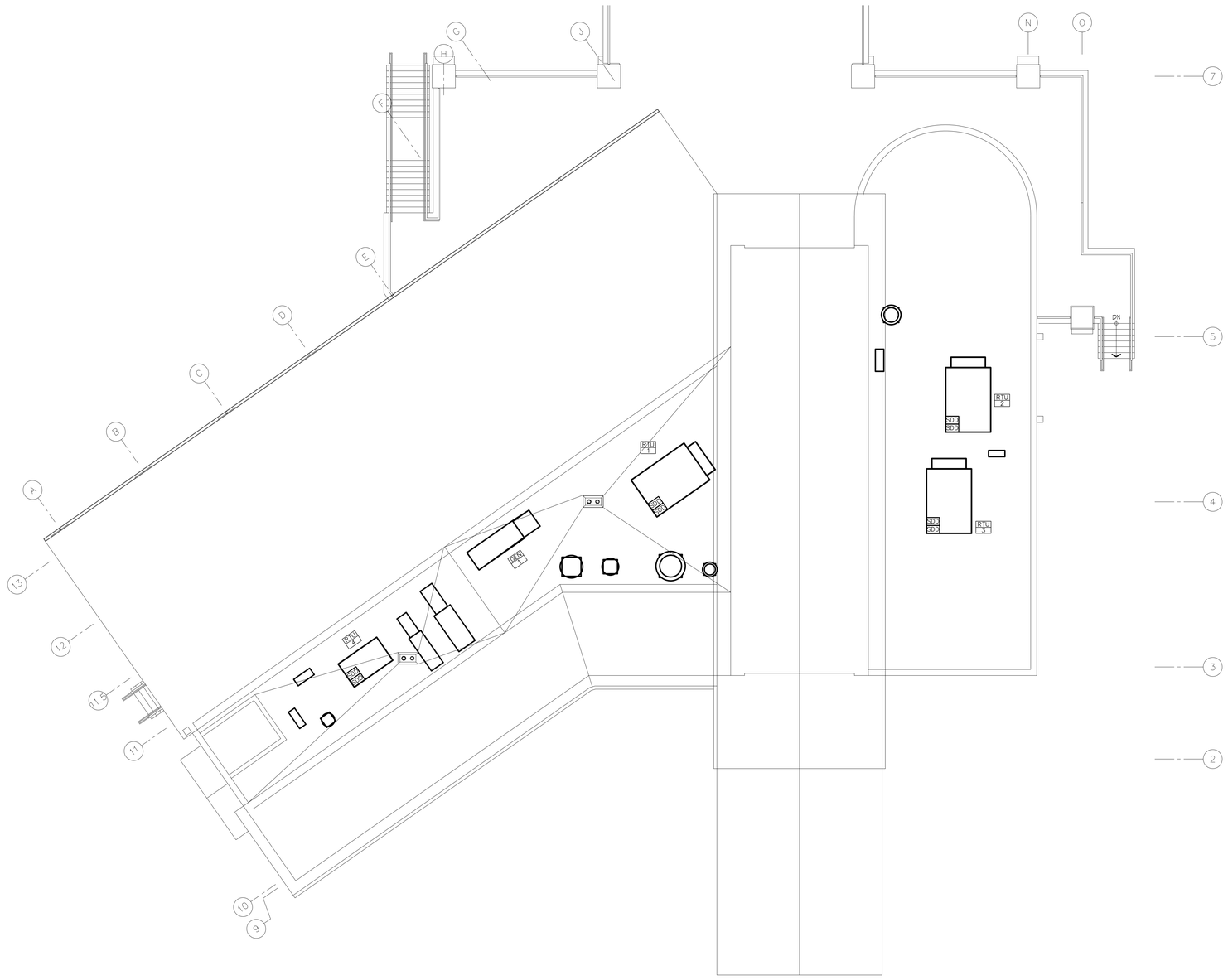
NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

CLUBHOUSE LEVEL - FIRE ALARM

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-302



ROOF LEVEL | Scale: 1/8"=1'-0" | 2' 4' 8' 16' | Drawing: **E-303** | Detail: **01**

The FACP And Associated Devices Shall Be Siemens XLS Series. No Substitutions Shall Be Accepted.

The Remote Alarm Transmission To Central Station Shall Be Wireless Dual Radio For Transmission Of Trouble, Supervisory, And Alarms, To A Siemens Central Station (No Telephone Lines For The FACP).

PARTIAL SYMBOLS & ABBREVIATIONS

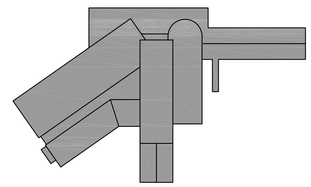
Identifier	Description
F	Manual Pull Station
P	Strobe Only
F	Horn/Strobe
SD ER	Smoke Detector (ER Indicates Elevator Recall)
R	Door Relay
194 H	Heat Detector, Fixed Temperature (135°F Standard Or As Shown)
FACP	Fire Alarm Control Panel
FARA	Fire Alarm Remote Annunciator Panel

Identifier	Description
SDD	Duct Mounted Smoke Detector W/ Addressable Control Relay & Remote Indicator
KNOX	Fire Department Knock Box
FACP	Fire Alarm Control Panel

GENERAL NOTES

1. Fire Alarm Plans Depict The General Layout And Intent Of The Fire Alarm System. The Contractor Must Determine The Exact Quantity And Final Location Of Devices Required By Code Based Upon Actual Field / Constructed Conditions.
2. The Riser Diagram Is For Design Purposes Only. The Fire Alarm Contractor Shall Provide A Detailed Riser Diagram With All Field Wiring And Conduit Sizes Required.
3. The Fire Alarm Detection / Initiation System Consists Of Smoke Detectors And Manual Pull Stations As Well As Water Flow Switches And Tamper Switches On The Automatic Sprinkler System. The Fire Alarm Notification / Indication System Consists Of Horn / Strobe Devices To Provide Audible And Visual Annunciation Throughout The Building.
4. Visual Fire Alarm Devices (Strobes) Shall Be Synchronized And Have A Minimum 5'-0" Clearance From Any Obstructions.
5. Visual Fire Alarm Devices (Strobes) Shall Be Rated At 75 Candela Unless Noted Otherwise.
6. The Elevator Operation Includes An Elevator Recall Strategy Directed By Smoke Detectors. The Elevator Shall Also Receive Input From Fixed Temperature Heat Detectors And Shutdown Prior To Sprinkler System Discharge.
7. Water Flow And Tamper Switches Have Been Shown On These Drawings For Reference. Coordinate With Sprinkler Plans / Contractor For The Exact Location And Quantity Of Devices.
8. Provide Fire Alarm Wiring Connections To Each Non-Addressable Device Via Monitor Modules.
9. All Smoke Duct Detectors (SDD) Shall Be Monitored By The Fire Alarm Control Panel (FACP). They Have Been Shown On These Drawings For Reference. Coordinate With Mechanical Plans / Contractor For Exact Location And Quantity Of Devices.
10. Smoke Duct Detectors Shall Be Provided With An Appropriate Environmental Housing, Addressable Control Relay, Remote Indicator / Test Switch, And Sampling Tubes.
11. All Fire Alarm Wiring Shall Be Installed Within Electrical Metallic Tubing (EMT) Conduit (Painted Red) And Sized Per Code Requirements. The Minimum Conduit Size Shall Be 3/4 Inch, Unless Noted Otherwise. Fire Alarm Wiring Is Permitted To Be Installed In Open Raceways Where Concealed.

KEY PLAN



Keyplan

Vertical Plan

NOT FOR CONSTRUCTION

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02-22-2017

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PROJECT:

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SHEET CONTENTS:

ROOF PLAN - FIRE ALARM

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
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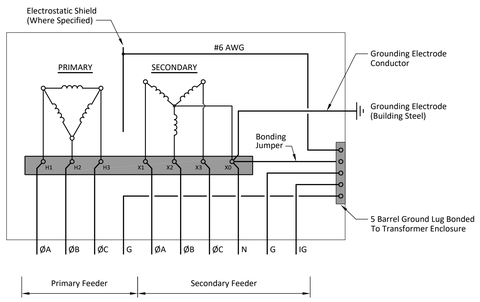
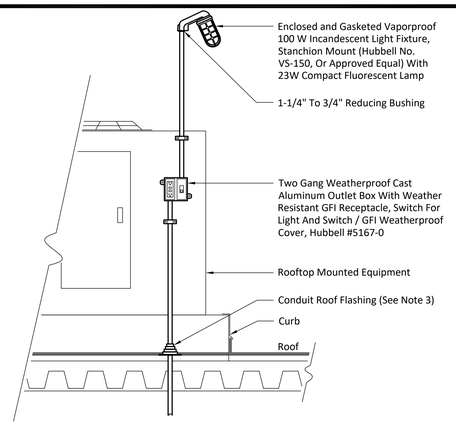


DETAIL NOTES:

1. Refer To The Single Line Diagram And Schedules For Primary And Secondary Feeder Sizes As Well As Connection Points.
2. Provide The Electrostatic Shield And #6 AWG Shield Grounding Conductor Only When Specified.
3. Provide The Isolated Ground Conductor Within Secondary Feeder Only When Specified.
4. The 5 Barrel Ground Lug May Be Reduced In Size If The Electrostatic Shied And/Or Isolated Ground Are Not Required. Minimum Size Shall Be A 3 Barrel Lug.

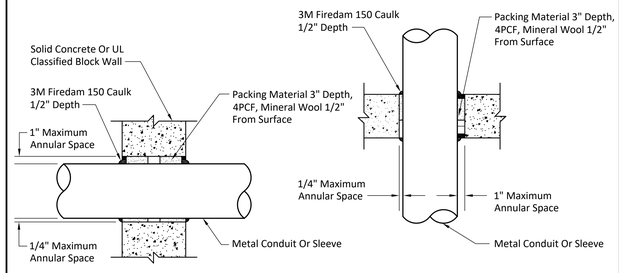
TRANSFORMER GROUNDING		
Transformer Size (KVA)	Derived Phase Conductors (208,3ϕ Secondary) (Copper)	Grounding Electrode Conductor Per NEC Table 250.66 (Copper)
A	B	C
15	#4	#8
30	#1	#6
45	#2/0	#4
75	350kcmil	#2
112.5	2 Sets: #3/0	#2
150	2 Sets: 350kcmil	#2/0
225	3 Sets: 300kcmil	#2/0
300	4 Sets: 350kcmil	#4/0
500	6 Sets: 500kcmil	400kcmil

DRY TYPE TRANSFORMER TYPICAL CONNECTION DETAIL | Scale: NTS | Drawing: **E-501** | Detail: **01**



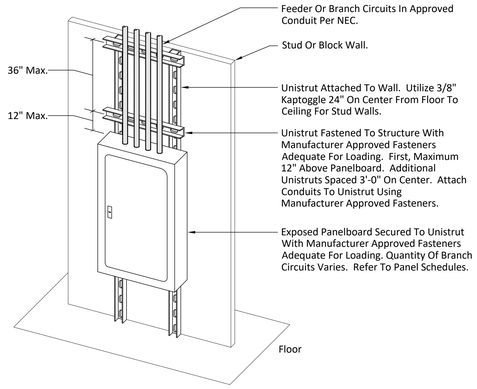
NOTES:
1. Locate Light and Receptacle Near Electrical Access Panel.
2. Power For Light And Receptacle Shall Not Be From Circuit That Feeds Rooftop Unit.
3. Run Conduit Up Through Curb Under Unit If Possible To Avoid Roof Penetration.
4. Provide Detail Shown For Each Rooftop Unit.

LIGHT AND RECEPTACLE FOR ROOFTOP EQUIPMENT | Scale: NTS | Drawing: **E-501** | Detail: **02**



HORIZONTAL CONDUIT VERTICAL CONDUIT

CONDUIT OR SLEEVE FIRESTOPPING DETAIL | Scale: NTS | Drawing: **E-501** | Detail: **03**

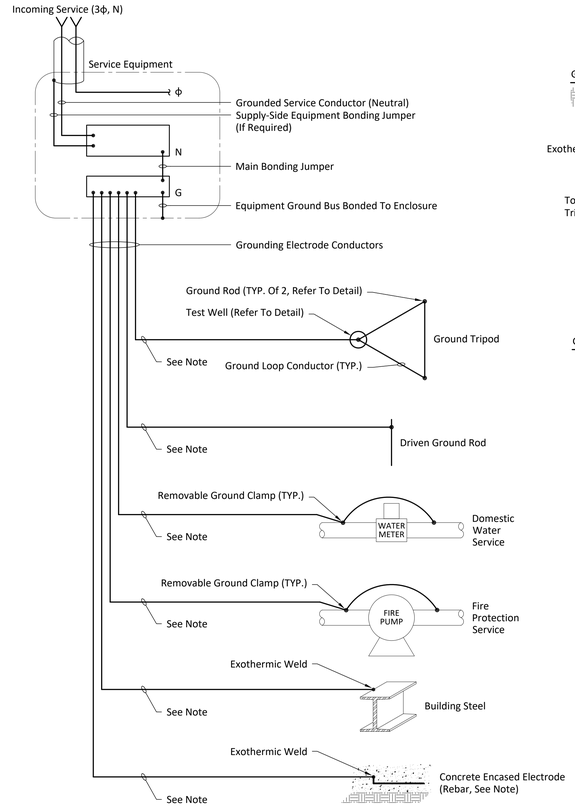


NOTES:
1. All Conductors, Feeders And Branch Circuits Entering Or Exiting Exposed Panels Shall Be Installed In Approved Conduit Per NEC. All Conduit Type Changes Shall Take Place Outside Of The Designated Electrical Room. Refer To Local Code For Installation Requirements.

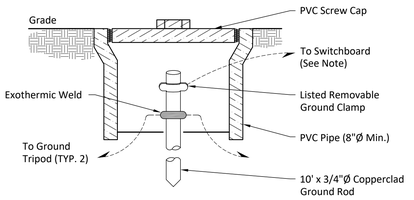
INTERIOR WALL MOUNTED PANELBOARD DETAIL | Scale: NTS | Drawing: **E-501** | Detail: **04**

NOTES:
1. In Accordance With The NEC Article 110.16, All Switchboards (Each Section), Panelboards, Enclosed Breakers/Switches, Transfer Switches, Transformers, Motor Starters, Contactors, Industrial Control Panels, Meter Socket Enclosures, And Motor Control Centers Shall Be Field Marked To Warn Qualified Persons Of Potential Electric Arc Flash Hazards. The Marking Shall Be Located So As To Be Clearly Visible To Qualified Persons Before Examination, Adjustment, Servicing, Or Maintenance Of The Equipment.

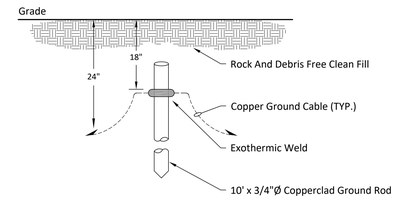
ARC FLASH WARNING LABEL | Scale: NTS | Drawing: **E-501** | Detail: **05**



GROUNDING ELECTRODE CONDUCTOR CONNECTIONS



TEST WELL DETAIL



GROUND ROD DETAIL

Grounding Electrode Conductor & Bonding Jumper Size		
Largest Phase Conductor*	GEC	Jumpers
#2 or smaller	#8	#8
#1 or 1/0	#6	#6
2/0 or 3/0	#4	#4
Over 3/0 through 350kcmil	#2	#2
Over 350kcmil through 600kcmil	#1/0	#1/0
Over 600kcmil through 1100kcmil	#2/0	#2/0
Over 1100kcmil	#3/0	12.5%
* Total Of All Sets		

NOTES:
1. All Grounding And Bonding Conductors Shall Be Copper And Sized Per NEC Article 250 Unless Otherwise Noted On Drawings, Schedules, And / Or Specifications.
2. Conductors Shall Not Pass Through Metallic Sleeves, Pipes, Clamps, Or Other Metallic Equipment. Use Non-Metallic Conduit Sleeves Where Necessary.
3. The Minimum Bending Radius For Conductors Up To And Including #6 AWG Shall Be 6". For Conductors Greater Than #6 AWG, Bending Radius Shall Be 12".
4. All Below-Grade Connections Shall Be By Exothermic Welds, UON. All Above Grade Connections Between Two Conductors Shall Be By Crimp Connector.
5. All Bare Conductors Installed Outside And Below Grade Shall Be 7-Strand Copper To Increase Longevity.
6. All Grounding Electrode Conductors That Are #8 AWG And / Or Run Exposed And Subject To Physical Damage Shall Be Installed In Metallic Conduit. Bond Grounding Electrode Conductor To Metallic Conduit At Both Ends With Hardware Listed For The Application To Prevent Metallic Conduit From Acting As An Inductive Choke.
7. Provide Grounding Electrode Conductor In Non-Metallic Conduit To Grounding Tripod Located In The Nearest Planted Area. Provide Three 10' x 3/4"Ø Copperclad Ground Rods At 20' Spacing. Connect Using Same-Sized Conductors Between Each Ground Rod As Shown In Detail With Exothermic Welds.
8. Provide Grounding Electrode Conductor In Non-Metallic Conduit To Ground Rod Located In The Nearest Planted Area. Exothermically Weld Conductor To 10' x 3/4"Ø Copperclad Ground Rod.
9. Provide Grounding Electrode Conductor To Water Service Pipe. Provide Listed Ground Clamp To Connect To Water Service Pipe. Provide Additional Clamps And Same-Sized Bonding Jumper To Bypass Water Meter. Make Connection On Street Side Of Insulating Coupling (If Present).
10. Provide Grounding Electrode Conductor To Fire Water Service Pipe. Provide Listed Ground Clamp To Connect To Fire Water Service Pipe. Provide Additional Clamps And Same-Sized Bonding Jumper To Bypass Fire Pump. Make Connections On Street Side Of Insulating Coupling (If Present).
11. Provide Grounding Electrode Conductor To Building Steel. Remove Paint At Weld Location And Exothermically Weld Conductor To Building Steel. Touch-Up Steel With Zinc-Rich Paint To Restore Corrosion Protection. Approved Alternate Is Hydraulically Compressed Long Barrel Two-Hole Listed Grounding Lug. Drill Steel As Required.
12. Provide Grounding Electrode Conductor To Concrete Encased Electrode. Connection To Foundation Or Footing Rebar Is Required Where 20 Feet Of 1/2" Or Larger Steel Rebar Is Encased In At Least 2" Of Concrete That Is In Direct Contact With The Earth. If Multiple Concrete Encased Electrodes Are Present At A Structure, It Shall Be Permissible To Bond Only One Into The Grounding Electrode System.
13. Provide Enough Exposed Conductor To Allow A Clamp On Style CT Meter In Test Well.
14. Provide Bonding Connections Between The Electrical Service's Grounding Electrode System And The Structure's Lightning Protection System As Recommended By The Lightning Protection System Installer, And In Accordance With NFPA 780 - Standard For The Installation Of Lightning Protection Systems.

GROUNDING ELECTRODE SYSTEM | Scale: NTS | Drawing: **E-501** | Detail: **06**

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02-22-2017

INTERIOR WALL MOUNTED PANELBOARD DETAIL

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PROJECT:

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SHEET CONTENTS:

ELECTRICAL DETAILS - 1

SUBMISSIONS		REVISIONS	
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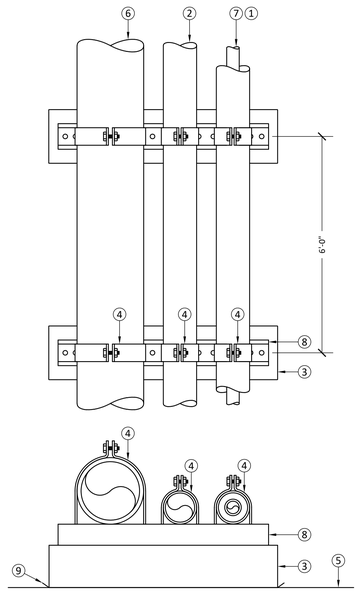
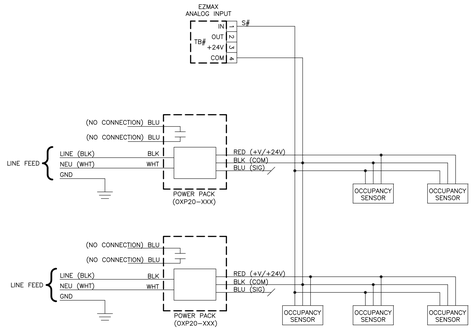


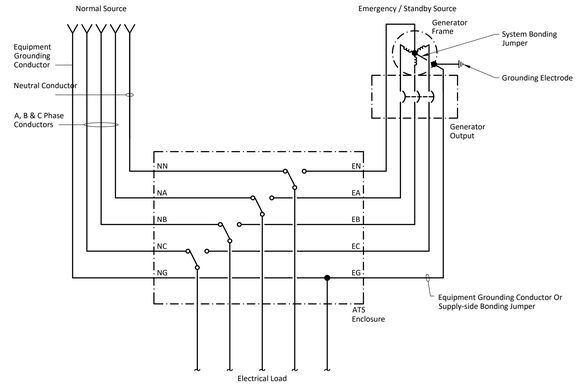
NOTES:
1. The #2/0 Ground Conductor Shall Not Be Installed In Metallic Conduit And Shall Not Pass Through Any Metallic Object That Encircles The Conductor. The Conductor Shall Pass Through Walls And Floors Via PCS Sleeves. If The Ground Conductor Must Be Installed In RGS Or EMT Then The Conduit Shall Be Bonded To The Ground Conductor At Both Ends.
2. RGS Power Conduit (3/4" Minimum).
3. Provide Rubber Rooftop Support Block, B-Line Dura-Blok Or Approved Equal, Every 6' Maximum.
4. Galvanized Pipe Clamp. Size As Required.
5. Existing Roof.
6. RGS Telephone Conduit (1-1/2" Minimum).
7. #2/0 Stranded Insulated Copper Ground In 1" PVC Conduit. Refer To Note 1.
8. Unistrut U-channel.
9. Roofing Material. Refer To Architectural Drawings For More Information.

ROOF MOUNTED CONDUIT SUPPORT DETAIL | Scale: NTS | Drawing: **E-502** | Detail: **01**

EZMAX INPUT TERMINATION FOR OCCUPANCY SENSORS POWERED BY POWER PACKS

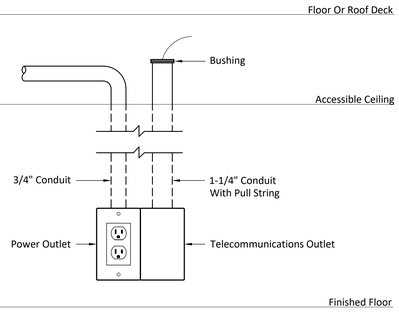


LIGHTING CONTROL WIRING DETAIL | Scale: NTS | Drawing: **E-502** | Detail: **02**



NOTES:
1. This Diagrammatic Detail Shows The Grounding Configuration For A 4-Pole Automatic Transfer Switch (ATS) With Switched Neutral That Creates A Separately Derived System. A System Bonding Jumper And Grounding Electrode System Shall Be Provided For The Generator.

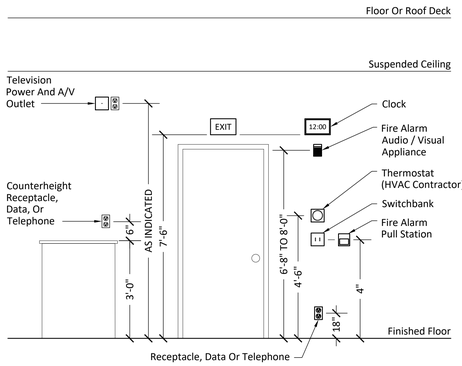
GENERATOR GROUNDING DETAIL (4-POLE ATS) | Scale: NTS | Drawing: **E-502** | Detail: **03**



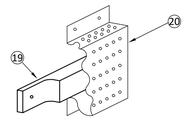
NOTES:
1. Provide Individual Conduits And Boxes To Isolate The Power And Telecommunications Outlets When Both Are Indicated At Same Location.
2. Boxes Shall Be Flush Mounted In Wall Unless Otherwise Noted.
3. Coordinate Exact Location, Back Box Size / Depth, And Conduit Sizes With Owner And System Installer Prior To Rough-In.
4. Receptacles And Telecommunication Jacks, Coverplates, Etc. (If Provided By EC) Shall Be Provided As Indicated On Drawings.
5. For Television Installations, Provide Double Gang Telecommunications Box And (2) 1-1/4" Empty Conduits With Pull String And Bushing.

POWER AND TELECOMMUNICATIONS DEVICE DETAIL | Scale: NTS | Drawing: **E-502** | Detail: **04**

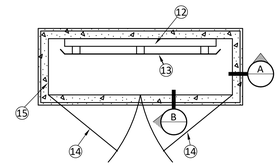
SYMBOLS LEGEND	
Plan View	Detail View
	EXIT
	12:00
F	
F	
T	
S	TT



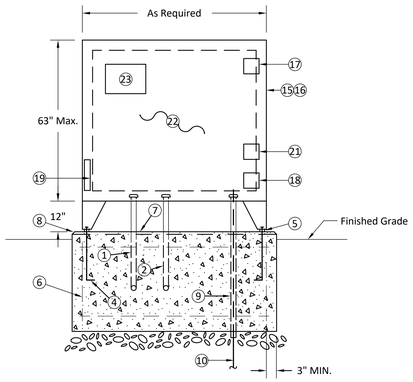
TYPICAL WIRING DEVICE MOUNTING HEIGHT | Scale: NTS | Drawing: **E-502** | Detail: **05**



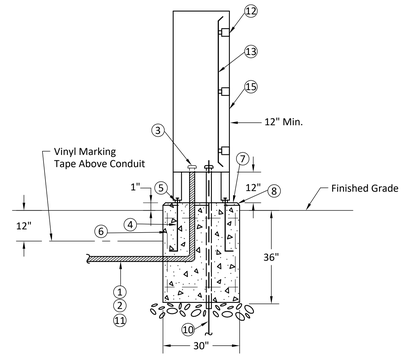
STRIP HEATER DETAIL



PLAN VIEW



SECTION 'A'



SECTION 'B'

ELECTRIC CABINET KEY NOTES (Symbols ①, ②, etc.)

1. Provide 2-2" PVC Schedule 40 Conduits (Spare) From Cabinet To 5" Past Cabinet Foundation For Future Use. Cap Conduits.
2. Conduits (As Required Per Dwgs.) For Feeders, Branch Circuits Etc.
3. Grounding Bushing (Typical).
4. 3/4" X 12" Anchor Bolt With Double Nut & Lock Washer.
5. Stainless Steel 1/4" Thick Spacer (Washer).
6. 1/2" Reinforcing Rod (Typical).
7. 1/4" / Foot Sloping Top.
8. 1" Chamfered Corners.
9. 2" Rigid Metallic Sleeve.
10. 1" Diameter X 10'-0" Long Driven Ground Rod With Clamp.
11. Provide Rigid Metallic Conduit Sweeps Up Into Cabinet. Transition From Rigid Metallic Conduit To Schedule 40 PVC Conduit 5'-0" From Foundation.
12. Body Stiffener Per Mfg. Requirements (Typical).
13. Mounting Panel - (12 Gauge).
14. Double Door (10 Gauge) With Neoprene Gaskets, Continuous Hinge, Stainless Steel Hinge Pins, Padlock Hasp And Padlock, And Screwed On Lamacoid Name Plate As Directed.
15. NEMA - 3R - Enclosure, With Drip Shield.
16. Prime And Paint Cabinet With 2 Coats Of Green Epoxy Paint.
17. 150 Watt Incandescent Lamp Wired To Energize Whenever The Cabinet Doors Are Open Using A Door Switch.
18. 20 Amp GFCI Duplex Receptacle.
19. 175 Watt Strip Heater. Chromalox #OT-817.
20. Strip Heater Guard Designed To Reduce Exposed Surface Temperature To A Safe Limit.
21. Strip Heater Thermostat. Chromalox #WR-90
22. See One Line Diagram For Additional Components.
23. Plexiglass Window To Allow Meter Reading.

NOTES:
1. All Equipment, Devices, Etc. Shall Be In Individual Enclosures. Enclosures Shall Be NEMA 1.
2. All Wiring Inside The Electrical Cabinet Shall Be Pulled Conductors In EMT.
3. No Live Parts Shall Be Exposed Inside The Electrical Cabinet And All Wiring Shall Be In Wire Trough Or Conduit.
4. Submit C/T Cabinet And Meter Details To Utility Co. For Approval.

SINGLE UNIT ELECTRICAL CABINET DETAIL | Scale: NTS | Drawing: **E-502** | Detail: **06**

NOT FOR CONSTRUCTION

BID SET
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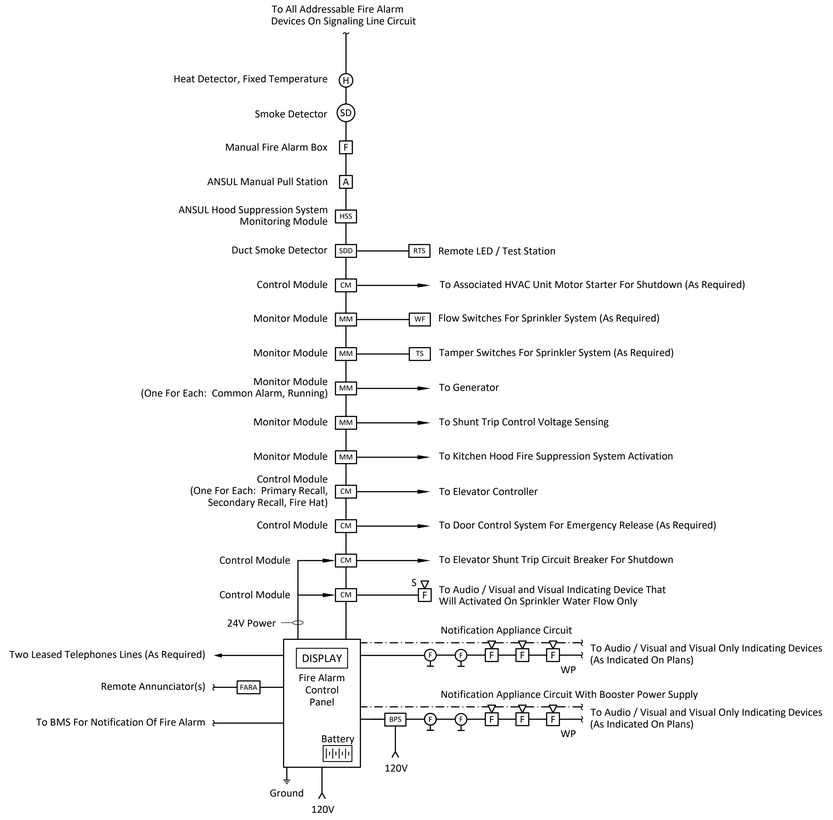
DRWG NO	E-502

FIRE ALARM SYSTEM RESPONSE MATRIX

Initiation Device Or Input		**Response**																				
System	Component	Building									FACP				Annunciator			Central Station				
		Activate Audio / Visual Signals Throughout Building	Shut Down All HVAC Units	Close Fire And / Or Smoke Dampers	Release Doors Held Open With Electro-Magnetic Holders	Activate Door Control System For Emergency Release	Recall Elevator To Primary Floor	Recall Elevator To Secondary Floor	Disconnect Elevator Power (Open Shunt Trip Breaker)	Notification Only	Audio / Visual Annunciation Of Alarm	Audio / Visual Annunciation Of Trouble	Audio / Visual Annunciation Of Supervisory Signal	Notification Only	Audio / Visual Annunciation Of Alarm	Audio / Visual Annunciation Of Trouble	Audio / Visual Annunciation Of Supervisory Signal	Transmit Alarm	Transmit Trouble	Transmit Supervisory Signal	Transmit Notification
General	Manual Fire Alarm Box	X	X	X	X	X	X				X				X			X			
	Heat Detector	X	X	X	X	X	X				X				X			X			
	Smoke Detector	X	X	X	X	X	X				X				X			X			
	Duct Smoke Detector		X	X	X	X					X				X			X			
	FACP Troubles Per NFPA 72											X				X			X		
Elevator	Smoke Detector Elevator Machine Room	X	X	X	X	X	X				X				X			X			
	Smoke Detector Top Of Elevator Shaft	X	X	X	X	X	X				X				X			X			
	Smoke Detector Elevator Lobbies (All Floors Except Main Level Of Egress)	X	X	X	X	X	X				X				X			X			
	Smoke Detector Elevator Lobby (Main Level Of Egress)	X	X	X	X	X		X			X				X			X			
	Heat Detector Elevator Pit, Shaft Or Machine Room	X	X	X	X	X	X		X		X				X			X			
Kitchen	Hood Fire Suppression System Activation	X	X	X	X	X	X				X				X			X			
Sprinkler	Flow Switch	X	X	X	X	X	X				X				X			X			
	Tamper Switch												X				X			X	
Generator	Running													X							X
	Common Alarm												X				X			X	



FIRE ALARM SCHEDULE

MARK	DESCRIPTION
FACP	FIRE ALARM CONTROL PANEL
FARA	REMOTE ANNUNCIATOR FIELD LOCATE PER FIRE MARSHAL
F	MANUAL FIRE ALARM BOX
A	ANSUL MANUAL FIRE ALARM BOX
F	FIRE ALARM AUDIO / VISUAL DEVICE
F	FIRE ALARM STROBE VISUAL DEVICE
H	HEAT DETECTOR
SD	SMOKE DETECTOR
SDD	DUCT SMOKE DETECTOR
RTS	DUCT SMOKE DETECTOR REMOTE LED / TEST STATION
WF	SPRINKLER FLOW SWITCH
TS	SPRINKLER TAMPER SWITCH
CM	FIRE ALARM CONTROL MODULE
MM	FIRE ALARM MONITOR MODULE
HSS	ANSUL HOOD SUPPRESSION SYSTEM MONITOR MODULE
BPS	NOTIFICATION APPLIANCE CIRCUIT BOOSTER POWER SUPPLY
———	POWER OR SIGNALING LINE CIRCUIT
— · —	AUDIO LINE CIRCUIT
S	AUDIO / VISUAL DEVICE THAT ACTIVATES ON SPRINKLER WATER FLOW ONLY

NOTES:

1. General
   - A. The Schematic Riser Diagram Is Intended As An Overview Of The Fire Alarm System Including The General Configuration And Type Of Devices Found Throughout The Building.
   - B. An Addressable Type, Fire Alarm System Shall Be Installed Throughout The Building. This System Shall Consist Of A Central Fire Alarm Control Panel (FACP), Detection Devices, And Notification Appliances.
   - C. The FACP Shall Automatically Contact A Central Station Monitoring Service Via A Digital Alarm Communication Transmitter (DACT) During An Alarm, Trouble, Or Supervisory Condition.
2. Equipment
   - A. Contractor Shall Allow Enough Flexibility In Bid Price To Include Additional Fire Alarm Devices Required By Fire Marshal.
   - B. Provide All Required Expansion Panels, PC Boards, Power Supplies, Batteries, Branch Circuits, Fuse Cutouts (Where Required), And NAC Signal Power Boosters, For A Complete And Operable Fire Alarm System.
   - C. Coordinate Exact Location, Quantity, And Voltage Of Smoke Dampers And Duct Smoke Detectors With Mechanical Contractor.
   - D. Control Modules For Elevator Recall Must Be Located Within Three Feet Of Elevator Controller. Control Module For Shunt Trip Of Elevator Must Be Located Within Three Feet Of Circuit Breaker.
   - E. Provide Remote LED Indicator / Test Station In Ceiling At RTU Locations Equipped With Duct Smoke Detector.
3. Wiring
   - A. The FACP Power Supply Shall Be Derived From A Dedicated, Lockable Electrical Circuit (Colored Red) As Well As An Internal Battery Sized To Provide 15 Minutes Of Alarm Condition After 24 Hours Of Operation Without Normal Power And Include 20% Additional Spare Capacity.
   - B. The FACP Ground Shall Consist Of An #8 AWG Conductor In 3/4" Conduit From The Fire Alarm Control Panel (FACP) To The Building's Grounding Electrode System. Bond To Metallic Conduit On Both Ends With Listed Hardware.
   - C. The Fire Alarm System's Wiring Method Shall Be Class A Rated Between Panels (Where Applicable) And Class B Rated For Detection Devices And Notification Appliances.
   - D. Each Notification Appliance Circuit Shall Contain A Minimum Of 30% Spare Capacity.
   - E. Provide Connections To Each Sprinkler System Waterflow & Tamper Switch (Refer To Fire Protection Plans).
4. Testing
   - G. Perform A Final Acceptance Test Of The Entire Fire Alarm System In Accordance With All Applicable Codes Including The International Building Code (IBC) And NFPA 72 By NICET Level II Or Greater Certified Fire Alarm Technician.

FIRE ALARM RISER DIAGRAM | Scale: NTS | Drawing: **E-503** | Detail: **01**

NOT FOR CONSTRUCTION

BID SET
02-22-2017

dlb associates
CONSULTING ENGINEERS, P.C.
One Penn Plaza, Suite 2601, New York, NY 10119

Questions For dlb Call:
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TEL: 973.379.0006 FAX: 973-379-1061
CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

FIRE ALARM DETAILS & RISER DIAGRAM

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-503

COMcheck Software Version 4.0.5.0

Interior Lighting Compliance Certificate

Project Information

Energy Code: 90.1 (2013) Standard
Project Title: Ashbrook Golf Course - Club House
Project Type: New Construction

Construction Site:
1210 Raritan Road
Scotch Plains, NJ 07076

Owner/Agent:

Designer/Contractor:
DLB Associates
One Penn Plaza
Suite 2601
New York, NY 10119

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Vestibule 100 (Common Space Types:Lobby - General)	135	0.90	122
2-Vestibule 101 (Common Space Types:Lobby - General)	1293	0.90	1164
3-Pro Shop 207 (Retail:Sales Area)	781	1.43	1125
4-Office 109 (Common Space Types:Office - Enclosed)	67	1.11	74
5-Office 108 (Common Space Types:Office - Open Plan)	171	0.98	168
6-IT 110 (Common Space Types:Electrical/Mechanical)	65	0.42	27
7-Union County 102 (Common Space Types:Office - Enclosed)	186	1.11	206
8-Conference 103 (Common Space Types:Conference/Meeting/Multipurpose)	164	1.23	202
9-Office 104 (Common Space Types:Office - Open Plan)	213	0.98	209
10-Storage 111 (Common Space Types:Storage >=50 - <=1000 sq.ft.)	90	0.63	57
11-Mens Toilet 106 (Common Space Types:Restrooms)	144	0.98	141
12-Womens Toilet 105 (Common Space Types:Restrooms)	154	0.98	151
13-Womens Toilet 113 (Common Space Types:Restrooms)	216	0.98	212
14-Mens Toilet 115 (Common Space Types:Restrooms)	219	0.98	215
15-Janitor's Closet 114 (Common Space Types:Storage <50 sq.ft.)	26	1.24	32
16-Walk In Freezer (Common Space Types:Storage >=50 - <=1000 sq.ft.)	338	0.63	213
17-Kitchen (Common Space Types:Food Preparation)	338	1.20	409
18-Resturant / Bar (Common Space Types:Dining Area - Bar Lounge/Leisure)	3073	1.7	3288
19-Stair #1 (Common Space Types:Stairwell)	164	0.69	113
20-Bar Storage L09 (Common Space Types:Storage)	98	0.63	62
21-Mechanical Room L08 (Common Space Types:Electrical/Mechanical)	95	0.42	40
22-Cart Storage L07 (Common Space Types:Storage)	4715	0.63	2970
23-Turnstand L01 (Common Space Types:Food Preparation)	453	1.20	548
24-Break Room L02 (Common Space Types:Lounge/Breakroom)	327	0.73	239
25-Corridor L03 (Common Space Types:Corridor/Transition >=8 ft wide)	218	0.66	144
26-Men's Locker Room L04 (Common Space Types:Locker Room)	225	0.75	169
27-Women's Locker Room L04 (Common Space Types:Locker Room)	225	0.75	169
28-Storage (Common Space Types:Storage >=50 - <=1000 sq.ft.)	670	0.63	422
29-Staff Locker Room L22 (Common Space Types:Locker Room)	124	0.75	93
30-Janitors Closet L21 (Common Space Types:Storage)	26	0.63	16
31-Toilet Room L20 (Common Space Types:Restrooms)	67	0.98	66
32-Kitchen Storage L17 (Common Space Types:Storage)	866	0.63	546
33-Stair #1 (Common Space Types:Stairwell)	164	0.69	113

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
34-Chef's Office L18 (Common Space Types:Office - Enclosed)	90	1.11	100
35-Elevator Machine Room (Common Space Types:Electrical/Mechanical)	42	0.42	18
36-Storage Room L15 (Common Space Types:Storage)	493	0.63	311
37-Storage Room L14 (Common Space Types:Storage)	323	0.63	203
38-Storage Room L11 (Common Space Types:Storage)	123	0.63	77
39-Hot Water Heater Room (Common Space Types:Electrical/Mechanical)	70	0.42	29
40-Fire Sprinkler Room L13 (Common Space Types:Electrical/Mechanical)	228	0.42	96
41-Electrical Room L12 (Common Space Types:Electrical/Mechanical)	307	0.42	129
		Total Allowed Watts =	14686

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Vestibule 100 (Common Space Types:Lobby - General)				
Ashbrook - Fixture K: K: Surface Mounted Linear LED W/Fl: LED Linear 8W:	1	10	4	40
Ashbrook - Fixture S-1: S-1: LED Downlight 8": LED Panel 54W:	1	2	54	108
2-Vestibule 101 (Common Space Types:Lobby - General)				
Ashbrook - Fixture AA: AA: LED Wall Grazer W/Fl: LED Linear 10W:	1	106	9	954
Ashbrook - Fixture H: H: Custom 72" LED Ring: LED Panel 70W:	1	2	72	144
Ashbrook - Fixture J: J: Surface Mounted Linear LED W/Fl: LED Linear 8W:	1	108	4	432
3-Pro Shop 207 (Retail:Sales Area)				
Ashbrook - Fixture E-1: E-1: 1.8" Diameter Downlight: LED A Lamp 25W:	1	10	14	145
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	15	14	216
Ashbrook - Fixture D: LED Cove Light W/Fl: LED PAR 7W:	1	55	7	385
4-Office 109 (Common Space Types:Office - Enclosed)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	2	37	74
5-Office 108 (Common Space Types:Office - Open Plan)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	5	37	185
6-IT 110 (Common Space Types:Electrical/Mechanical)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	2	37	74
7-Union County 102 (Common Space Types:Office - Enclosed)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	4	37	148
8-Conference 103 (Common Space Types:Conference/Meeting/Multipurpose)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	4	37	148
9-Office 104 (Common Space Types:Office - Open Plan)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	6	37	222
10-Storage 111 (Common Space Types:Storage >=50 - <=1000 sq.ft.)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	2	37	74
11-Mens Toilet 106 (Common Space Types:Restrooms)				
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	2	14	29
Ashbrook - Fixture F: F: Recessed LED Slot (W/Fl): LED Other Fixture Unit 6.5W:	1	16	4	61
12-Womens Toilet 105 (Common Space Types:Restrooms)				
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	2	14	29
Ashbrook - Fixture F: F: Recessed LED Slot (W/Fl): LED Other Fixture Unit 6.5W:	1	16	4	61
13-Womens Toilet 113 (Common Space Types:Restrooms)				
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	4	14	58
Ashbrook - Fixture F: F: Recessed LED Slot (W/Fl): LED Other Fixture Unit 6.5W:	1	20	4	76
14-Mens Toilet 115 (Common Space Types:Restrooms)				

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	4	14	58
Ashbrook - Fixture F: F: Recessed LED Slot (W/Fl): LED Other Fixture Unit 6.5W:	1	20	4	76
15-Janitor's Closet 114 (Common Space Types:Storage <50 sq.ft.)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	1	41	41
16-Walk In Freezer (Common Space Types:Storage >=50 - <=1000 sq.ft.)				
Ashbrook - Fixture A: A: 2' X 4' Prismatic Trofter: LED Panel 60W:	1	3	58	174
17-Kitchen (Common Space Types:Food Preparation)				
Ashbrook - Fixture A: A: 2' X 4' Prismatic Trofter: LED Panel 60W:	1	15	58	870
18-Resturant / Bar (Common Space Types:Dining Area - Bar Lounge/Leisure)				
Ashbrook - Fixture C: C: 16" Pendant Mounted: LED Other Fixture Unit 46W:	1	4	45	180
Ashbrook - Fixture E-1: E-1: 1.8" Diameter Downlight: LED A Lamp 25W:	1	9	14	130
Ashbrook - Fixture E: E: 1.8" Diameter Downlight: LED A Lamp 25W:	1	18	14	261
Ashbrook - Fixture D: D: 16" Pendant Mounted: LED Other Fixture Unit 25W:	1	60	25	1500
Ashbrook - Fixture M: M: Pendant LED Downlight: LED Other Fixture Unit 50W:	1	8	50	400
Ashbrook - Fixture X: X: LED Tape Light W/Fl: LED Linear 8W:	1	128	4	512
Ashbrook - Fixture J: J: Surface Mounted Linear LED W/Fl: LED Linear 8W:	1	77	4	308
Ashbrook - Fixture C-1: C-1: 52" Pendant Mounted: LED Other Fixture Unit 60W:	1	4	61	244
19-Stair #1 (Common Space Types:Stairwell)				
Ashbrook - Fixture U: U: LED Stair Lighter: LED Panel 54W:	1	3	52	156
20-Bar Storage L09 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	3	41	123
21-Mechanical Room L08 (Common Space Types:Electrical/Mechanical)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	2	41	82
22-Cart Storage L07 (Common Space Types:Storage)				
Ashbrook - Fixture CC-1: CC-1: Recessed LED Downlight: LED A Lamp 25W:	1	16	22	352
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	28	41	1148
23-Turnstand L01 (Common Space Types:Food Preparation)				
Ashbrook - Fixture CC-2: CC-2: Recessed LED Downlight: LED Other Fixture Unit 46W:	1	9	46	414
24-Break Room L02 (Common Space Types:Lounge/Breakroom)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	8	37	296
25-Corridor L03 (Common Space Types:Corridor/Transition >=8 ft wide)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	4	37	148
26-Men's Locker Room L04 (Common Space Types:Locker Room)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	3	37	111
27-Women's Locker Room L04 (Common Space Types:Locker Room)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	3	37	111
28-Storage (Common Space Types:Storage >=50 - <=1000 sq.ft.)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	9	41	369
29-Staff Locker Room L22 (Common Space Types:Locker Room)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	2	37	74
30-Janitors Closet L21 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	1	41	41
31-Toilet Room L20 (Common Space Types:Restrooms)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	1	37	37
32-Kitchen Storage L17 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	8	41	328
Ashbrook - Fixture CC-1: CC-1: Recessed LED Downlight: LED A Lamp 25W:	1	2	22	44
33-Stair #1 (Common Space Types:Stairwell)				
Ashbrook - Fixture U: U: LED Stair Lighter: LED Panel 54W:	1	1	52	52
34-Chef's Office L18 (Common Space Types:Office - Enclosed)				
Ashbrook - Fixture P: P: Recessed Panel Trofter: LED Panel 38W:	1	2	37	74
35-Elevator Machine Room (Common Space Types:Electrical/Mechanical)				

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	1	41	41
36-Storage Room L15 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	6	41	246
37-Storage Room L14 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	3	41	123
38-Storage Room L11 (Common Space Types:Storage)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	2	41	82
39-Hot Water Heater Room (Common Space Types:Electrical/Mechanical)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	1	41	41
40-Fire Sprinkler Room L13 (Common Space Types:Electrical/Mechanical)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	3	41	123
41-Electrical Room L12 (Common Space Types:Electrical/Mechanical)				
Ashbrook - Fixture Z: Z: LED Strip Light: LED Panel 41W:	1	4	41	164
		Total Proposed Watts =		13199

Interior Lighting PASSES: Design 10% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 90.1 (2013) Standard requirements in COMcheck Version 4.0.5.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	TYPICAL LOCATION & APPLICATION	MOUNTING	VOLTAGE	LAMP TYPE	WATTAGE PER UNIT	MFG	CATALOG NUMBER
R	52" Diameter, Universal Mount For Flat or Sloped Ceilings. Settings Include On / Off, Sleep Mode And 16 Dimminable Light Levels	Throughout	Ceiling	120	LED	40	Haiku	L3127-X5-XX-XX-00-E
EX	Architectural Edgelith LED Exit Sign, Clear Or Mirrored Face, 6" Green Lettering, Battery Backup, Self Diagnostics, UL Listed	Throughout	Wall / Ceiling	277	LED	3	Evenlite	SOV-EM-G-1C-TRIM-FINISH-MOUNTING-CHEVRON DIRECTION-SD

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	TYPICAL LOCATION & APPLICATION	MOUNTING	VOLTAGE	LAMP TYPE	WATTAGE PER UNIT	MFG	CATALOG NUMBER
A	Recessed LED Primastic Troffer, Nominal 4'L X 2' W X 4-3/8" H, With 5000 Lument LEDs, 3500K, 80 CRI, Acrilic Prismatic Lens Installed With Prism Facing Into Housing, Triple Gasket, 0-10V Dimming, cETLus Listed For Damp Locations	Throughout	Recessed	277	LED	58	HE Williams	50G-S24-L65-835-S-AF12125 (INVERTED LENS)-TG/MYLAR-L50-DIM-UNV
C	Pendant Mounted Decorative Luminaire, Nominal 16" Diameter Mounting Plate With (5) LED Pendant Components, Overall 50" Height (Luminaire Only), With 2700K LEDs, Silver Braided Power Cord / Suspension Calbes, cETLus Listed, 0-10V Dimming	Throughout	Pendant	277	LED	45	OCL Glowstick Pendant Cluster	GS1-P5CA-07-CR-PTD-SLD9/27K-VOLTS-50-DMO-FUS
C-1	Pendant Mounted Decorative Luminaire, Nominal 52" Height (Luminaire Only, Does Not Include Pendant Cable To And From Canopy) With 2700K LEDs, Silver Braided Power Cord / Suspension Cables, cULus And cETL Listed, 0-10V Dimming	Throughout	Pendant	277	LED	63	OCL Glowstick Pendant Cluster	GS1-P7CA-08-PTD-7LD9/27K-VOLTS-50-DMO-FUS
D	Pendant Mounted LED Fixture With Integral Dirvier, 0-10V Dimming With Medium Optical Distribution Option. Matte White Acrylic Cylinder.	Throughout	Pendant	277	LED	86	VISA Lighting	CP2038-L30K-MVOLT-L20K-MED-TW9016-36"
D-1	Pendant Mounted LED Fixture With Integral Dirvier, 0-10V Dimming With Medium Optical Distribution Option. Matte White Acrylic Cylinder.	Throughout	Pendant	277	LED	86	VISA Lighting	CP2044-L30K-MVOLT-L20K-MED-TW9016-72"
E	Recessed Fixed LED Downlight, Nominal 2" Diameter Aperature, W/Nominal 935 Lumen LEDs, 2700K, 85 CRI, High Brightness Flood Beamspread, Listed For Wet Locations, 0-10V Dimming	Throughout	Recessed	277	LED	14.5	WAC	HR2LED-T109P-F-827-FINISH+HR-2LED-HO9D-ICA
E-1	Recessed Adjustable LED Downlight, Nominal 2" Diameter Aperature, W/Nominal 750 Lumen LEDs, 2700K, 85 CRI, High Brightness Flood Beamspread, Listed For Damp Locations, 0-10V Dimming.	Throughout	Recessed	277	LED	14.5	WAC	HR2LED-T309P-F-827-FINISH+HR-2LED-HO9D-ICA
F	Recessed Linear LED Slot Luminaire, Length To Be Field Determined Prior To Ordering X 4"W Aperature X 5.88"H, With Nominal 375 Lumens Per Linear Foot, 3000K LEDs, 80+ CRI, Regressed Satin Lens, 0-10V Dimming, UL and cUL Listed	Throughout	Recessed	277	LED	3.75 W/Ft	Focal Point Seem 4	FSM4L05R-375LF-30K-1C-VOLTS-LD1-G1-WH-LENGTH IN 1" INCREMENTS
H	Custom Decorative Chandelier, Nominal 72" Ring With (8) Pendant Mounted 2700K LED Cylinders. 0-10V Dimming, See Cut Sheet For Details.	Throughout	Pendant	277	LED	TBD	G-Lighting	P-18787-A
J	Surface Mounted Linear LED Wall Glazer / Washer, Nominal 1' L X 1.64" W X 1.99" H (Folded Position), With Nominal 678 Lumens Per Linear Foot, 2700K LEDs, 25 X 75 Degree Wall Wash, Beam Spread, Nominal 4 Input Watts Per Linear Foot, cETLus Listed For Interior Locations, 0-10V Dimming, Power Supply And DMX Subcontroller	Throughout	Surface	277	LED	4 W/Ft	EcoSense Trov	L50-I-12-04-27-80-MULT-25X75
K	Surface Mounted Linear LED Wall Glazer / Washer, Nominal 1' L X 1.64" W X 1.99" H (Folded Position), With Nominal 678 Lumens Per Linear Foot, 2700K LEDs, 25 X 75 Degree Wall Wash, Beam Spread, Nominal 4 Input Watts Per Linear Foot, cETLus Listed For Exterior Locations, 0-10V Dimming, Power Supply And DMX Subcontroller	Throughout	Surface	277	LED	4 W/Ft	EcoSense Trov	L50-E-12-08-27-80-MULT-25X75
L	Surface Mounted Exterior Rated LED Tape Light Lengths To Be Field Varified Prior To Purchasing, With 2700K LEDs,, UL Listed, Dimmable With MLV Dimmers	Throughout	Surface	277	LED	2 W/Ft	WAC	Tape: 8011/8051/8101-27-BK+OPTIONS+TRANSFORMER
M	Pentant (Cable_ Mounted Decorative Downlight, Nominal 3-1/16"D X 5-7/8"H (Does Not Include Cord Length), WX1X10. 10-Watt Incandescent Lamp, 120V Only, ETL Listed For Dry Locations Only.	Throughout	Pendant	120	Incandescent	10	Fabbian Bijou	D75A01A01-A16105-Finishes
N	Ingraded Directional LED Uplight, Nominal 11-5-16"D X 9-1/16"H, With 840 Lummenl, BW, 3000K LEDs, 30 Degree Tilt And 360 Degree Rotation cULus Listed For Wet Locations	Throughout	Surface	277	LED	8	Erco Tesis	33637-023
P	Recessed Shallow Plenum Center Acrylic Panel Troffer, Nominal 4'L X 2'W X 2-3/8"H, With Nominal 3800 Lumen, 3500K LEDs, 0-10V Dimming cCSAus Listed For Dry Locations	Throughout	Recessed	277	LED	37	HE Williams	PT-22-L38-835-RA-DIM-UNV
Q	Curvable Surface Mount LED Cove Light, Lengths To Be Field Varified Prior To Purchase, Nominal 4-5/16"L x 2.5"W x 1-3/4"H Per Module, With 2700K LEDs, UL Listed, TRIAC Dimming (Conult Factory)	Throughout	Surface	277	LED	7 W/Ft	Tivoli	TVCP-01-27-S-PWR-2+(8) TVCP-01-27-S-LE6
S	Wall Mounted LED Downlight Cylinder With Away-From-Wall Distribution, Nominal 5"D X 7"H With 1210 Delivered Lumens, 2700K LEDs, CTL and cETL Listed For Wet Locations, 0-10V Dimming	Throughout	Wall	277	LED	24	WAC	DS-WS05-F27A-FINISH
S-1	Wall Mounted LED Downlight Cylinder With Away-From-Wall Distribution, Nominal 8"D X 7"H With 3300 Delivered Lumens, 2700K LEDs, CTL and cETL Listed For Wet Locations, 0-10V Dimming	Throughout	Wall	277	LED	54	WAC	DS-WS08-F27A-FINISH
T	Recessed Square Aperture LED Wide Flood Downlight Nominal 4.5" X 4.5" Aperature X 3"H With 1028 Delivered Lumen, 2700K LEDs, Wide Flood Distribution, UL Listed For Wet Locations Under A Covered Cielling, 0-10V Dimming	Throughout	Recessed	277	LED	21	Kirlin	LRS-04046-27K-WFL
U	Surface Mounted LED Stair Lighter, Nominal 4"L X 9.4"W X 3.6"H, With 3000K LEDs, 5958 Lumens (MAX Mode), Vandal Resistant, Lifetime Warranty Due To Vandalism, UL Listed For Damp Locations	Throughout	Surface	277	LED	52	Luminaire	TSL9-4-50W-3000K-M7-VOLTS-OP-FINISH-DAMP
V	Ground Mounted LED Bollard, Nominal 8"D X 4'H, With 2700K LEDs, White Translucent UV Stabilized Acrylic Diffuser, Integral Driver, INRTL Ranted For Wet Locations.	Throughout	Ground	277	LED	31	Selux Corral	CORL-4-4L35-27-FINISH-VOLTS-OPTIONS
W	Wall Mounted LED Up / Down Sconce, Nominal 5"D X 8"H With 2700K LEDs, Narrow Flood Beamspread, Nominal 15W Up and 15W Down, Finish By Architect, ETL Listed For Wet Locations, IP 66, 0-10V Dimming	Throughout	Wall	277	LED	30	OCL Vega	WA2-010A-08-NF-FINISH-2LD15/27K-VOLTS-DMO-OPTIONS
X	Surface Mounted Interior Rated LED Tape Light, Lengths To Be Field Verified Prior To Purchasing, With 2700K LEDs, Nominal 325 Lumens Per Foot, UL Listed ELV Dimming	Throughout	Surface	277	LED	4 W/Ft	WAC	LED-TX24-27-LENGTH-WT+EN-24100-RB2-T+OPTIONS
Y	Ground Mounted LED Bollard, Nominal 8"D X 2.5'H, With 2700K LEDs, White Translucent UV Stabilized Acrylic Diffuser, Integral Driver, INRTL Ranted For Wet Locations.	Throughout	Ground	277	LED	31	Selux Corral	CORL-2.5-4L35-27-FINISH-VOLTS-OPTIONS
Z	Pendant Mounted Linar LED Striplight Nominal 4'L X 2-5/8" W X 3-7/16"H, With 4100Lumeens, 3000K LEDs, Round Frosted Acrylic Lens, UL Listed.	Throughout	Pendant	277	LED	41	HE Williams	LLM-4-L41-830-S-RD-ED-UT-UNV
AA	Cantilever Mounted Linear LED Rotatable Wall Grazer, Nominal Length X 3.25" Diameter Tube With 18" Arms And Additional Tie Back To Wall, With 800 Lumens Per Foot, 2700K LEDs, Satin Anodized Finish, UL Listed, 0-10V Dimming.	Throughout	Cantilever	277	LED	9 W/Ft	Birchwood Hailey	HAI-LED-32S-HLO-27-LENGTH-SC-FW-VOLTS-D1-RAS-XXX-XX-SC-18-TB
CC-1	Shallow Plenum Recessed LED Downlight, Nominal 4" Diameter Aperture X 2-3/4"H, With 2700K LEDs, Regressed Tempered Parismatic Spread Lens, 0-10V Dimming, Acrylic Enamel Aluminum Housing, UL Listed For Wet Locations Under A Covered Ceiling.	Throughout	Recessed	277	LED	22	Kirlin	LRR-04006-27K-WFL
CC-2	Shallow Plenum Recessed LED Downlight, Nominal 4" Diameter Aperture X 2-3/4"H, With 2700K LEDs, Regressed Tempered Parismatic Spread Lens, 0-10V Dimming, Acrylic Enamel Aluminum Housing, UL Listed For Wet Locations Under A Covered Ceiling.	Throughout	Recessed	277	LED	46	Kirlin	LRR-05440-27K-WFL

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

LIGHTING SCHEDULES - 1

SUBMISSIONS		REVISIONS		
DATE	DESCRIPTION	DATE	DESCRIPTION	
10.03.16	100% ISSUE			
10.17.16	BID SET			
02.22.17	REBID SET			

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-601

ELECTRICAL DEMAND LOAD SUMMARY PANEL MDP

CONTINUOUS LOAD				
Lighting	32,190 W	x 100% =	32.2 kW	
NON-CONTINUOUS RECEPTACLE LOAD				
First 10 kVA	10,000 W	x 100% =	10.0 kW	
Remainder	185,810 W	x 50% =	92.9 kW	
HVAC LOAD				
Mechanical - Cooling	25,373 W	x 0% =	0.0 kW	
Largest Motor Load	6,349 W	x 25% =	1.6 kW	
Mechanical - Heating	141,782 W	x 100% =	141.8 kW	
MISCELLANEOUS LOAD				
Non-Defined	9,855 W	x 100% =	9.9 kW	
KITCHEN LOADS				
Cooking Equipment	16,301 W	x 65% =	10.6 kW	

TOTAL CALCULATED DEMAND LOAD: 298.9 kW
ELECTRIC UTILITY SERVICE VOLTAGE: 480Y/277V
TOTAL CALCULATED DEMAND AMPERAGE: 360 AMPS

SCHEDULE FOR DISTRIBUTION BOARD: MDP

SYSTEM: **480Y/277V, 3Ø, 4W** | NUMBER OF POLES: **CONTINUOUS BUS** | AREA SERVED: **ASHBROOK GOLF COURSE CLUB HOUSE**
BUS RATING: **600 A** | MINIMUM CB IC: **42kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**
MAINS TYPE: **MCB** | MAINS RATING: **600 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **UTILITY**

CIR. #	SERVES	LOAD kVA	LOAD AMP	CIRCUIT BREAKER P	CIRCUIT BREAKER FRAME	CIRCUIT BREAKER TRIP	MINIMUM FEEDER AND CONDUIT SIZE	COMMENTS
1	Panel LP-LL-1	33	40	3	100	100	See One Line Diagram	
2	Panel HP-1	188	226	3	250	250	See One Line Diagram	
3	Panel RP-CL-1	80	96	3	125	125	See One Line Diagram	
4	Panel RP-LL-1	138	165	3	125	125	See One Line Diagram	
5	Elevator	6	7	3	30	30	See One Line Diagram	
6	Panel EM-LP-1	5	7	3	100	100	See One Line Diagram	
7	Panel STBY-PP-1	18	22	3	45	45	See One Line Diagram	
8								

TOTAL CONNECTED LOAD (kVA): 468 | **TOTAL DEMAND LOAD (kVA): 299**
TOTAL CONNECTED LOAD (AMPS): 563 | **TOTAL DEMAND LOAD (AMPS): 360**

NOTES:
1. The Capacity Of All Switchboard Distribution Board Bus Bars Shall Remain Consistent Throughout The Entire Length / All Sections. Do Not Reduce The Ampacity Between Sections.
2. Provide 100% Rated Neutral Bus In All Switchboards And Distribution Boards Unless Specifically Noted Otherwise.
3. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
4. Elevator Circuit Breaker Shall Be Shunt Trip And Tied Into Elevator Control Panel.

SCHEDULE FOR PANEL: LP-LL-1

SYSTEM: **480Y/277V, 3Ø, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **LOWER LEVEL**
BUS RATING: **125 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER ELEVEL ELECTRICAL CLOSET**
MAINS TYPE: **MCB** | MAINS RATING: **100 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Lighting Zone #8	847	2#12, #12 G, 3/4" C	1	20	1700			20	1	2#12, #12 G, 3/4" C	853	Lighting Zone #9	2
3	Lighting Zone #10	1064	2#12, #12 G, 3/4" C	1	20		1720		20	1	2#12, #12 G, 3/4" C	656	Lighting Zone #11	4
5	Spare			1	20			0	20	1			Spare	6
7	Spare			1	20	0			20	1			Spare	8
9	Spare			1	20		0		20	1			Spare	10
11	Spare			1	20			0	20	1			Spare	12
13	Spare			1	20	0			20	1			Spare	14
15	Spare			1	20		0		20	1			Spare	16
17	Spare			1	20			0	20	1			Spare	18
19	Spare			1	20	0			20	1			Spare	20
21	Spare			1	20		0		20	1			Spare	22
23	Spare			1	20			0	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	12242						12242		38
39	Space			1	-		11566		60	3	See One Line Diagram	11566	Panel LP-CL-1	40
41	Space			1	-			6062				6062		42
						13942	13286	6062	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): 33290 | 50 | 48 | 22 AMPS PER PHASE | **40** **TOTAL CONNECTED LOAD (AMPS)**

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

SCHEDULE FOR PANEL: LP-CL-1

SYSTEM: **480Y/277V, 3Ø, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **CLUB HOUSE LEVEL**
BUS RATING: **125 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **JANITOR'S CLOSET**
MAINS TYPE: **MCB** | MAINS RATING: **60 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL LP-LL-1**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Site Lighting	4432	2#12, #12 G, 3/4" C	1	20	5729			20	1	2#12, #12 G, 3/4" C	1297	Lighting Zone #1	2
3	Site Lighting	4432	2#12, #12 G, 3/4" C	1	20		4820		20	1	2#12, #12 G, 3/4" C	388	Lighting Zone #2	4
5	Site Lighting	4432	2#12, #12 G, 3/4" C	1	20			4935	20	1	2#12, #12 G, 3/4" C	503	Lighting Zone #3	6
7	Site Lighting	4432	2#12, #12 G, 3/4" C	1	20	5754			20	1	2#12, #12 G, 3/4" C	1322	Lighting Zone #4	8
9	Site Lighting	4432	2#12, #12 G, 3/4" C	1	20		5962		20	1	2#12, #12 G, 3/4" C	1530	Lighting Zone #5	10
11	Spare			1	20			823	20	1	2#12, #12 G, 3/4" C	823	Lighting Zone #6	12
13	Spare			1	20	759			20	1	2#12, #12 G, 3/4" C	759	Lighting Zone #7	14
15	Spare			1	20		784		20	1	2#12, #12 G, 3/4" C	784	Lighting Zone #12	16
17	Spare			1	20			304	20	1	2#12, #12 G, 3/4" C	304	Lighting Zone #13	18
19	Spare			1	20	0			20	1			Spare	20
21	Spare			1	20		0		20	1			Spare	22
23	Spare			1	20			0	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	0			-	1			Space	38
39	Space			1	-		0		-	1			Space	40
41	Space			1	-			0	-	1			Space	42
						12242	11566	6062	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): 29870 | 44 | 42 | 22 AMPS PER PHASE | **36** **TOTAL CONNECTED LOAD (AMPS)**

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

TRANSFORMER SCHEDULE

NAME	LOCATION	TYPE	PRIMARY VOLTAGE	PRIMARY CONFIG.	SECONDARY VOLTAGE	SECONDARY CONFIG.	WINDING MATERIAL	RATING (kVA)	PHASE	TEMP. RISE (°C)	APPROX. SIZE / WEIGHT H (")	W (")	D (")	(LBS)	MOUNTING	MODEL #
HP-2	Lower Level Electric Room	Dry Type	480	Delta	208/120	Wye	Copper	75	Three	150	37	30	20	410	Floor	
RP-CL-1	Lower Level Electric Room	Dry Type	480	Delta	208/120	Wye	Copper	75	Three	150	37	30	20	410	Floor	
RP-LL-1	Lower Level Electric Room	Dry Type	480	Delta	208/120	Wye	Copper	75	Three	150	37	30	20	410	Floor	
STBY-PP-1	Lower Level Electric Room	Dry Type	480	Delta	208/120	Wye	Copper	45	Three	150	30	20	20	320	Floor	

NOTES:
1. All Transformers Shall Be Bonded To Grounding Electrode System; Refer To Detail.
2. Naming Conventions Utilized For Transformers:
   T = Transformer (General Loads)
   CT = Computer Transformer (Computer / Electronic Loads Only)
   ET = Emergency Transformer (Part Of Emergency Distribution System)
3. Basis Of Design Is Square D:
   Model Prefix EE = NEMA TP1, General Purpose Or K13 Rated
   Model Prefix EP = NEMA Premum, General Purpose Or K13 Rated
   Model Prefix HM = NEMA Premum, Harmonic Mitiitgating Type
4. Harmonic Mitigating Transformers Shall Be +30° Phase Shift Unless Otherwise Indicated.
5. Provide Manufacturer's Ceiling / Wall Bracket Where Ceiling / Wall Mounting Is Indicated.

SCHEDULE FOR PANEL: EM-LP-1

SYSTEM: **480Y/277V, 3Ø, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **ASHBROOK GOLF COURSE**
BUS RATING: **125 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**
MAINS TYPE: **MCB** | MAINS RATING: **100 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	LIGHTING ZONE 1	356	2#12, #12 G, 3/4" C	1	20	866			20	1	2#12, #12 G, 3/4" C	510	LIGHTING ZONE 2	2
3	LIGHTING ZONE 3	510	2#12, #12 G, 3/4" C	1	20		910		20	1	2#12, #12 G, 3/4" C	400	LIGHTING ZONE 4	4
5	LIGHTING ZONE 5	620	2#12, #12 G, 3/4" C	1	20			938	20	1	2#12, #12 G, 3/4" C	318	LIGHTING ZONE 6	6
7	LIGHTING ZONE 7	216	2#12, #12 G, 3/4" C	1	20	1074			20	1	2#12, #12 G, 3/4" C	858	LIGHTING ZONE 8	8
9	LIGHTING ZONE 9	655	2#12, #12 G, 3/4" C	1	20		1142		20	1	2#12, #12 G, 3/4" C	487	LIGHTING ZONE 10	10
11	LIGHTING ZONE 11	385	2#12, #12 G, 3/4" C	1	20			465	20	1	2#12, #12 G, 3/4" C	80	LIGHTING ZONE 12	12
13	LIGHTING ZONE 13	32	2#12, #12 G, 3/4" C	1	20	32				1				14
15				1			0			1				16
17				1				0		1				18
19				1		0				1				20
21				1			0			1				22
23				1				0		1				24
25				1		0				1				26
27				1			0			1				28
29				1				0		1				30
31				1		0				1				32
33				1			0			1				34
35				1				0		1				36
37				1		0				1				38
39				1			0			1				40
41				1				0		1				42
						1972	2052	1403	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): 5427 | 7 | 7 | 5 AMPS PER PHASE | **7** **TOTAL CONNECTED LOAD (AMPS)**

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

SCHEDULE FOR PANEL: STBY-PP-1

SYSTEM: **208Y/120V, 3Ø, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **ASHBROOK GOLF COURSE CLUBHOUSE**
BUS RATING: **225 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**
MAINS TYPE: **MCB** | MAINS RATING: **175 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Kitchen Walk In Freezer	1414	2#12, #12 G, 3/4" C	2	20	2236			20	2	2#12, #12 G, 3/4" C	822	Defroster & Fan Kitch Walk In	2
3		1414					2236					822		4
5	Kitchen Walk In Freezer	1082	2#12, #12 G, 3/4" C	2	20			1289	20	1	2#12, #12 G, 3/4" C	207	Fan Kitch Walk In	6
7		1082				2331						1249		8
9	Turnstand Reach In Fridge	1725	2#12, #12 G, 3/4" C	1	20		2974		20	3	3#12, #12 G, 3/4" C	1249	Kitchen Storage Walk In	10
11	Turnstand Reach In Fridge	1725	2#12, #12 G, 3/4" C	1	20			2974				1249		12
13	Spare			1	20	1249						1249		14
15	Spare			1	20		1249		20	3	3#12, #12 G, 3/4" C	1249	Kitchen Storage Walk In	16
17	Spare			1	20			1249				1249		18
19	Spare			1	20	414			20	1	2#12, #12 G, 3/4" C	414	Kitchen Storage Freezer Fan	20
21	Spare			1	20		0		20	1			Spare	22
23	Spare			1	20			0	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	0			-	1			Space	38
39	Space			1	-		0		-	1			Space	40
41	Space			1	-			0	-	1			Space	42
						6230	6459	5512	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): 18201 | 52 | 54 | 46 AMPS PER PHASE | **51** **TOTAL CONNECTED LOAD (AMPS)**

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

NOT FOR CONSTRUCTION

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02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

PANEL SCHEDULES - 2

SUBMISSIONS DATE	SUBMISSIONS DESCRIPTION	REVISIONS DATE	REVISIONS DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-602

SCHEDULE FOR PANEL: RP-LL-3

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **CART STORAGE**
BUS RATING: **225 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **CART STORAGE**
MAINS TYPE: **MCB** | MAINS RATING: **200 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL RP-LL-1**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	2
3	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	4
5	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	6
7	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	8
9	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	10
11	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	12
13	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	14
15	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	16
17	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	18
19	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	20
21	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	22
23	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	24
25	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	26
27	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	28
29	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	30
31	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	32
33	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	34
35	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	36
37	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	38
39	Spare			1	15		0		15	1			Spare	40
41	Spare			1	15			0	15	1			Spare	42
						20160	17280	17280	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	**54720**				168	144	144	AMPS PER PHASE		**152**		**TOTAL CONNECTED LOAD (AMPS)**	

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

SCHEDULE FOR PANEL: RP-LL-1

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **LOWER LEVEL**
BUS RATING: ***400 A*** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**
MAINS TYPE: **MCB** | MAINS RATING: ***300 A*** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Reach In & Beer Tap (Item TS04-05)	959	2#12, #12 G, 3/4" C	1	20	2147			20	1	2#12, #12 G, 3/4" C	1188	Froster, Fridge Slicer Turnstand	2
3	Item TS17, TS20	1680	2#12, #12 G, 3/4" C	1	20		3830		25	2	2#10, #10 G, 3/4" C	2150	Coffee Brewer	4
5	Items TS19 & TS21	972	2#12, #12 G, 3/4" C	1	20			3122				2150		6
7	Items TS20	2400	2#10, #10 G, 3/4" C	2	25	3120			20	1	2#12, #12 G, 3/4" C	720	Breakroom Recept	8
9		2400					2900		20	1	2#12, #12 G, 3/4" C	500	Breakroom Refrigerator	10
11	Restroom & Storage Recept	720	2#12, #12 G, 3/4" C	1	20			2160	20	1	2#12, #12 G, 3/4" C	1440	Cart Storage Recept	12
13	Lower Level Recept	1080	2#12, #12 G, 3/4" C	1	20	2880			20	1	2#12, #12 G, 3/4" C	1800	Elevator Lights	14
15	Lower Level Recept	1080	2#12, #12 G, 3/4" C	1	20		1440		20	1	2#12, #12 G, 3/4" C	360	Elevator Pit Recept & Light	16
17	Office Recept Lower Level	720	2#12, #12 G, 3/4" C	1	20			1720	20	1	2#12, #12 G, 3/4" C	1000	Roll Up Gate	18
19	Roll Up Gate	1000	2#12, #12 G, 3/4" C	1	20	1000			20	1			Spare	20
21	Spare			1	20		0		20	1			Spare	22
23	Spare			1	20			0	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	20160						20160		38
39	Space			1	-		17280		200	3	See One Line Diagram	17280	Panel RP-LL-3	40
41	Space			1	-			17280				17280		42
	FEED THROUGH LUGS SUPPLY:	20160				20160								
	Panel RP-LL-2	20160	See One Line Diagram				20160							
		20160						20160						
						49467	45610	44442	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	***139519***				***412***	***380***	***370***	AMPS PER PHASE		***387***		**TOTAL CONNECTED LOAD (AMPS)**	
											258		**TOTAL DEMAND LOAD (AMPS)**	

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. The Capacity Of All Panelboard Bus Bars Shall Remain Consistent Throughout The Entire Length / All Sections. Do Not Reduce The Ampacity Between Sections.
3. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

SCHEDULE FOR PANEL: RP-CL-1

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **CLUB HOUSE LEVEL**
BUS RATING: **400 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **JANITORS CLOSET**
MAINS TYPE: **MCB** | MAINS RATING: **300 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Terrace Receptacles	720	2#12, #12 G, 3/4" C	1	20	1440			20	1	2#12, #12 G, 3/4" C	720	Terrace Televisions	2
3	Resutrant Receptacles	1080	2#12, #12 G, 3/4" C	1	20		1800		20	1	2#12, #12 G, 3/4" C	720	Resturant Receptacles	4
5	Bar / Lounge Receptacles	900	2#12, #12 G, 3/4" C	1	20			2160	20	1	2#12, #12 G, 3/4" C	1260	Under Bar Charging Stations	6
7	Stackable Cuber	1725	2#12, #12 G, 3/4" C	1	20	3450			20	1	2#12, #12 G, 3/4" C	1725	Refrigerator	8
9	Bev Cntr & Dispense	300	2#12, #12 G, 3/4" C	1	20		3600		35	2	2#8, #10 G, 3/4" C	3300	Coffee Brewer	10
11	Bathroom & Jan Recept	540	2#12, #12 G, 3/4" C	1	20			3840				3300		12
13	Heated Cabinet	1800	2#12, #12 G, 3/4" C	1	20	3000			20	1	2#12, #12 G, 3/4" C	1200	Combi Oven	14
15		2767					3964		20	1	2#12, #12 G, 3/4" C	1197	Slicer & Vertical Slicer	16
17	Rotisserie	2767	3#10, #10 G, 3/4" C	3	30			3847	20	1	2#12, #12 G, 3/4" C	1080	Kitchen Receptacles	18
19		2767				3187						420		20
21	Refrigerator	420	2#12, #12 G, 3/4" C	1	20		840		20	3	3#12, #12 G, 3/4" C	420	Mixer	22
23	Refrigerated Base	888	2#12, #12 G, 3/4" C	1	20			1308				420		24
25	Kitchen Appliances	1632	2#12, #12 G, 3/4" C	1	20	2352			20	1	2#12, #12 G, 3/4" C	720	Vestibule Receptacles	26
27	Refrig & Sand Prep	794	2#12, #12 G, 3/4" C	1	20		6642					5848		28
29	Drop In Hot Well	1200	2#12, #12 G, 3/4" C	1	20			7048	70	3	3#4, #8 G, 1" C	5848	Dishwasher	30
31	Refrigerator	696	2#12, #12 G, 3/4" C	1	20	6544						5848		32
33	Toaster	1800	2#12, #12 G, 3/4" C	1	20		2800		20	1	2#12, #12 G, 3/4" C	1000	Roll Up Gate	34
35	Microwave	1550	2#12, #12 G, 3/4" C	1	20			1550	20	1			Spare	36
37	Space			1	-	0			-	1			Space	38
39	Space			1	-		0		-	1			Space	40
41	Space			1	-			0	-	1			Space	42
	FEED THROUGH LUGS SUPPLY:	6440				6440								
	Panel RP-CL-2	9200	See One Line Diagram				9200							
		7660						7660						
						26413	28846	27413	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	**82672**				220	240	228	AMPS PER PHASE		**229**		**TOTAL CONNECTED LOAD (AMPS)**	
											129		**TOTAL DEMAND LOAD (AMPS)**	

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. The Capacity Of All Panelboard Bus Bars Shall Remain Consistent Throughout The Entire Length / All Sections. Do Not Reduce The Ampacity Between Sections.
3. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

SCHEDULE FOR PANEL: RP-LL-2

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **CART STORAGE**
BUS RATING: **300 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **CART STORAGE**
MAINS TYPE: **MLO** | MAINS RATING: **N / A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL RP-LL-1**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	2
3	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	4
5	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	6
7	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	8
9	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	10
11	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	12
13	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	14
15	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	16
17	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	18
19	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	20
21	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	22
23	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	24
25	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	26
27	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	28
29	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	30
31	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	32
33	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	34
35	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	36
37	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15	2880			15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	38
39	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15		2880		15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	40
41	Cart Charger	1440	2#12, #12 G, 3/4" C	1	15			2880	15	1	2#12, #12 G, 3/4" C	1440	Cart Charger	42
						20160	20160	20160	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	**60480**				168	168	168	AMPS PER PHASE		**168**		**TOTAL CONNECTED LOAD (AMPS)**	

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.
3. The Capacity Of All Panelboard Bus Bars Shall Remain Consistent Throughout The Entire Length / All Sections. Do Not Reduce The Ampacity Between Sections.

SCHEDULE FOR PANEL: RP-CL-2

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **CLUB HOUSE LEVEL**
BUS RATING: **300 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **JANITORS CLOSET**
MAINS TYPE: **MLO** | MAINS RATING: **N / A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL RP-CL-1**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Terrace Receptacles	540	2#12, #12 G, 3/4" C	1	20	1440			20	1	2#12, #12 G, 3/4" C	900	Pro Shop Receptacles	2
3	Office Receptacles	1080	2#12, #12 G, 3/4" C	1	20		2980		20	1	2#12, #12 G, 3/4" C	1900	Overhead Warmer	4
5	Vestibule and Restroom Recept	1260	2#12, #12 G, 3/4" C	1	20			3160	20	1	2#12, #12 G, 3/4" C	1900	Overhead Warmer	6
7	Union County Office Recept	1080	2#12, #12 G, 3/4" C	1	20	1160			20	1	2#12, #12 G, 3/4" C	80	Bar Pendant Lights	8
9	Storage & Office Recepts	900	2#12, #12 G, 3/4" C	1	20		1980		20	1	2#12, #12 G, 3/4" C	1080	Bar Refrigerator	10
11	Conference Room Recept	540	2#12, #12 G, 3/4" C	1	20			1620	20	1	2#12, #12 G, 3/4" C	1080	Bar Refrigerator	12
13	Printers	1000	2#12, #12 G, 3/4" C	1	20	2000			20	1	2#12, #12 G, 3/4" C	1000	Security Equipment	14
15	Spare			1	20		1000		20	1	2#12, #12 G, 3/4" C	1000	Audio Equipment	16
17	Glass Washer	1380	2#12, #12 G, 3/4" C	1	20			1380	20	1			Spare	18
19	Blender Station & Refrigerator	840	2#12, #12 G, 3/4" C	1	20	840			20	1			Spare	20
21	Spare			1	20		1500		20	1	2#12, #12 G, 3/4" C	1500	Hot Box Heater - 1 (See Civil)	22
23	Spare			1	20			1500	20	1	2#12, #12 G, 3/4" C	1500	Hot Box Heater - 2 (See Civil)	24
25	Fans Vestibule	200	2#12, #12 G, 3/4" C	1	20	1000			20	1	2#12, #12 G, 3/4" C	800	Pond Aerator (See Civil Dwgs)	26
27	Fans Terrace	240	2#12, #12 G, 3/4" C	1	20		1740		20	1	2#12, #12 G, 3/4" C	1500	Fire Pit Ignitors	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	0			-	1			Space	38
39	Space			1	-		0		-	1			Space	40
41	Space			1	-			0	-	1			Space	42
						6440	9200	7660	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	**23300**				54	77	64	AMPS PER PHASE		**65**		**TOTAL CONNECTED LOAD (AMPS)**	

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.
2. The Capacity Of All Panelboard Bus Bars Shall Remain Consistent Throughout The Entire Length / All Sections. Do Not Reduce The Ampacity Between Sections.
3. Provide 100% Rated Neutral Bus In All Panelboards Unless Specifically Noted Otherwise.

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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CERTIFICATE OF AUTHORIZATION AC-438

PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

PANEL SCHEDULES - 3

SUBMISSIONS		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	12285
SHEET:	OF:
DRWG NO	E-603

SCHEDULE FOR PANEL: HP-1

SYSTEM: **480Y/277V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **ASHBROOK GOLF COURSE CLUB HOUSE**

BUS RATING: **250 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**

MAINS TYPE: **MCB** | MAINS RATING: **250 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL MDP**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1		10198				10198			20	1			Spare	2
3	RTU-1	10198	3#4, #10 G, 1" C	3	60		10198		20	1			Spare	4
5		10198						10198	20	1			Spare	6
7		7316				7316			20	1			Spare	8
9	RTU-2	7316	3#6, #10 G, 3/4" C	3	45		7316		20	1			Spare	10
11		7316						7316	20	1			Spare	12
13		7316				7316			20	1			Spare	14
15	RTU-3	7316	3#6, #10 G, 3/4" C	3	45		7316		20	1			Spare	16
17		7316						7316	20	1			Spare	18
19		4855				4855			20	1			Spare	20
21	RTU-4	4855	3#10, #10 G, 3/4" C	3	30		4855		20	1			Spare	22
23		4855						4855	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37		31064				31064			-	1			Space	38
39	Panel HP-2	34540	See One Line Diagram	3	125		34540		-	1			Space	40
41		33149						33149	-	1			Space	42
						60750	64226	62835	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): **187811**

	A	B	C
AMPS PER PHASE	219	232	227

226 TOTAL CONNECTED LOAD (AMPS)

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.

SCHEDULE FOR PANEL: HP-2

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **ASHBROOK GOLF COURSE CLUB HOUSE**

BUS RATING: **400 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**

MAINS TYPE: **MCB** | MAINS RATING: **300 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL HP-1**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	Spare			2	20	1997			25	2	2#10, #10 G, 3/4" C	1997	EUH-2	2
3							1997					1997		4
5	ACU-2	2163	2#8, #10 G, 3/4" C	2	40			3078	20	2	2#12, #12 G, 3/4" C	915	EUH-1	6
7		2163				3078						915		8
9	ACU-3	2912	2#8, #10 G, 3/4" C	2	40		4056		20	2	2#12, #12 G, 3/4" C	1144	EF-1	10
11		2912						4056				1144		12
13	ACU-4	1082	2#12, #12 G, 3/4" C	2	20	1983						901		14
15		1082					1983		20	3	3#12, #12 G, 3/4" C	901	TF-1	16
17	Spare			1	20			901				901		18
19	EF-6 & EF-7	1560	2#12, #12 G, 3/4" C	1	20	1720			20	1	2#12, #12 G, 3/4" C	160	VAV'S	20
21		5333					8508		35	2	2#8, #10 G, 3/4" C	3174	VAV 2-1	22
23	EDH-1	5333	3#4, #10 G, 1" C	3	60			8507				3174		24
25		5333				7000						1667		26
27		5333					7000		20	3	3#12, #12 G, 3/4" C	1667	EDH-4	28
29	EDH-2	5333	3#4, #10 G, 1" C	3	60			7000				1667		30
31		5333				5967						633		32
33		2667					3300		20	3	3#12, #12 G, 3/4" C	633	FTR-1	34
35	EDH-3	2667	3#10, #10 G, 3/4" C	3	30			3300				633		36
37		2667				9319						6653		38
39	Mechanical Recept	540	2#12, #12 G, 3/4" C	1	20		7696		100	3	See One Line Diagram	7156	Panel HP-3	40
41								6307				6307		42
						31064	34540	33149	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): **98753**

	A	B	C
AMPS PER PHASE	259	288	276

274 TOTAL CONNECTED LOAD (AMPS)

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.

SCHEDULE FOR PANEL: HP-3

SYSTEM: **208Y/120V, 3Φ, 4W** | NUMBER OF POLES: **42** | AREA SERVED: **ASHBROOK GOLF COURSE CLUBHOUSE**

BUS RATING: **100 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION: **LOWER LEVEL ELECTRICAL ROOM**

MAINS TYPE: **MCB** | MAINS RATING: **100 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM: **PANEL HP-2**

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	AC-2	346	2#12, #12 G, 3/4" C	2	20	679						333		2
3		346					679		20	3	3#12, #12 G, 3/4" C	333	FTR-2	4
5	AC-3	641	2#12, #12 G, 3/4" C	2	20			974				333		6
7		641				2307						1667		8
9		1729					3396		20	3	3#12, #12 G, 3/4" C	1667	EDH-5	10
11	EWH-1	1729	3#12, #12 G, 3/4" C	3	20			3396				1667		12
13		1729				2873			20	2	2#12, #12 G, 3/4" C	1144	EF-2	14
15	EF-4	1144	2#12, #12 G, 3/4" C	2	20		2288					1144		16
17		1144						1937				793		18
19	Spare			1	20	793			20	3	3#12, #12 G, 3/4" C	793	EF-5	20
21	Spare			1	20		793					793		22
23	Spare			1	20			0	20	1			Spare	24
25	Spare			1	20	0			20	1			Spare	26
27	Spare			1	20		0		20	1			Spare	28
29	Spare			1	20			0	20	1			Spare	30
31	Spare			1	20	0			20	1			Spare	32
33	Spare			1	20		0		20	1			Spare	34
35	Spare			1	20			0	20	1			Spare	36
37	Space			1	-	0			-	1			Space	38
39	Space			1	-		0		-	1			Space	40
41	Space			1	-			0	-	1			Space	42
						6653	7156	6307	VA PER PHASE					

TOTAL CONNECTED LOAD (VA): **20115**

	A	B	C
AMPS PER PHASE	55	60	53

56 TOTAL CONNECTED LOAD (AMPS)

NOTES:
1. Spare Provisions And Additional Physical Space Have Been Intentionally Included In The Design For Future Expansion Capabilities. These Characteristics Shall Be Maintained.

NOT FOR CONSTRUCTION

BID SET
02-22-2017

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PROJECT:

NEW CLUB HOUSE
ASH BROOK GOLF COURSE
1210 RARITAN RD, SCOTCH PLAINS, NJ 07076

SHEET CONTENTS:

PANEL SCHEDULES - 4

SUBMISSIONS DATE	DESCRIPTION	REVISIONS DATE	DESCRIPTION
10.03.16	100% ISSUE		
10.17.16	BID SET		
02.22.17	REBID SET		

DATE	02.22.2017
SCALE	AS NOTED
DRWN BY	CAD
CHKD BY	DLB
JOB NO	I2285
SHEET:	OF:
DRWG NO	E-604