DESIGN STANDARDS FOR DEVELOPMENTS AND RELATED LAND IMPROVEMENTS IMPACTING COUNTY ROADS AND DRAINAGE FACILITIES

DEPARTMENT OF ENGINEERING AND PUBLIC WORKS
DIVISION OF ENGINEERING

May 2009

DESIGN STANDARDS FOR DEVELOPMENTS AND RELATED LAND IMPROVEMENTS IMPACTING COUNTY ROADS AND DRAINAGE FACILITIES COUNTY OF UNION NEW JERSEY

Adopted by The Union County Board of Chosen
Freeholders May 28, 2009

Amends or Supersedes Design
Details in Union County of Union
Land Development Standards
Adopted in 1999

UNION COUNTY BOARD OF CHOSEN FREEHOLDERS

Angel G. Estrada Chairman
Alexander Mirabella Vice Chairman
Chester Holmes
Bette Jane Kowalski
Rick Proctor
Deborah P. Scanlon
Daniel P. Sullivan
Rayland Van Blake
Nancy Ward Nicole L. DiRado, Clerk of the Board

UNION COUNTY PLANNING BOARD

Angel Estrada, Freeholder Chairman
Nancy Ward, Freeholder
Thomas O. Mineo, P.E., Division of Engineering,
County Engineer Timothy Mettlen, P.E., Division of Engineering, Bureau Chief (Alternate)
Elizabeth Geminder
Rob Garrison
Yves Aubourg
Michael Timoni
Michael D'Agostino William Malone (Alternate #1)
Lawanda Gilbert (Alternate #2)

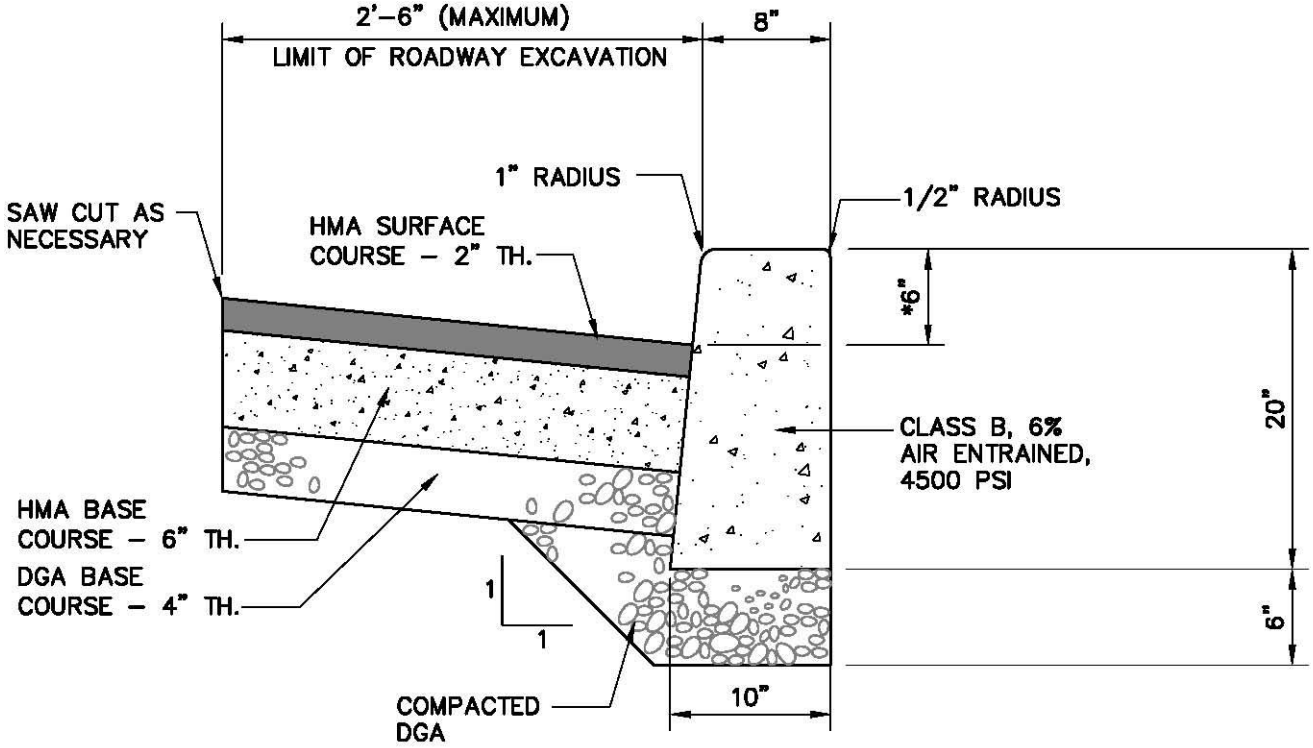
UNION COUNTY STAFF

Georg W. Devanney, County Manager
M. Elizabeth Genievich, Deputy County Manager
Alfred J. Faella, Director, Department of Parks & Community Renewal
Joseph A. Graziano, Sr., C.P.W.M., Director, Department of Engineering & Public Works
Thomas O. Mineo, P.E., Director, Division of Engineering
Timothy R. Mettlen, P.E., Chief, Bureau of Engineering Services
Paul J. Leso, P.E., P.L.S., P.P. Supervising Engineer
Dr. Eugene Koo, P.E., P.P., Principal Hydraulic Engineer
Nicholas J. Pantina, P.E., Traffic Engineer
Kamal Saleh, PP, AICP, Supervising Planner
Gary Weltchek, Supervising Planner
Anthony M. Bastardi, Supervising Drafting Technician
Manuel R. Grova, Esq., Planning Board Attorney

DESIGN STANDARDS FOR DEVELOPMENTS AND RELATED LAND IMPROVEMENTS IMPACTING COUNTY ROADS AND COUNTY DRAINAGE FACILITIES

TABLE OF CONTENTS

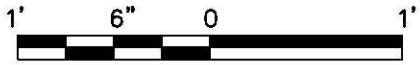
1.40 Riprap Transition Detail
1.41 Curb & Sidewalk Joints
1.42 Public Sidewalk and Curb Ramps
1.43 Single Handicap Ramp at Corner
1.44 Dual Handicap Ramp at Corner
1.45 Method of Determining Reflector Spacing at Intersections
1.46 Plowable Pavement Reflector Location Details
1.47 Method for Determining Reflector Spacing on Horizontal Curves
1.48 Method for determining Reflector Spacing on Vertical (Crest) Curves
1.49 Method of Determining Reflector Spacing on Two Lane Roads
1.50 Installation and Marker Outline
1.51 ADA Detectable Warning Truncated Dome Detail
1.52 Detectable Warning Surface
1.53 Yield Triangles
1.54 Standard Rumble Strips
1.55 Traffic Striping
1.56 Typical Work Zone Traffic Control
1.57 Typical Deceleration Lane Treatment
1.58 Typical Paved Median Treatment
1.59 Loop Detector Trench
1.60 Loop Detector Detail
1.61 Typical Loop Layout
1.62 Loop Lead-In Thru Curb
1.63 Bolt Thru Brackets
1.64 Street Name Sign, Type DF (Typical)
1.65 Tree Well Details
1.66 Steel Curb Plate at Trees
1.67 Single Staking
1.68 Tree Planting Detail
1.69 Chain Link Fence, 3’-6” High



NOTE: EXPANSION JOINTS TO BE SET AT 10' INCREMENTS.

* CURB FACE HEIGHT – 6" (OR AS SPECIFIED BY COUNTY ENGINEER)

TYPICAL ROADWAY EXCAVATION & RESTORATION AT CURBS



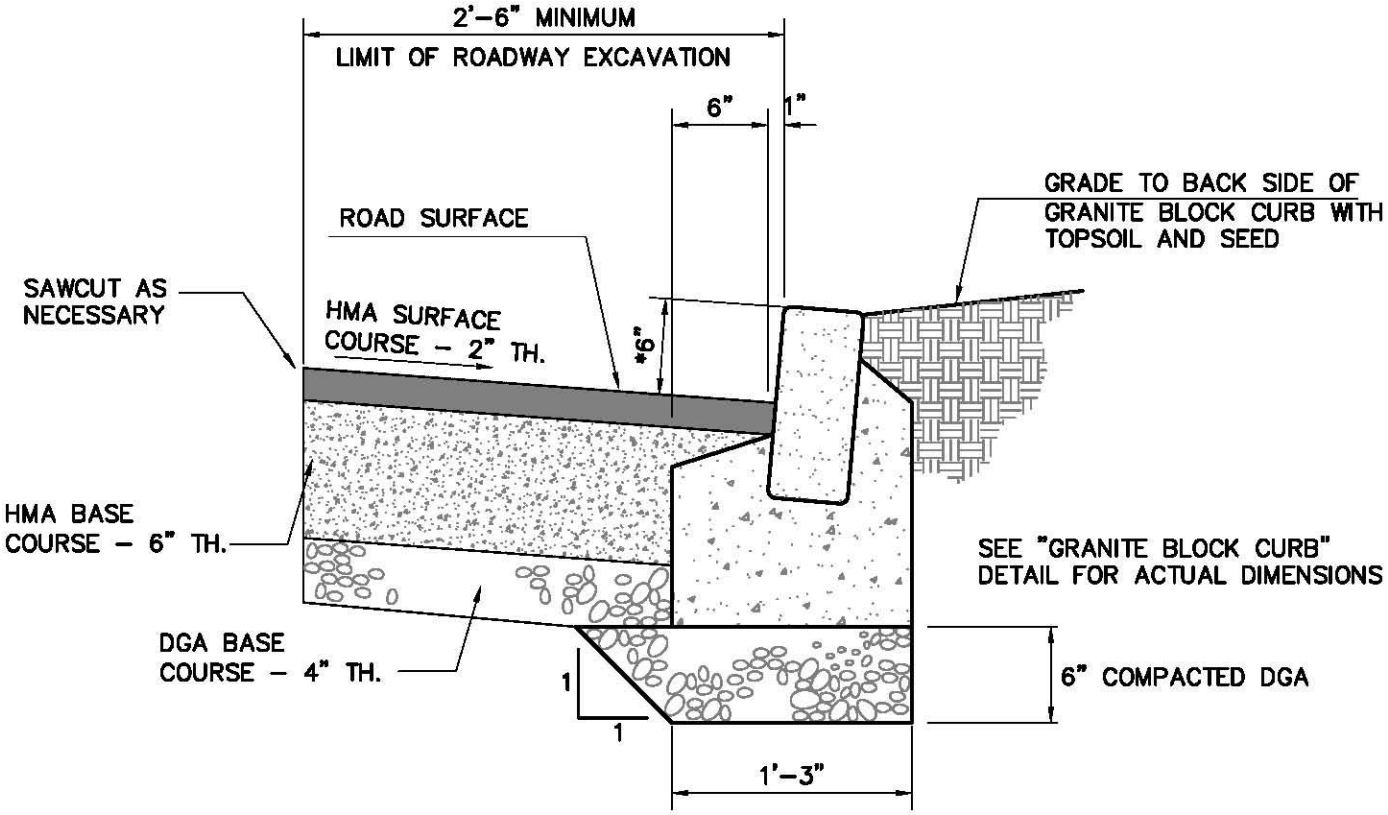
SCALE IN FEET

HMA SURFACE COURSE – NJDOT SUPERPAVE HOT MIX ASPHALT SURFACE COURSE. (AS PER ENGINEER'S SPECIFICATIONS).

HMA BASE COURSE – NJDOT SUPERPAVE HOT MIX ASPHALT 19.5 M64 BASE COURSE. NOTE: CONSTRUCT IN LAYERS NOT MORE THAN 3"COMPACTED THICKNESS.

DGA BASE COURSE – NJDOT DENSE GRADED AGGREGATE BASE COURSE 4" THICK (FORMERLY NJDOT QUARRY PROCESSED STONE)

5/21/2008
9/21/2007
3/28/2007
7/11/2000

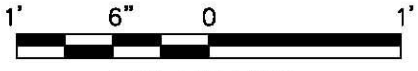


CLASS B AIR-ENTRAINED CONCRETE
NJDOT SPECIFICATIONS

*CURB FACE HEIGHT - 6"
(OR AS SPECIFIED BY COUNTY ENGINEER)

GRANITE BLOCK DIMENSIONS
HEIGHT: MIN. 10" TO 12" MAX.
THICKNESS + WIDTH: MIN. 5" TO 7" MAX.

TYPICAL ROADWAY EXCAVATION & RESTORATION AT GRANITE BLOCK CURBS



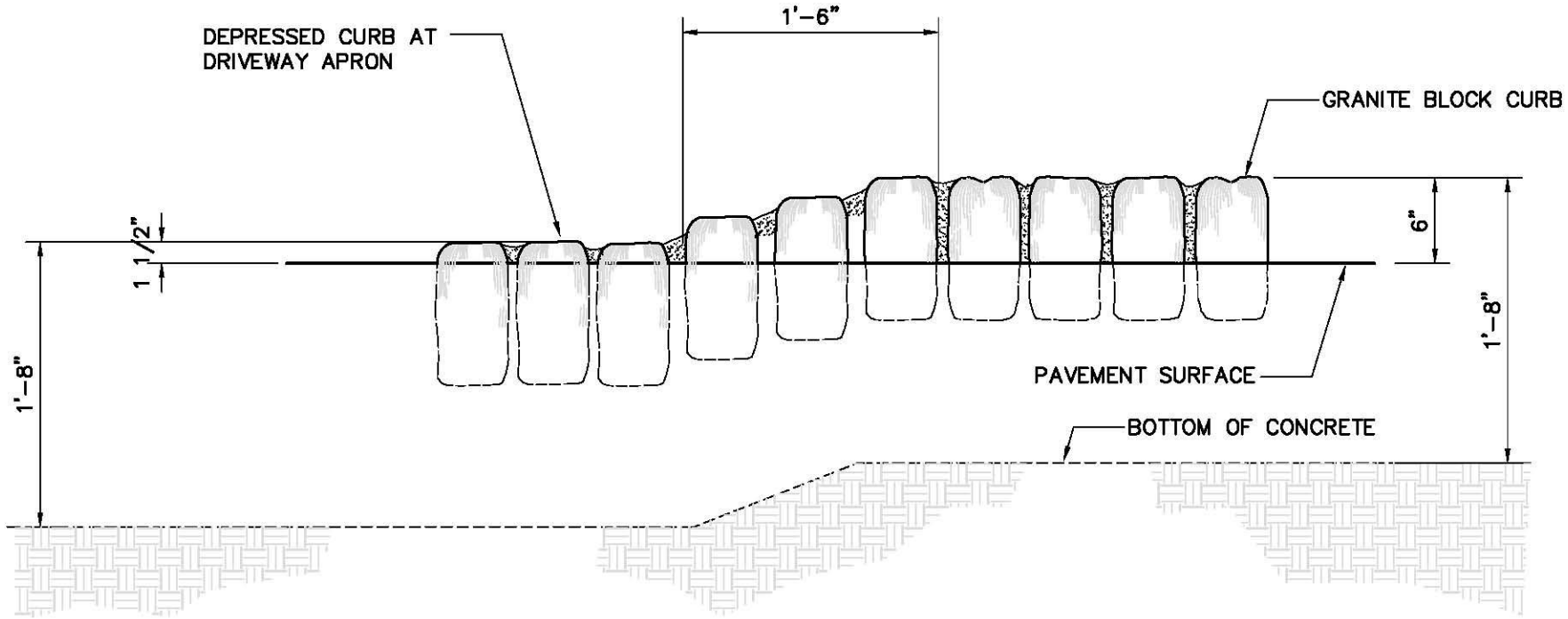
SCALE IN FEET

HMA SURFACE COURSE - NJDOT SUPERPAVE HOT MIX ASPHALT SURFACE COURSE. (AS PER ENGINEER'S SPECIFICATIONS).

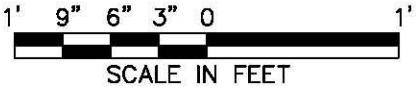
HMA BASE COURSE - NJDOT SUPERPAVE HOT MIX ASPHALT 19.5 M64 BASE COURSE. NOTE: CONSTRUCT IN LAYERS NOT MORE THAN 3"COMPACTED THICKNESS.

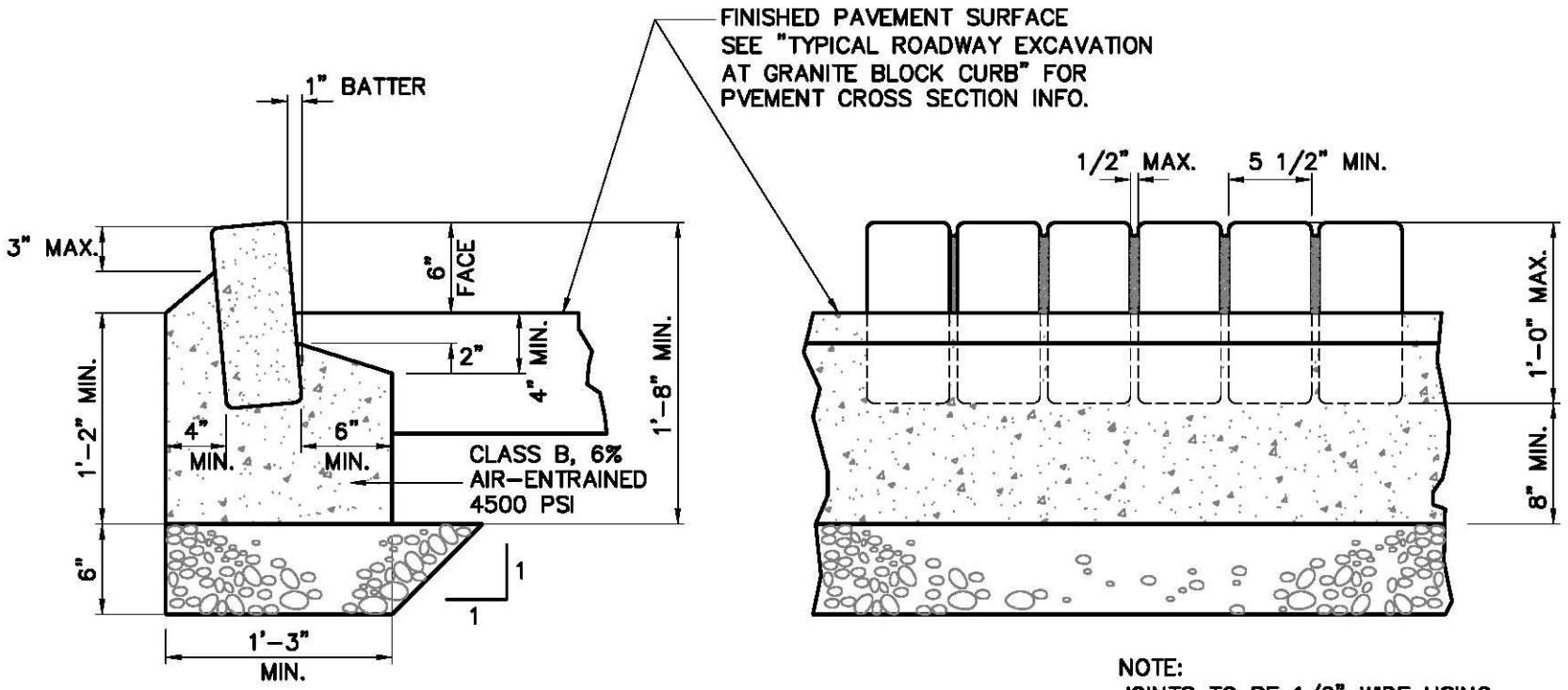
DGA BASE COURSE - NJDOT DENSE GRADED AGGREGATE BASE COURSE 4" THICK (FORMERLY NJDOT QUARRY PROCESSED STONE)

09/24/2007
03/28/2007



DEPRESSED GRANITE CURB AT DRIVEWAY APRON





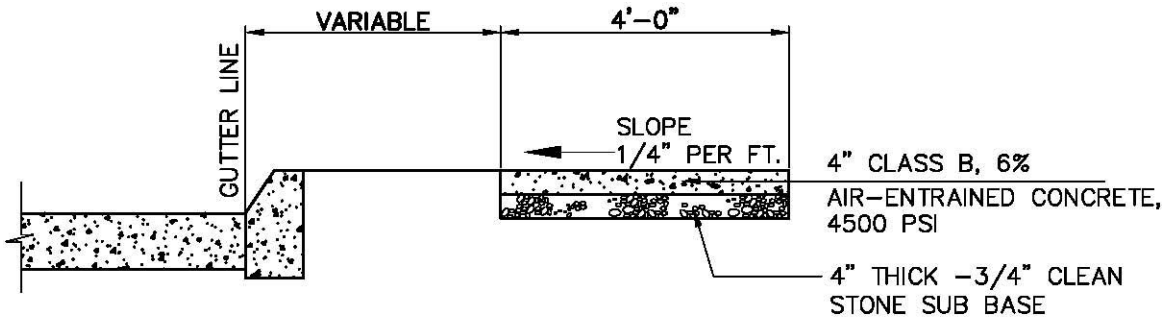
GRANITE BLOCK DIMENSIONS
HEIGHT: MIN. 10" TO 12" MAX.
THICKNESS + WIDTH: MIN. 5" TO 7" MAX.

NOTE:
JOINTS TO BE 1/2" WIDE USING
I-2 MIX CEMENT MORTAR STRUCK
WITH CONCRETE TOOL.

GRANITE BLOCK CURB

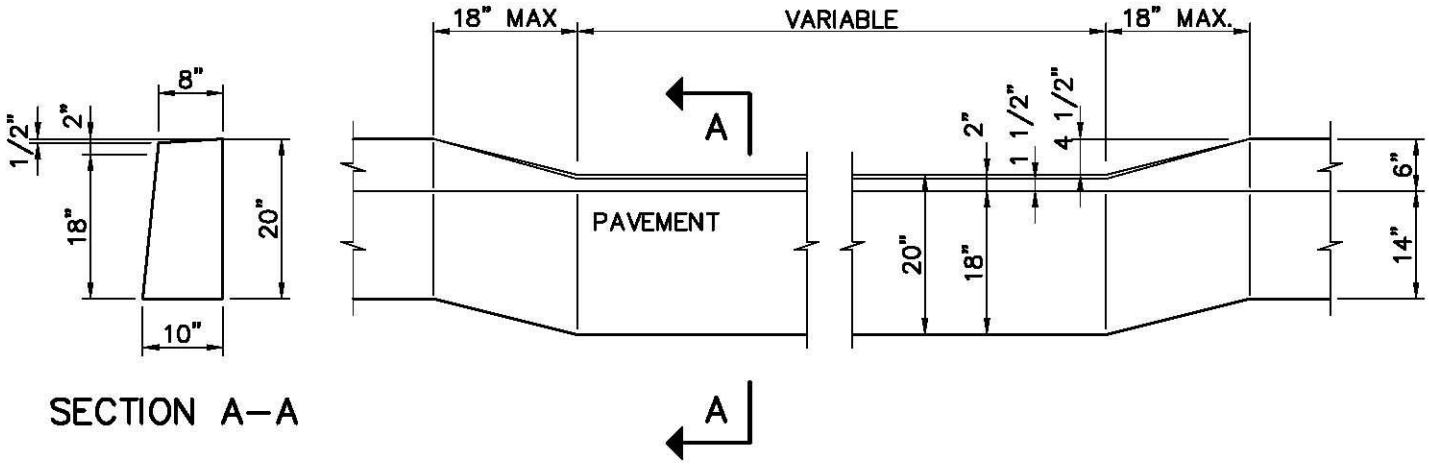
1' 6" 0 1'

SCALE IN FEET



CONCRETE SIDEWALK

N.T.S.

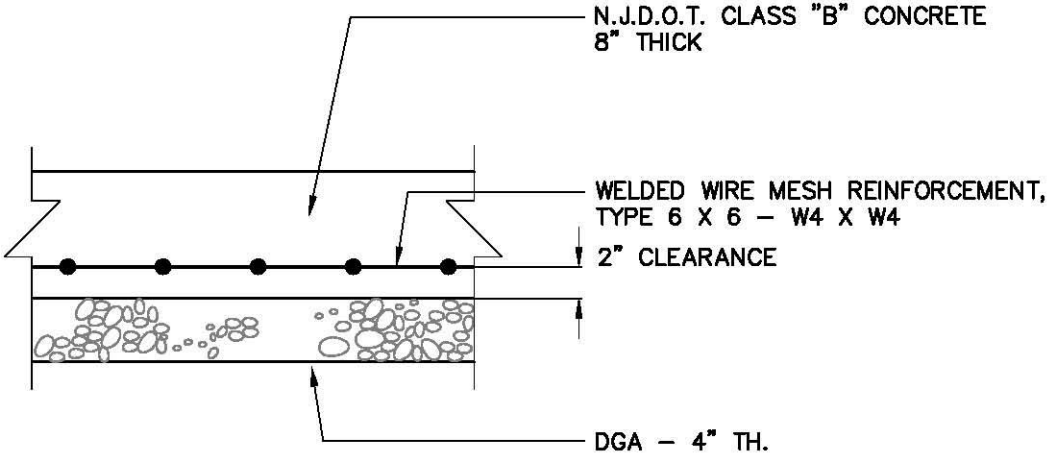


SECTION A–A

DEPRESSED CURB AT DRIVEWAYS

1' 6" 0 1' 2'

SCALE IN FEET

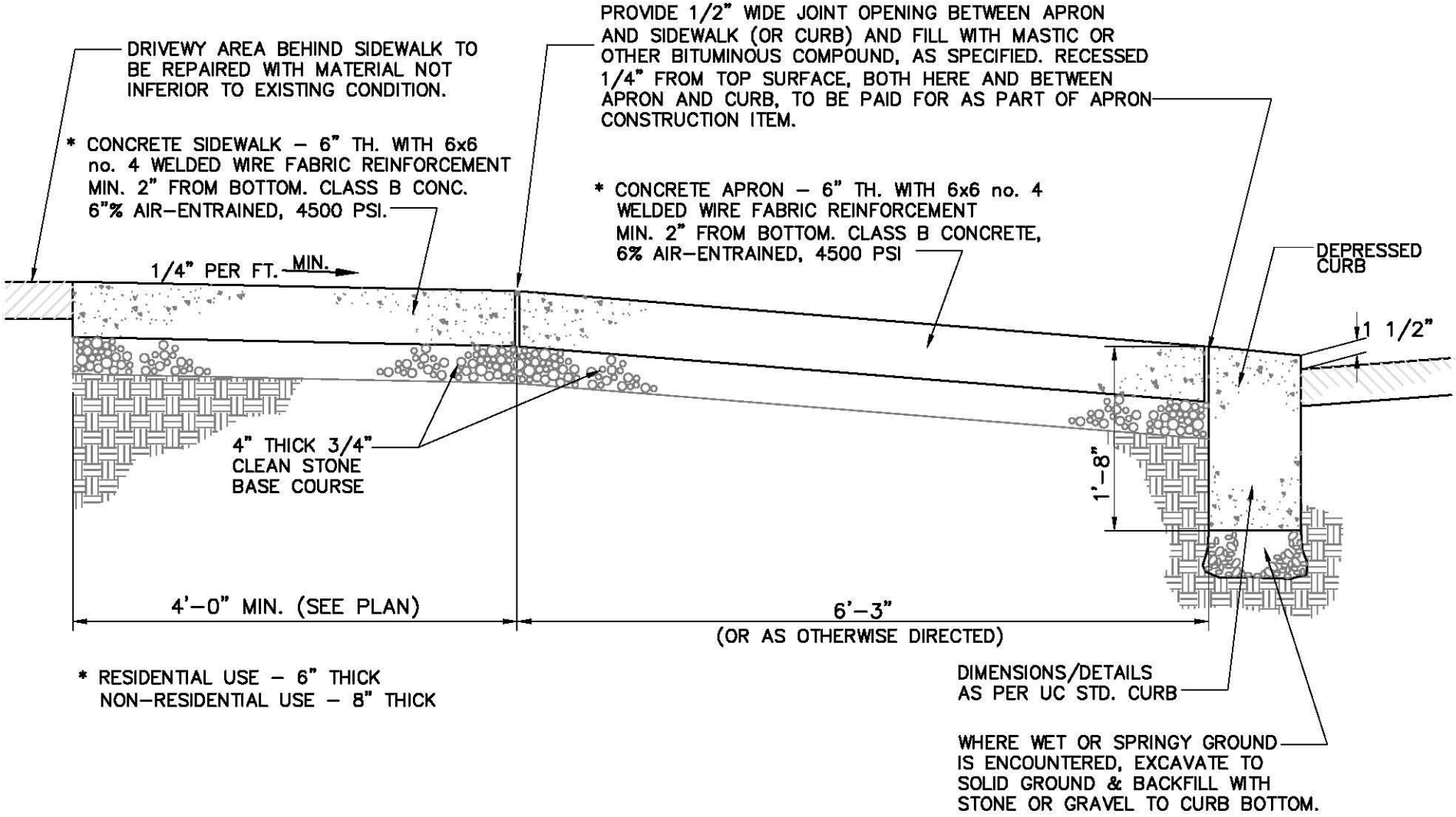


CONCRETE DRIVEWAY, REINFORCED

DRIVEWAYS

NTS

5/21/2008
10/03/2007
7/17/2000

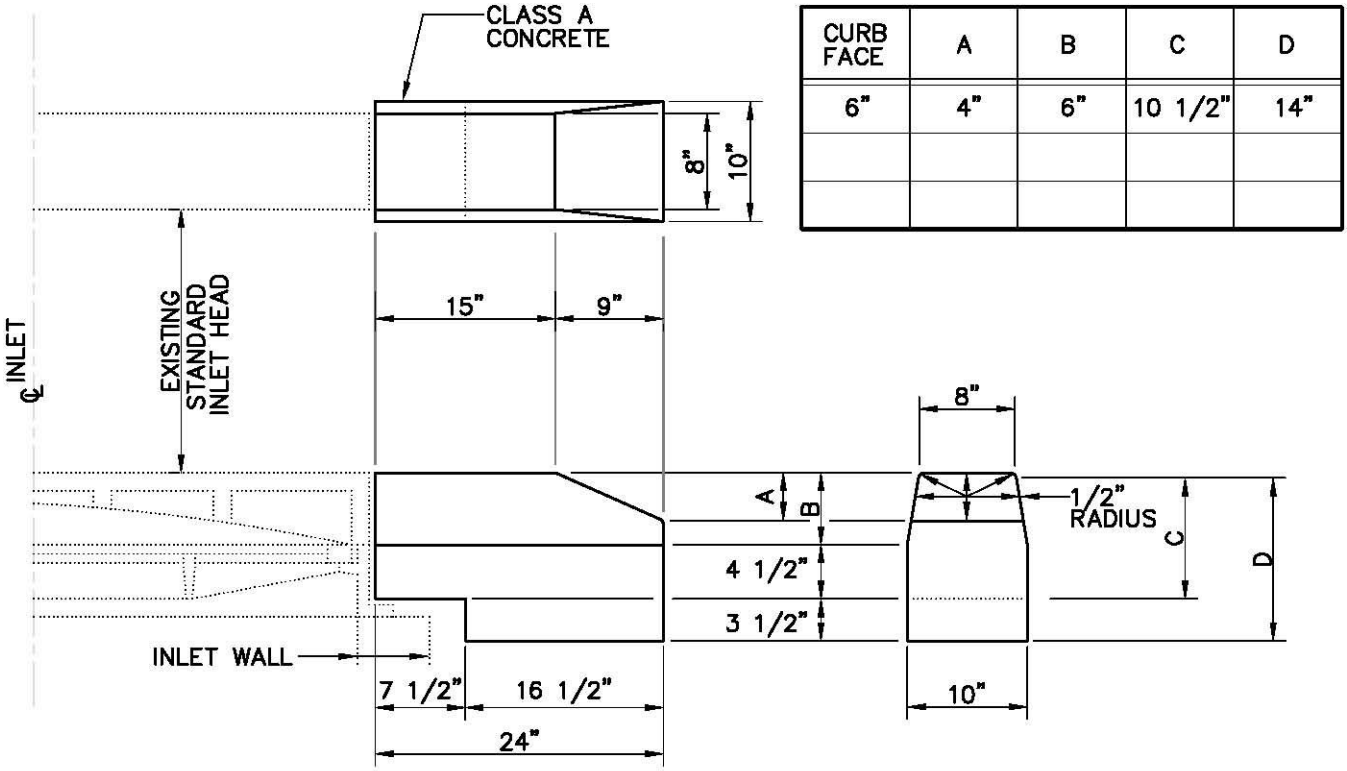


CONCRETE DRIVEWAY APRON
TYPICAL SECTION

1' 6" 0 1'

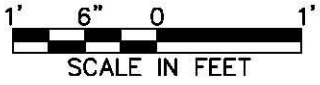
SCALE IN FEET

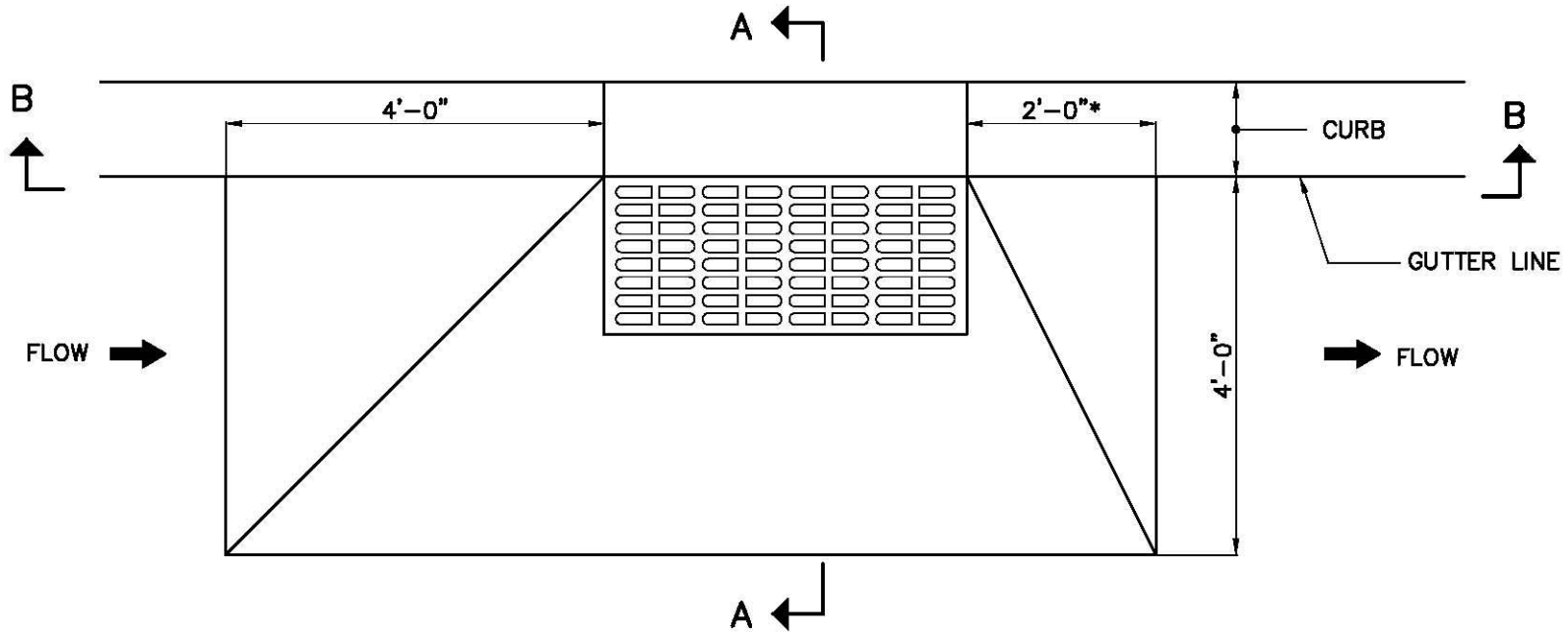
1.09



CURB FACE	A	B	C	D
6"	4"	6"	10 1/2"	14"

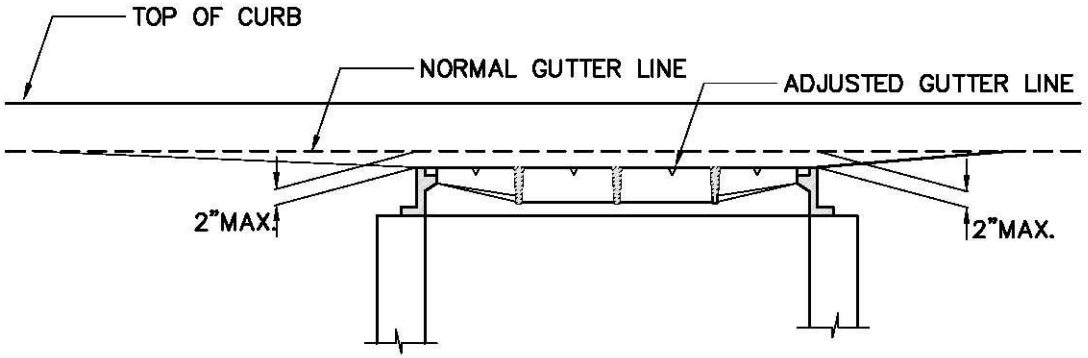
PRECAST CONCRETE CURB ENDS AT INLET



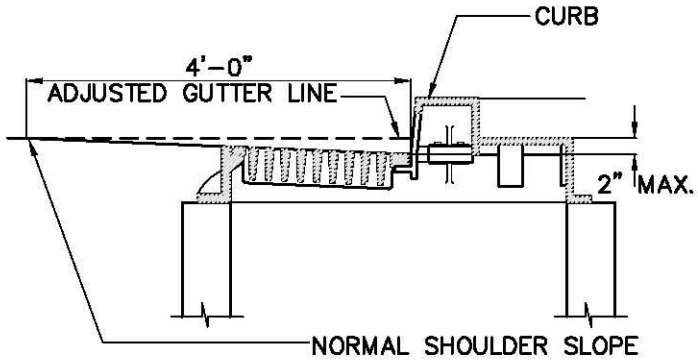


PLAN

* NOTE: AT LOW POINT INCREASE TO 4' ON BOTH SIDES

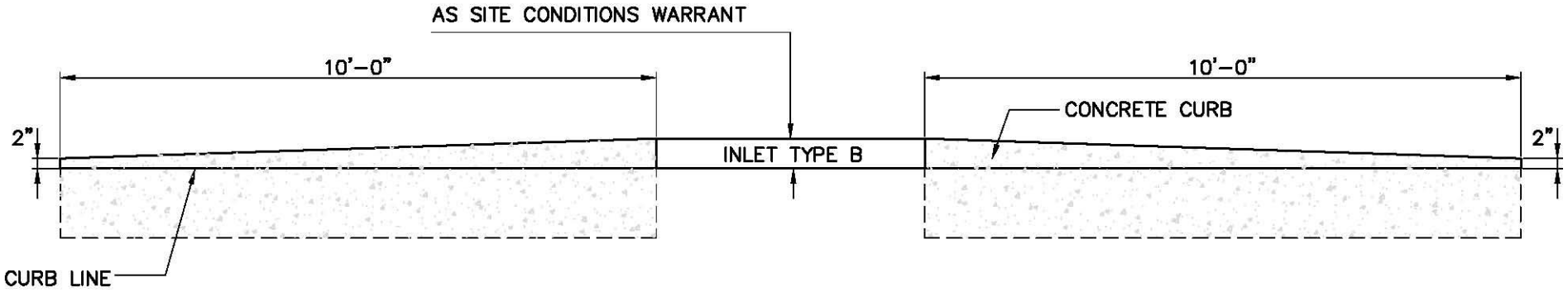


SECTION B–B



SECTION A–A

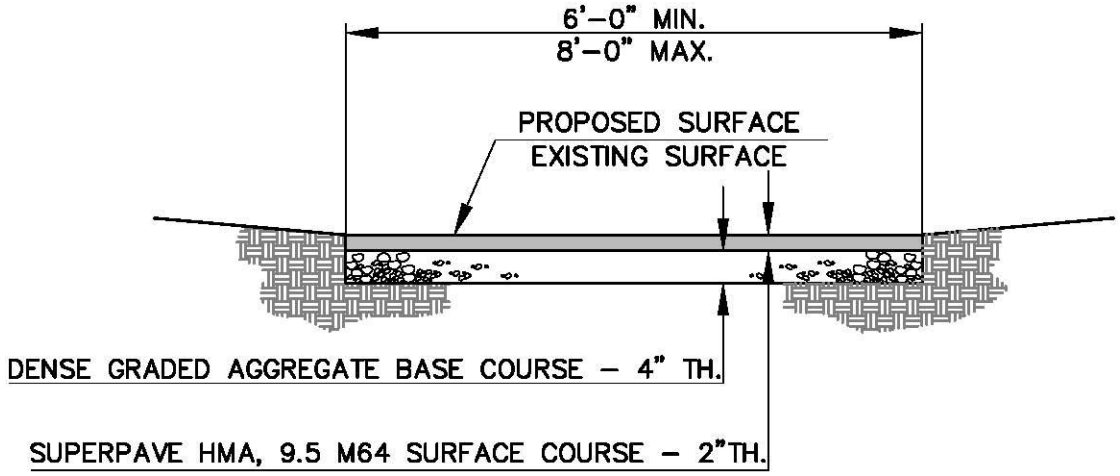
METHOD OF DEPRESSING PAVEMENT AROUND INLETS



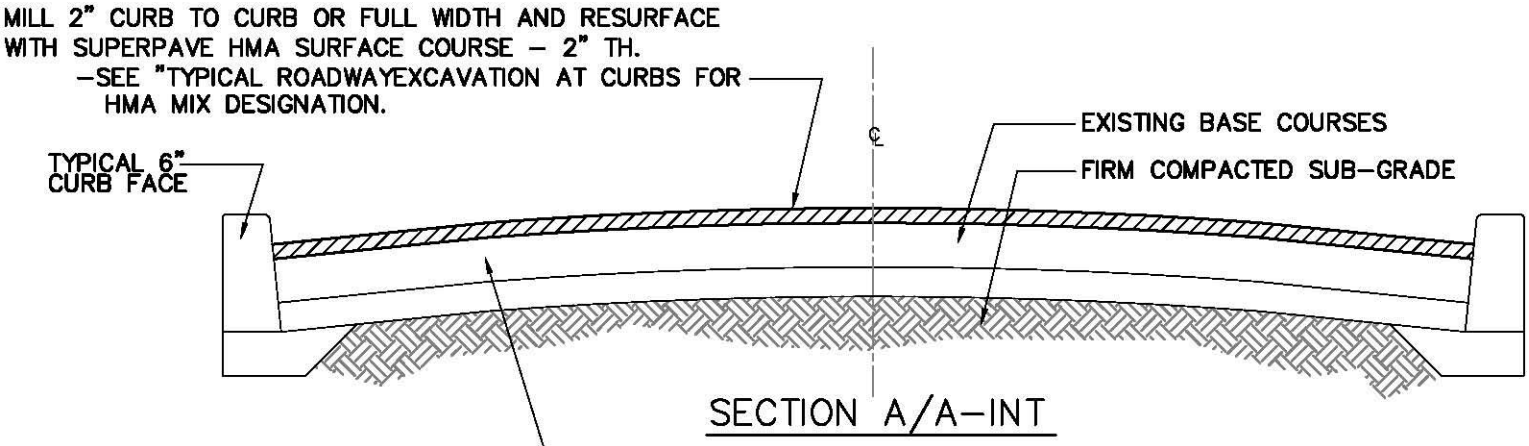
CURB ENDS AT INLETS

1' 0 2' 4'

SCALE IN FEET



BIKEWAY PATH CROSS SECTION



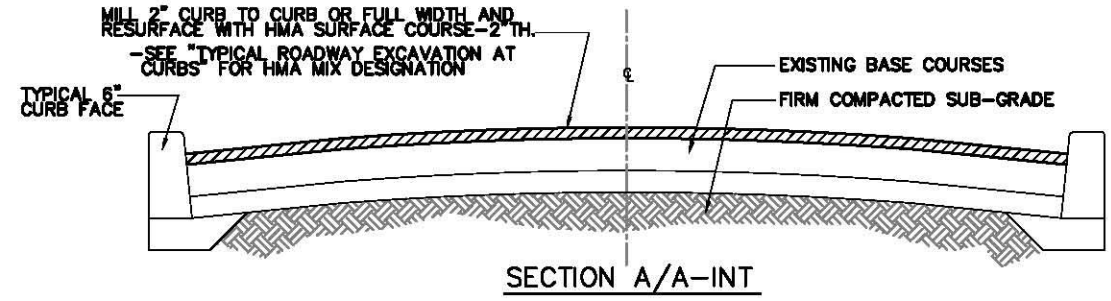
NOTES:

1. HMA PAVEMENT REPAIR (VARIABLE THICKNESS) PRIOR OVERLAY–SHALL BE PERFORMED AFTER THE MILLING PHASE.
2. HMA PAVEMENT MIXES TO BE SPECIFIED BY THE COUNTY ENGINEER.

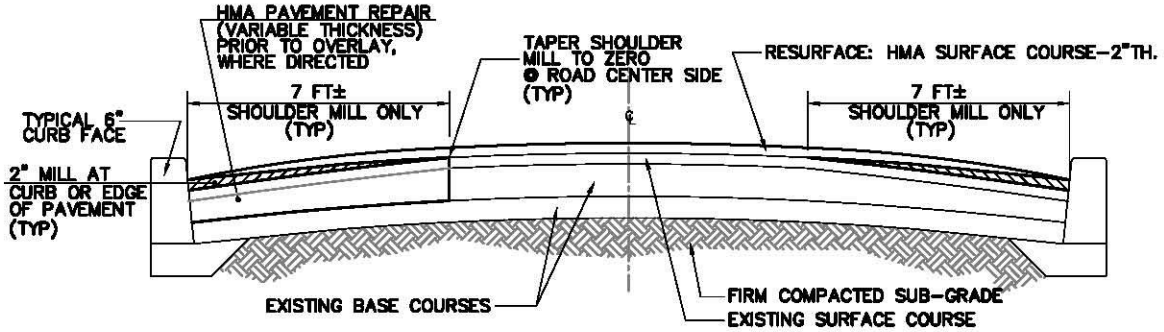
TYPICAL MILLING & RESURFACING DETAIL

NO SCALE

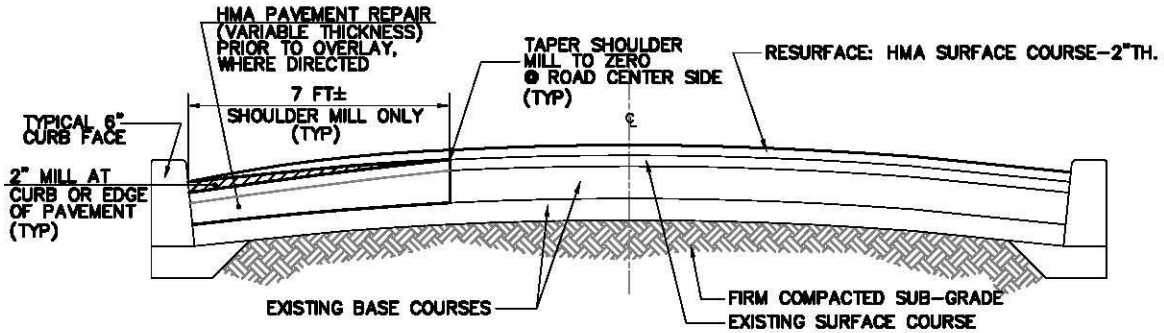
VARIOUS MILLING SECTIONS



SECTION A/A-INT



SECTION B



SECTION C

ALL ROADS TO BE MILLED AS FOLLOWS:

SECTION A/A-INT:

FULL WIDTH, MILL, 2" DEPTH

SECTION B:

SHOULDER MILL TO A WIDTH OF 7 FT.± BOTH SIDES OF ROAD. DEPTH OF MILL TO VARY BETWEEN 2" @ CURB AND ZERO TOWARD CENTER OF ROAD.

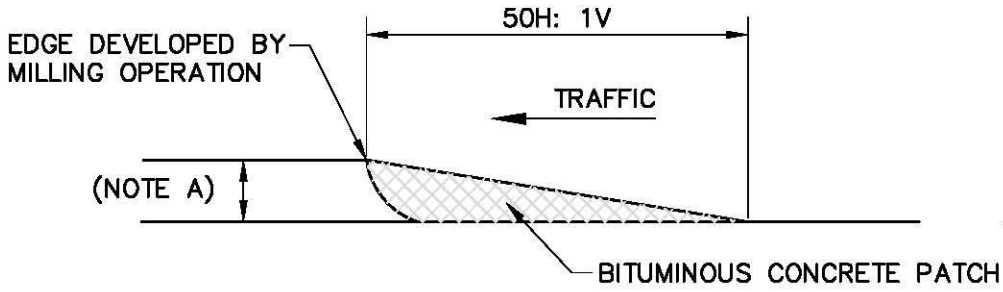
SECTION C:

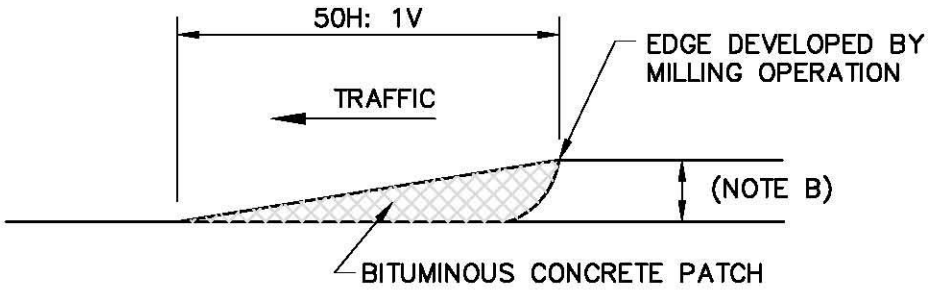
SIMILAR TO SECTION B, HOWEVER, ONLY SINGLE SHOULDER (1 (ONE) SIDE)

NOTE:

HMA PAVEMENT REPAIR (VARIABLE THICKNESS) PRIOR TO OVERLAY – SHALL BE PERFORMED AFTER THE MILLING PHASE.

BITUMINOUS CONCRETE PATCH TO BE REMOVED AND THE RADIUS CAUSED BY MILLING SQUARED PRIOR TO FINAL PAVING.





NOTE A:

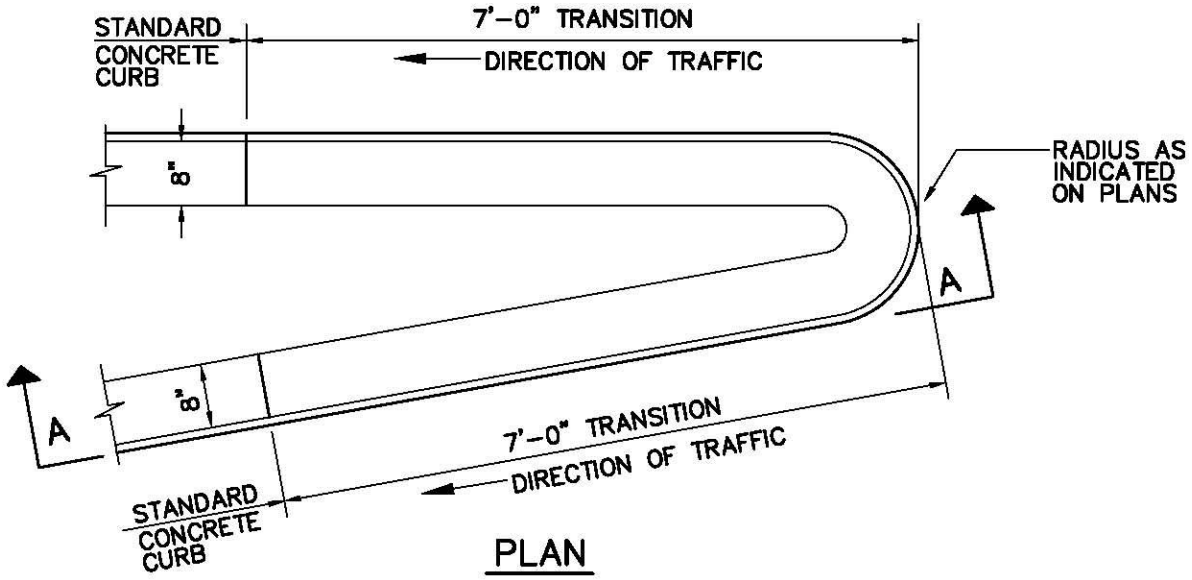
BITUMINOUS CONCRETE PATCH MILLING TRANSITION TO BE USED WHEN LEADING EDGE DEVELOPED BY MILLING OPERATION IS EQUAL TO OR GREATER THAN 1 INCH. NONE REQUIRED FOR EDGE LESS THAN 1 INCH.

NOTE B:

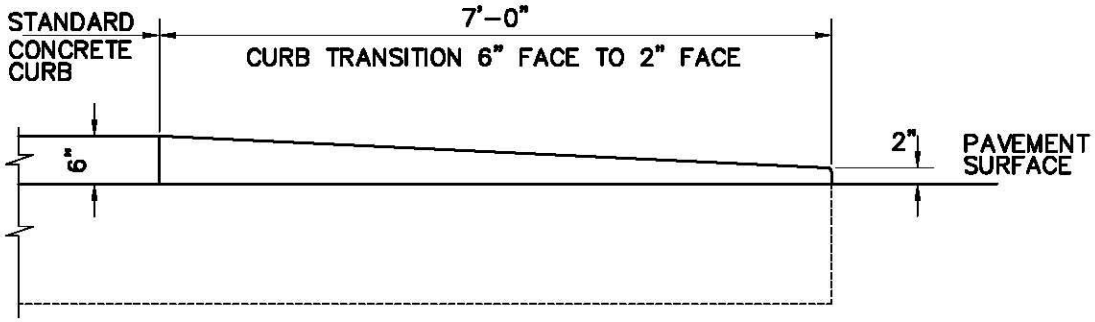
BITUMINOUS CONCRETE PATCH MILLING TRANSITION TO BE USED WHEN LEADING EDGE DEVELOPED BY MILLING OPERATION IS EQUAL TO OR GREATER THAN 1 INCH. NONE REQUIRED FOR EDGE LESS THAN 1 INCH.

MILLING TRANSITIONS

N.T.S.



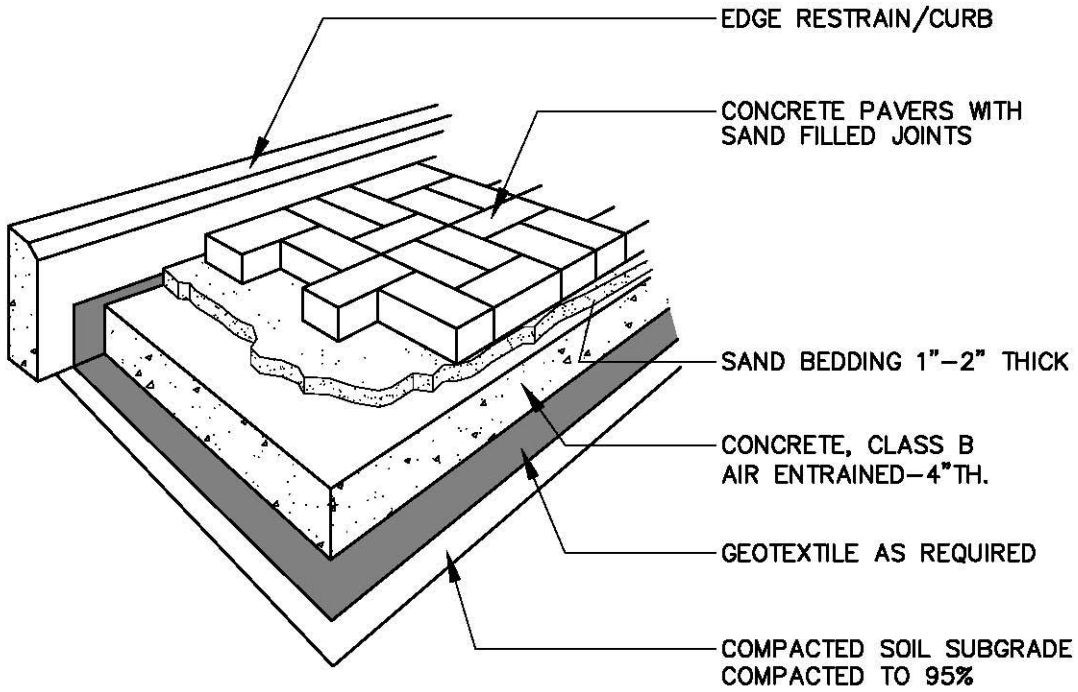
PLAN



SECTION A–A

CURB TRANSITION AT ISLANDS

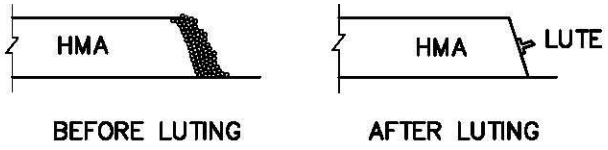
SCALE IN FEET



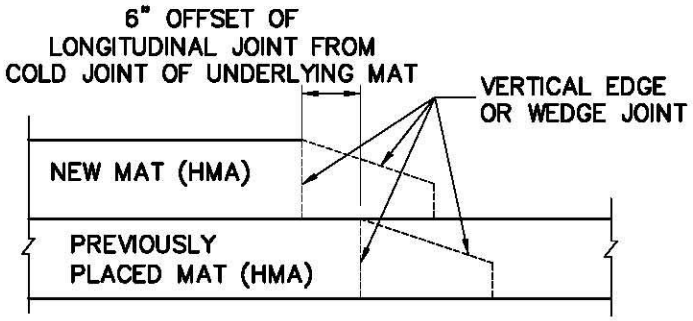
INTERLOCKING BRICK PAVER DETAIL

NOT TO SCALE

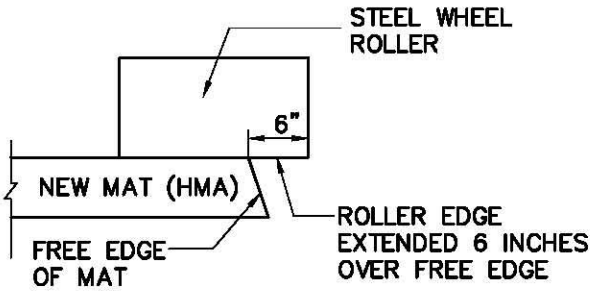
WEDGE JOINT
(NOTE 1)



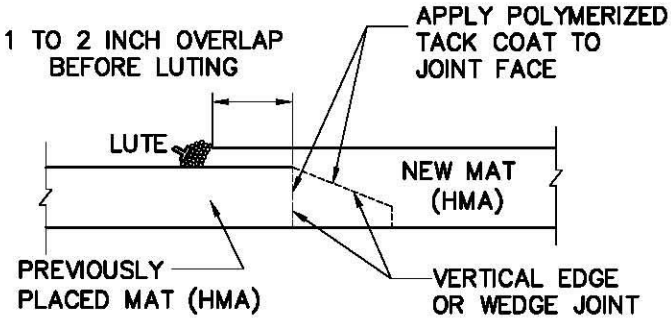
COMPACTION OF UNCONFINED VERTICAL EDGE
(NOTE 3)



OFFSET OF JOINTS
(NOTE 2)



ROLLER PLACEMENT FOR COMPACTING
ALONG THE UNCONFINED VERTICAL EDGE
(NOTE 6)



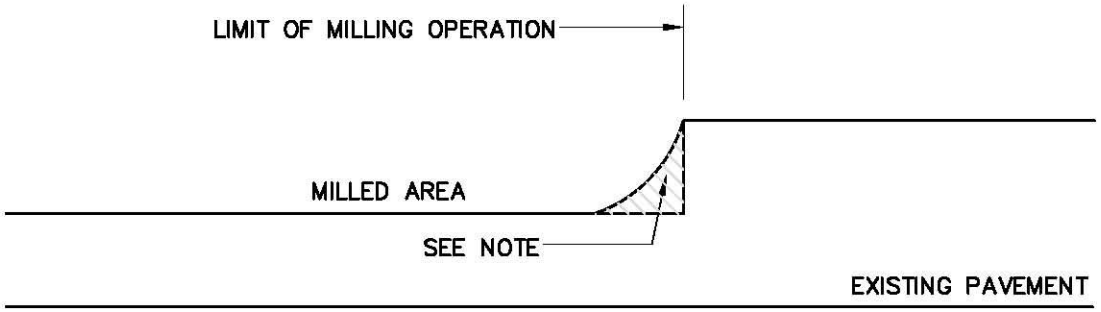
OVERLAPPED HMA BEFORE ROLLING
(NOTE 4 & 5)

HMA PAVEMENTS

NOTES:

1. WHEN HMA LIFT THICKNESS IS GREATER THAN 2 1/4 INCHES AND WHEN TRAFFIC IS TO BE MAINTAINED. A WEDGE JOINT SHALL BE CONSTRUCTED.
2. THE JOINT IN THE HMA SURFACE COURSE SHALL BE OFFSET FROM THE LANE LINES BY 6 INCHES EXCEPT FOR THE CENTERLINE OF A ROADWAY IN WHICH THE JOINT SHALL FALL BETWEEN THE DOUBLE YELLOW TRAFFIC STRIPES.
3. TO ENSURE A TRUE VERTICAL AND DENSE UNCONFINED EDGE, THE LUTE OPERATOR SHALL MANUALLY BUMP THE EDGE.
4. THE OVERLAPPED HMA MATERIAL AT THE JOINT SHALL BE TIGHTLY CROWDED (BUMPED) OVER THE JOINT ONTO THE NEWLY PLACED LANE LEAVING A SMALL MOUND OF MIXED HUMPED UP FOR THE ROLLERS TO COMPACT.
5. IN THE CASE OF A WEDGE JOINT, CARE SHALL BE TAKEN TO KEEP COARSE AGGREGATE PARTICLES AWAY FROM THE POINT WHERE THE WEDGE MEETS THESURFACE OF THE PREVIOUSLY PLACED LANE.
6. TO PREVENT LATERAL DISPLACEMENT OF THE UNCONFINED EDGE, THE EDGE OF THE ROLLER WHEEL SHALL EXTEND OVER THE FREE EDGE OF THE HMA MAT BY AT LEAST 6 INCHES.

LONGITUDINAL JOINTS IN HMA

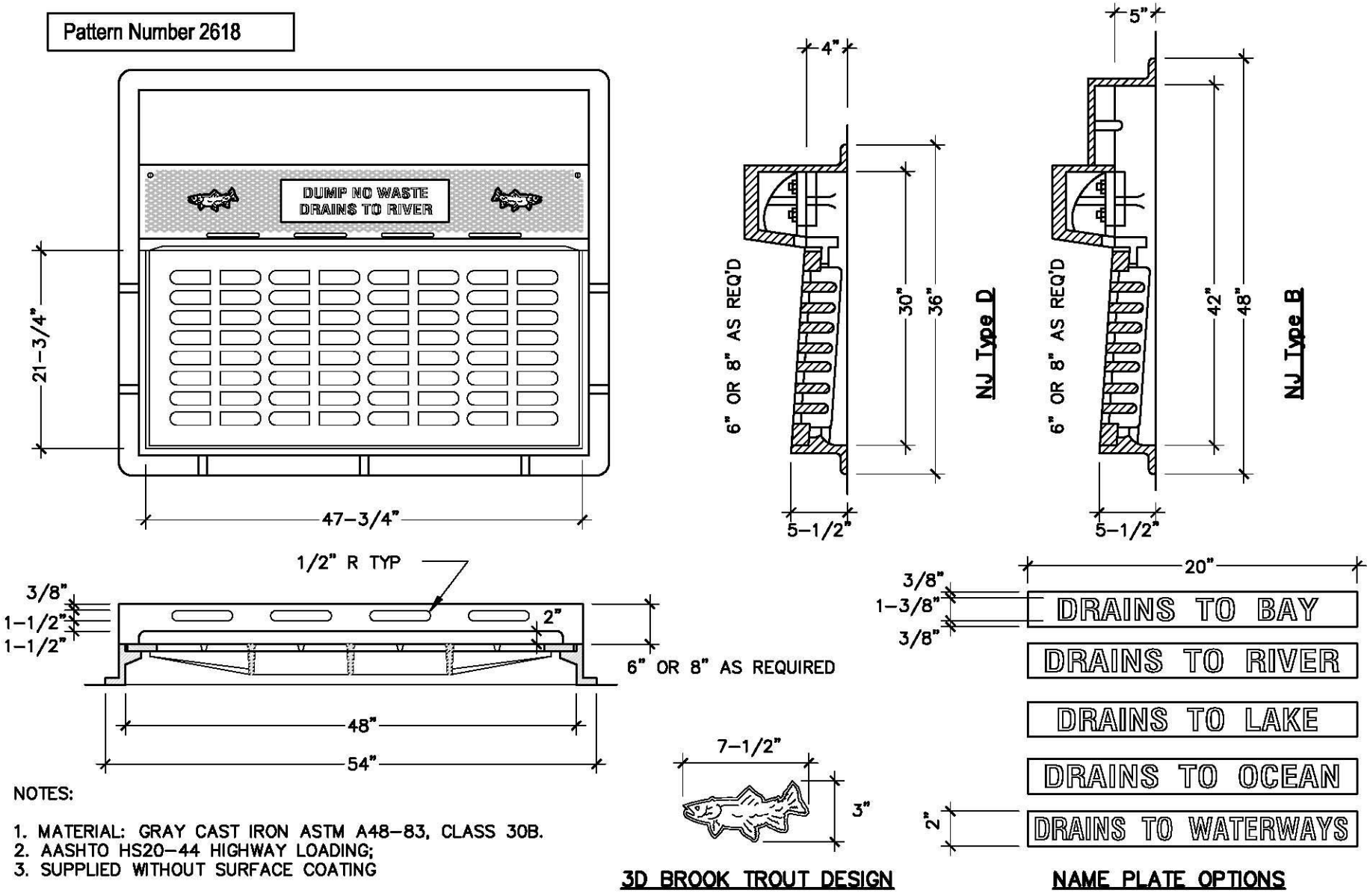


NOTE:

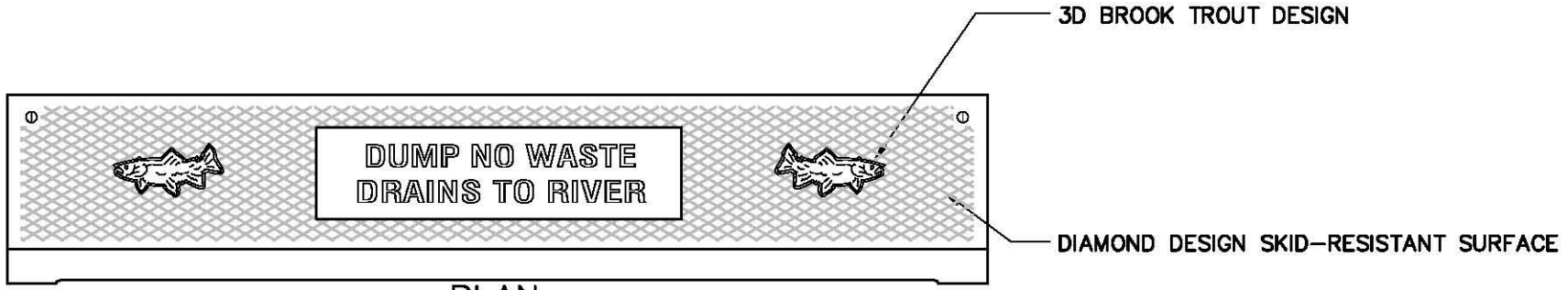
AT THE LIMITS OF THE MILLING OPERATION THE BITUMINOUS MATERIAL LEFT BY THE DRUM RADIUS SHALL BE REMOVED. SAWING OR TRANSVERSE MILLING SHALL BE USED TO INSURE THAT THE FACE IS CLEAN AND VERTICAL. THIS END TREATMENT IS NOT APPLICABLE TO TEMPORARY LIMITS OF MILLING (i e END OF WORKDAY) IT IS APPLICABLE TO ALL AREAS WHERE THE COMPLETED MILLING OPERATION MATCHES ANY EXISTING PAVEMENT INCLUDING BRIDGES.

DETAIL FOR MILLING OPERATIONS (END TREATMENT)

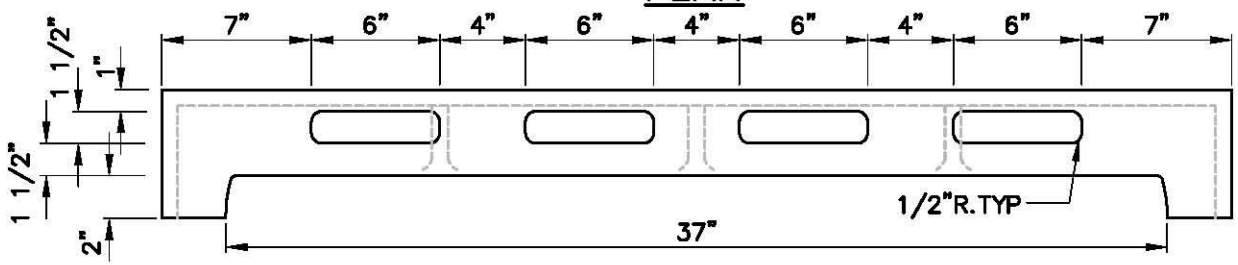
N.T.S.



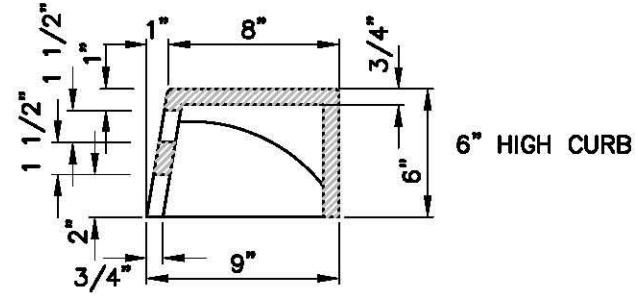
CURB INLET WITH BICYCLE SAFE GRATE AND TYPE 'N-ECO CURB PIECE'



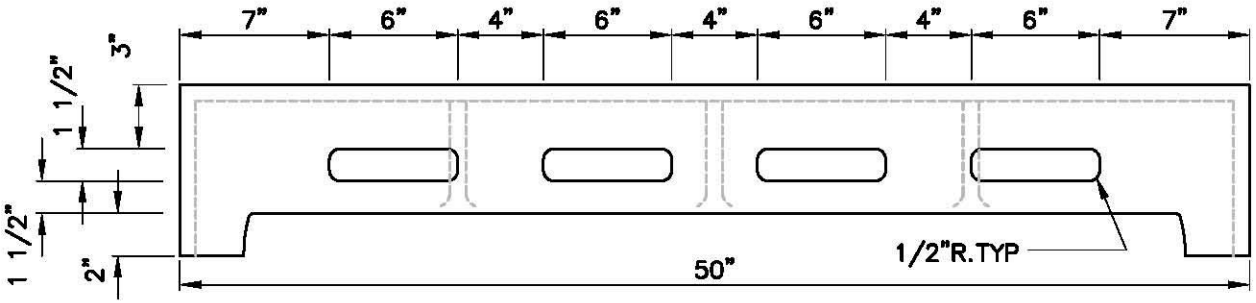
PLAN

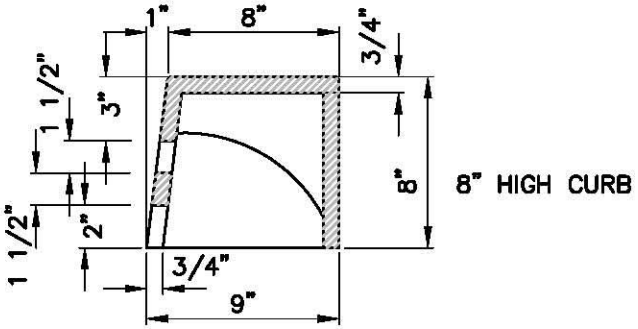


FRONT ELEVATION



END SECTION



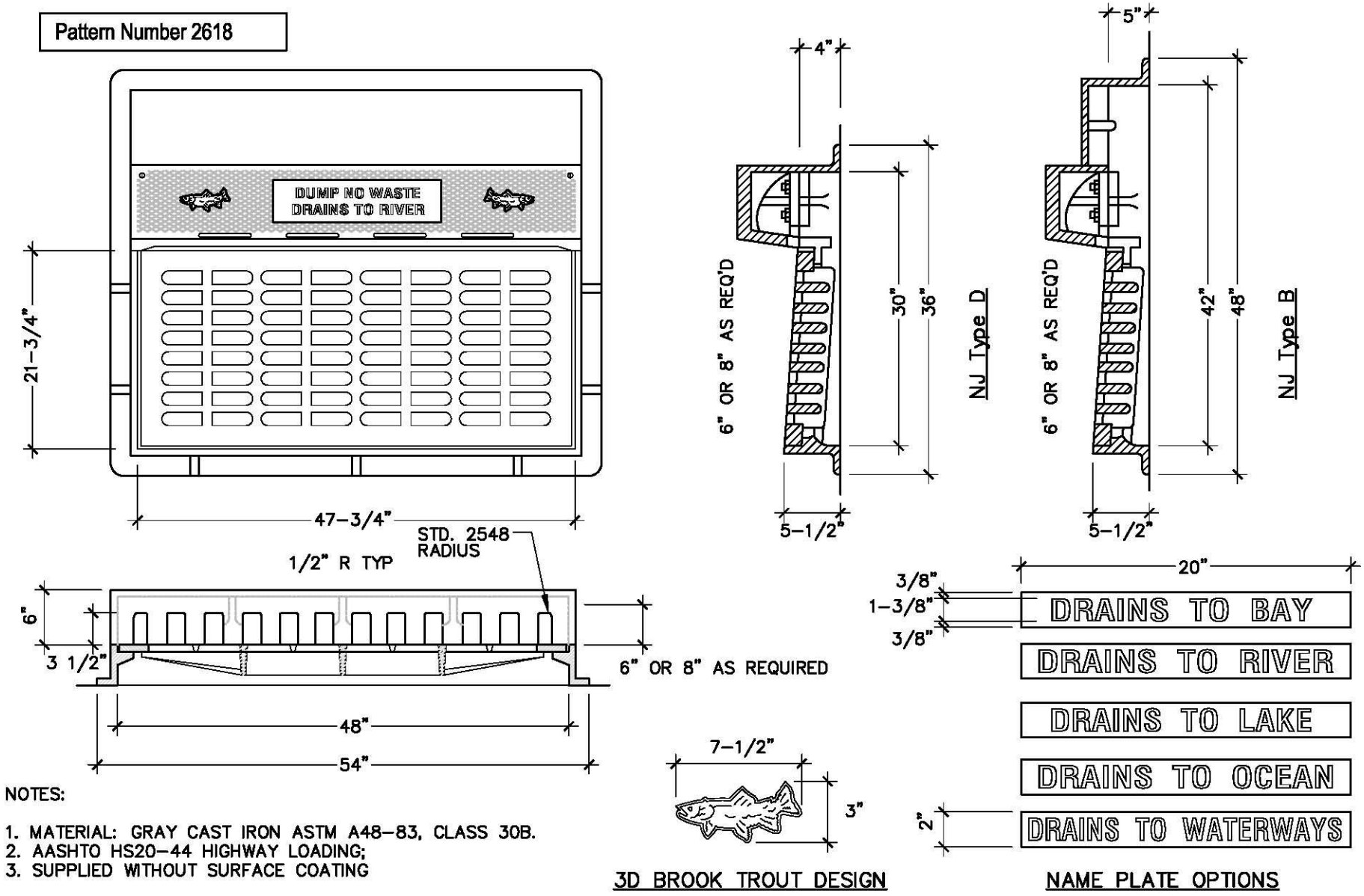


NOTES:

1. MATERIAL: GRAY CAST IRON ASTM A48–83, CLASS 30B.
2. IN RETROFIT SITUATIONS THIS CURB PIECE (HEAD) WILL FIT EXISTING CAMPBELL FOUNDRY CO. MANUFACTURED CURB INLETS FOR NJDOT TYPES B, B–1, B–2, D, D–1, AND D–2.
3. NAMPLATE MESSAGE CAN BE MODIFIED TO YOUR SPECIFIC NEEDS WITHIN AREA SHOWN.
4. CASTING SUPPLIED WITHOUT SURFACE COATING.

Pattern Number 2618

6" – 8" CURB PIECE TYPE 'N–ECO'



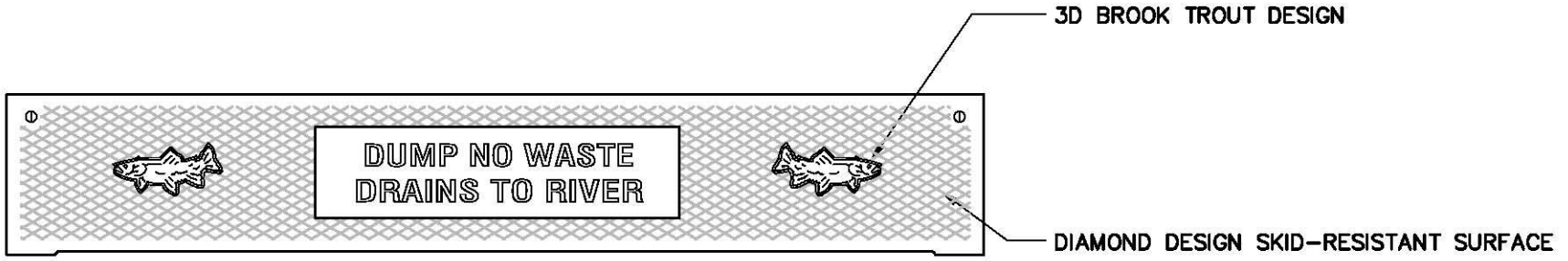
NOTES:

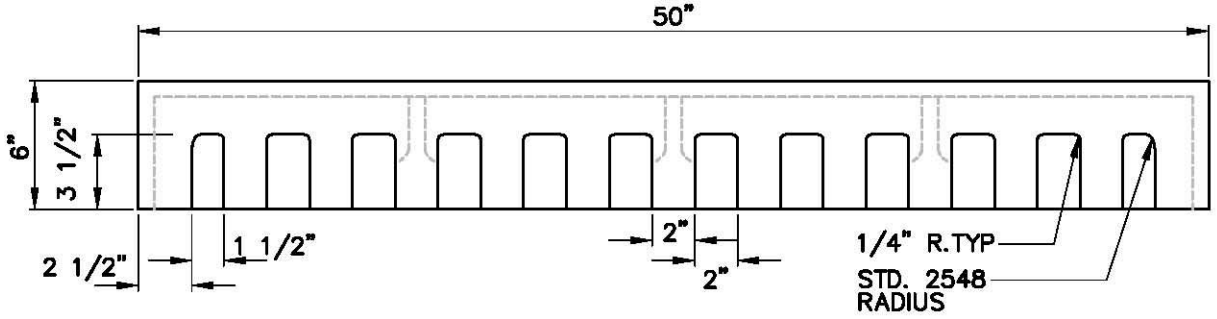
1. MATERIAL: GRAY CAST IRON ASTM A48-83, CLASS 30B.
2. AASHTO HS20-44 HIGHWAY LOADING;
3. SUPPLIED WITHOUT SURFACE COATING

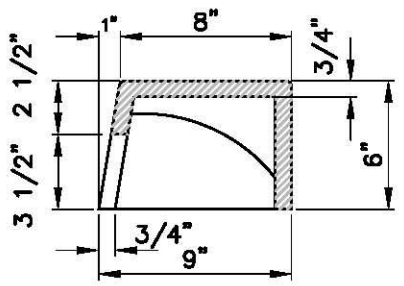
3D BROOK TROUT DESIGN

NAME PLATE OPTIONS

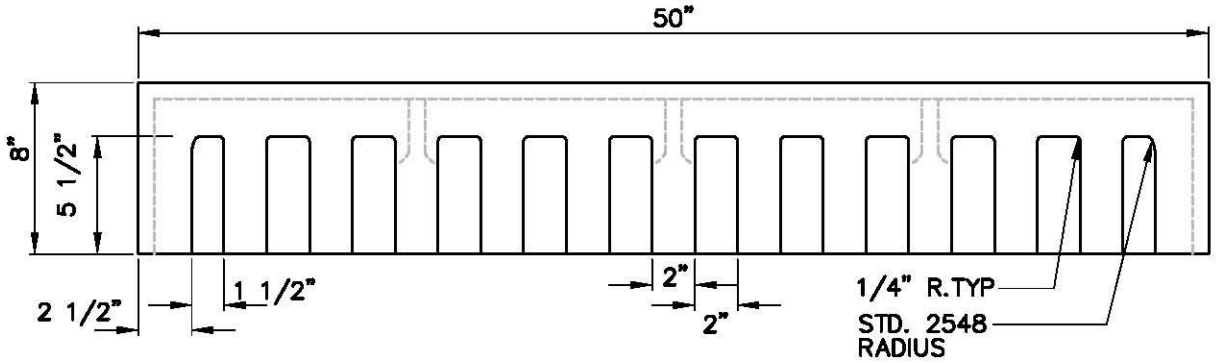
CURB INLET WITH BICYCLE SAFE GRATE AND TYPE 'J-ECO CURB PIECE'

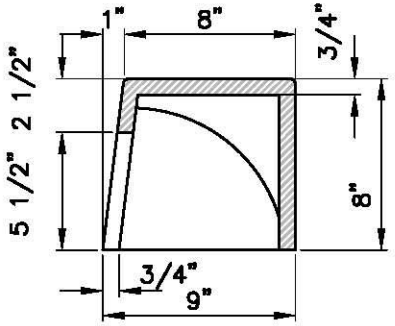






6" HIGH CURB





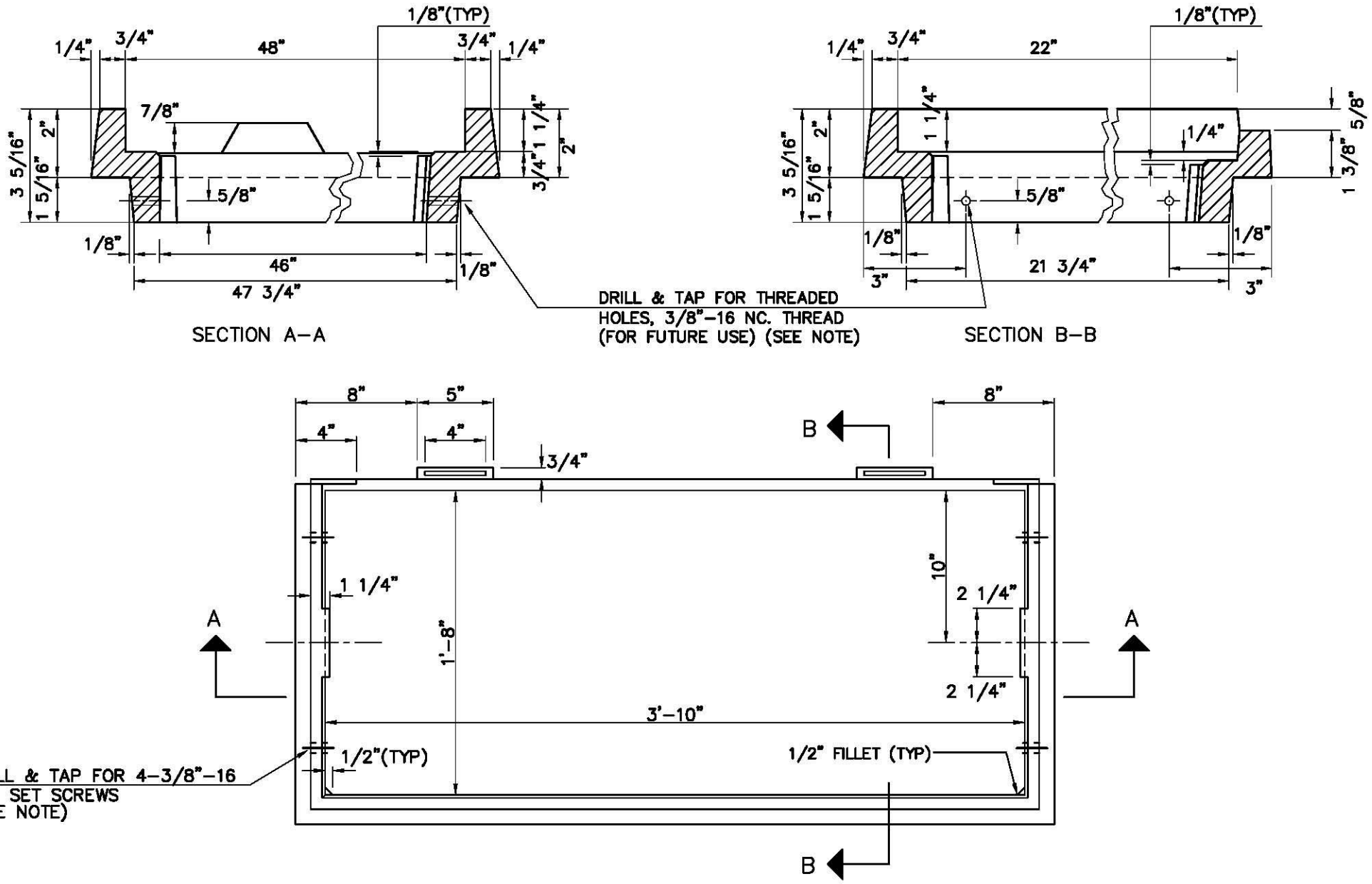
8" HIGH CURB

NOTES:

1. MATERIAL: GRAY CAST IRON ASTM A48-83, CLASS 30B.
2. CASTING SUPPLIED WITHOUT SURFACE COATING.

Pattern Number 2618

6" – 8" CURB PIECE TYPE 'J-ECO'

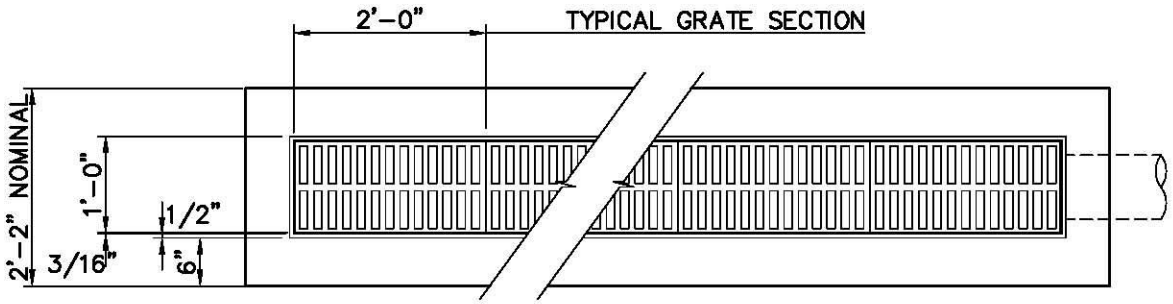


NOTE : A THREADED INSERT MAY BE USED AS AN ALTERNATE TO DRILLING AND TAPPING

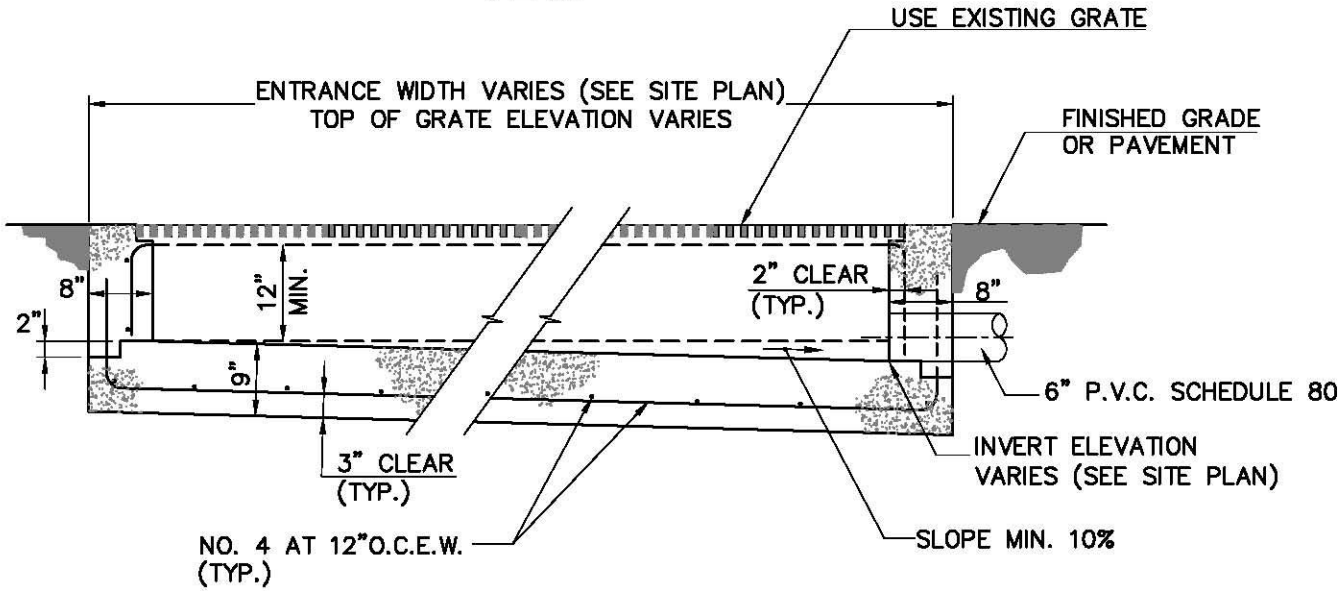
FOR INLETS, TYPE B

CAST IRON EXTENSION FRAMES FOR EXISTING INLETS

REV. 6/29/2000



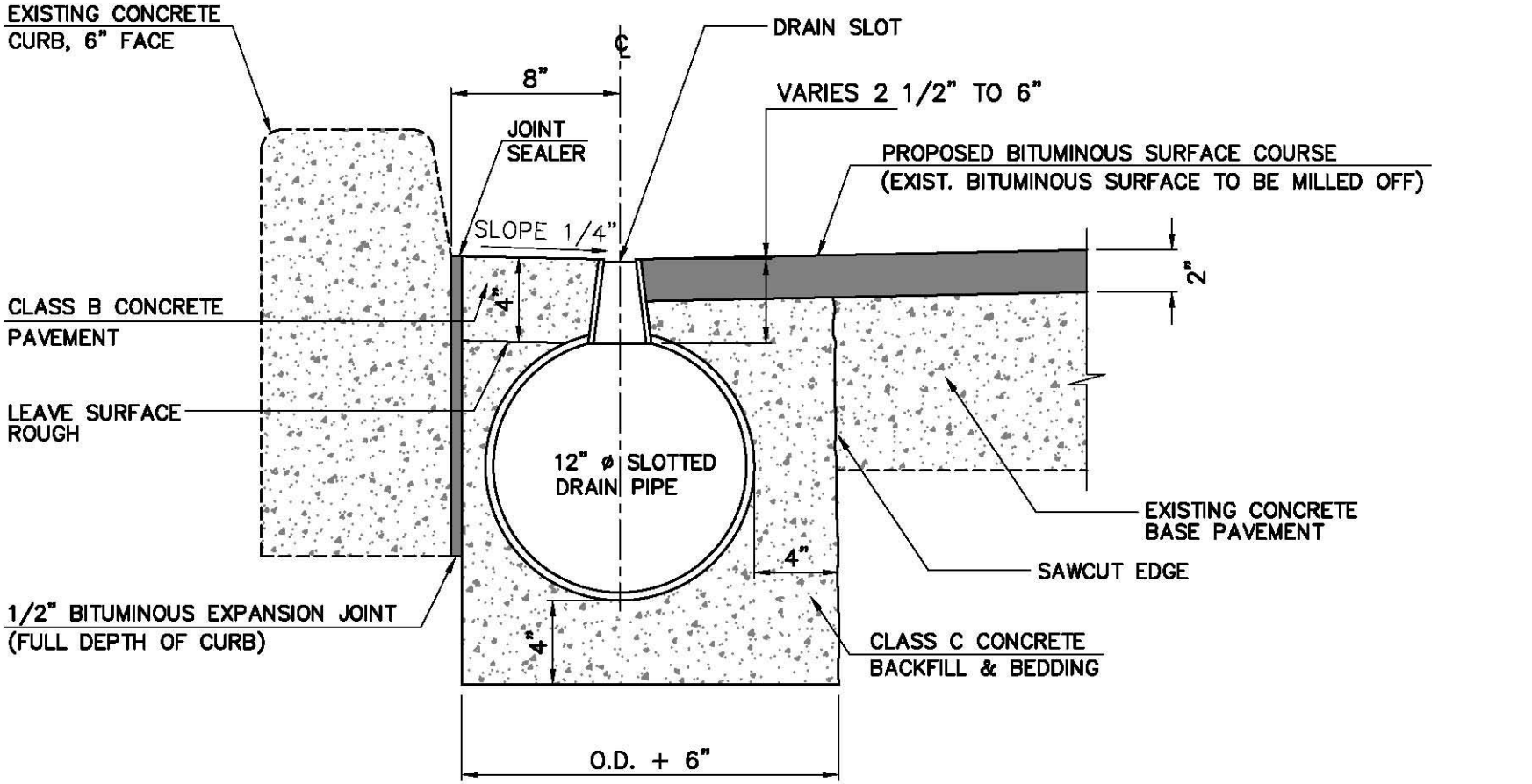
PLAN



ELEVATION

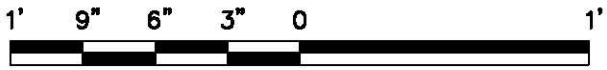
RECONSTRUCT TRENCH DRAIN

REV. 5/21/2008
REV. 8/17/2000



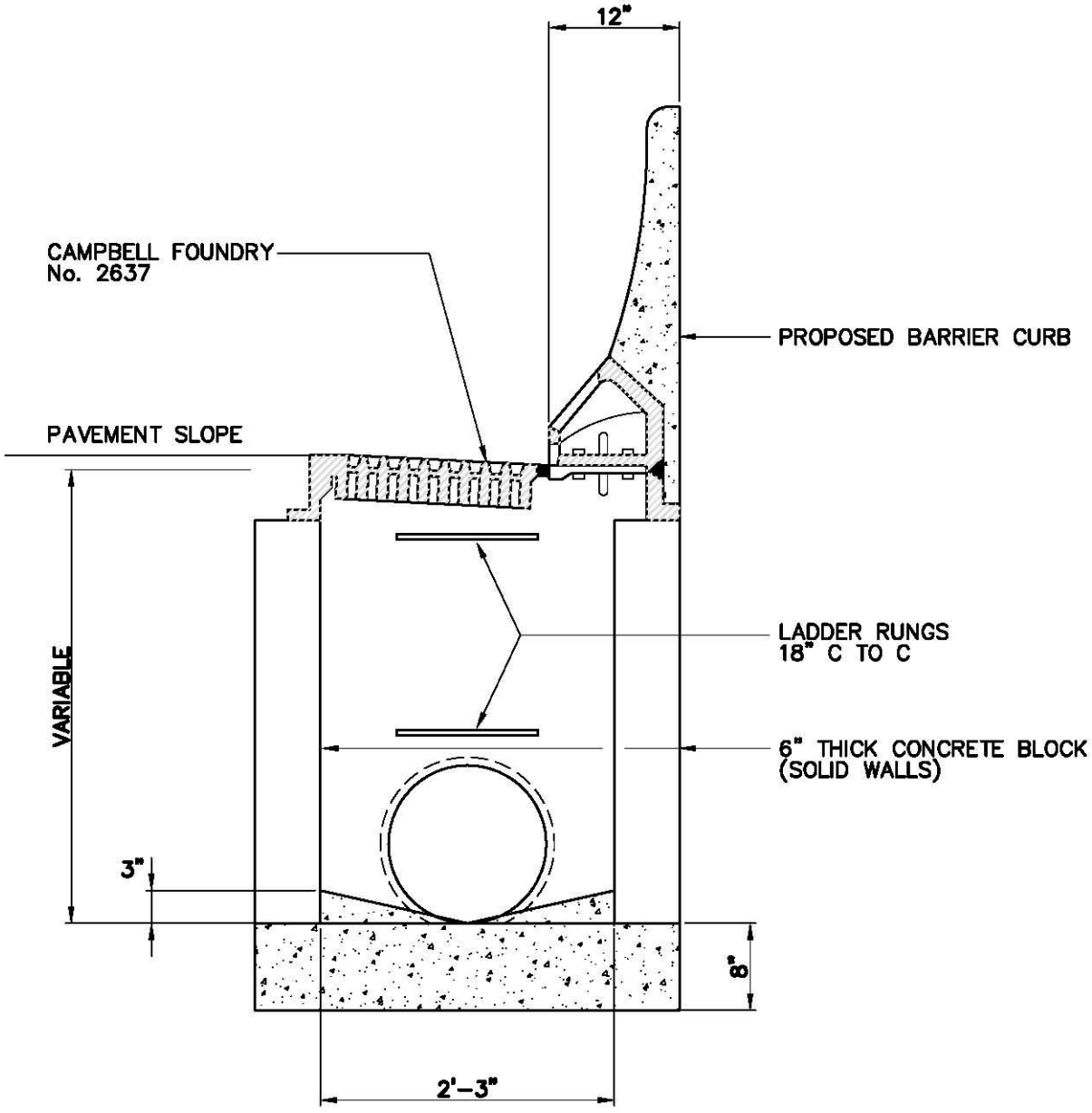
ARMCO 12" ø SLOTTED DRAIN PIPE
ALUMINIZED AS MANUFACTURED
BY CONTECH CONSTRUCTION
PRODUCTS, INC.

SLOTTED DRAIN DETAIL



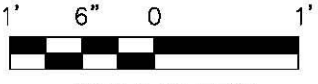
SCALE IN FEET

9/12/2000

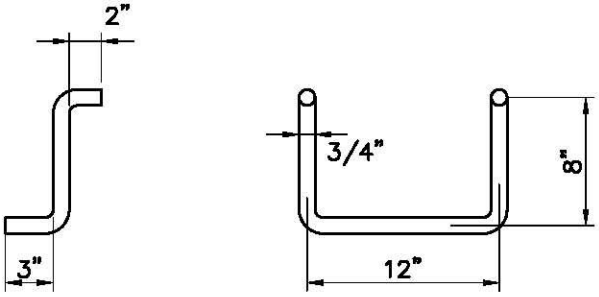


SECTION B–B

INLETS D–1, TYPE 2

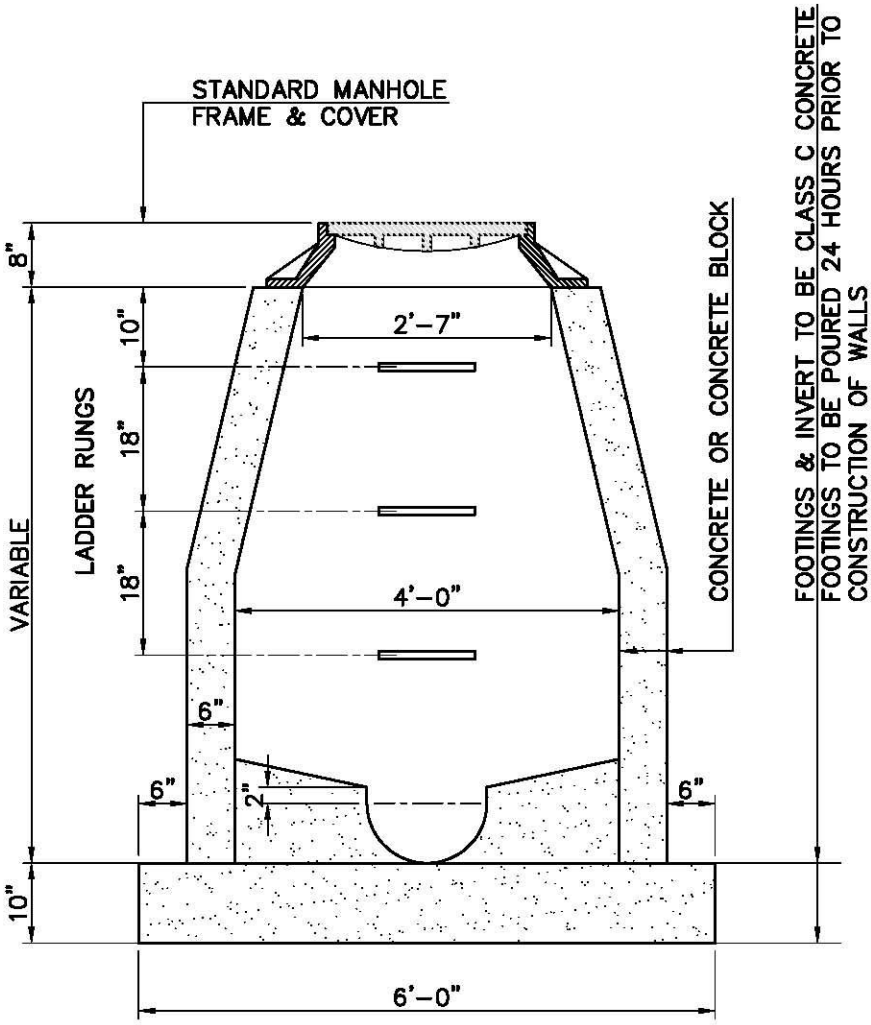


SCALE IN FEET



LADDER RUNG

SCALE IN INCHES

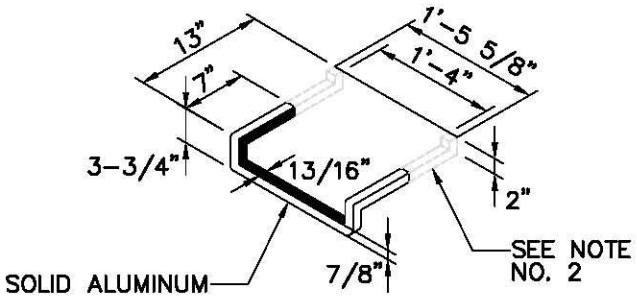


MANHOLE

SCALE IN FEET

NOTE : PRECAST MANHOLES NOT PERMITTED

REV. 10/11/2000



NOTES:

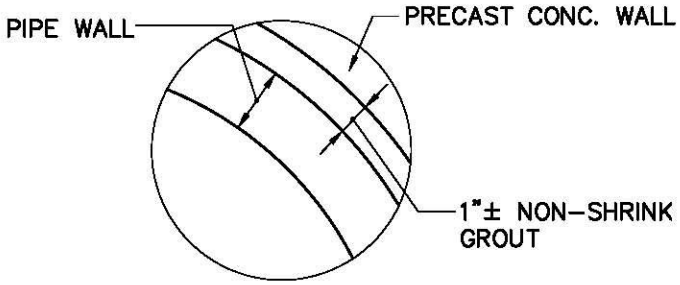
1. ALUMINUM STEPS SHALL BE EXTRUDED ALUMINUM 6061-T6 ALLOY DROP FRONT DESIGN OR APPROVED EQUAL.

2. THE PORTION TO BE EMBEDDED IN THE CONCRETE SHALL BE COATED WITH COAL TAR PITCH OR OTHER APPROVED MATERIAL AND SHALL BE IN ACCORDANCE WITH THE LATEST O.S.H.A. STANDARDS (3" MINIMUM IMBEDMENT)

3. ALL MANHOLE STEPS TO MEET OR EXCEED ASTM AND O.S.H.A. REQUIREMENTS.

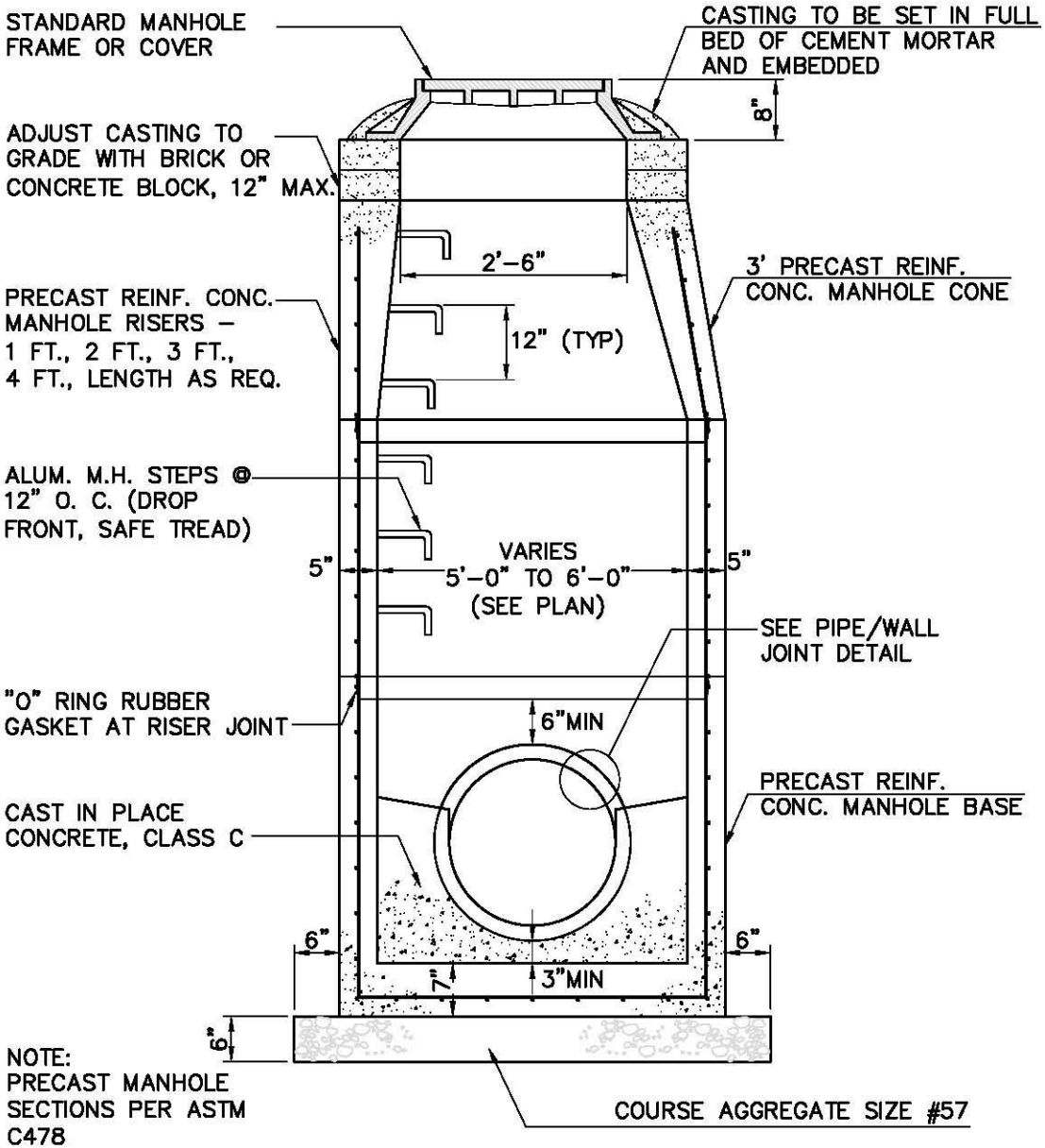
ALUMINUM STEP DETAIL

NTS



PIPE/WALL JOINT DETAIL

NTS

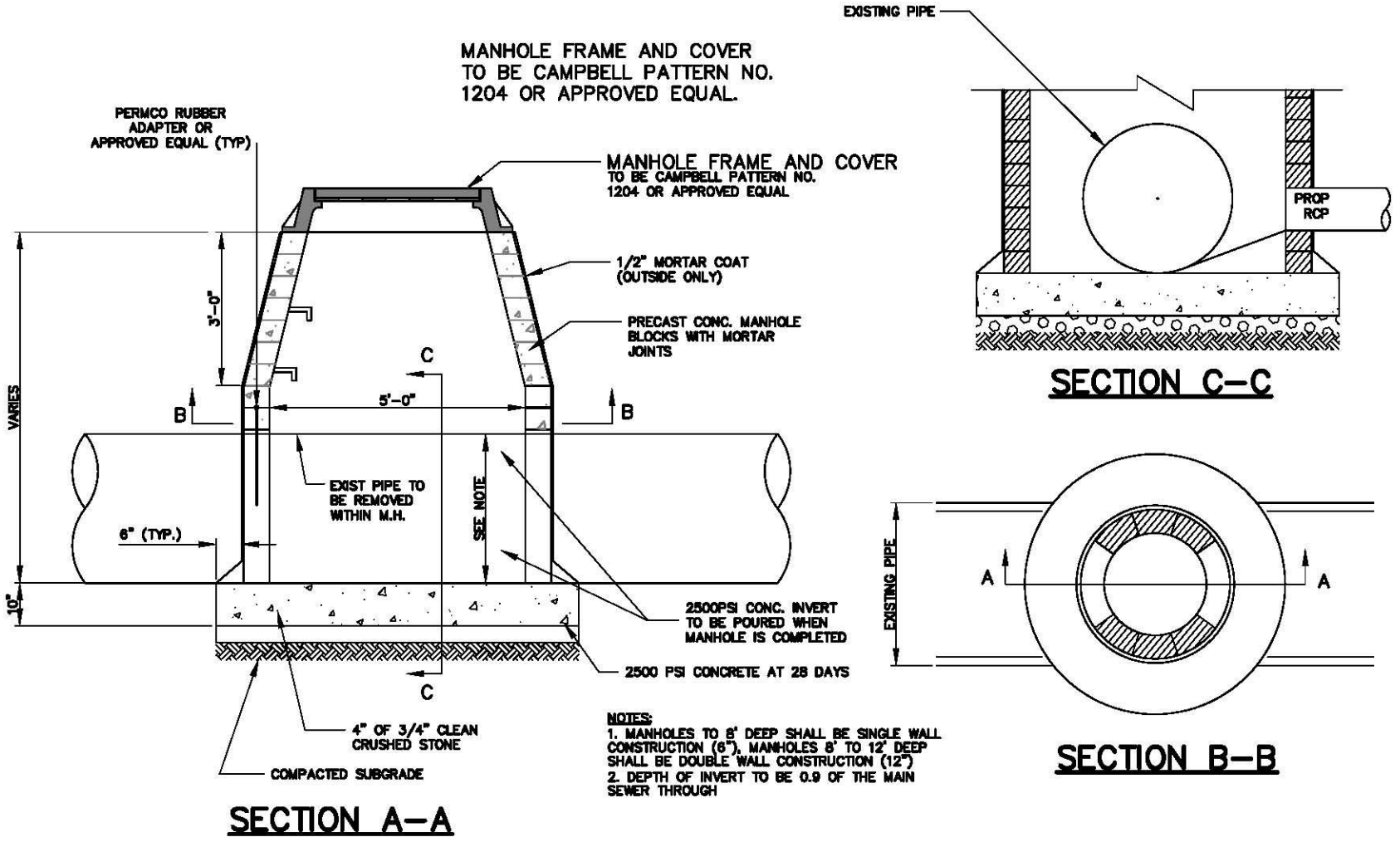


MANHOLES, PRECAST

1' 6" 0 1' 2'

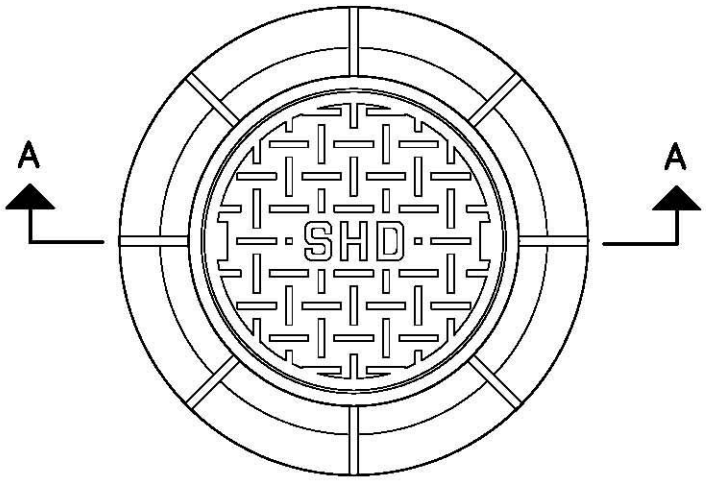
SCALE IN FEET

REV. 8/14/2000



DOG HOUSE MANHOLE DETAIL

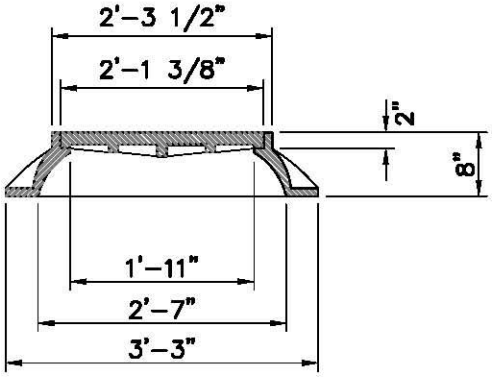
NOT TO SCALE



NOTE: DIMENSIONS FOR FRAME & COVER
EQUIVALENT TO CAMPBELL FOUNDRY
CATALOG NO. 1202B

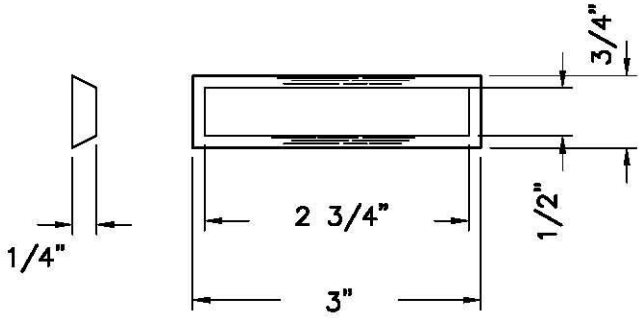
STANDARD MANHOLE FRAME & COVER

SCALE IN FEET



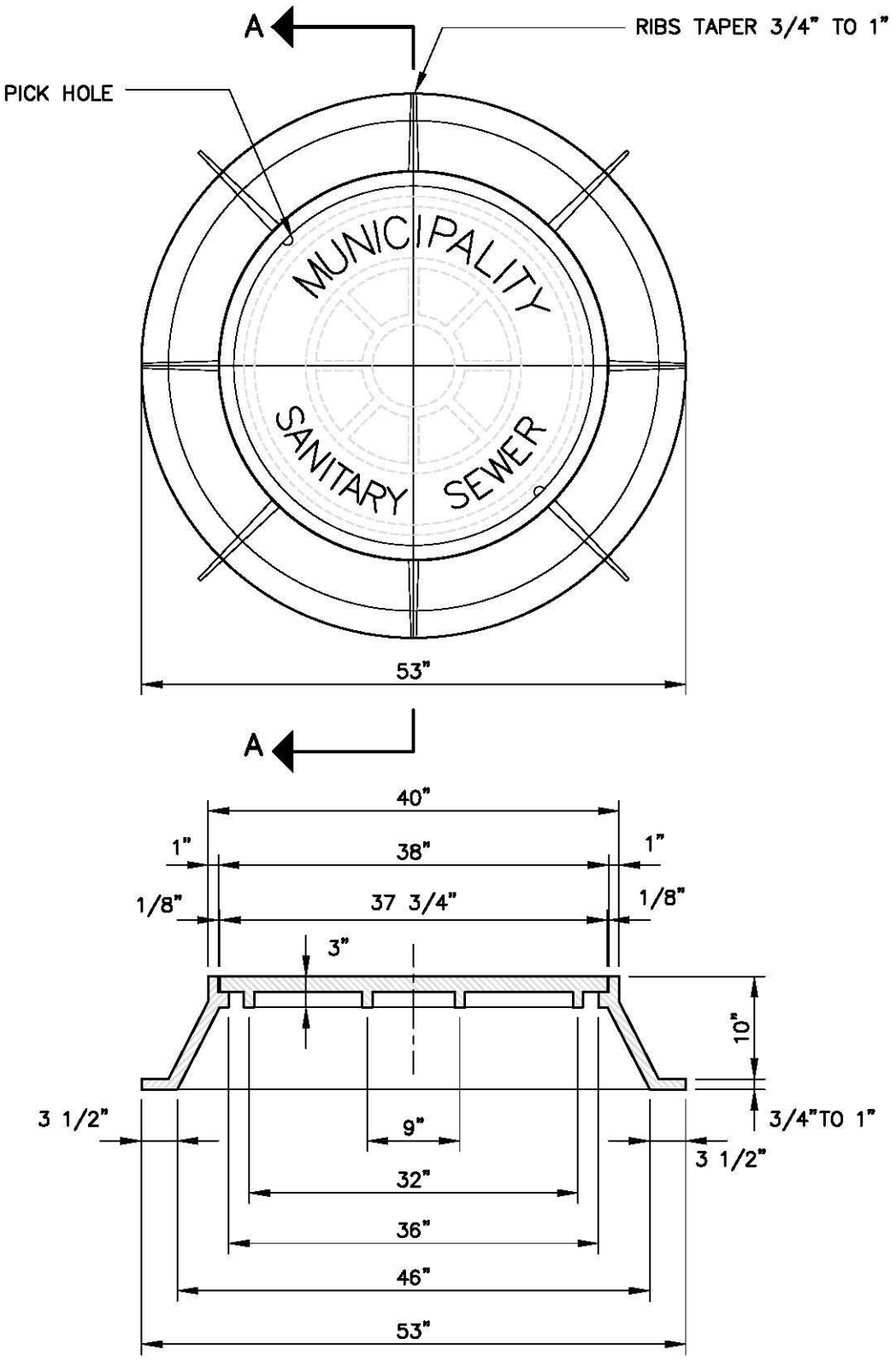
SECTION A–A

SCALE IN FEET



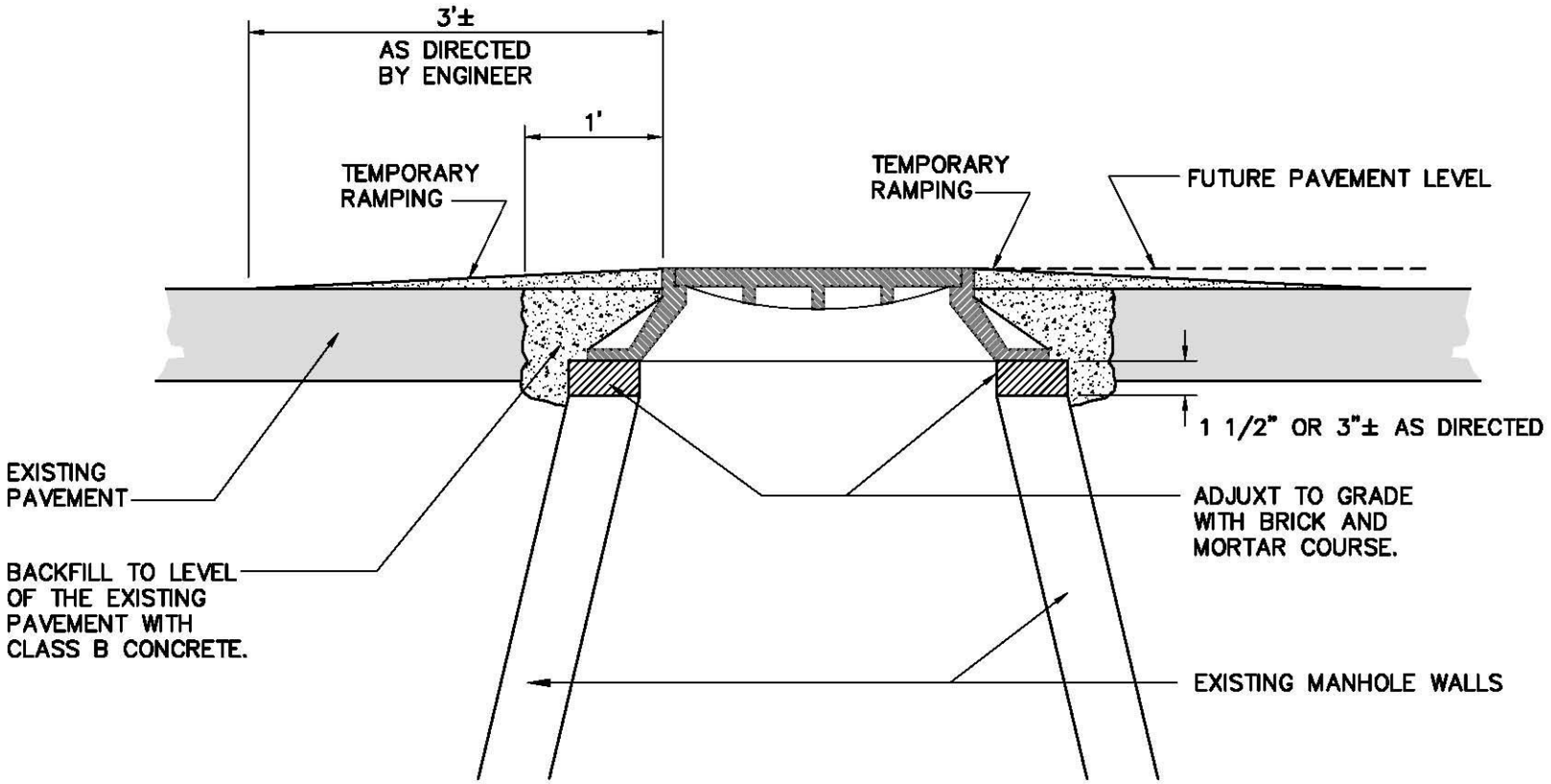
NON–SKID LUG

SCALE IN INCHES



NEW MANHOLE CASTING, SQUARE FRAME, CIRCULAR COVER

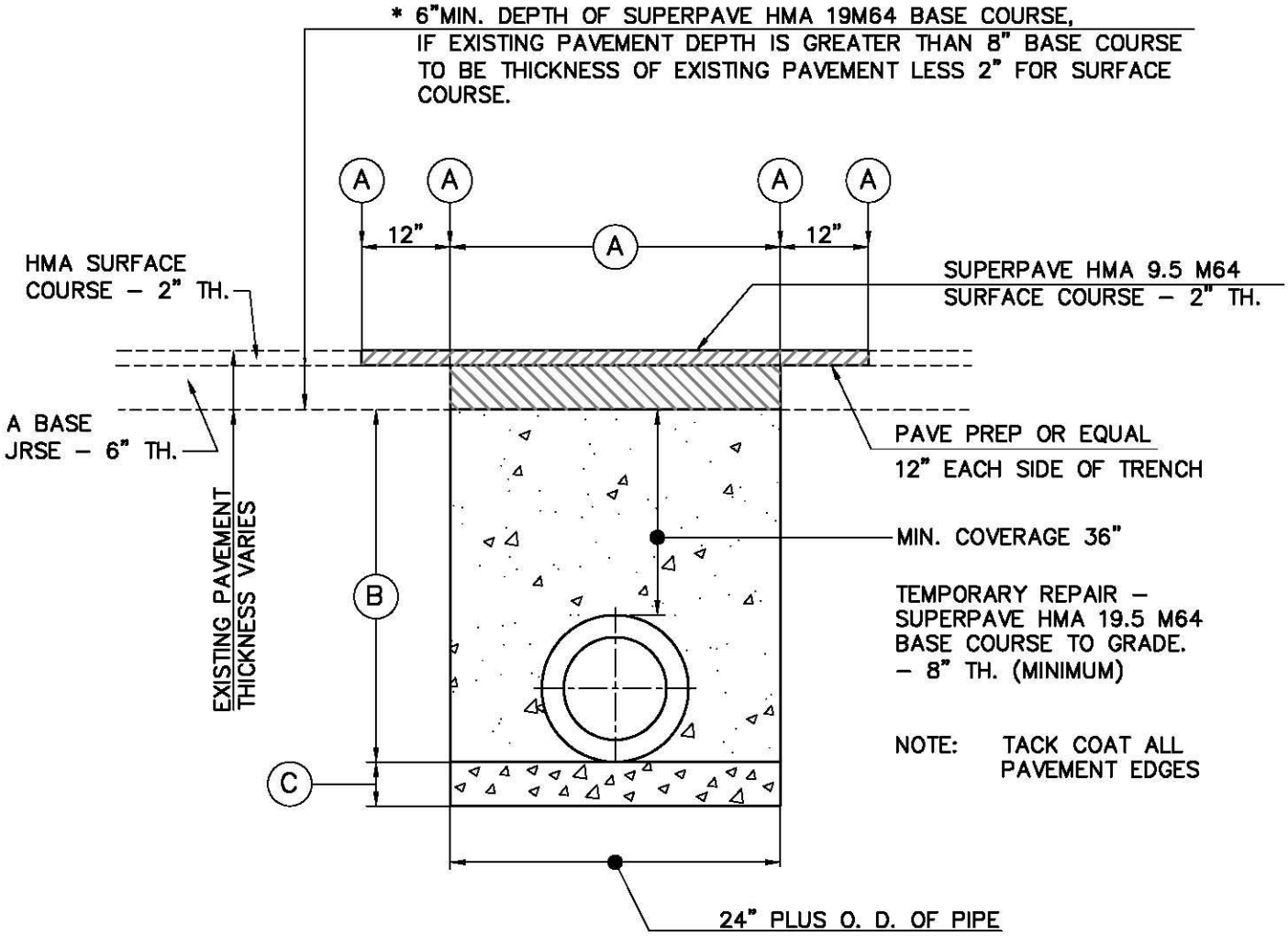
REV. 8/14/2000



STANDARD FOR RAISING EXISTING MANHOLE AND INLET CASTINGS

1' 6" 0 1'

SCALE IN FEET



(A) EXISTING HOT MIX ASPHALT OR CONCRETE PAVEMENT TO BE SAW CUT.

(B) DENSE GRADED AGGREGATE BASE COURSE

(C) 3/4" CLEAN STONE, 6" LAYER. USE ONLY IF PIPE SIZE IS 36" OR LARGER OR IF WET CONDITIONS ARE PRESENT

* IF EXISTING PAVEMENT IS CONCRETE, RESTORATION MATERIAL FOR BASE COURSE SHALL ALSO BE CONCRETE, OR AS DIRECTED BY THE COUNTY ENGINEER.

NOTE: IF EXCAVATION IS WITHIN 2' OF CURB, REMOVE PAVEMENT TO CURB AND REPLACE

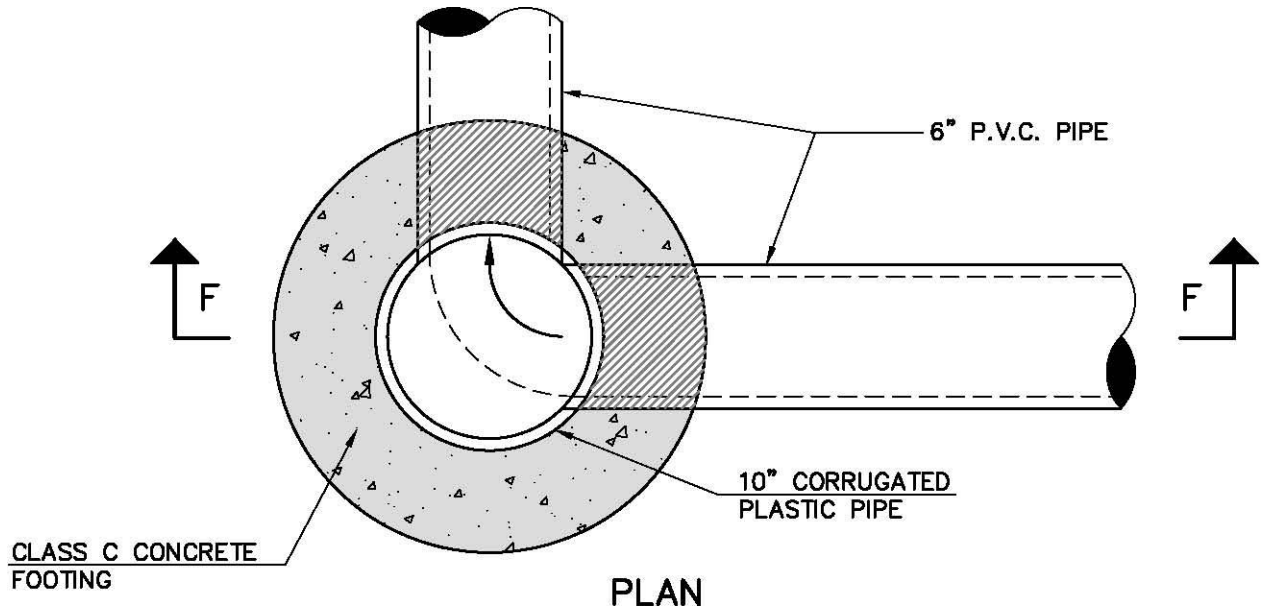
HOT MIX ASPHALT PAVEMENT

TRENCH RESTORATION

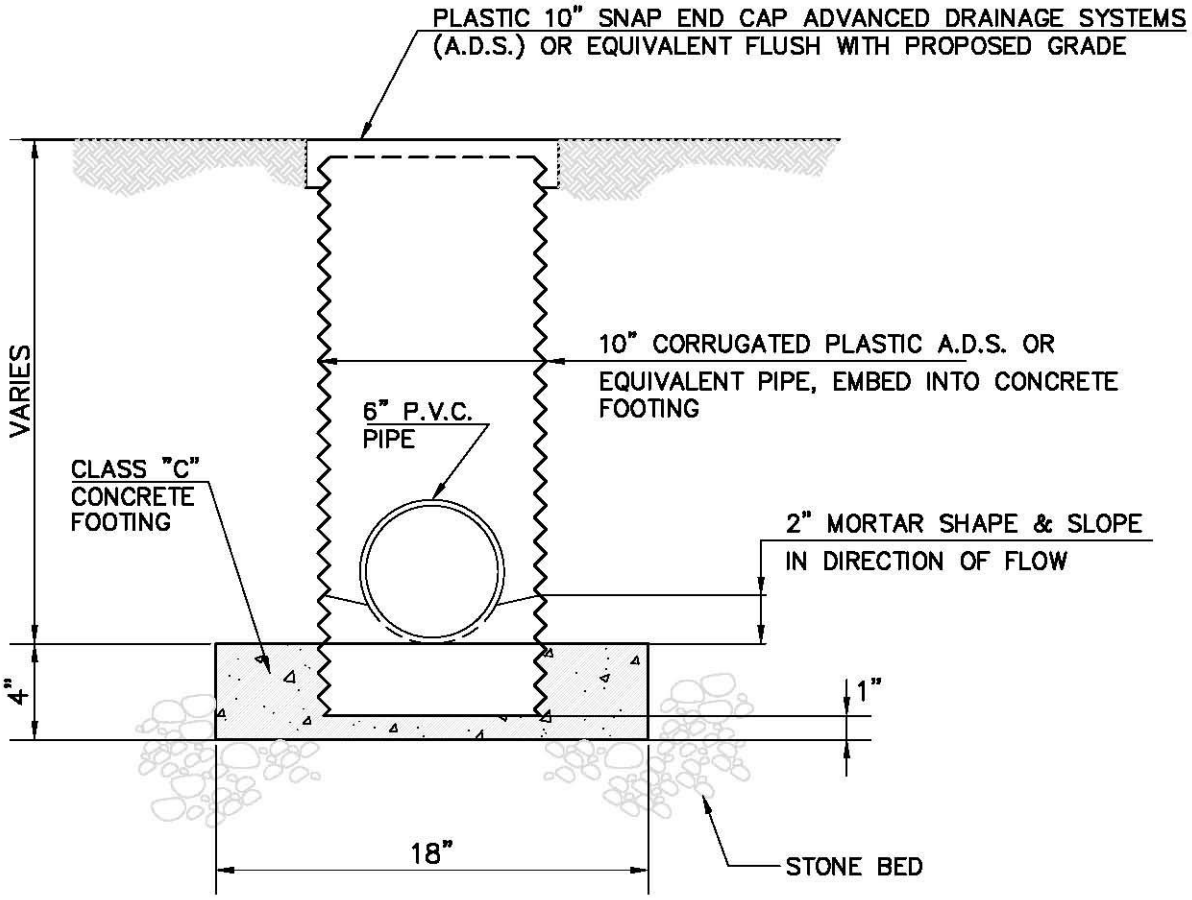
1' 6" 0 1' 2'

SCALE IN FEET

REV. 4/3/2008
REV. 9/20/2007
REV. 1/26/2006

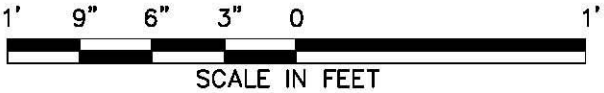


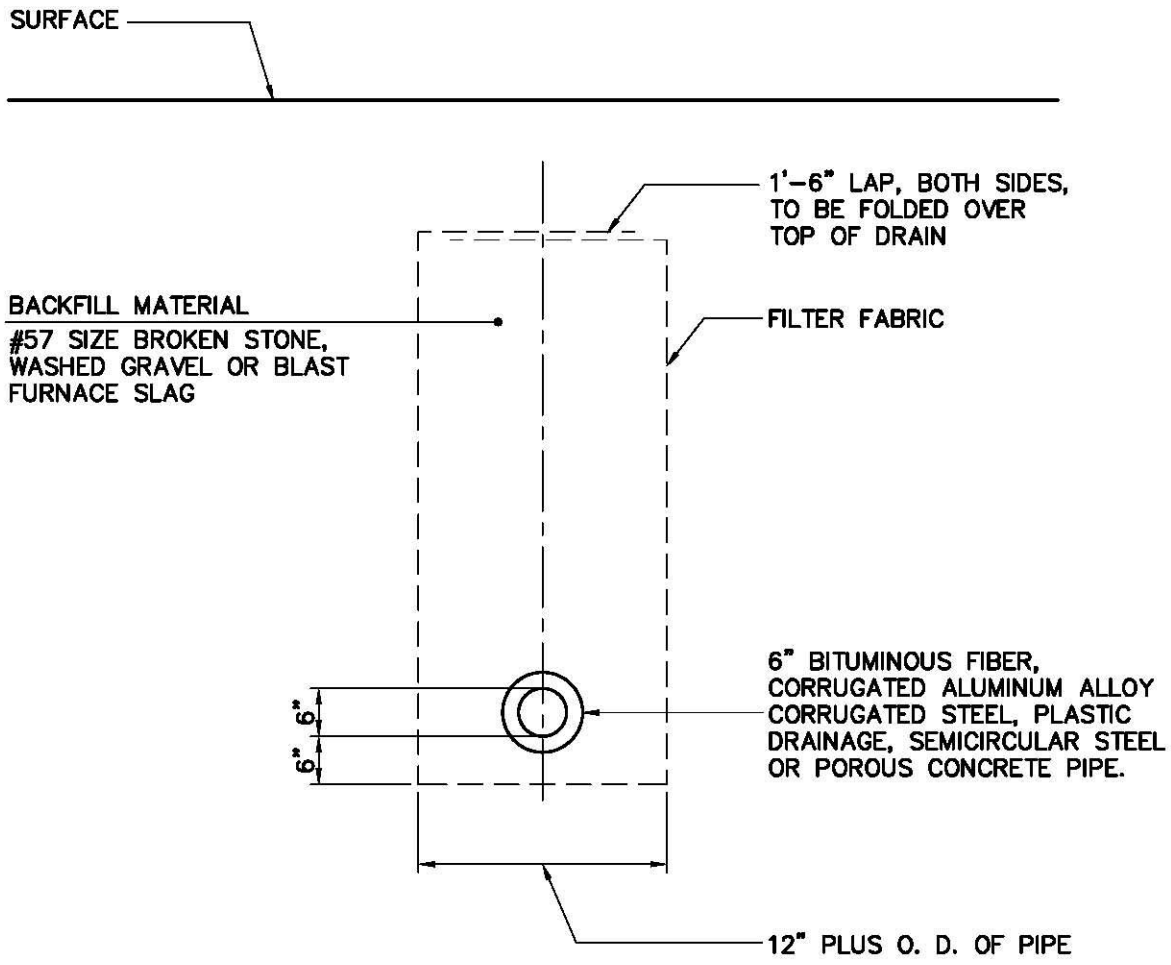
PLAN



SECTION F–F

CLEANOUT DETAIL





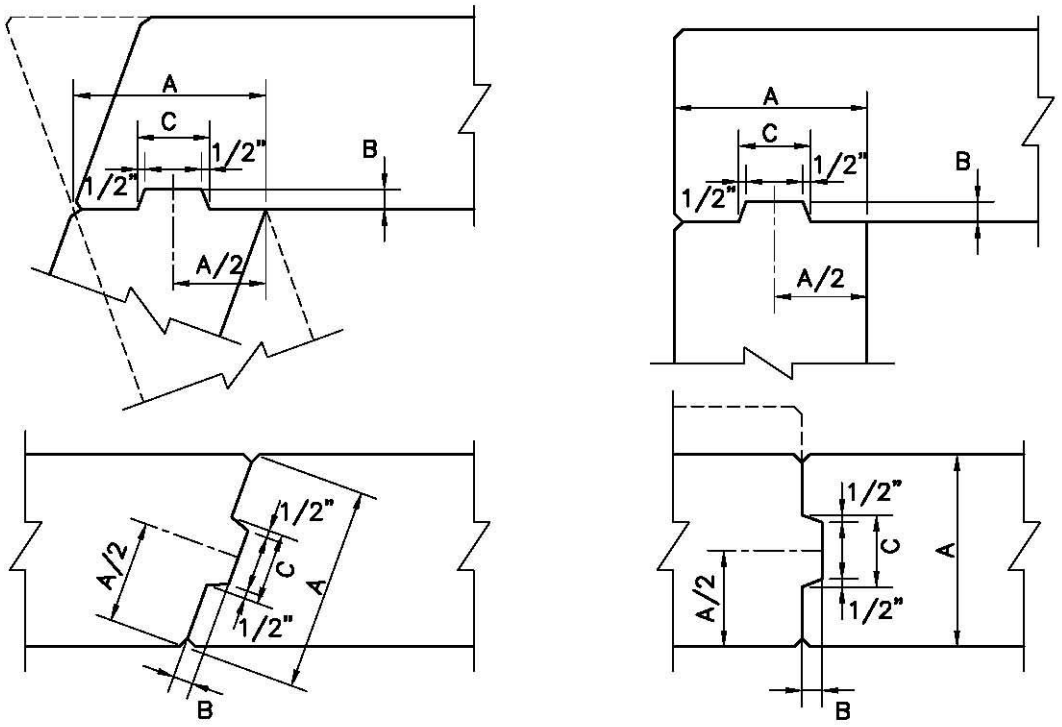
UNDERDRAIN TYPE F WITH PERFORATED PIPE

1' 6" 0 1' 2'

SCALE IN FEET

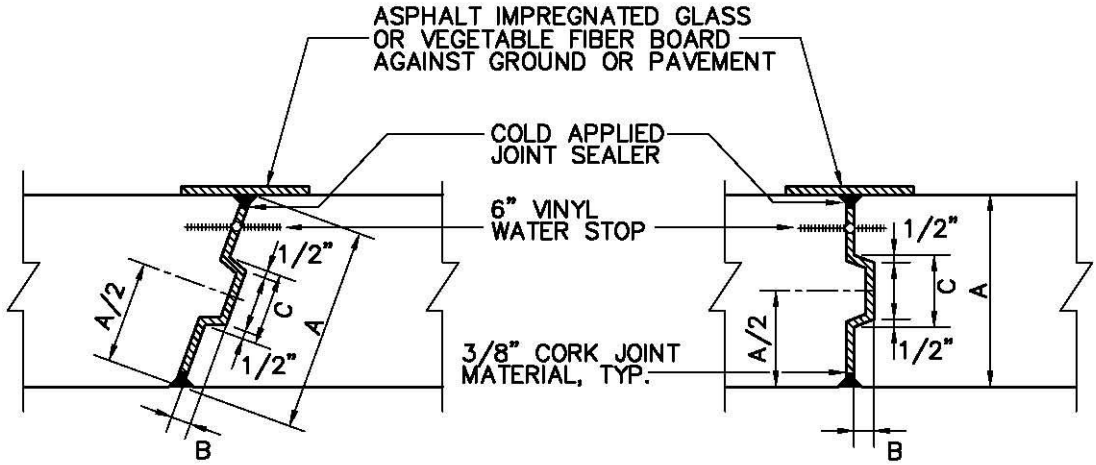
8/11/2000

WIDTH OF JOINT	KEY		
A	DEPTH **B**	WIDTH **C**	STANDARD LUMBER SIZE
8" TO 9"	1 1/4"	1 1/2"	1 X 2 (2 REQ'D)
OVER 9" TO 10"	1 1/2"	2 1/2"	2 X 3
OVER 10" TO 14"	1 1/2"	3 1/2"	2 X 4
OVER 14" TO 19"	1 1/2"	5 1/2"	2 X 6
OVER 19" TO 24"	3	7 1/2"	2 X 8 (2 REQ'D)

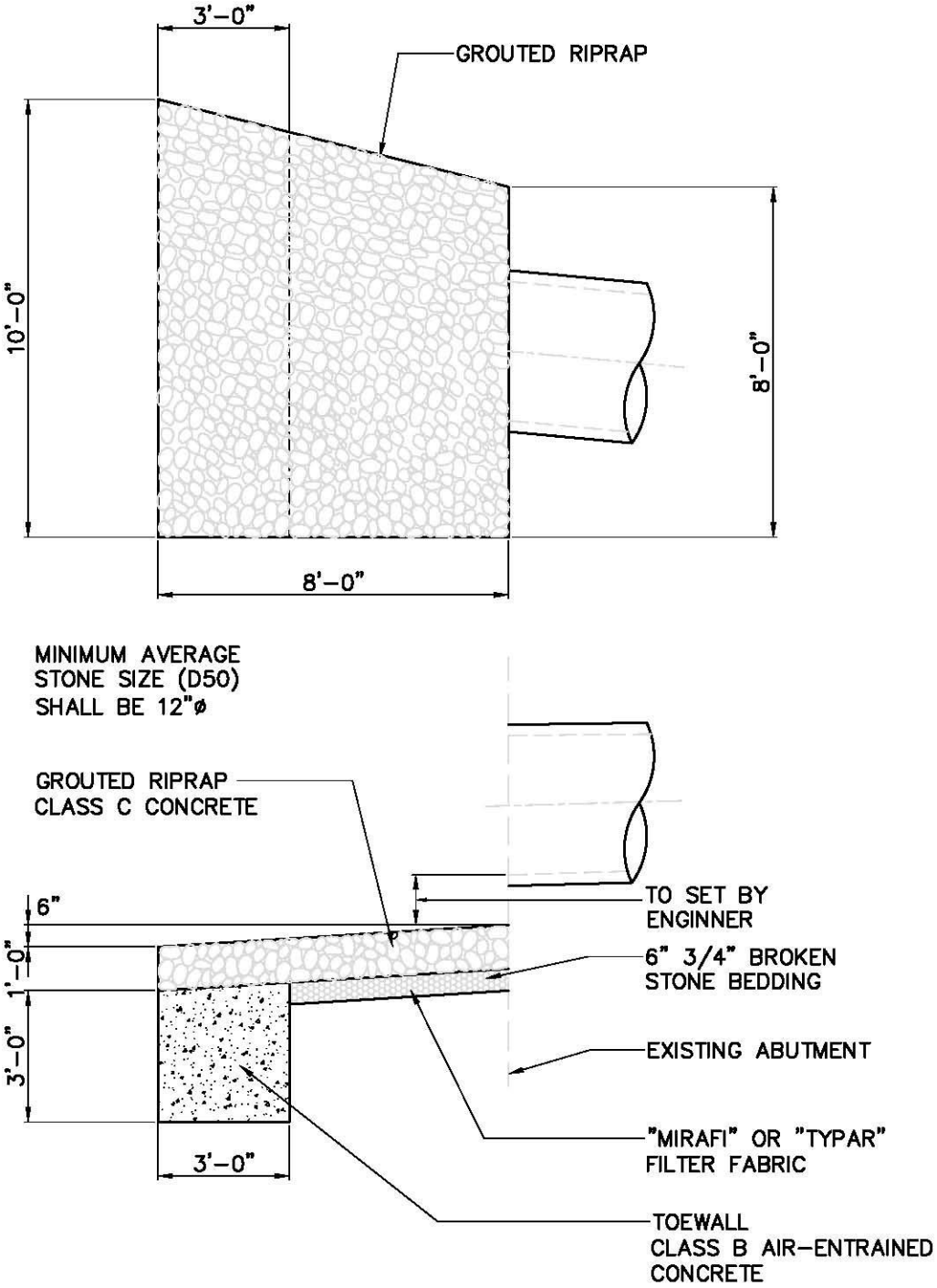


CONTRACTION & CONSTRUCTION JOINTS

NOTE: CONTRACTION JOINTS TO BE TIGHT & PARAFFIN COATED



EXPANSION JOINTS

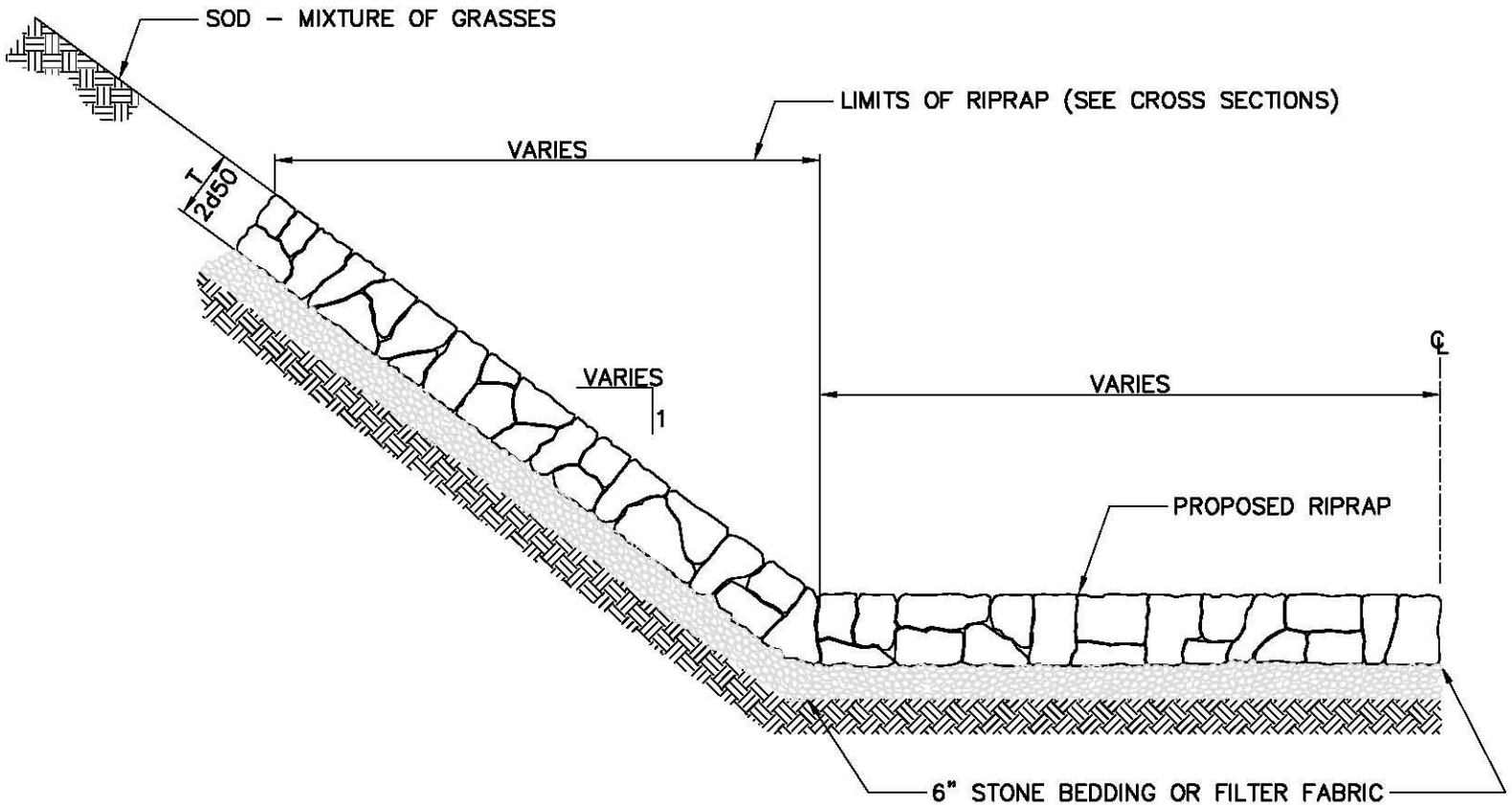


DETAIL OF SPLASH PAD WITH TOE WALL

1' 0 4' 8'

SCALE IN FEET

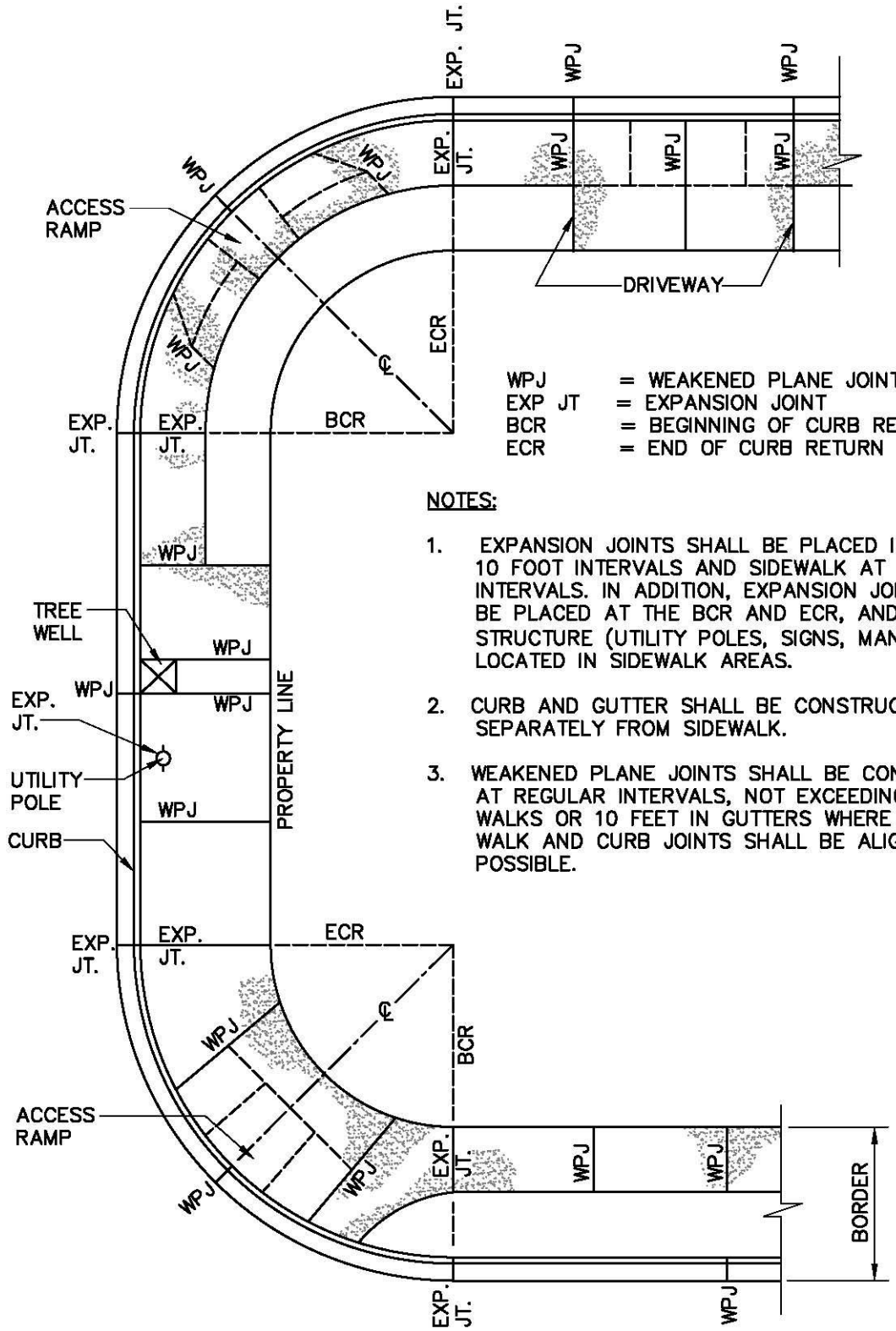
7/25/2000



RIPRAP TRANSITION DETAIL

1' 0 2' 4'

SCALE IN FEET



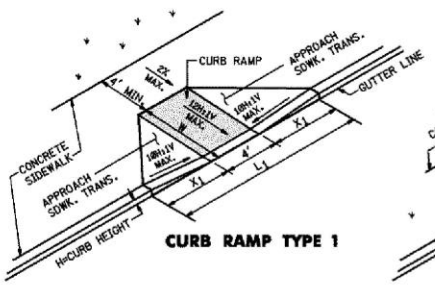
WPJ = WEAKENED PLANE JOINT
EXP JT = EXPANSION JOINT
BCR = BEGINNING OF CURB RETURN
ECR = END OF CURB RETURN

NOTES:

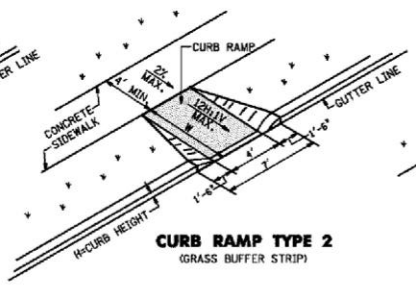
1. EXPANSION JOINTS SHALL BE PLACED IN CURB, AT 10 FOOT INTERVALS AND SIDEWALK AT 12 FOOT INTERVALS. IN ADDITION, EXPANSION JOINTS SHALL BE PLACED AT THE BCR AND ECR, AND AROUND ANY STRUCTURE (UTILITY POLES, SIGNS, MANHOLES, ETC.) LOCATED IN SIDEWALK AREAS.
2. CURB AND GUTTER SHALL BE CONSTRUCTED SEPARATELY FROM SIDEWALK.
3. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT REGULAR INTERVALS, NOT EXCEEDING 4 FEET IN WALKS OR 10 FEET IN GUTTERS WHERE APPLICABLE, WALK AND CURB JOINTS SHALL BE ALIGNED, WHERE POSSIBLE.

CURB AND SIDEWALK JOINTS

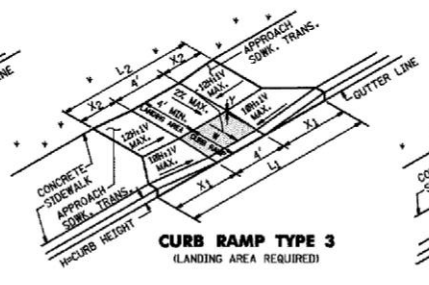
NOT TO SCALE



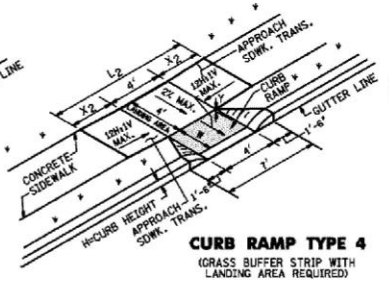
CURB RAMP TYPE 1



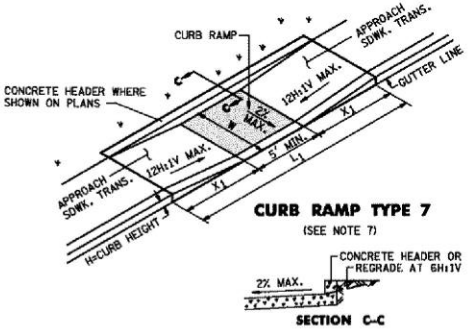
CURB RAMP TYPE 2
(GRASS BUFFER STRIP)



CURB RAMP TYPE 3
(LANDING AREA REQUIRED)

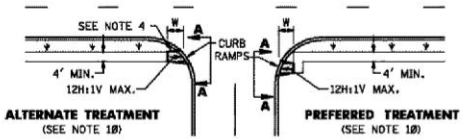


CURB RAMP TYPE 4
(GRASS BUFFER STRIP WITH LANDING AREA REQUIRED)

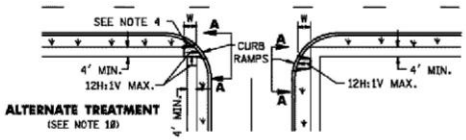


CURB RAMP TYPE 7
(SEE NOTE 7)

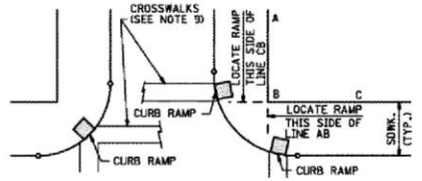
SECTION C-C



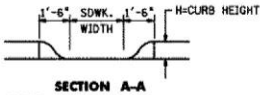
CURB RAMP TYPE 5
(CROSSING PARALLEL TO HIGHWAY ONLY)



CURB RAMP TYPE 6
(CROSSING PARALLEL TO HIGHWAY ONLY)



LOCATION OF CURB RAMP TYPES 1, 2, 3, 4 & 7 FOR CROSSING PARALLEL AND PERPENDICULAR TO HIGHWAY

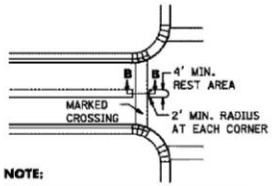


SECTION A-A

NOTE:
CURB RAMP OPENING TO BE FLUSH WITH ROADWAY PAVEMENT (CURB RAMP TYPES 5 & 6).

CURB RAMP TYPE 1			
H INCHES	X1 FEET	L1 FEET	W FEET
3	2.5	9.0	3
4	3.3	10.6	4
5	4.2	12.4	5
6	5.0	14.0	6
7	5.8	15.6	7
8	6.7	17.4	8
9	7.5	19.0	9

CURB RAMP TYPE 2, 5 OR 6	
H INCHES	W FEET
3	3
4	4
5	5
6	6
7	7
8	8
9	9



NOTE:
WHERE PRACTICAL, END LEFT TURN ISLAND OR DIVISIONAL ISLAND BEFORE CROSSWALK TO ELIMINATE CUT-THROUGH

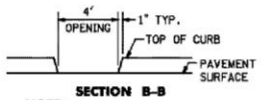
ISLAND WALKWAY OPENING AT INTERSECTIONS

PREFERRED TREATMENT
(SEE NOTE 10)

CURB RAMP TYPE 7			
W FEET	H INCHES	X1 FEET	L1 FEET
4 MIN. 6 MAX.	3	3	11
	4	4	13
	5	5	15
	6	6	17
	7	7	19
	8	8	21
	9	9	23

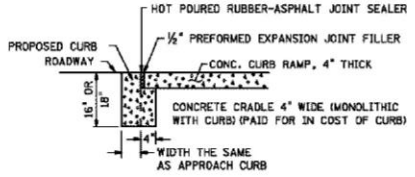
CURB RAMP TYPE 3						
W FEET	H INCHES	X1 FEET	L1 FEET	Y INCHES	X2 FEET	L2 FEET
2.5	3	2.5	9	2.5	Ø.5	5
	4	3.3	10.6	2.5	1.5	7
	5	4.2	12.4	2.5	2.5	9
	6	5.0	14.0	2.5	3.5	11
	7	5.8	15.6	2.5	4.5	13
	8	6.7	17.4	2.5	5.5	15
	9	7.5	19.0	2.5	6.5	17
3.0	3	*	*	*	*	*
	4	3.3	10.6	3.0	1	6
	5	4.2	12.4	3.0	2	8
	6	5.0	14.0	3.0	3	10
	7	5.8	15.6	3.0	4	12
	8	6.7	17.4	3.0	5	14
	9	7.5	19.0	3.0	6	16
3.5	3	*	*	*	*	*
	4	3.3	10.6	3.5	Ø.5	5
	5	4.2	12.4	3.5	1.5	7
	6	5.0	14.0	3.5	2.5	9
	7	5.8	15.6	3.5	3.5	11
	8	6.7	17.4	3.5	4.5	13
	9	7.5	19.0	3.5	5.5	15
4.0	3	*	*	*	*	*
	4	*	*	*	*	*
	5	4.2	12.4	4.0	1	6
	6	5.0	14.0	4.0	2	8
	7	5.8	15.6	4.0	3	10
	8	6.7	17.4	4.0	4	12
	9	7.5	19.0	4.0	5	14

CURB RAMP TYPE 4					
W FEET	H INCHES	Y INCHES	X2 FEET	L2 FEET	
2.5	3	2.5	Ø.5	5	
	4	2.5	1.5	7	
	5	2.5	2.5	9	
	6	2.5	3.5	11	
	7	2.5	4.5	13	
	8	2.5	5.5	15	
	9	2.5	6.5	17	
3.0	3	**	**	**	
	4	3.0	1	6	
	5	3.0	2	8	
	6	3.0	3	10	
	7	3.0	4	12	
	8	3.0	5	14	
	9	3.0	6	16	
3.5	3	**	**	**	
	4	3.5	Ø.5	5	
	5	3.5	1.5	7	
	6	3.5	2.5	9	
	7	3.5	3.5	11	
	8	3.5	4.5	13	
	9	3.5	5.5	15	
4.0	3	**	**	**	
	4	**	**	**	
	5	4.0	1	6	
	6	4.0	2	8	
	7	4.0	3	10	
	8	4.0	4	12	
	9	4.0	5	14	



SECTION B-B

NOTE:
4' WIDE OPENING TO BE FLUSH WITH ROADWAY PAVEMENT



DROPPED CURB AND CRADLE

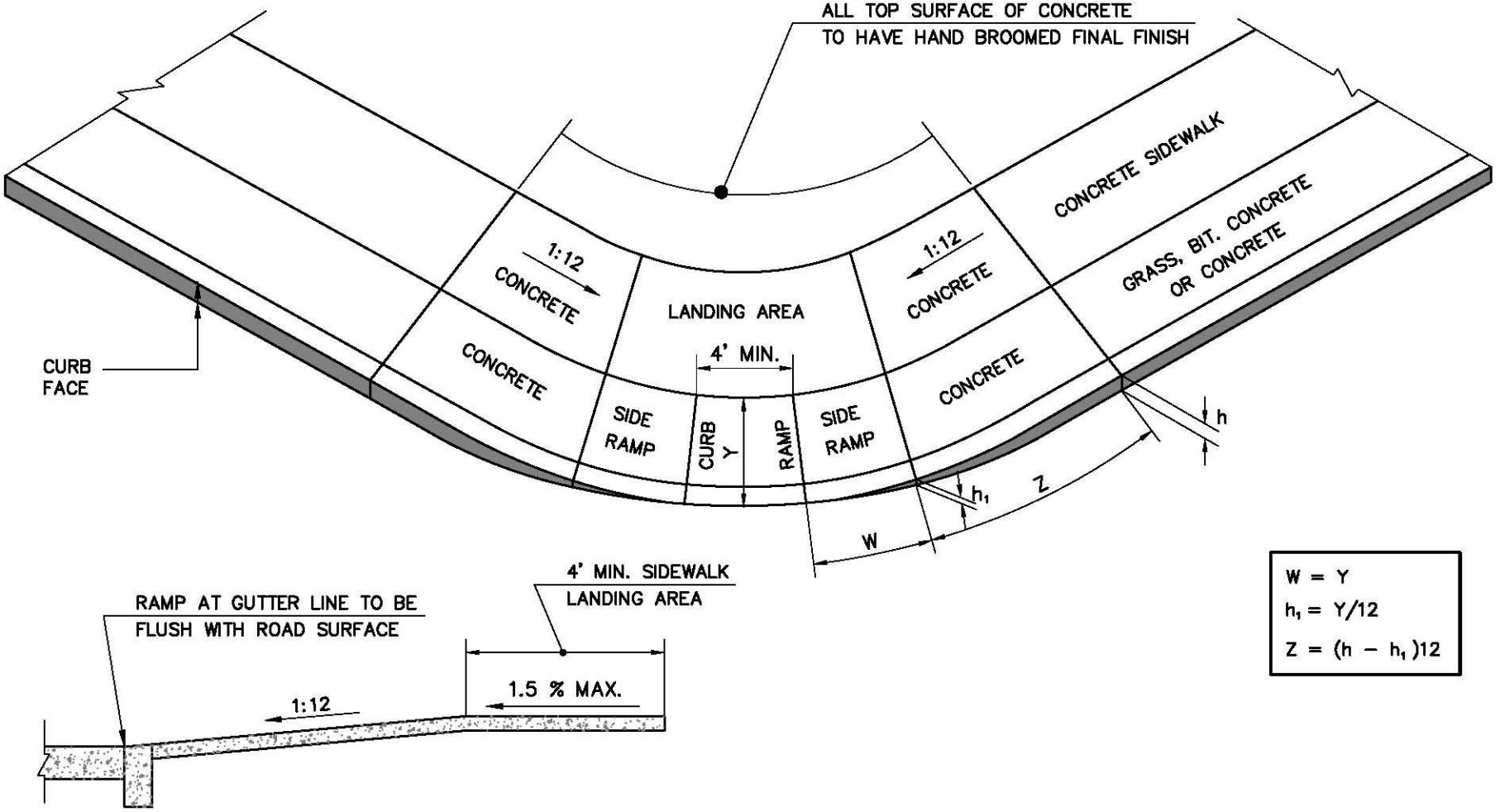
GENERAL NOTES:

1. LANDING AREA, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP SHALL BE KEPT CLEAR OF OBSTRUCTIONS.
2. DIMENSIONS SHOWN IN TABLES ARE RELATIVELY FLAT SIDEWALK AREAS. CARE SHOULD BE TAKEN WHEN DETERMINING CURB RAMP SIZE BASED ON CURB HEIGHT (H) WHERE ELEVATION OF CURB AND SIDEWALK VARY DRASTICALLY IN AREA OF PROPOSED CURB RAMP.
3. CURB (DROPPED CURB) GUTTERLINE TO BE FLUSH WITH ROADWAY PAVEMENT A MINIMUM OF 4 FEET AT ALL CURB RAMPS, EXCEPT THAT CURB RAMP TYPE 6 SHALL BE A MINIMUM OF 5 FEET.
4. FOR CURB RAMPS TYPE 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 OF ENCLOSED BY HEAVY LINES TO BE PAID FOR AS CONCRETE SIDEWALK OF THE APPROPRIATE ADJACENT THICKNESS.
6. CURB AND HEADER WITHIN AREA ENCLOSED BY HEAVY LINES TO BE PAID FOR AS VERTICAL CURB OR SLOPING CURB OF THE APPROPRIATE ADJACENT SIZE AND KIND.
7. WHERE THE DISTANCE FROM THE GUTTER LINE TO THE OUTSIDE EGDE OF SIDEWALK IS 6 FEET OR LESS, CURB RAMP TYPE 7 SHOULD BE USED, INSTEAD OF CURB RAMP TYPE 1 THROUGH 4.
8. THE PUBLIC SIDEWALK CUTB RAMP DELINEATION (SHADED AREA) SHALL BE SAFETY RED IN COLOR AND APPLIED WITH TRUNCATED DOMES.
9. CROSSWALKS AND STOP LINES MAY BE MARKED OR UNMARKED, SEE PLANS.
10. PREFERRED AND ALTERNATE TREATMENTS SHOULD NOT BE INTERMIXED WITHIN THE SAME INTERSECTION.
11. 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.

* **NOTE:** TYPE 3 RAMP IS NOT APPLICABLE, USE TYPE 1.

** **NOTE:** TYPE 4 RAMP IS NOT APPLICABLE, USE TYPE 2.

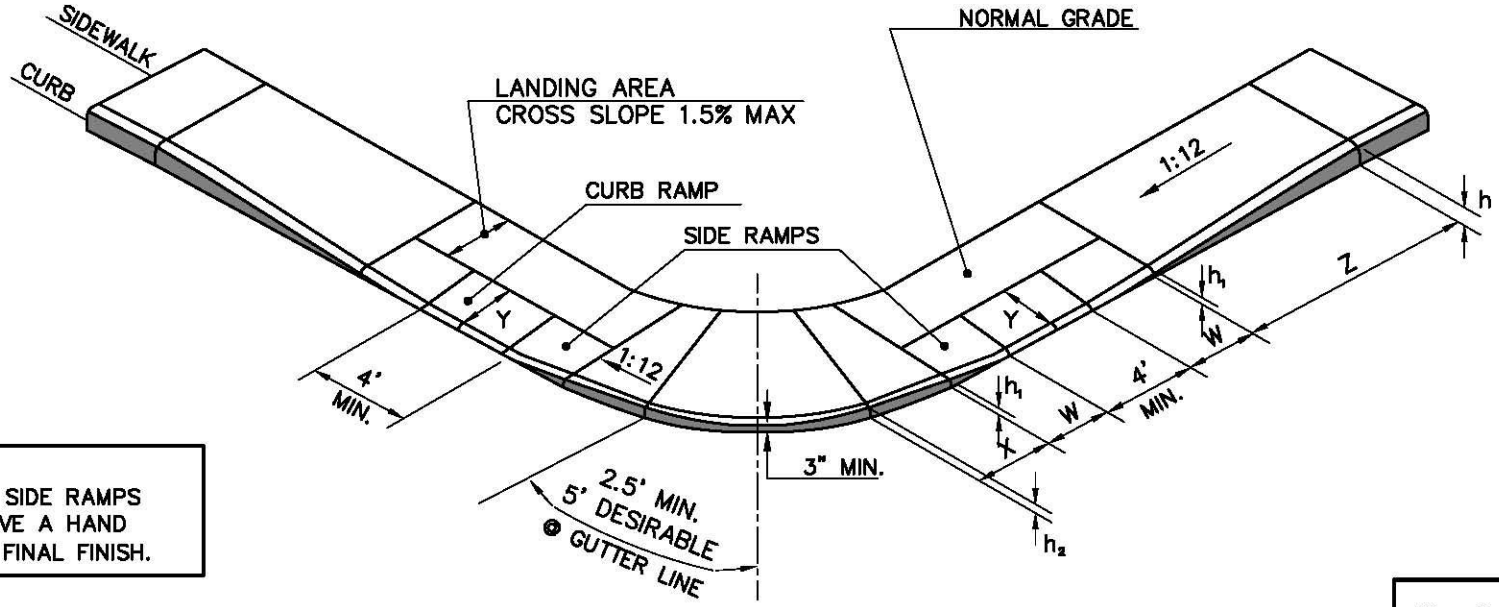
PUBLIC SIDEWALK AND CURB RAMPS



SECTION THROUGH RAMP

SINGLE HANDICAP RAMP AT CORNER

REV. 3/27/02



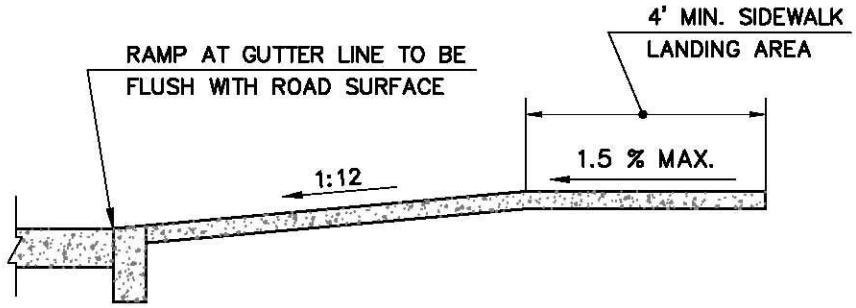
NOTE:
RAMPS & SIDE RAMPS SHALL HAVE A HAND BROOMED FINAL FINISH.

$W = Y$

$h_1 = W/12$

$Z = (h - h_1)12$

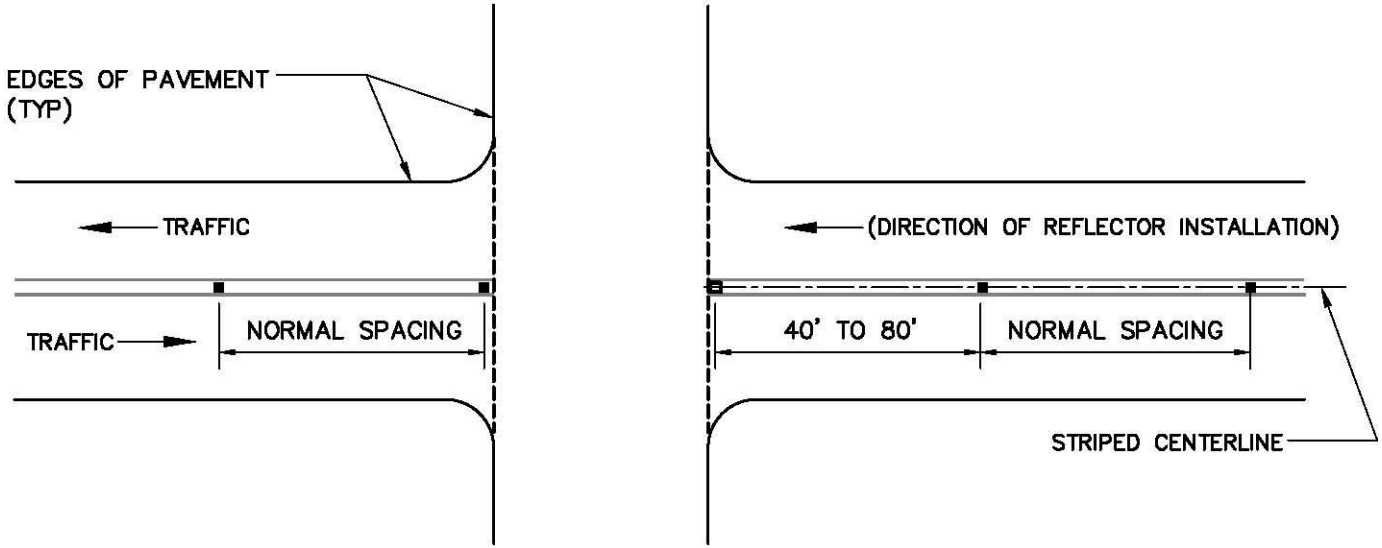
$h_2 = h_1 + X/12$



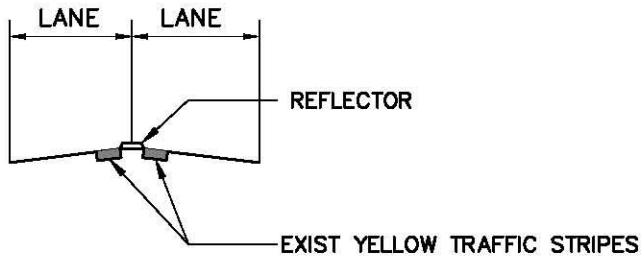
SECTION THROUGH RAMP

DUAL HANDICAP RAMP AT CORNER

REV. 3/27/02



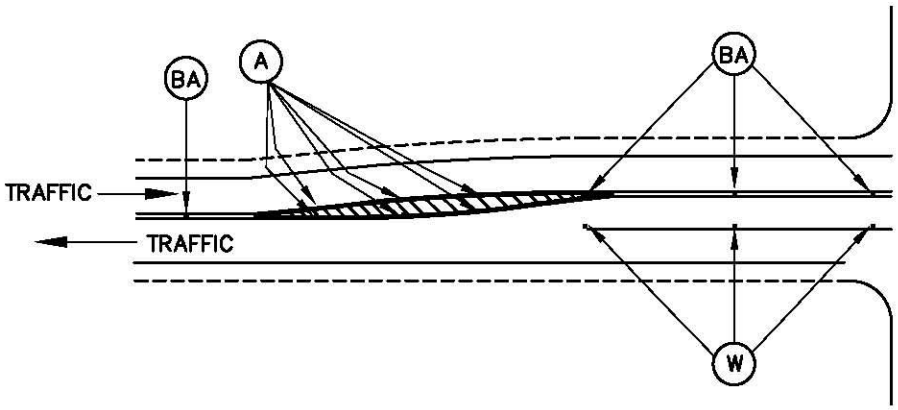
ON EITHER SIDE OF INTERSECTIONS, WHEN THE REFLECTOR NEAREST TO THE INTERSECTION, IF THE APPROACH SPACING IS LESS THAN 80' BUT MORE THAN 40', PROVIDE AN ADDITIONAL REFLECTOR AT THE INTERSECTION.

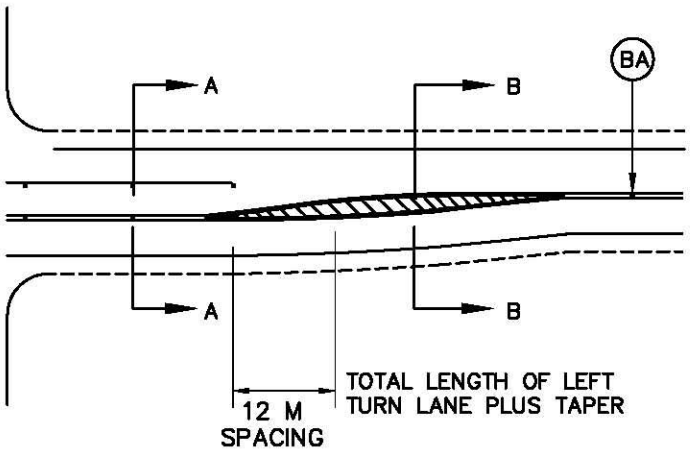


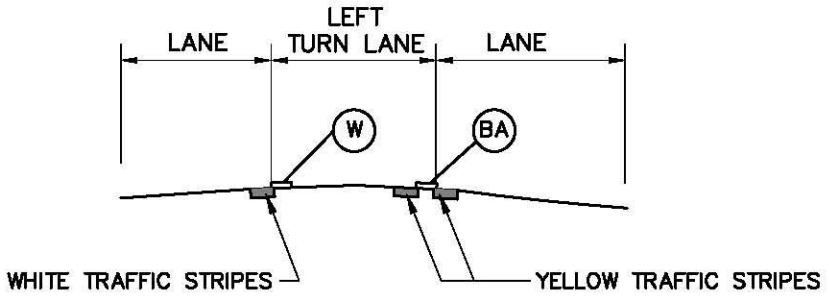
TYPICAL SECTION

METHOD OF DETERMINING REFLECTOR SPACING AT INTERSECTIONS

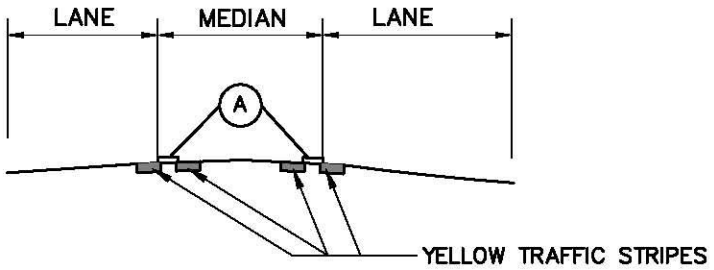
NOT TO SCALE







SECTION A–A



SECTION B–B

NOTE: ALL DIMENSIONS SHOWN ON THIS SHEET ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

LEGEND:

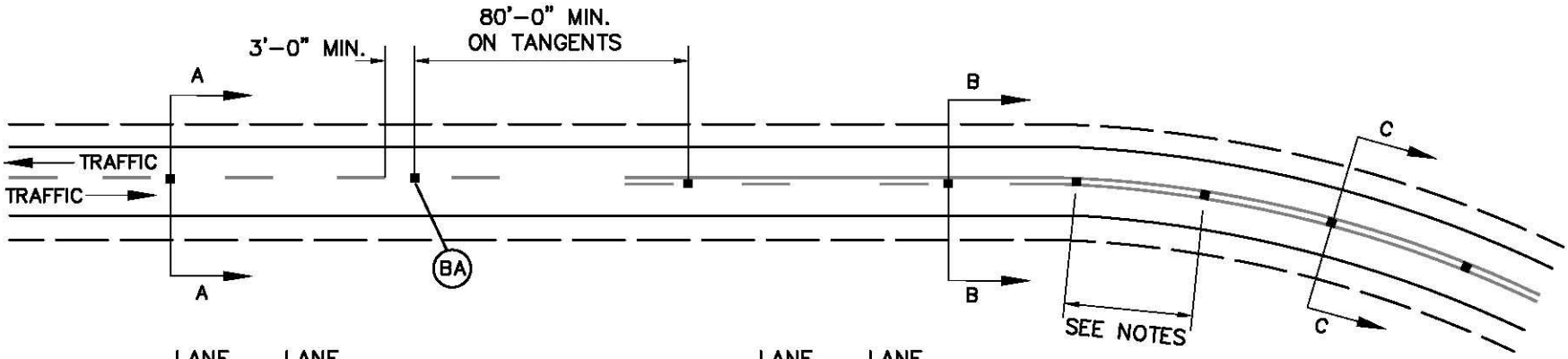
(W) TWO–WAY PLOWABLE MONO–DIRECTIONAL WHITE PAVEMENT REFLECTOR

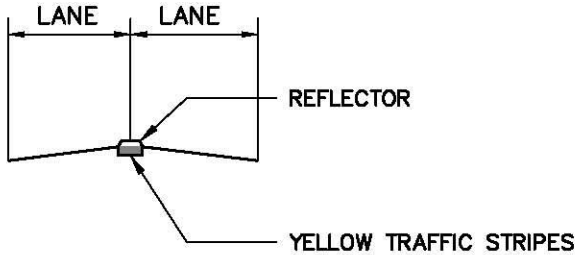
(A) TWO–WAY PLOWABLE MONO–DIRECTIONAL AMBER PAVEMENT REFLECTOR

(BA) TWO–WAY PLOWABLE BI–DIRECTIONAL AMBER PAVEMENT REFLECTOR

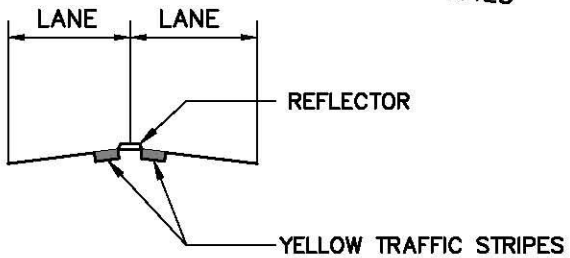
PLOWABLE PAVEMENT REFLECTOR LOCATION DETAILS

NTS.





SECTION A–A



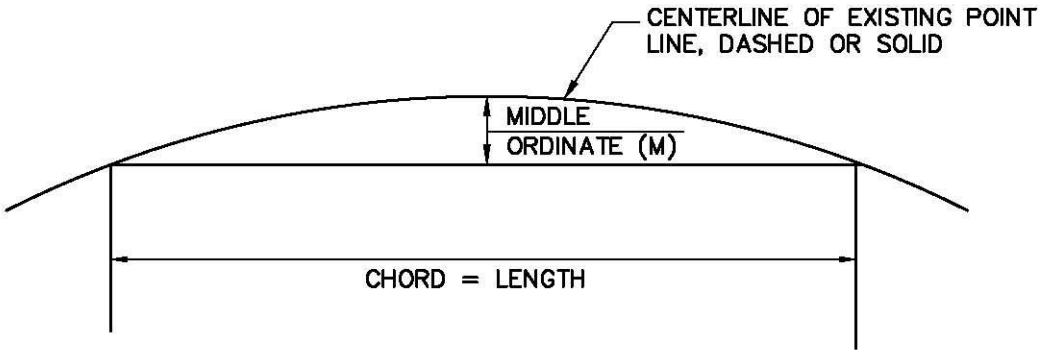
SECTION B–B
SECTION C–C

NOTES:

1. FOR SPACING ON CURVES, SEE METHOD FOR DETERMINING REFLECTOR SPACING ON HORIZONTAL CURVES.
2. FOR SPACING ON VERTICAL CURVES, SEE METHOD FOR DETERMINING REFLECTOR SPACING ON VERTICAL (CREST) CURVES.
3. FOR SPACING AT INTERSECTION, SEE METHOD FOR DETERMINING REFLECTOR SPACING AT INTERSECTIONS.

METHOD OF DETERMINING REFLECTOR SPACING ON TWO LANE ROADS

NOT TO SCALE



1. USE 200' TAPE.
2. ESTABLISH 200' CHORD.
3. MEASURE MIDDLE ORDINATE PERPENDICULAR TO CHORD 100' FROM EITHER END.
4. DETERMINE SPACING FROM TABLE 1.
5. WHEN DIFFICULT TO DETERMINE MIDDLE ORDINATE 60', 40' SPAING WLL BE AS DIRECTED BY THE ENGINEER.

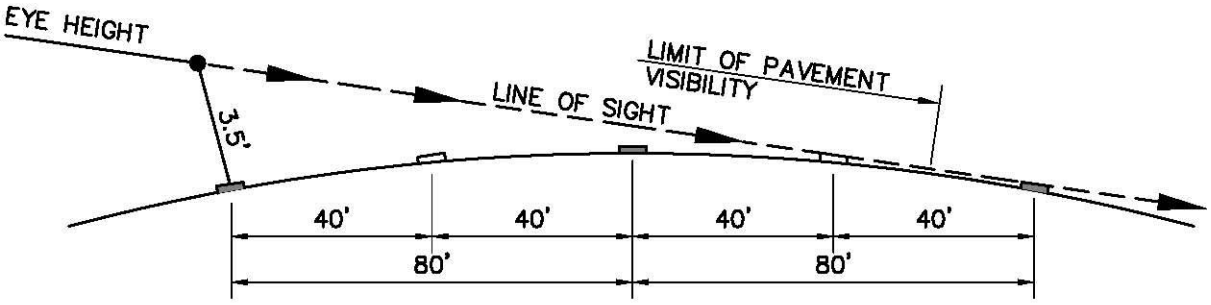
TABLE 1

CHORD LENGTH	MIDDLE ORDINATE	RADIUS	REFLECTOR SPACING
200'–0"	M > 2'–7"	R < 1910'	40'–0"
200'–0"	M < 2'–7"	R > 1910'	80'–0"

< LESS THAN
> GREATER THAN

METHOD FOR DETERMINING REFLECTOR SPACING ON HORIZONTAL CURVES

NOT TO SCALE



ON CREST VERTICAL CURVES WHEN 3 REFLECTORS SPACED AT 80' CAN NOT BE SEEN FROM AN EYE HEIGHT OF 3.6' PROVIDE ADDITIONAL REFLECTOR SPACED AT 40'

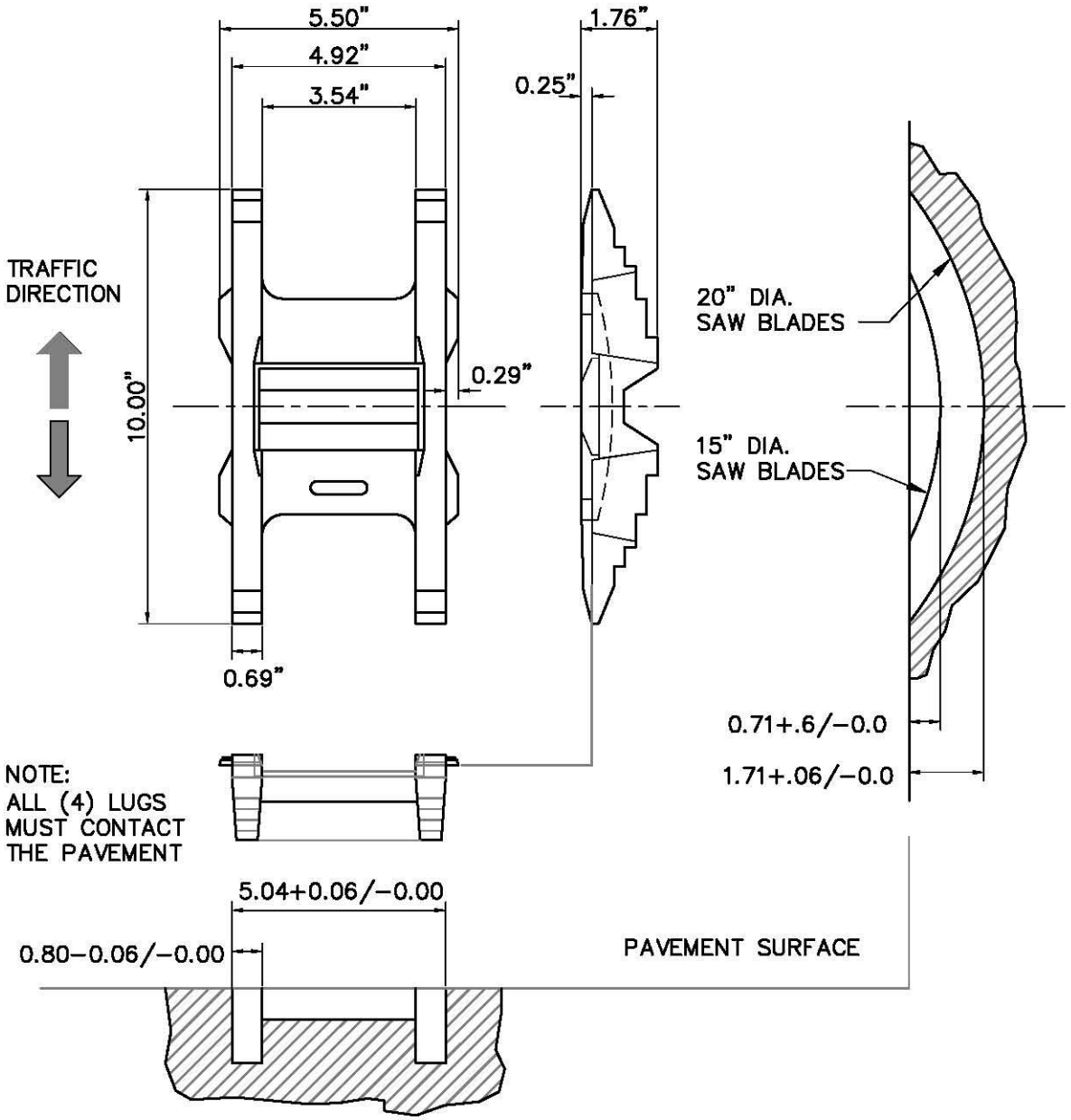
LEGEND:

REFLECTOR AT 80' SPACING

ADDITIONAL REFLECTOR AT 40' SPACING NECESSITATED BECAUSE OF VERTICAL CURVATURE

METHOD FOR DETERMINING REFLECTOR SPACING ON VERTICAL (CREST) CURVES

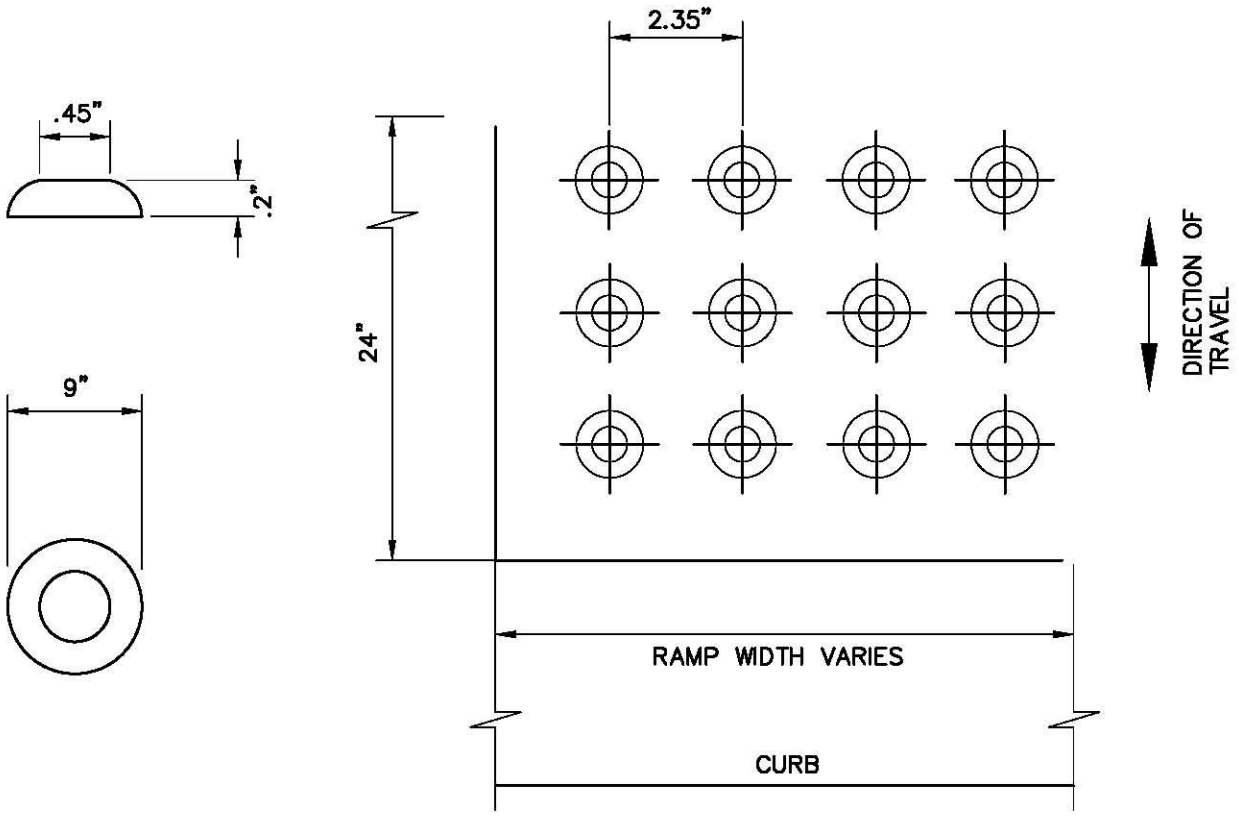
NOT TO SCALE



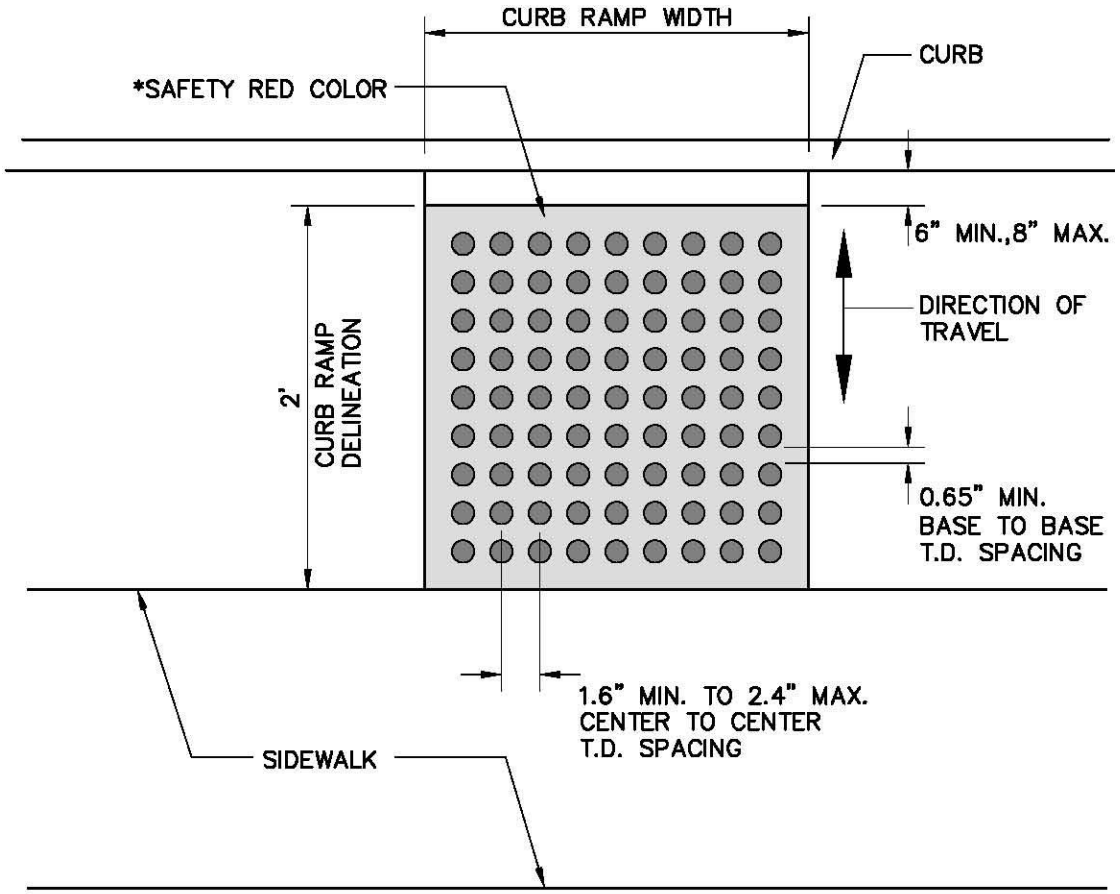
INSTALLATION NOTES:

1. THE PAVEMENT SHALL BE SAW CUT TO THE DIMENSIONS SHOWN IN OUTLINE AT LEFT.
2. A 65 HP CONCRETE SAW IS RECOMMENDED FOR MAKINGTHE REQUIRED SAW CUT.
3. THE CONCRETE SAW SHALL BE FITTED WITH A GANG OF 18.0 INCH DIAMETER CONCRETE SAW BLADES, BORDERED BY 20.0 INCH DIAMETER BLADES AT EACH END.
4. EACH CUT SHOULD BE INSPECTED FOR PROPER FIT OF THE MARKER.
   - −THE CASTING SHOULD HAVE APPROXIMATELY 1/8 INCH CLEARANCE (SIDE TO SIDE MOVEMENT) WHEN INSERTED INTO THE CUT.
   - −ALL FOUR LEVELING LUGS MUST CONTACT THE PAVEMENT
   - −THE LEADING EDGES OF THE CASTING MUST LIE BELOW THE PAVEMENT SURFACE.
5. THE SAW CUT AREA MUST BE DRY AND FREE OF DUST, DIRT OR ANY MATERIAL WHICH WILL ADVERSELY AFFECT THE BOND OF THE ADHESIVE.
6. INSTALL THE MARKER WITH AN APPROVED TWO COMPONENT EPOXY ADHESIVE, BY FIRST FILLING THE SAW CUT TO WITHIN APPROXIMATELY 3/8 INCH OF PAVEMENT SURFACE AND THEN PLACING THE MARKER BY HAND INTO THE EPOXY FILLED SAW CUT. AFTER PLACEMENT OF MARKER, EPOXY SHOULD BE FLUSH WITH THE PAVEMENT SURFACE. EPOXY SHOULD NOT BE ALLOWED TO BUILD UP IN FRONT OF THE MARKER LENS.

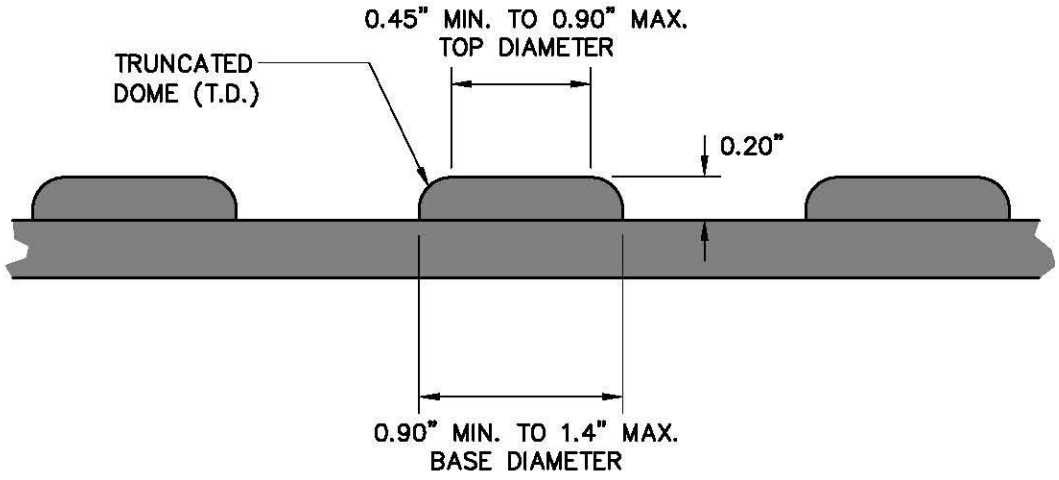
INSTALLATION AND MARKER OUTLINE



ADA DETECTABLE WARNING TRUNCATED DOME DETAIL



PLAN VIEW



ELEVATION

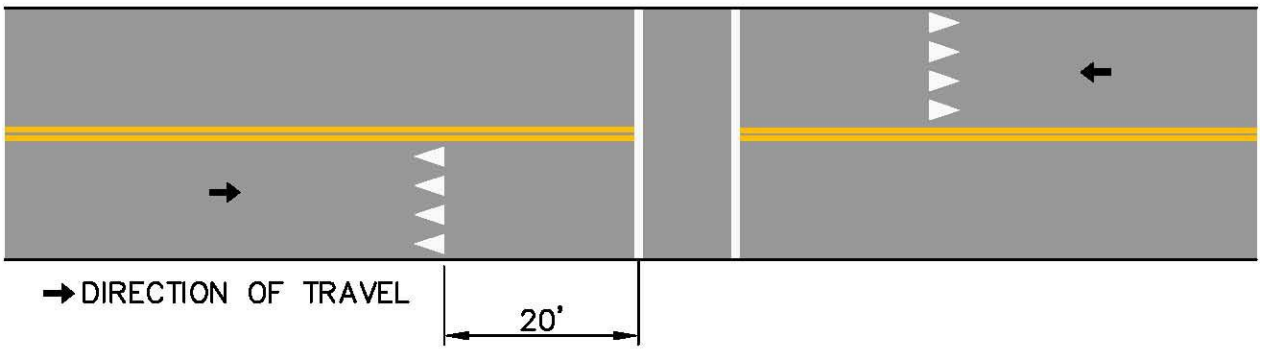
* MATERIAL TO BE USED AT ALL HANDICAP RAMPS AND OTHER AREAS REQUIRING DETECTABLE WARNING SURFACES SHALL BE:

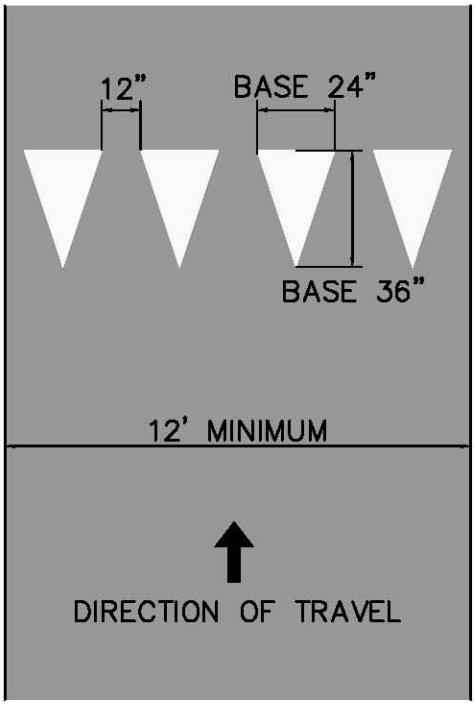
- DETECTABLE WARNING SURFACES – CAST IN PLACE TILES; OR
- DETECTABLE WARNING SURFACES – RETROFIT SURFACE MOUNT TILES.

AS MANUFACTURED BY "ADA SOLUTIONS, INC." OR APPROVED EQUAL.

DETECTABLE WARNING SURFACE

TWO–WAY ROADWAY



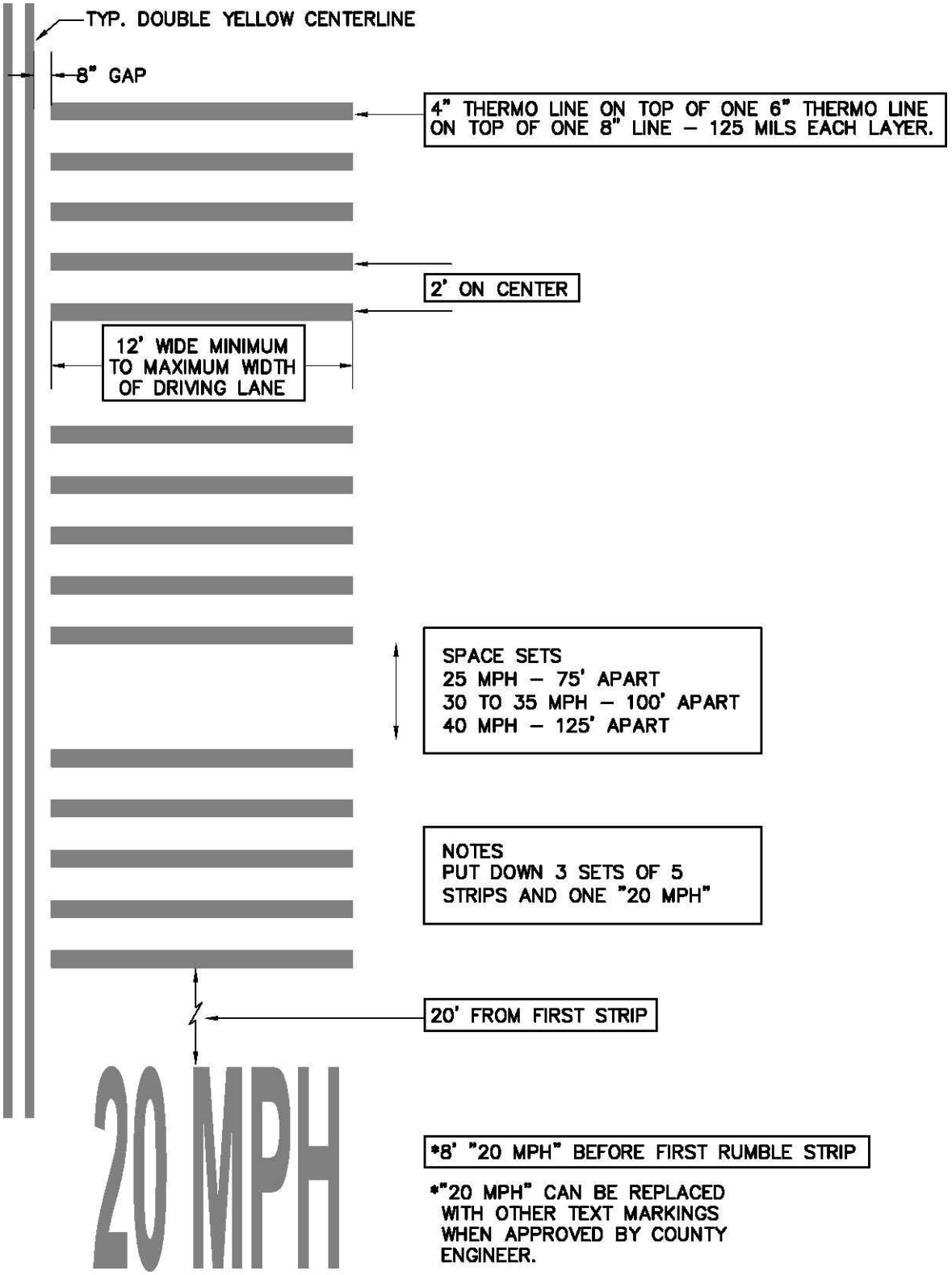


NOTES:

TRIANGLE HEIGHT IS EQUAL TO
1.5 TIMES THE BASE DIMENSION.

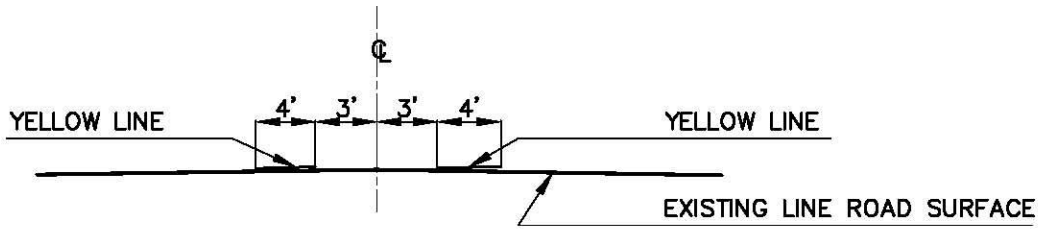
YIELD TRIANGLES

NO SCALE



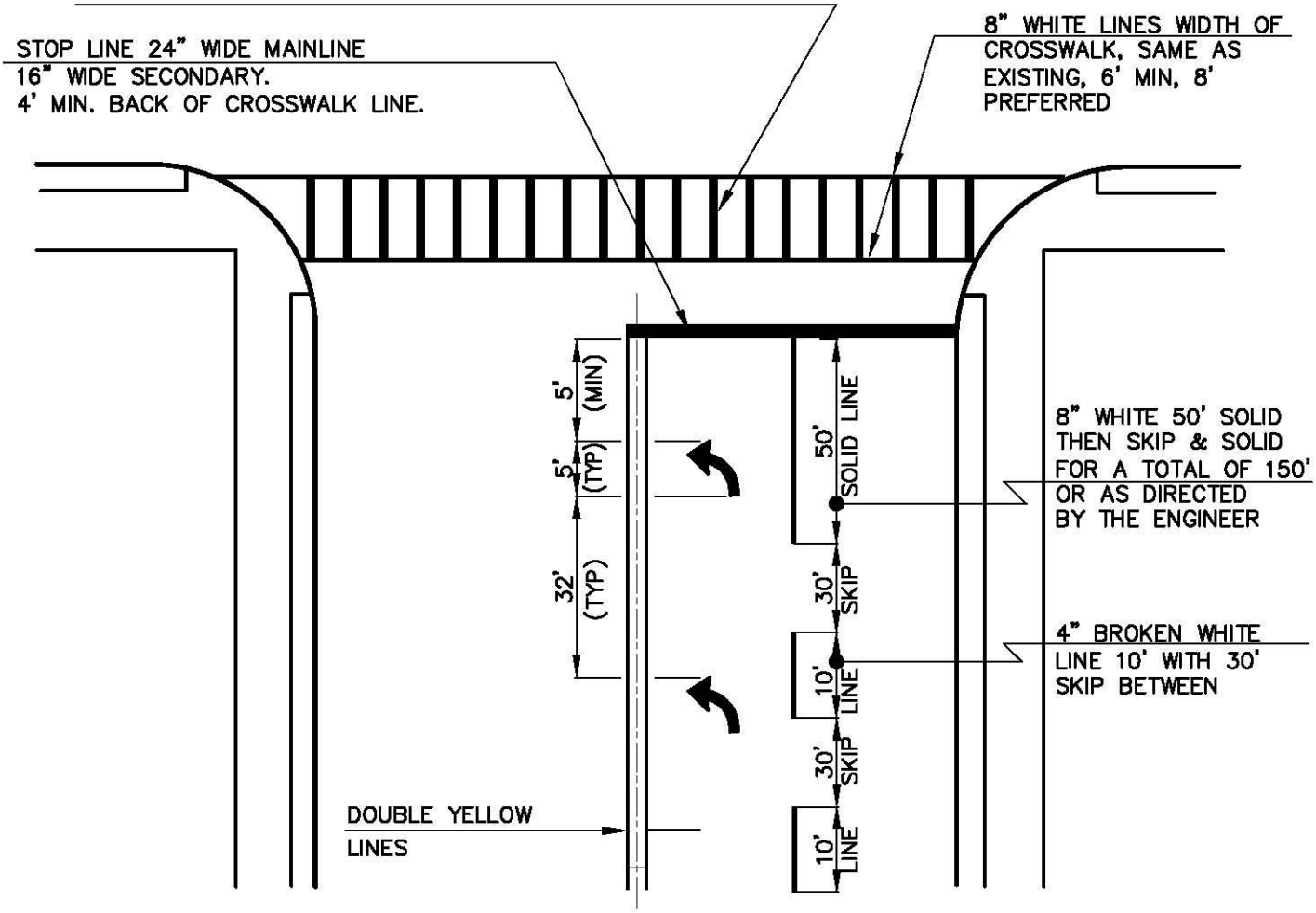
STANDARD RUMBLE STRIPS

NO SCALE



ROAD SECTION
NO PASSING ZONE

NOTE: CROSSWALK HATCHING IS REQUIRED AT ALL CROSSWALKS. ALL HATCHING SHALL BE 12" WIDE SOLID WHITE LINES, UNLESS DIRECTED OTHERWISE BY THE ENGINEER AND SPACED 3 FEET ON CENTER. ALL HATCHING SHALL BE PLACED AT PARALLEL TO CENTERLINE STRIPING.



PLAN
APPROACH TO SIGNALIZED INTERSECTION

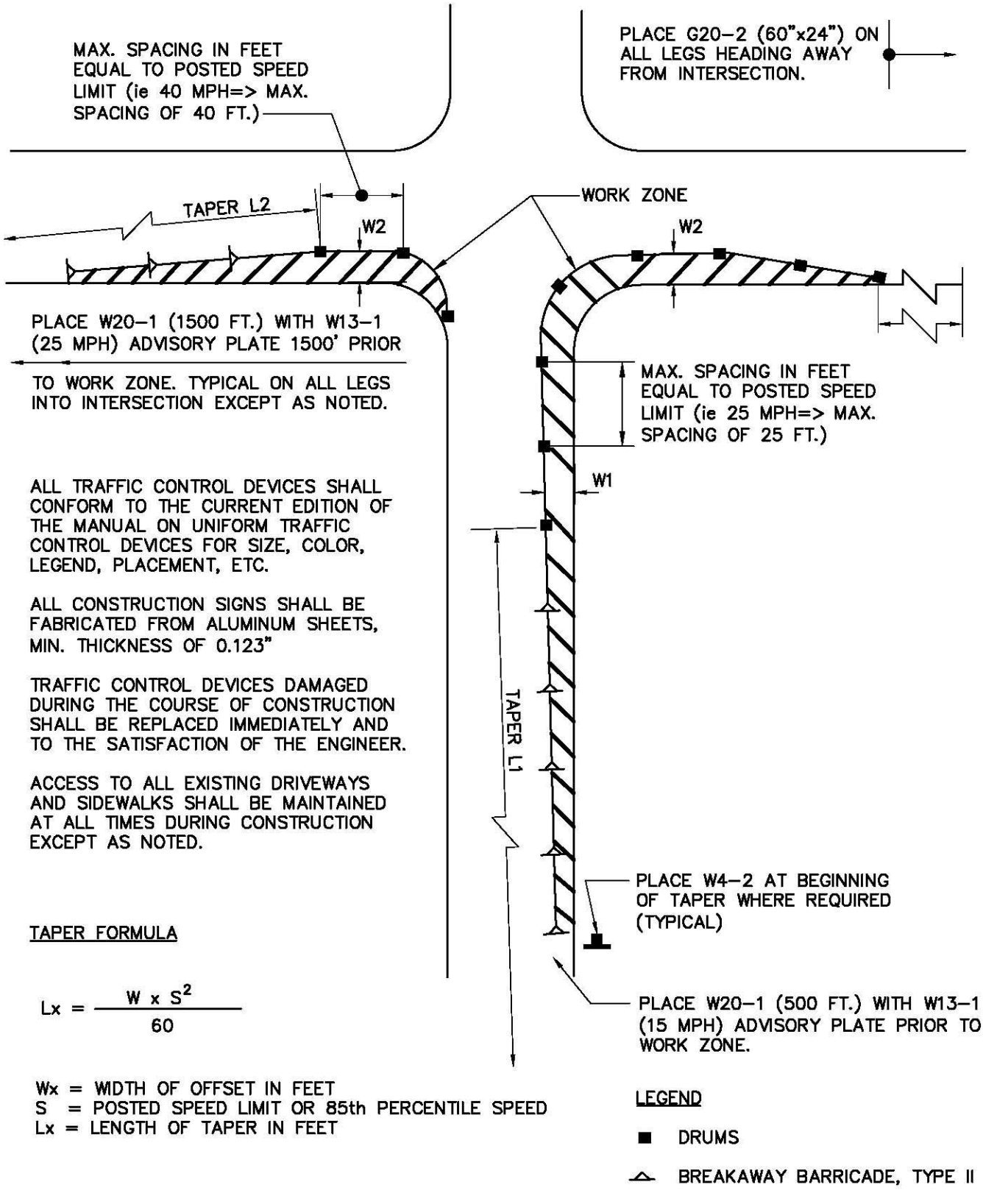
NOTE: ALL TRAFFIC MARKINGS IN CONFORMANCE WITH THE M.U.T.C.D.

*PAVEMENT SYMBOL MARKINGS SHALL BE DESIGNED IN CONFORMANCE WITH THE STANDARD ALPHABET FOR HIGHWAY SIGNS & PAVEMENT MARKINGS.

ALL PAVEMENT MARKINGS SHALL BE APPLIED TO WITH THERMOPLASTIC MATERIAL.

TRAFFIC STRIPING

NOT TO SCALE



ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR SIZE, COLOR, LEGEND, PLACEMENT, ETC.

ALL CONSTRUCTION SIGNS SHALL BE FABRICATED FROM ALUMINUM SHEETS, MIN. THICKNESS OF 0.123"

TRAFFIC CONTROL DEVICES DAMAGED DURING THE COURSE OF CONSTRUCTION SHALL BE REPLACED IMMEDIATELY AND TO THE SATISFACTION OF THE ENGINEER.

ACCESS TO ALL EXISTING DRIVEWAYS AND SIDEWALKS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION EXCEPT AS NOTED.

TAPER FORMULA

$$Lx = \frac{W \times S^2}{60}$$

Wx = WIDTH OF OFFSET IN FEET
S = POSTED SPEED LIMIT OR 85th PERCENTILE SPEED
Lx = LENGTH OF TAPER IN FEET

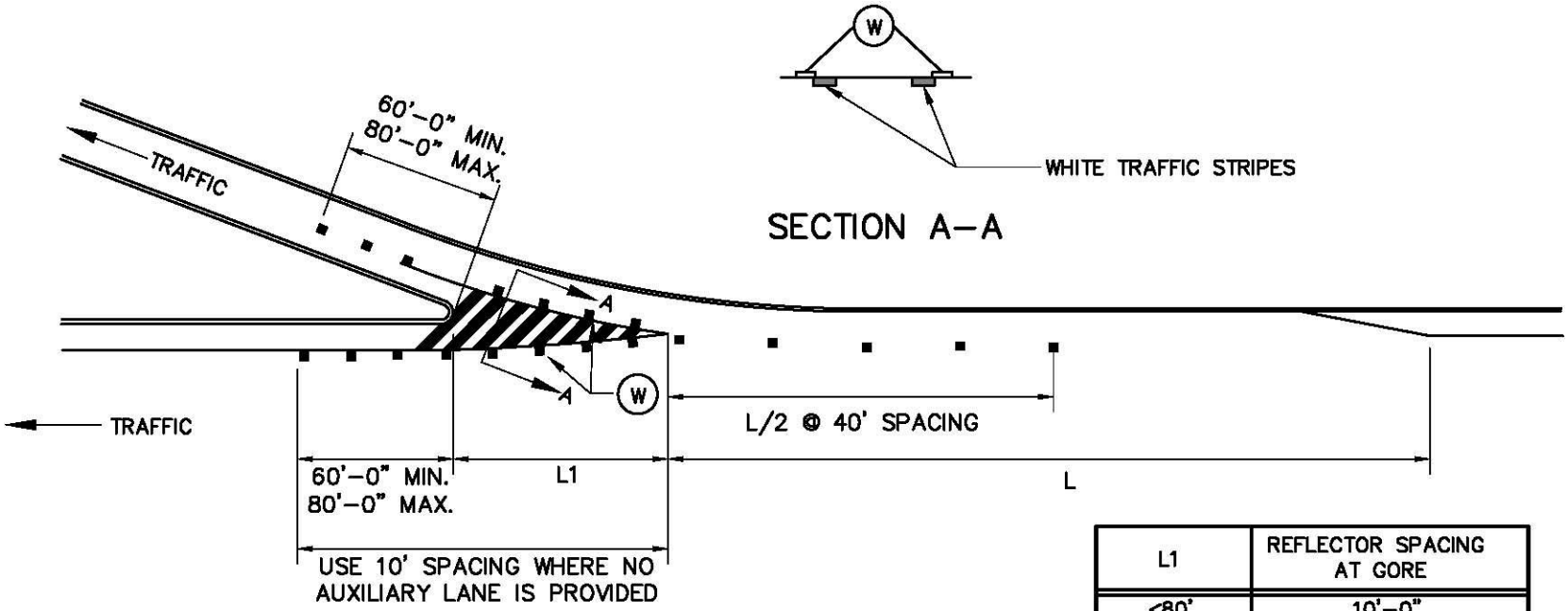
LEGEND

■ DRUMS

BREAKAWAY BARRICADE, TYPE II

TYPICAL WORK ZONE TRAFFIC CONTROL

NOT TO SCALE



L1	REFLECTOR SPACING AT GORE
<80'	10'–0"
80' – 200'	20'–0"
>200'	40'–0"

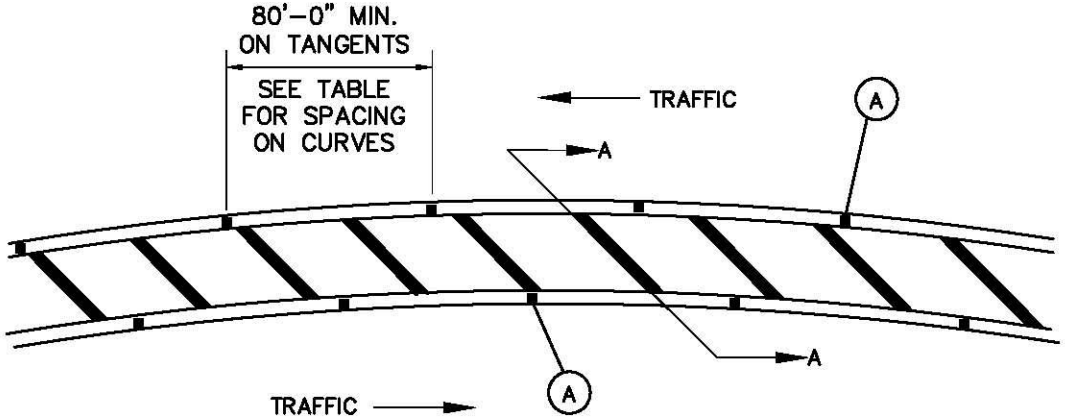
LEGEND:

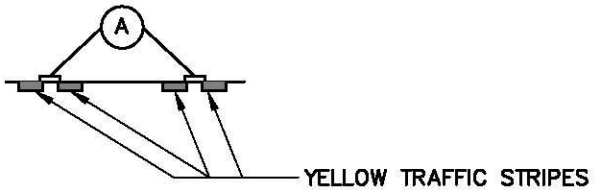
(W) TWO–WAY PLOWABLE MONO–DIRECTIONAL WHITE PAVEMENT REFLECTOR

TYPICAL DECELERATION LANE TREATMENT

NOT TO SCALE

ONLY ON ROADS WHERE REFLECTORS ARE INDICATED





SECTION A–A

CHORD LENGTH	MIDDLE ORDINATE	RADIUS	REFLECTOR SPACING
200'–0"	M ≥ 2'–7"	R ≤ 1910'	40'–0"
200'–0"	M < 2'–7"	R > 1910'	80'–0"

< LESS THAN
≤ EQUAL TO OR LESS THAN
> GREATER THAN
≥ EQUAL TO OR GREATER THAN

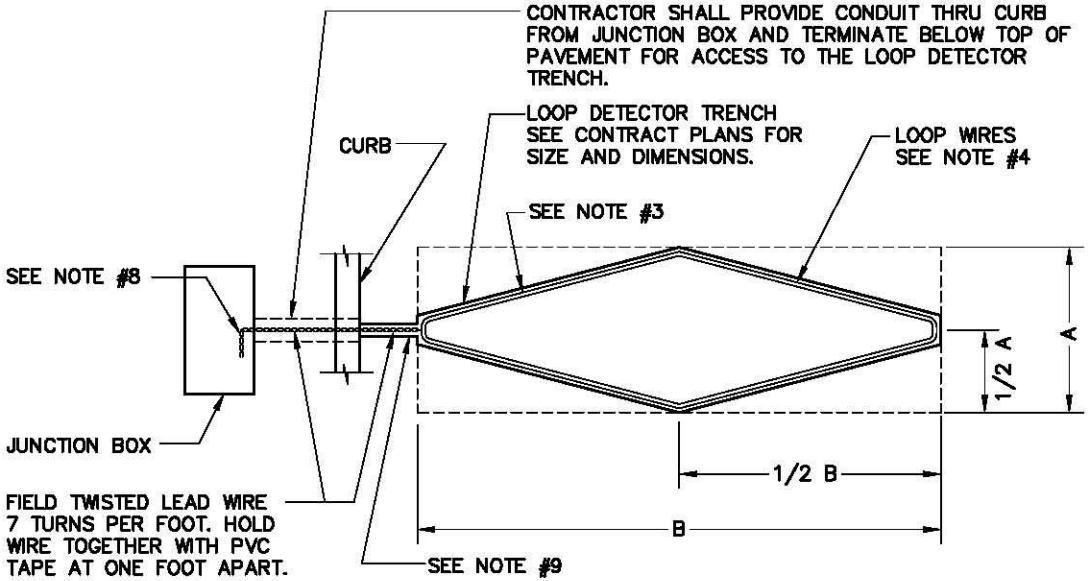
LEGEND:

(A) TWO–WAY PLOWABLE MONO–DIRECTIONAL AMBER PAVEMENT REFLECTOR

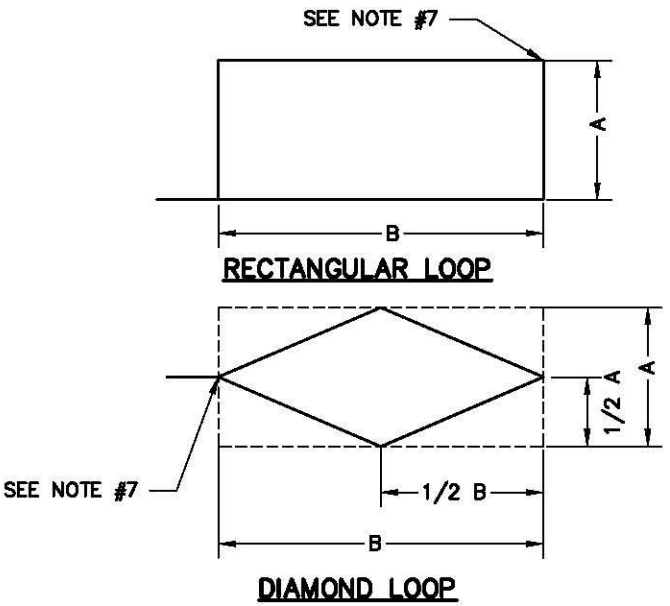
TYPICAL PAVED MEDIAN TREATMENT

NOT TO SCALE

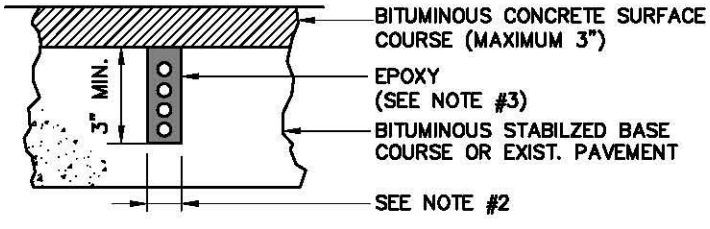
ONLY ON ROADS WHERE REFLECTORS ARE INDICATED



TYPICAL LOOP DETECTOR INSTALLATION



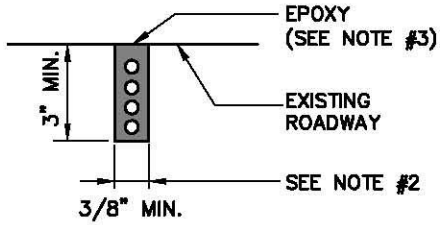
LOOP CONFIGURATIONS



SKETCH 'A'

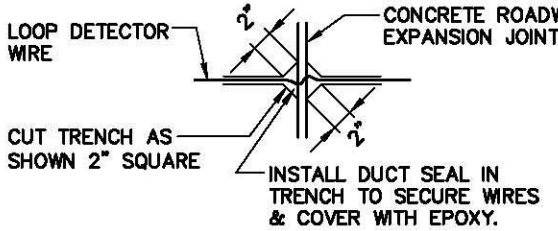
SEE NOTE #6

SECTION SHOWING INSTALLATION IN NEW ROADWAYS OR IN EXISTING ROAD WITH NEW OVERLAY



SKETCH 'B'

SECTION SHOWING INSTALLATION IN EXISTING ROADWAY WITH NO NEW OVERLAY

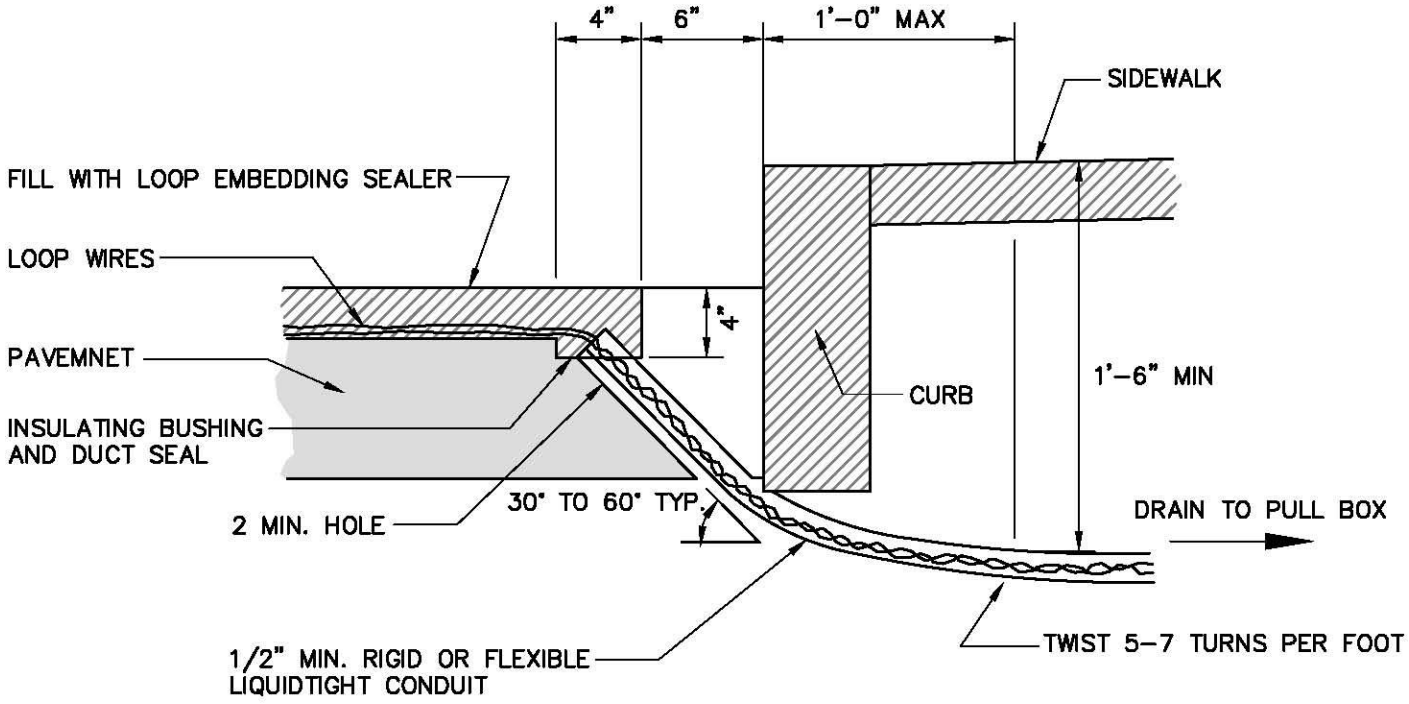


TYPICAL CONCRETE EXPANSION JOINT CUT FOR LOOP DETECTOR WIRE

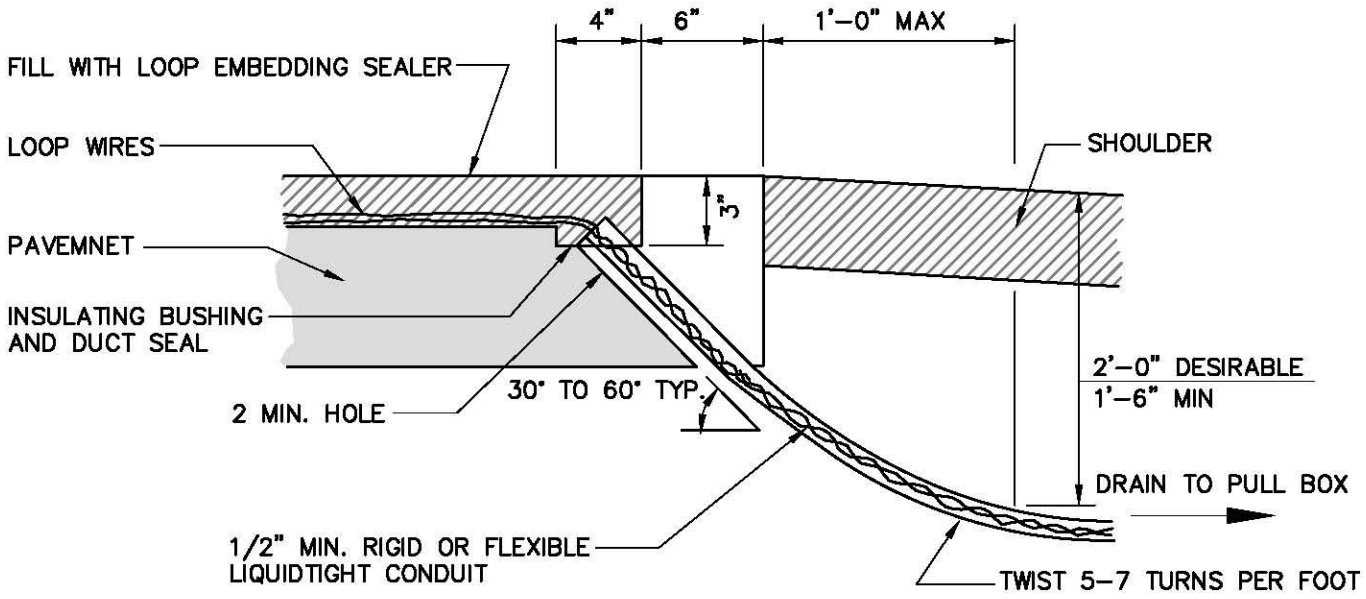
GENERAL NOTES:

1. SKETCH 'A' & 'B' APPLIES WHEN CONTRACT PROVIDES FOR LOOP DETECTOR ONLY.
2. DIMENSIONS AND CONFIGURATIONS FOR LOOP DETECTOR TRENCHES SHALL BE AS SHOWN ON THE PLAN SHEETS FOR EACH LOCATION. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE TRENCH OF SUFFICIENT SIZE TO ACCOMODATE THE TYPE THE NUMBER OF CONDUCTORS REQUIRED BY LOOP DETECTOR SENSOR.
3. EPOXY FOR LOOP DETECTORS TO BE A FLEXIBLE SEALER WITH SUFFICIENT STRENGTH AND RESILIENCY TO WITHSTAND STRESS SET UP BY DIFFERENCE IN EXPANSION AND CONTRACTION OF THE PAVEMENT CAUSED BY TEMPERATURE CHANGES AND NORMAL PAVEMENT MOVEMENT.
4. THE LOOP INDUCTANCE SHALL BE MEASURED IN THE FIELD. ALL LOOPS SHALL HAVE SIX TURNS.
5. 'DIAMOND' LOOPS ARE BASED ON RECTANGULAR MEASUREMENTS GIVEN IN THE LOOP DETECTOR SCHEDULE ON PLAN SHEETS FOR EACH LOCATION.
6. LOOPS IN EXISTING ROADWAY SHALL BE INSTALLED AFTER THE MILLING PROCESS AND PRIOR TO THE INSTALLATION OF THE NEW OVERLAY.
7. ALL CORNERS ARE TO BE CUT SMOOTH WITH A CHISEL TO ASSURE A CLEAN SMOOTH RADIUS.
8. THE SPLICE KIT USED TO SPLICE THE LOOP DETECTOR LEAD TO THE LOOP WIRE SHALL ENCAPSULATE A MINIMUM OF 1" OF THE LOOP WIRE TUBING.
9. IF THE LOOP WIRE IN THE CUT TRENCH TO THE CURB LINE IS DUCT WIRE, IT SHALL NOT BE TWISTED BUT TAPED TOGETHER EVERY 6" WITH PVC TAPE.

LOOP DETECTOR TRENCH

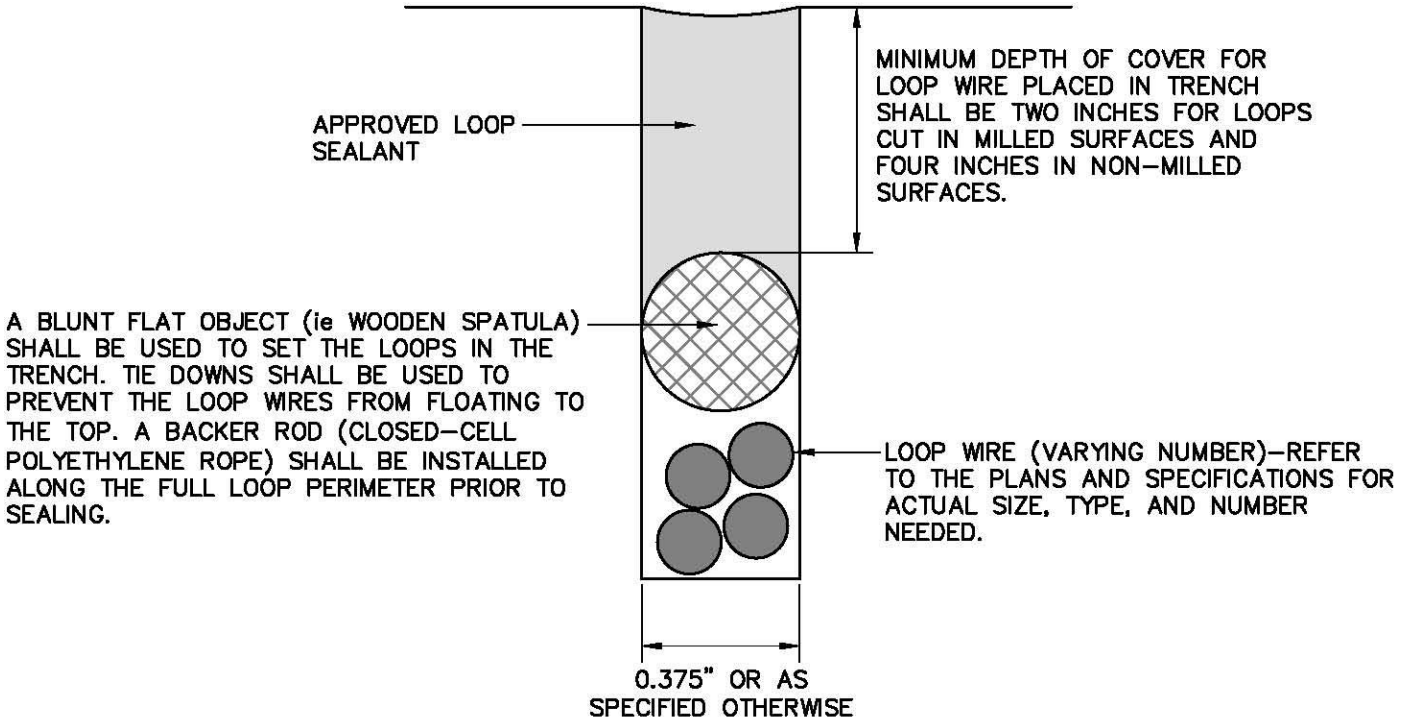


LOOP LEAD-IN UNDER CURB SECTION

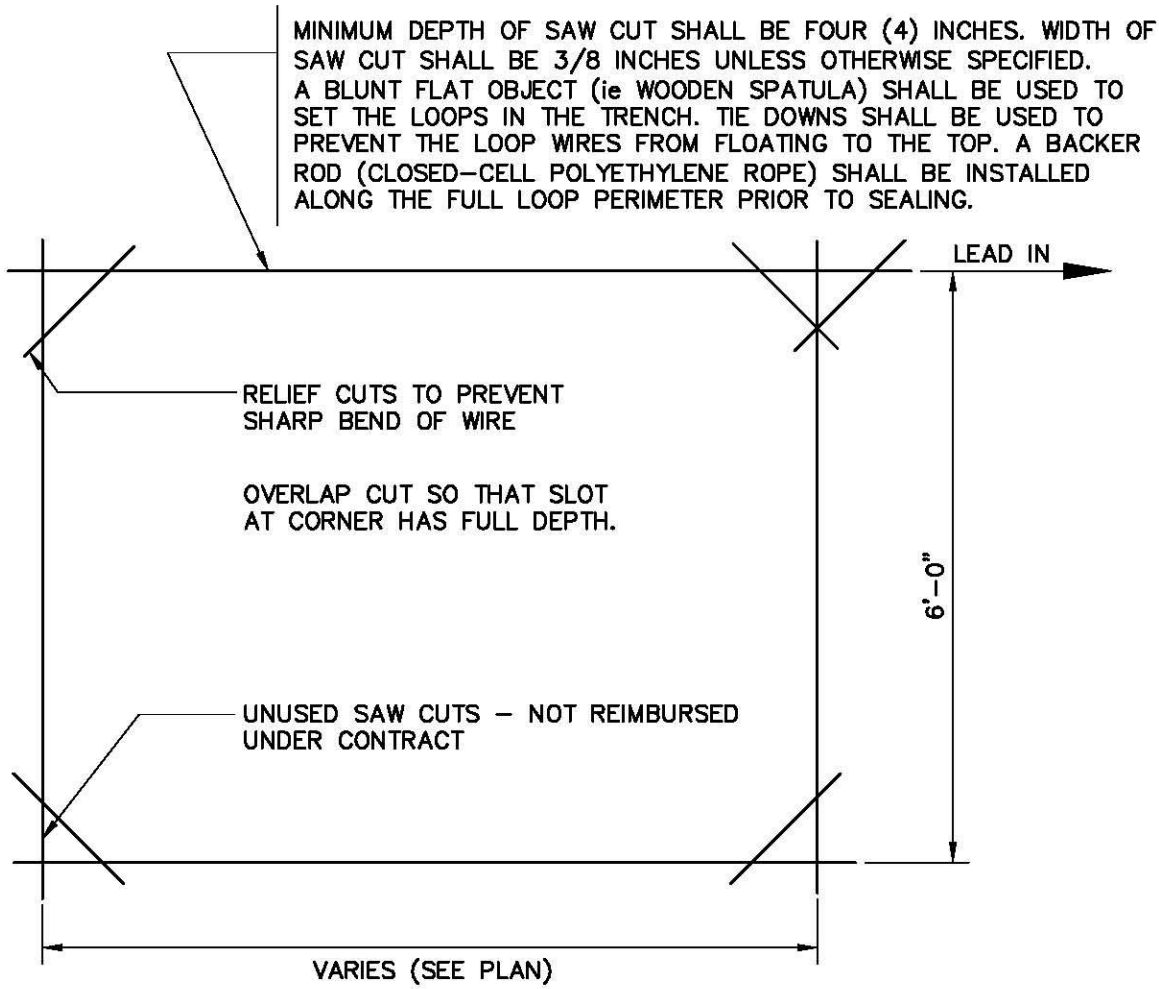


LOOP LEAD-IN AT PAVEMENT EDGE

LOOP DETECTOR DETAIL



TYPICAL LOOP DETECTOR INSTALLATION



CHAMFER CUT CORNER TREATMENT

TYPICAL LOOP LAYOUT

LOOP DETECTOR NOTES:

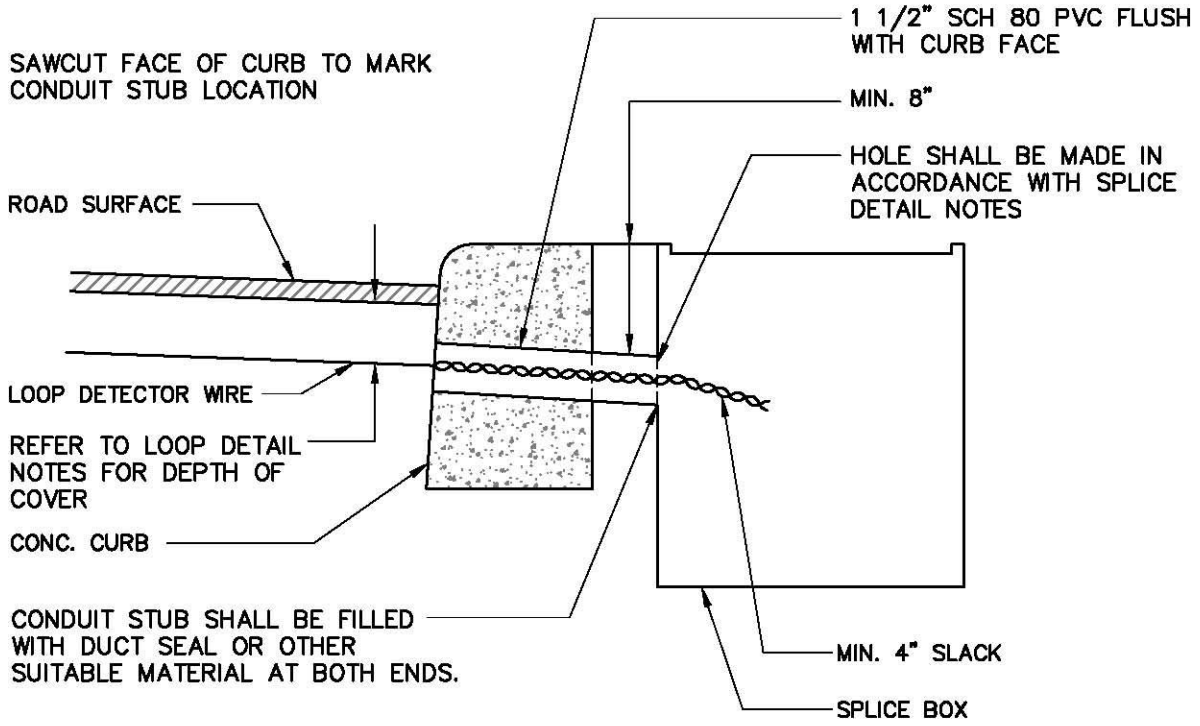
1. MINIMUM DEPTH OF SAW CUT SHALL BE FOUR (4) INCHES. WIDTH OF SAW CUT SHALL BE 3/8 INCHES UNLESS OTHERWISE SPECIFIED.

2. LOOPS SHALL BE TESTED FOR INDUCTANCE PRIOR TO SEALING, TO ENSURE PROPER INDUCTANCE VALUES, THE CONTRACTOR SHALL CONSULT THE ENGINEER IF ACTUAL VALUES ARE LESS THAN THOSE STATED ON THE TRAFFIC SIGNAL ELECTRICAL PLAN.

3. A BLUNT FLAT OBJECT (ie WOODEN SPATULA) SHALL BE USED TO SET THE LOOPS IN THE TRENCH. TIE DOWNS SHALL BE USED TO PREVENT THE LOOP WIRES FROM FLOATING TO THE TOP. A BACKER ROD (CLOSED-CELL POLYETHYLENE ROPE) SHALL BE INSTALLED ALONG THE FULL LOOP PERIMETER PRIOR TO SEALING. SEE FIGURE BELOW.

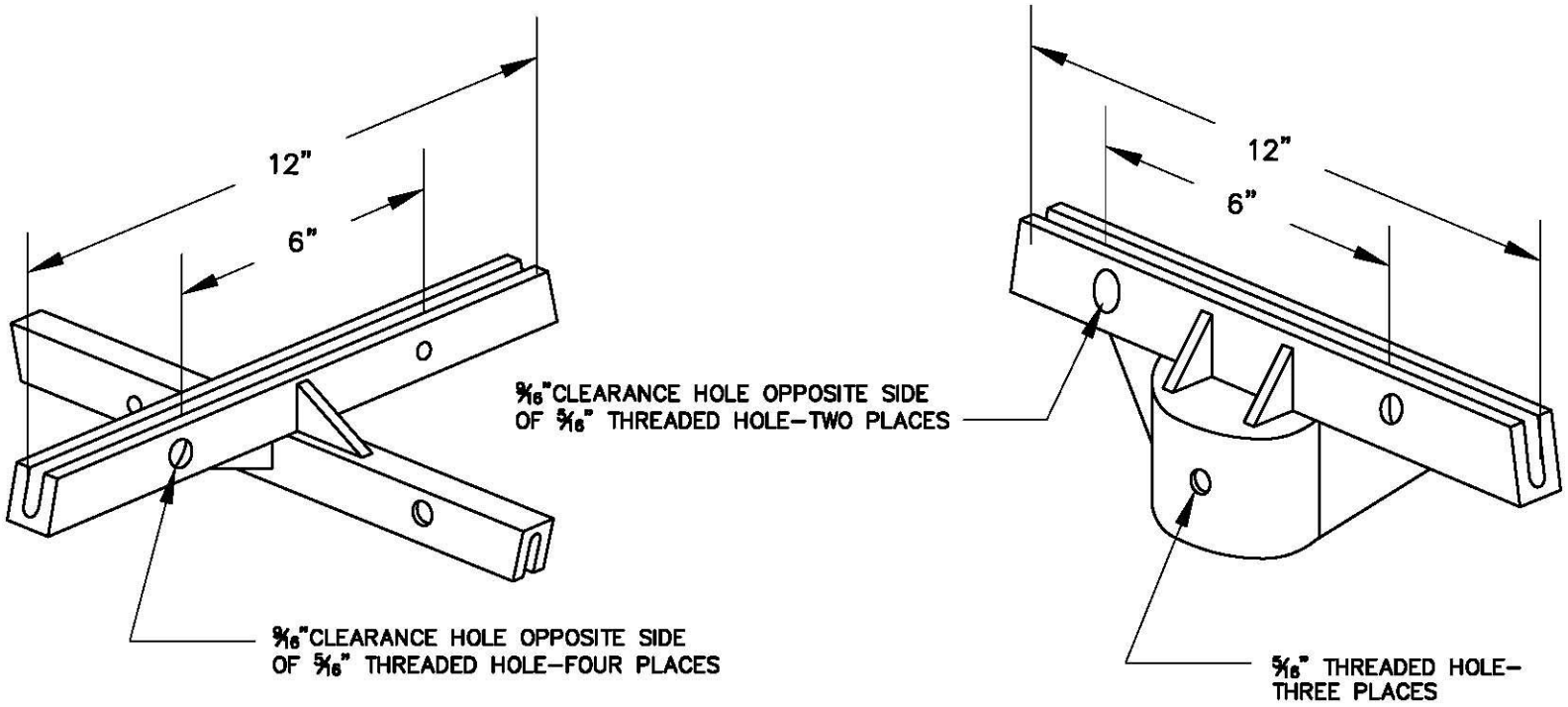
4. MINIMUM DEPTH OF COVER FOR LOOP WIRE PLACED IN TRENCH SHALL BE TWO INCHES FOR LOOPS CUT IN MILLED SURFACES AND FOUR INCHES IN NON-MILLED SURFACES.

5. LOOP SLOTS SHALL BE WET CUT USING AN APPROPRIATE DIAMOND BLADE AND SAW TO PRODUCE THE REQUIRED SLOT WIDTH AND DEPTH. SLOTS SHALL BE BLOWN CLEAN WITH COMPRESSED AIR AND DRY PRIOR TO LOOP WIRE INSTALLATION.



LOOP LEAD-IN THRU CURB

NOT TO SCALE



BOLT THRU CROSS

EACH HOLE SHALL BE DRILLED AND TAPPED TO ACCEPT A 5/16" STANDARD SET SCREW. VANDAL PROOF SET SCREWS SHALL BE USED IN PLACE OF THE STANDARD SET SCREW 9/16" CLEARANCE HOLE ON OPPOSITE SIDE FOR BOLT–THROUGH ALIGNMENT WITH VANDAL PROOF BOLTS.

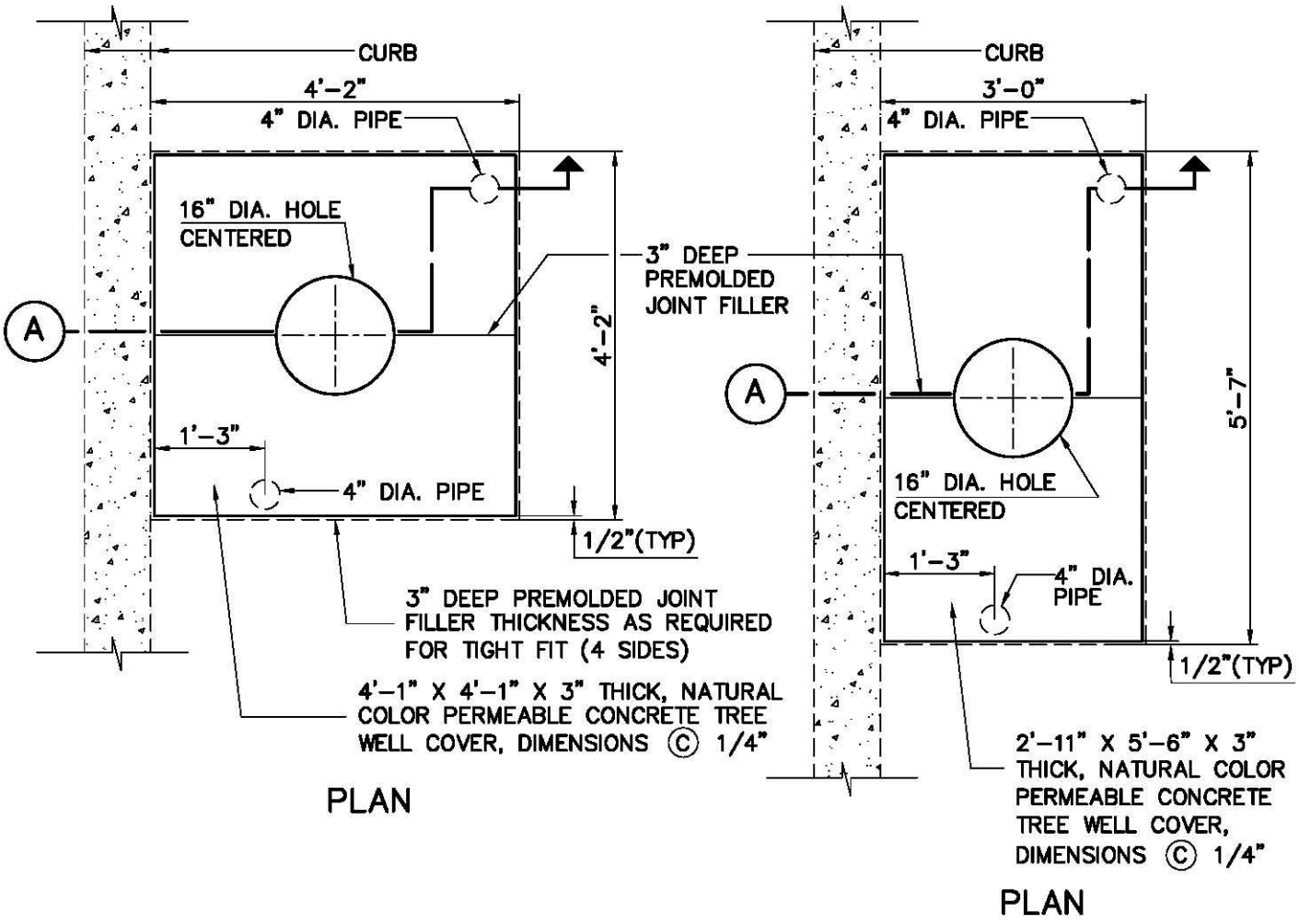
BOLT THRU BRACKETS

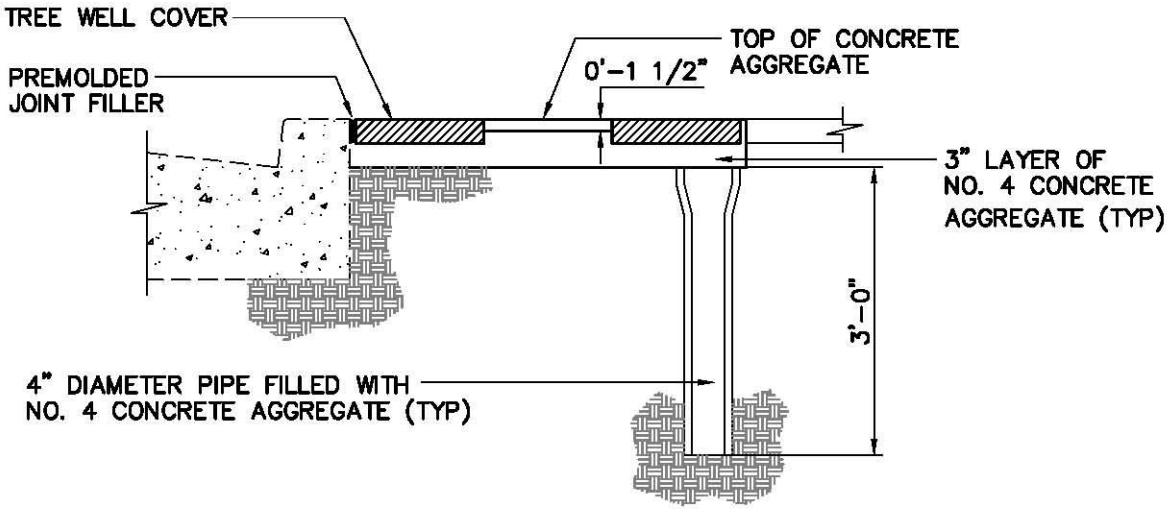
FOR FLAT EXTRUDED SIGNS AND ROUND, SQUARE OR U–CHANNEL POSTS
12' BLADE HOLDER DRILLED AND TAPPED ON 6" CENTERS

NOT TO SCALE

FONT: HIGHWAY GOTHIC B 6”

STREET NAME SIGN, TYPE DF
(TYPICAL)



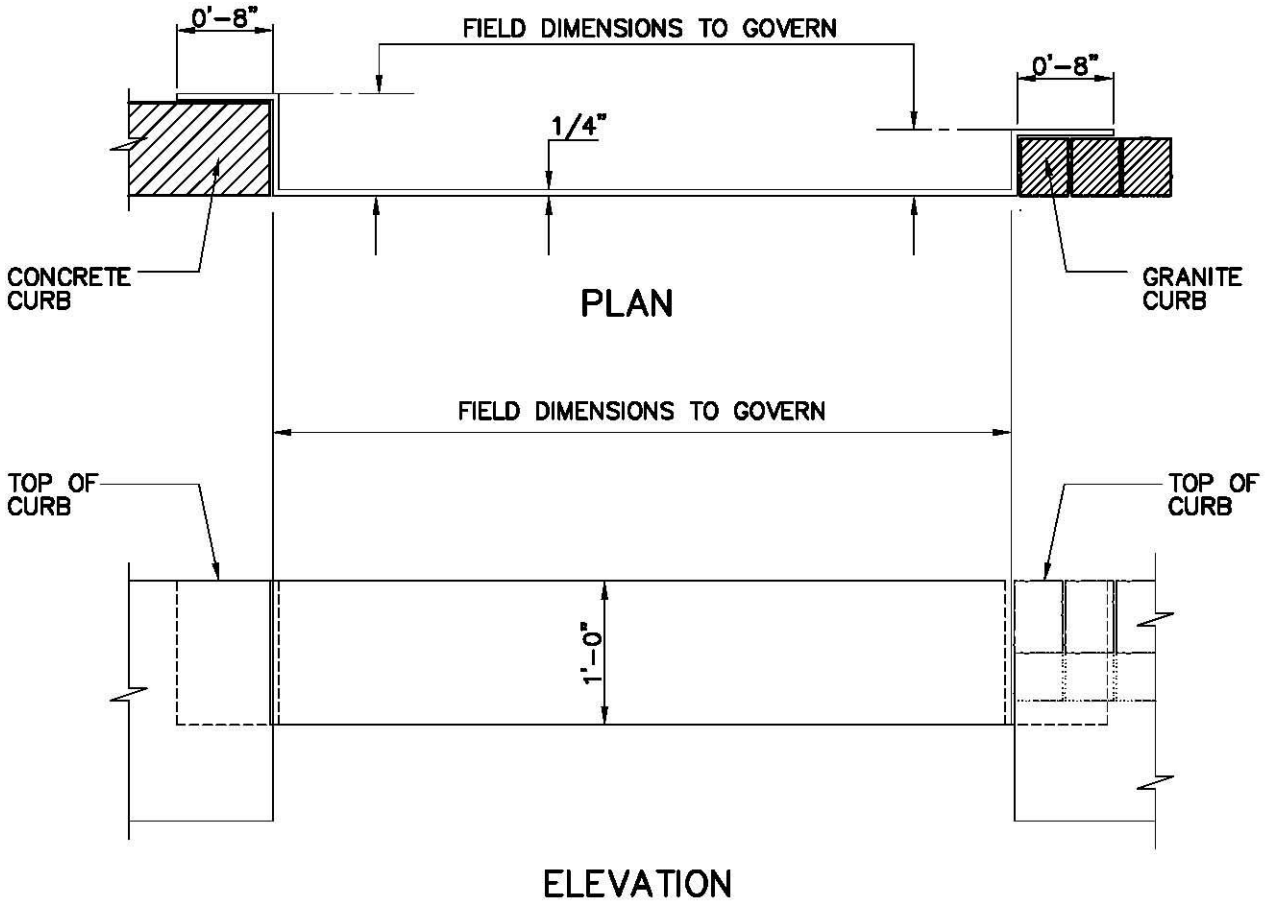


SECTION A

TREE WELL DETAILS

1' 6" 0 1' 2'

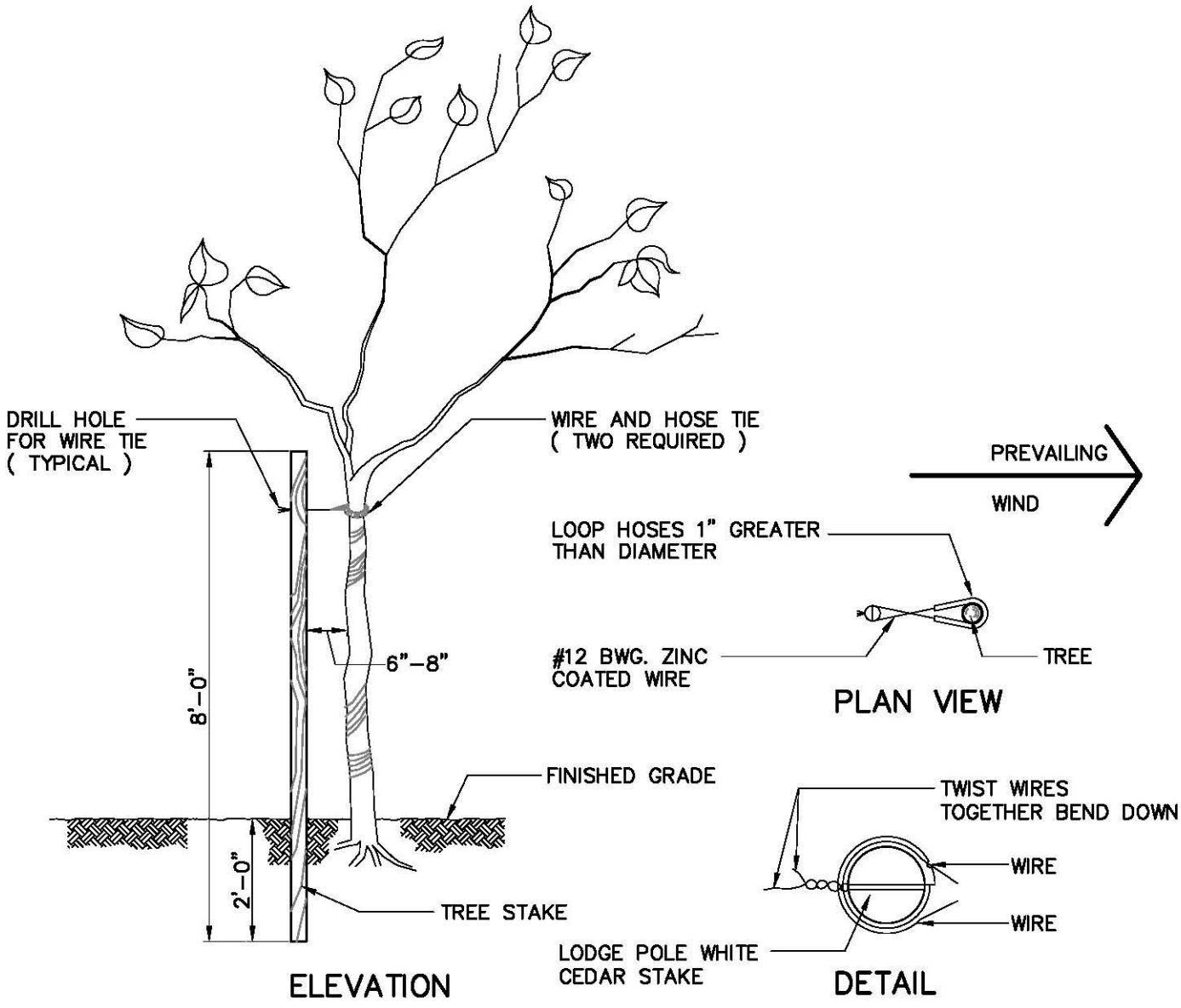
SCALE IN FEET



STEEL CURB PLATE AT TREES

1' 6" 0 1'

SCALE IN FEET

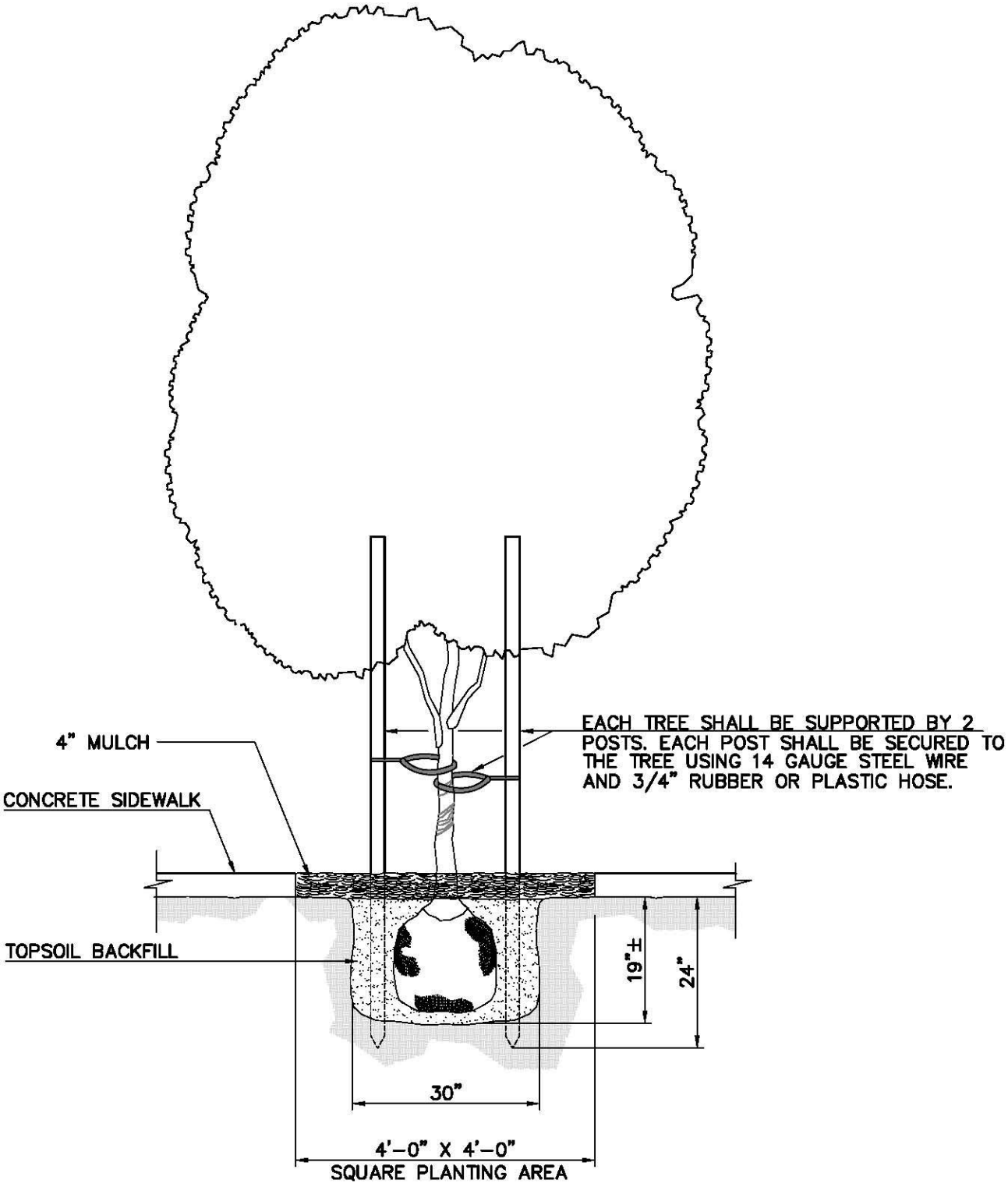


NOTES:

1. EACH WIRE SHALL BE WRAPPED TIGHTLY AROUND AND THROUGH LODGE POLE (IN OPPOSITE DIRECTIONS) PRIOR TO BEING TWISTED TOGETHER. BEND TWISTED WIRE DOWNWARD.

2. TREE STAKES:
   CASE 1: 1 1/2" DIAMETER, SCHEDULE 40, GALVANIZED STEEL PIPE STAKE
   CASE 2: 2" DIAMETER LODGE POLE WHITE CEDAR

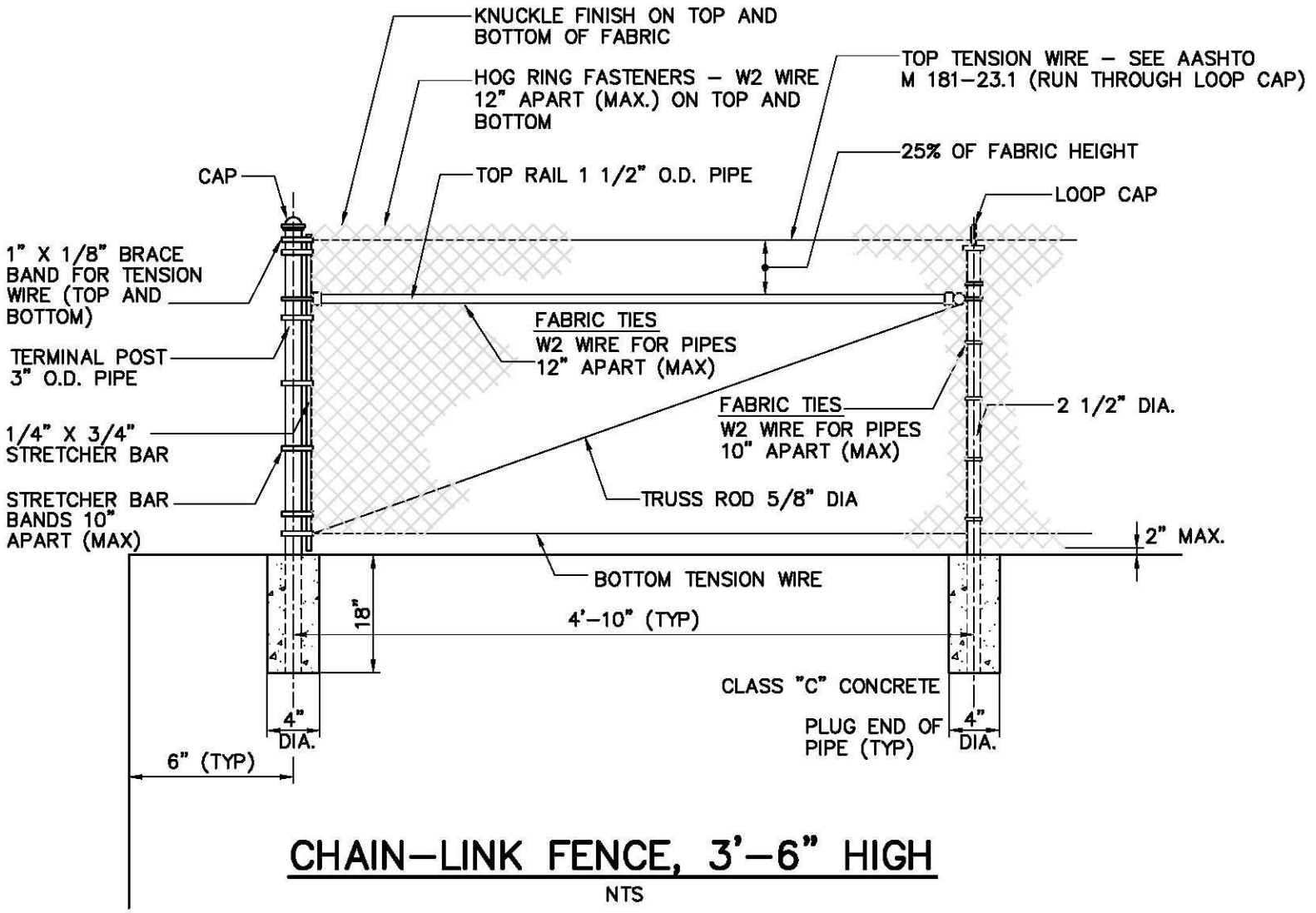
SINGLE STAKING



TREE PLANTING DETAIL

1' 6" 0 1' 2'

SCALE IN FEET



CHAIN–LINK FENCE, 3'–6" HIGH

NTS