

OS-299 (7-08)



# TRANSMITTAL LETTER

**PUBLICATION:**

Publication 72M  
June 2010 Edition  
Change No. 2

**DATE:**

September 15, 2016

**SUBJECT:**

**Revisions to  
Standards for Roadway Construction  
June 2010 Edition  
Change No. 2**

**INFORMATION AND SPECIAL INSTRUCTIONS:**

Incorporate the attached revisions into the June 2010 Edition of Publication 72M.

These revisions include redesigned standards for sanitary sewer and storm water man-holes. These revised standard drawings should be adopted as soon as possible on all new and existing designs without affecting any letting schedules and in conjunction with the current Publication 408 Specifications. Projects with PS&E Submissions to Central Office after May 16, 2017 should use these revised standards.

STANDARD	SHEET	DESCRIPTION OF CHANGES
Revised Sheets	All Sheets	<p>Revised title and signature blocks as follows:</p> <p>Changed "BUREAU OF DESIGN" to "BUREAU OF PROJECT DELIVERY".</p> <p>Changed "CHIEF, HWY. QA DIVISION" to "CHIEF, HWY. DELIVERY DIVISION".</p> <p>Removed metric dimensions.</p> <p>Removed Notes indicating all dimensions are in millimeters unless otherwise noted and U.S. customary units are in parentheses. Renumbered all subsequent Notes.</p> <p>Revised references to Superpave from "HMA" to "HMA or WMA".</p>
Index Sheet		<p>In "GUIDE RAIL AND MEDIAN BARRIER", for RC-50M, revised Description from "GUIDE RAIL TRANSITION AT END OF STRUCTURE" to "GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS" to match the actual title shown on the RC-50M sheets.</p> <p>Changed "FRAME" to "FRAMES" to match sheets for RC-45M.</p> <p>Revised "13" to "14" to match number of sheets for RC-67M.</p> <p>Added the following new Standard Drawings:            -RC-14M (Geosynthetic Reinforced Soil Slope - 3 sheets)            -RC-38M (Sanitary Sewer Manholes - 3 sheets)            -RC-39M (Storm Water Manholes - 30 sheets) (was previously Standard Manholes)</p>

RC-12M	Sheet 2	<p>In Limits of Backfill Integral Abutment detail:</p> <ul style="list-style-type: none"> <li>-Added vertical dimension of 1'-6" in two locations to indicate thickness of granular fill.</li> <li>-Changed " 1" THICK STYROFOAM SHEET" to " 1" THICK PREFORMED CELLULAR POLYSTYRENE SHEET".</li> <li>-Added horizontal dimension of 2'-0" for structure backfill and added "(INCLUDES 1" THICK PREFORMED CELLULAR POLYSTYRENE SHEET)".</li> <li>-Added dimension line to indicate the bridge pay limit as per BD-628M.</li> <li>-Added dimension to indicate location for Section A-A, Limits of Backfill, Wingwalls of Integral Abutments.</li> <li>-Changed "GRANULAR FILL (TYP)" to "STRUCTURE BACKFILL (TYP), SEE NOTES 10 &amp; 11 THIS SHEET".</li> <li>-Changed "SUBBASE" to "STRUCTURE BACKFILL (TYP)".</li> </ul> <p>In Limits of Backfill Wingwalls of Integral Abutments detail:</p> <ul style="list-style-type: none"> <li>-Added "SECTION A-A".</li> <li>-Changed "GRANULAR FILL (TYP)" to "STRUCTURE BACKFILL (TYP), SEE NOTE 10 THIS SHEET".</li> </ul> <p>In General Notes:</p> <ul style="list-style-type: none"> <li>-Added Note 12.</li> </ul>
RC-14M	Sheets 1-3	<p>Issued new Standard Drawings (Geosynthetic Reinforced Soil Slope).</p>
RC-20M	Sheet 1	<p>In Typical Layout detail:</p> <ul style="list-style-type: none"> <li>-Deleted one bar in transverse joint for each lane.</li> <li>-Revised distance between longitudinal shoulder joint and first coated dowel bar from 6" +/- 1" to 12" +/- 1" (2 locations).</li> <li>-Added Note 14.</li> </ul>
	Sheet 3	<p>In plan views of Typical Expansion Joint Assembly and Typical Contraction Joint Assembly details:</p> <ul style="list-style-type: none"> <li>-Revised distance between edge of pavement and center of epoxy coated dowel bar from 6" to 12" (4 locations).</li> <li>-Revised distance between edge of pavement and lower side wire from 3" to 9" (4 locations).</li> </ul> <p>In Typical Load Transfer Assembly table:</p> <ul style="list-style-type: none"> <li>-Decreased values for overall unit length by 6" for each lane width.</li> <li>-Decreased number of dowels by 1 for each lane width.</li> <li>-Added "(MAX)" under the column heading "OVERALL UNIT LENGTH".</li> </ul>
	Sheet 4	<p>Added Sheet for Concrete Pavement Joints, 6:1 Skewed, Load Transfer Assemblies.</p>

	Sheets 5-8	Added Sheets for Concrete Pavement Joints, Intersection Joint Layout.
	Sheets 9-12	Added Sheets for Concrete Pavement Joints, Roundabouts.
RC-25M	Sheets 1-7	Revised Notes regarding rumble strips.
	Sheet 1	Revised Note 2 by deleting "CONSIDER THE" before "PAYMENT".  Added details for Safety Edge-Wearing Course and Safety Edge-with Binder and Wearing Course (Refer to Publication 13M, Design Manual Part 2, Highway Design, Section 12.8.B).  Added Notes 12 and 13.
	Sheet 2	Deleted guide rail and vertical dimension (See Note 3) in typical sections for Type 4, Type 6, and Type 7 Shoulders.  Deleted Note 3; renumbered all subsequent Notes.
	Sheet 3	In Concrete Shoulders Adjacent to Plain Concrete Pavement for Collectors and Local Roads detail, revised spacing of tie bars to make them graphically appear 30" from the transverse roadway joint and the transverse shoulder joint.  In Section B-B for Shoulder Relief Joints detail, modified the 1'-0" wide pavement relief joint to indicate Superpave HMA binder course only (deleted Superpave HMA base course).  Revised Note 9 regarding rumble strips.
	Sheets 4-6	Revised Sheet title from "SHOULDERS RUMBLE STRIPS" to "MILLED RUMBLE STRIPS SHOULDER RUMBLE STRIPS".
	Sheet 7	Revised Note 11 regarding rumble strips.
RC-26M	Sheet 1	Revised Note 2 to match RC-20M, Sheet 1, Note 4.  In Section A-A, Typical Pavement Patching Joint detail:  -Removed one dowel bar from each side of centerline (also Plan View).  -Revised distance between longitudinal joint and first coated dowel bar from 6" to 12".  -Revised distance between edge of pavement and first coated dowel bar from 6" to 12".  -Revised Note 6 regarding sealing joints.  -Added Note 7.
	Sheet 4	Revised new "F" pavement joints in three details to be shown as skewed along the centerline of the original joint. Added "F" for bottom center detail to indicate location of skewed joints along the centerline of the original joints (3 locations). Revised Note 5 to indicate "...A NEW PAVEMENT JOINT AT THE LOCATION OF..." rather than "...A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF...".  Deleted Note 7.

	Sheet 5	For upper center and middle left details, rotated new pavement joint F counterclockwise about the center to the same angle as the centerlines of the original joints.
	Sheet 6	Moved this sheet from Sheet 9 to Sheet 6. Renumbered Sheets 6-8 to Sheets 7-9.  Added detail for Lane Widening Plan with skewed joints. Revised label of existing detail to indicate Lane Widening Plan with perpendicular joints.
	Sheet 9	Revised Note 7 regarding spacing between dowels.
	Sheet 10	Added sheet with details for cross-stitching.
	Sheet 11	Added sheet with details for new pavement repair.
RC-28M	Sheet 1	Replaced Overlay Transition with Paving Notch on Concrete and Bituminous Pavements detail with Typical Paving Notch detail.  Added Legend for Typical Paving Notch detail:  -Denoted a patterned area of the existing pavement to be milled.  -Defined the minimum length of existing pavement to be milled for the wearing course (LW), binder course (LB), and leveling course (LL).  -Noted that the variable depth milling is incidental to the paving item.  Revised Table A to identify Roadway ESAL Level and Minimum Length of Milling.  Deleted Notes 1 and 2. Renumbered all subsequent Notes.
RC-38M	Sheets 1-3	Issued new Standard Drawings (Sanitary Sewer Manholes).
RC-39M	Sheets 1-30	Voided previous sheets for Standard Manholes. Issued new sheets (Storm Water Manholes).
RC-45M	Sheet 1	In General Notes, deleted Notes 1 and 2; renumbered all subsequent Notes.
	Sheets 2-3	Added unit in inches (") to indicate 3/8" diameter studs.
RC-46M	All Sheets	Deleted Design Tables with metric units (Sheets 20-22, 32-34, 40-44). Renumbered Sheets 23-31 to Sheets 20-28, Sheets 35-39 to Sheets 29-33, and Sheet 45 to 34.  Updated all sheet references where necessary.  Removed references to "U.S. CUSTOMARY UNITS".
	Sheet 1	In General Notes, deleted Notes 1 and 2; renumbered all subsequent Notes.  In Note 14, inserted second sentence to locate the top step 6" minimum below the top of the inlet box.  Revised Index of Sheets to reflect reduction from 45 to 34 sheets.

	Sheet 8	In Section D-D, Top Slab with Shiplap Joint (Precast Only) detail:  -Changed dimension from " 1" MIN." to " 1 1/2" MIN." on the right side for the location of the bottom rebar.
	Sheet 12	In Section F-F, Transition Slab with Shiplap Joint (Precast Only) detail:  -Changed dimension from " 1" MIN." to " 1 1/2" MIN." on the left and right sides for the location of the bottom rebars.
RC-50M	Sheet 1	Added new Section D-D with Rock, Class R-4 in situations without inlet placement to protect the embankment from erosion, especially in the area behind guide rail posts.  In Elevation View for Typ. Concrete Bridge Barrier (Without Inlet Placement) detail:  -Added graphics for Rock, Class R-4 behind guide rail posts between end of concrete barrier and Post 6.  -Added "ROCK, CLASS R-4 SEE NOTE 3".  -Added arrows and letters to identify Section D-D.  Moved Note 3 to Note 1.  Inserted Note 3.
	Sheet 10	In Section F-F, added "(A307) BOLTS (3 TOTAL)" for 1 1/16" oversized holes.
	Sheet 16	Added the callout "SEE NOTE 3." in all three details.  Added Note 3 (was previously note with double asterisk); inserted "5/8 Ø" to define size of splice bolts.
RC-65M	Sheet 1	Deleted Note 6.  Added Roundabout Truck Apron Curb detail below Type A and Type B.
RC-70M	Sheet 1	Revised Note 5 to read, "PROVIDE MESH SUPPORT MEETING THE MATERIAL REQUIREMENTS AS SPECIFIED IN PUBLICATION 408, SECTION 865.2(b)." Section 865.2(b) identifies that mesh support can be metallic coated steel, 14.5 gage wire mesh, arranged in a maximum grid of 6 inches by 6 inches, or an acceptable, equivalent plastic mesh.
	Sheet 3	For Compost Filter Berm Detail, revised slope from 2 MIN:1 to 1 MIN:1.  For Compost Filter Sock Detail, in Section View, added 32" size.

Any comments or questions regarding the above revisions should be directed to the Highway Design and Technology Section, Highway Delivery Division, Bureau of Project Delivery.

**CANCEL AND DESTROY THE FOLLOWING:**

Index Sheet	June 10, 2013
RC-12M	June 1, 2010
RC-20M	June 1, 2010
RC-25M	June 1, 2010
RC-26M	June 1, 2010
RC-28M	June 10, 2013
RC-39M	June 1, 2010
RC-45M	June 1, 2010
RC-46M	June 1, 2010
RC-50M	June 1, 2010
RC-65M	June 1, 2010
RC-70M	June 1, 2010

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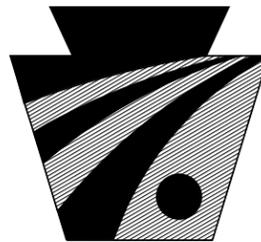
**APPROVED FOR ISSUANCE BY:**

LESLIE S. RICHARDS BY:



Brian G. Thompson, P.E.  
Director, Bureau of Project Delivery,  
Highway Administration

# COMMONWEALTH OF PENNSYLVANIA



pennsylvania

DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STANDARDS FOR ROADWAY CONSTRUCTION  
SERIES RC-1M TO 100M

JUNE 2010 EDITION

PDT Pub #72M

# INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

<u>STANDARD DRAWING NUMBER</u>	<u>DRAWING DATE</u>	<u>DESCRIPTION</u>
<u>EARTHWORK</u>		
RC-10M _____	JUN. 1, 2010	CLASSIFICATION OF EARTHWORK
RC-11M __ (2 Sheets) _____	JUN. 1, 2010	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
** RC-12M __ (2 Sheets) _____	SEPT. 15, 2016	BACKFILL AT STRUCTURES
RC-13M _____	JUN. 1, 2010	PAY LIMIT OF SUBBASE
** RC-14M __ (3 Sheets) _____	SEPT. 15, 2016	GEOSYNTHETIC REINFORCED SOIL SLOPE
<u>PAVEMENTS</u>		
** RC-20M __ (12 Sheets) _____	SEPT. 15, 2016	CONCRETE PAVEMENT JOINTS
RC-21M _____	JUN. 1, 2010	REINFORCED CONCRETE PAVEMENT
RC-22M __ (4 Sheets) _____	JUN. 1, 2010	RUMBLE STRIPS
RC-23M __ (3 Sheets) _____	JUN. 1, 2010	BRIDGE APPROACH SLABS
RC-24M __ (3 Sheets) _____	JUN. 1, 2010	PAVEMENT RELIEF JOINT
** RC-25M __ (7 Sheets) _____	SEPT. 15, 2016	SHOULDERS
** RC-26M __ (11 Sheets) _____	SEPT. 15, 2016	CONCRETE PAVEMENT REHABILITATION
RC-27M __ (2 Sheets) _____	JUN. 1, 2010	PLAIN CONCRETE PAVEMENT
** RC-28M __ (2 Sheets) _____	SEPT. 15, 2016	OVERLAY TRANSITIONS AND PAVING NOTCHES
RC-29M __ (3 Sheets) _____	JUN. 1, 2010	BRIDGE ANTI-ICING SYSTEM APPROACH INSTALLATION
<u>DRAINAGE</u>		
RC-30M __ (5 Sheets) _____	JUN. 1, 2010	SUBSURFACE DRAINS
RC-31M __ (2 Sheets) _____	JUN. 1, 2010	ENDWALLS
RC-32M _____	JUN. 1, 2010	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
RC-33M __ (2 Sheets) _____	JUN. 1, 2010	END SECTIONS FOR PIPE CULVERTS
RC-35M _____	JUN. 1, 2010	DRAINAGE DIKE
RC-36M _____	JUN. 1, 2010	SPRING BOXES
** RC-38M __ (3 Sheets) _____	SEPT. 15, 2016	SANITARY SEWER MANHOLES
** RC-39M __ (30 Sheets) _____	SEPT. 15, 2016	STORM WATER MANHOLES
RC-40M _____	JUN. 1, 2010	SLOPE PROTECTION
RC-43M __ (5 Sheets) _____	JUN. 1, 2010	GABIONS
** RC-45M __ (20 Sheets) _____	SEPT. 15, 2016	INLET TOPS, GRATES AND FRAMES
** RC-46M __ (34 Sheets) _____	SEPT. 15, 2016	INLET BOXES
<u>GUIDE RAIL AND MEDIAN BARRIER</u>		
** RC-50M __ (16 Sheets) _____	SEPT. 15, 2016	GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
RC-52M __ (7 Sheets) _____	JUN. 1, 2010	TYPE 2 STRONG POST GUIDE RAIL
RC-53M __ (2 Sheets) _____	JUN. 1, 2010	TYPE 2 WEAK POST GUIDE RAIL
RC-54M __ (7 Sheets) _____	JUN. 1, 2010	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-57M __ (6 Sheets) _____	JUN. 1, 2010	CONCRETE MEDIAN BARRIER
RC-58M __ (4 Sheets) _____	JUN. 1, 2010	SINGLE FACE CONCRETE BARRIER
RC-59M __ (4 Sheets) _____	JUN. 1, 2010	CONCRETE GLARE SCREEN

<u>STANDARD DRAWING NUMBER</u>	<u>DRAWING DATE</u>	<u>DESCRIPTION</u>
<u>FENCES AND CURBS</u>		
RC-60M __ (3 Sheets) _____	JUN. 1, 2010	RIGHT-OF-WAY FENCE
RC-61M _____	JUN. 1, 2010	RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS
RC-63M __ (2 Sheets) _____	JUN. 1, 2010	PERMANENT BARRICADES
RC-64M _____	JUN. 1, 2010	CURBS AND GUTTERS
** RC-65M _____	SEPT. 15, 2016	CONCRETE MOUNTABLE CURBS
* RC-67M __ (14 Sheets) _____	JUN. 10, 2013	CURB RAMPS AND SIDEWALKS

## EROSION AND SEDIMENTATION CONTROL

** RC-70M __ (3 Sheets) _____	SEPT. 15, 2016	PERIMETER CONTROL DEVICES
RC-71M __ (4 Sheets) _____	JUN. 1, 2010	SEDIMENT BASIN AND SEDIMENT TRAP
RC-72M __ (7 Sheets) _____	JUN. 1, 2010	INLET AND OUTLET PROTECTION
RC-73M __ (4 Sheets) _____	JUN. 1, 2010	CHANNEL AND SLOPE PROTECTION
RC-74M _____	JUN. 1, 2010	TEMPORARY DIVERSIONS
RC-75M _____	JUN. 1, 2010	DEWATERING DEVICES
RC-76M _____	JUN. 1, 2010	STRAW BALE BARRIER
RC-77M _____	JUN. 1, 2010	ROCK CONSTRUCTION ENTRANCE
RC-78M __ (4 Sheets) _____	JUN. 1, 2010	SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS

## HIGHWAY LIGHTING

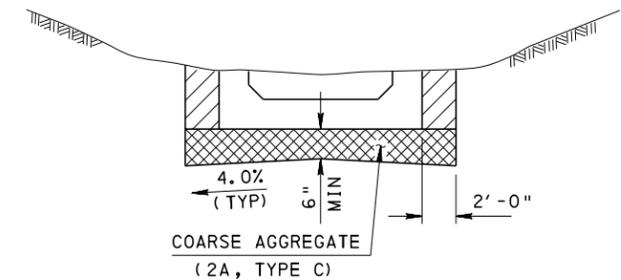
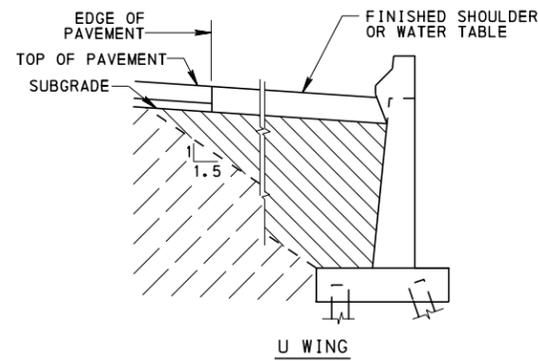
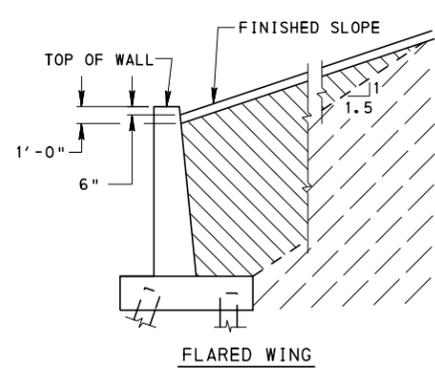
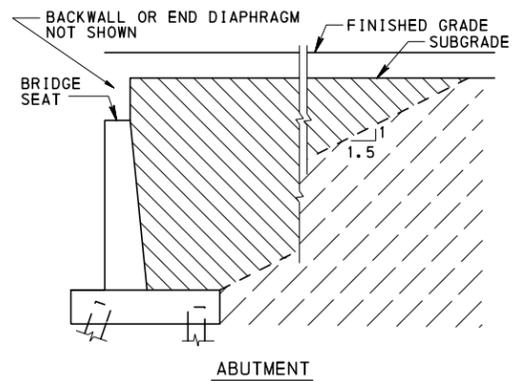
RC-80M __ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M _____	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M __ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
RC-83M __ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M __ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS

## ROADSIDE DEVELOPMENT AND PLANTING

RC-91M __ (2 Sheets) _____	JUN. 1, 2010	BRACING AND PLANTING DETAILS
RC-92M _____	JUN. 1, 2010	REMOVAL LIMITS OF TREE TRIMMING

### JUNE, 2010 EDITION

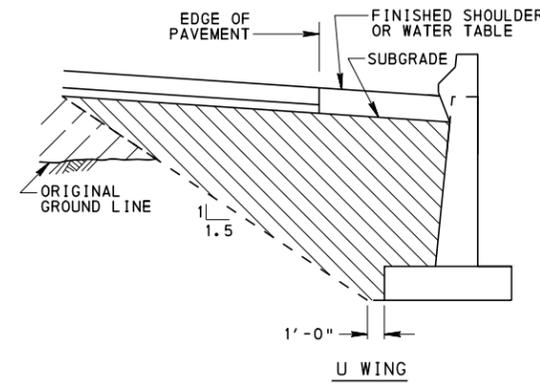
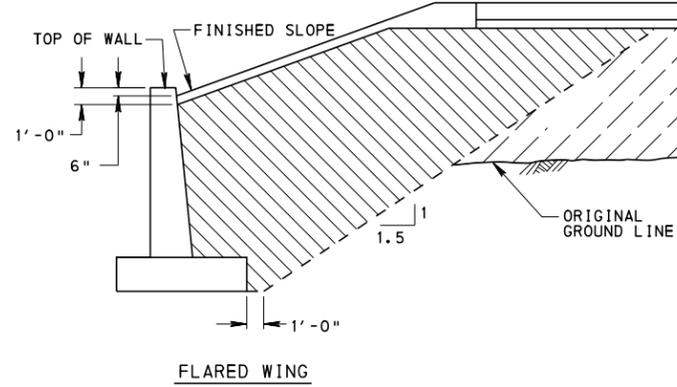
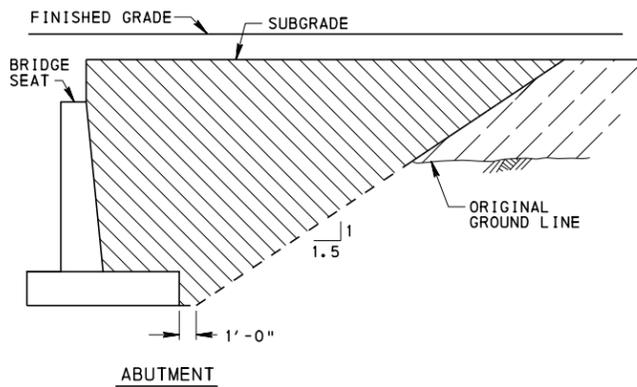
- \* SEE CHANGE #1 FOR JUNE 10, 2013 STANDARD REVISIONS
- \*\* SEE CHANGE #2 FOR SEPT. 15, 2016 STANDARD REVISIONS



**FOUNDATION PREPARATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL ONLY**

NOTE: EXCAVATE THE LAST 2'-0" WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM. FOR CULVERTS WITH SPANS LESS THAN 8'-0", BOTTOM MAY BE SLOPED IN ONE DIRECTION.

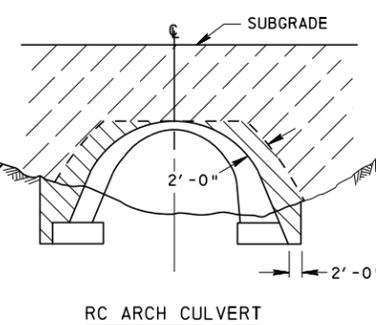
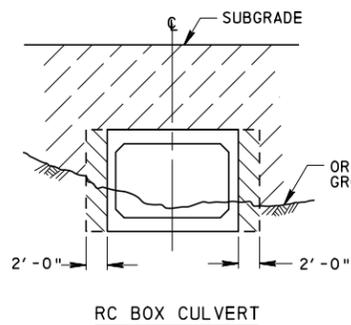
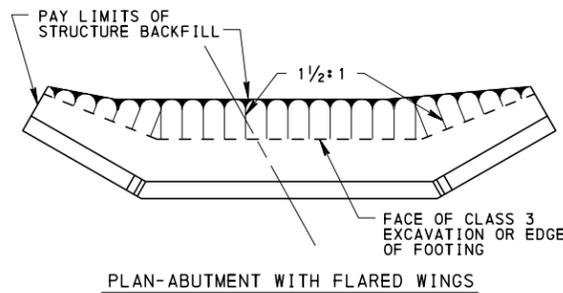
**TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL**



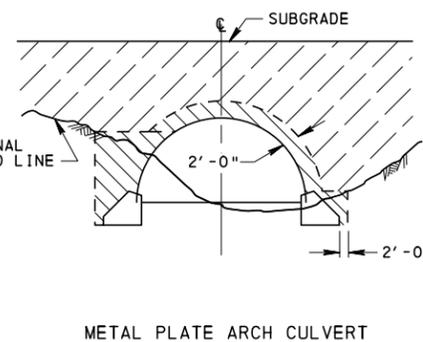
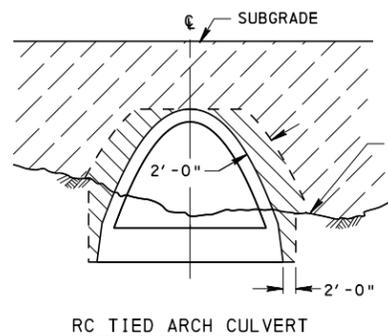
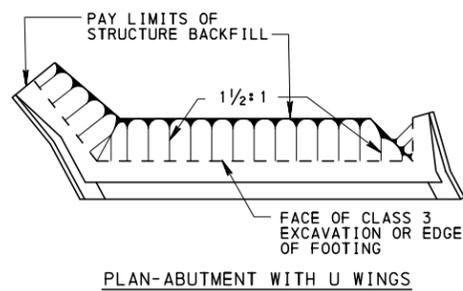
**LEGEND**

- STRUCTURE BACKFILL
- EMBANKMENT MATERIAL

**TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT**



NOTE: SEE SHEET 2 FOR GENERAL NOTES.



**BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

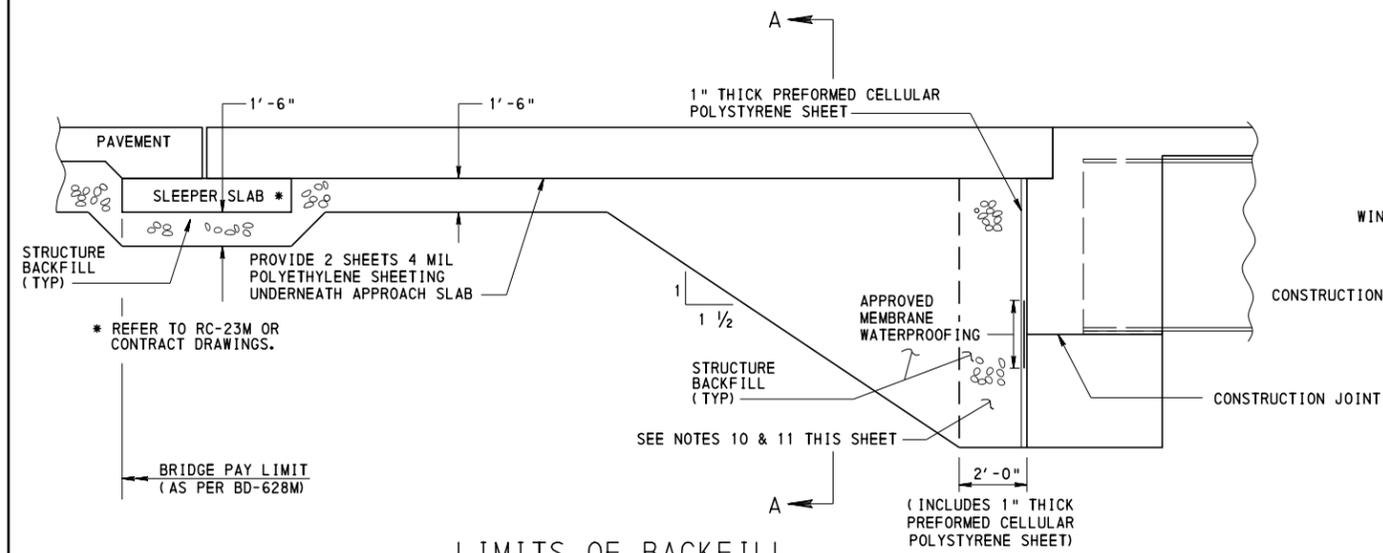
**BACKFILL AT STRUCTURES**

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

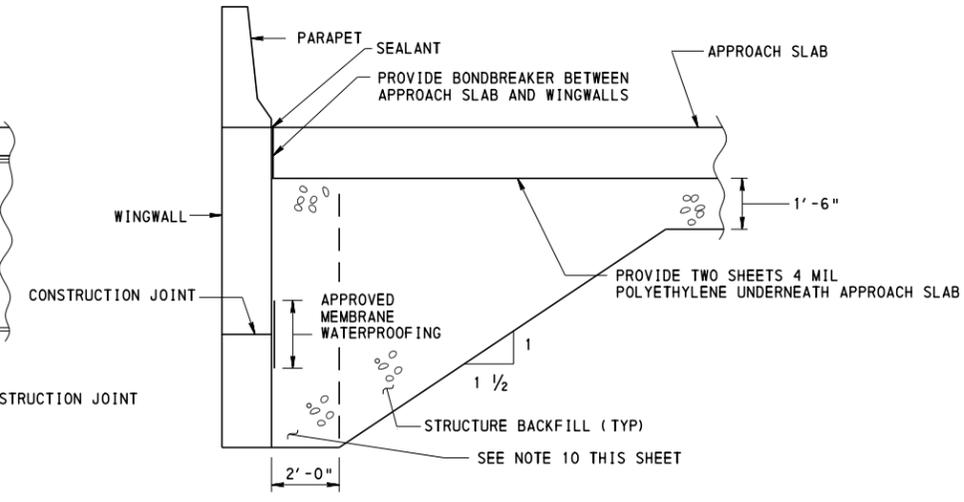
RECOMMENDED SEPT. 15, 2016  
*Burt J. Ryan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 2

RC-12M



LIMITS OF BACKFILL  
INTEGRAL ABUTMENT



LIMITS OF BACKFILL  
WINGWALLS OF INTEGRAL ABUTMENTS  
SECTION A-A

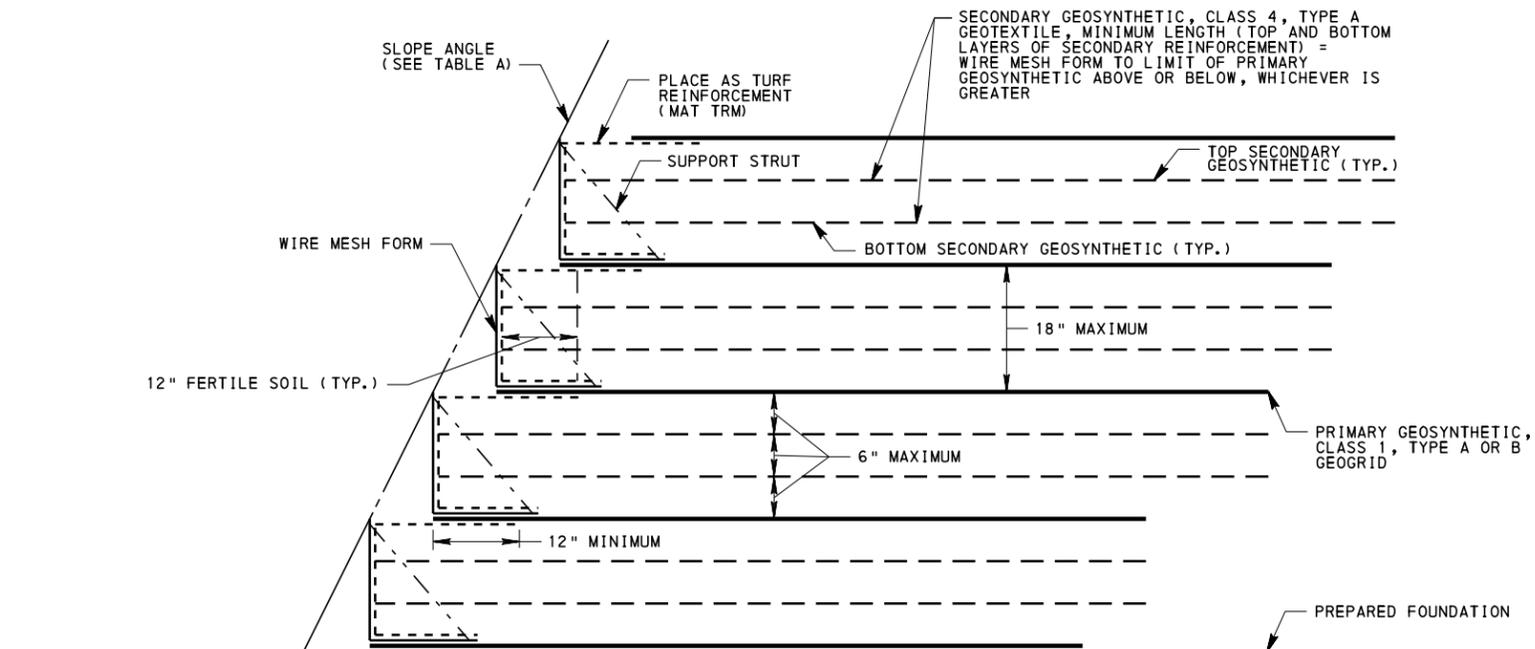
GENERAL NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408. PLACE BACKFILL AND EMBANKMENT IN ACCORDANCE WITH THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN ON THE STRUCTURE DRAWINGS.
2. USE ONLY R-3 ROCK LINING, MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 850.2(d); AASHTO NO. 1, 3, 5 OR 57 COARSE AGGREGATES, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408, SECTION 703.2, TABLE B; OR TYPE OGS COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408, SECTION 703.2, TABLE B. MEASURE AND PAY STRUCTURE BACKFILL AS SELECTED BORROW EXCAVATION-STRUCTURE BACKFILL. DO NOT USE R-3 FOR STRUCTURE BACKFILL FOR ANY TYPE RC OR METAL PLATE CULVERT. PLACE A CLASS 4, TYPE A GEOTEXTILE BLANKET AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET ON ENTIRE TOP OF THE COMPLETED STRUCTURE BACKFILL PRIOR TO PLACING ANY SUBBASE MATERIAL FOR THE ROADWAY. THE GEOTEXTILE IS CONSIDERED INCIDENTAL TO THE SELECTED BORROW EXCAVATION STRUCTURE BACKFILL AND WILL NOT BE PAID FOR SEPARATELY.
3. TREAT BACKFILL LIMITS AT RETAINING WALLS AND WINGWALLS FOR CULVERTS THE SAME AS FLARED ABUTMENT WINGWALLS.
4. TREAT BACKFILL CONSTRUCTION AT RC BOX CULVERTS WITH THE TOP SLAB AT ROADWAY GRADE THE SAME AS ABUTMENTS.
5. TREAT BACKFILL CONSTRUCTION AT CULVERTS, WHERE THE TOP OF THE CULVERT IS NEAR SUBGRADE, AS SHOWN ON THE STRUCTURE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
6. PLACE STRUCTURE BACKFILL AND ADJOINING EMBANKMENT SIMULTANEOUSLY UNLESS OTHERWISE PERMITTED BY THE ENGINEER.
7. REPLACE MATERIAL REMOVED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION WITH STRUCTURE BACKFILL. CONSIDER MATERIAL REMOVED OR STRUCTURE BACKFILL PLACED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION AS INCIDENTAL TO THE CLASS OF EXCAVATION SPECIFIED.
8. REFER TO STRUCTURE DRAWINGS FOR DRAINAGE DETAILS, WEEP HOLES, ETC.
9. INDICATE STRUCTURE BACKFILL QUANTITIES ON THE STRUCTURE DRAWINGS.
- \*10. PLACE BACKFILL WITHIN 24" FROM THE REAR FACE OF THE ABUTMENT AND THE WINGWALL IN LOOSE LIFTS OF 6" FOR TYPE OGS, AASHTO NO. 3, 5 OR 57 COARSE AGGREGATE; 9" AASHTO NO. 1; 1'-0" FOR R-3 ROCK LINING. COMPACT EACH LAYER WITH TWO PASSES OF A WALK-BEHIND VIBRATORY PLATE SOIL COMPACTOR.
- \*11. BACKFILL SIMULTANEOUSLY BEHIND BOTH ABUTMENTS. KEEP THE DIFFERENCE BETWEEN THE FILL HEIGHT AT BOTH ENDS OF THE BRIDGE BELOW 12" AT ALL TIMES DURING BACKFILLING.
- \*12. FOR EXCAVATION CALCULATIONS, USE 2'-0" ON EACH SIDE OF INTEGRAL ABUTMENT BEFORE STARTING SLOPE OF EXCAVATION.

LEGEND

\* IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

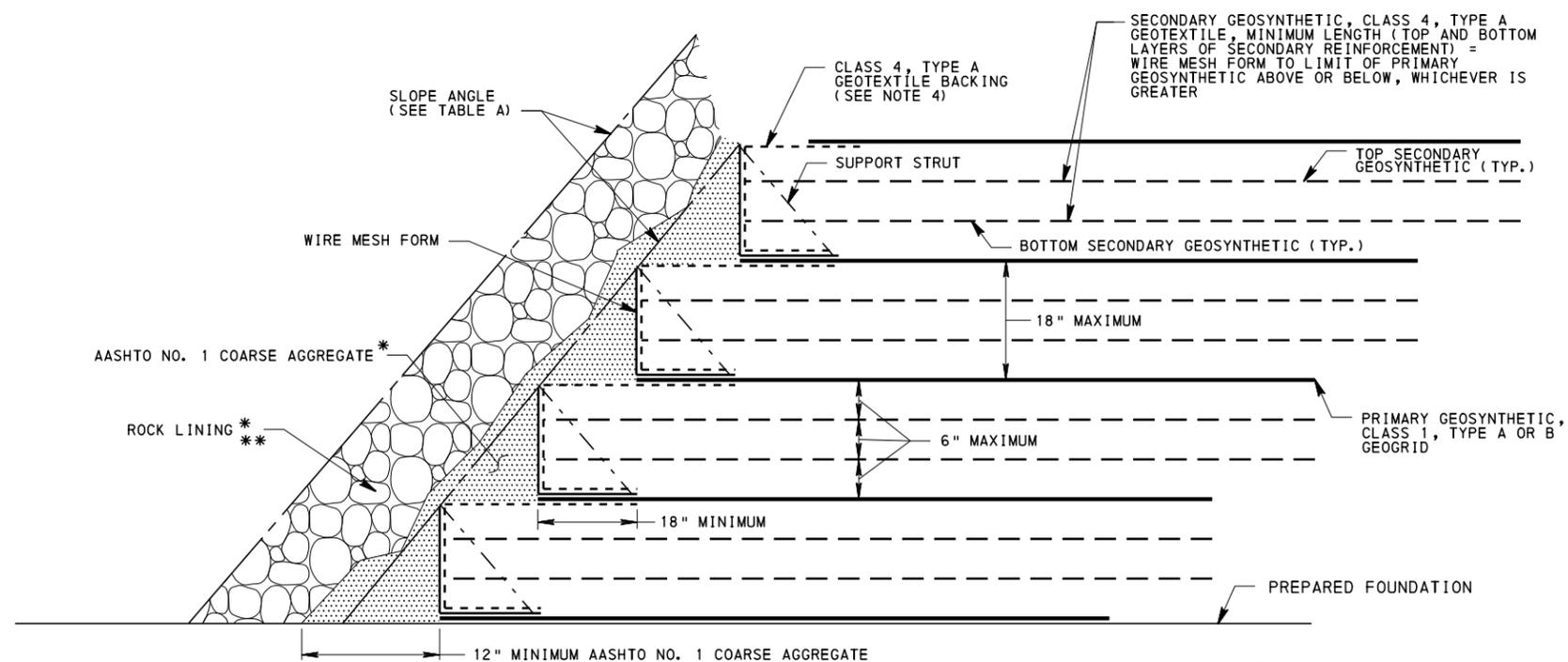
<p><b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF PROJECT DELIVERY</p>		
<p>BACKFILL AT STRUCTURES</p>		
<p>RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION</p>	<p>RECOMMENDED SEPT. 15, 2016 <i>Burt J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY</p>	<p>SHT 2 OF 2 <b>RC-12M</b></p>



**TYPE A SLOPE LEGEND**

- = PRIMARY GEOSYNTHETIC
- = SECONDARY GEOSYNTHETIC
- - - - - = TURF REINFORCEMENT MAT (TRM)
- = WIRE MESH FORM
- - - - - = WIRE MESH SUPPORT STRUT
- = SLOPE ANGLE

**TYPE A SLOPE**



**TYPE B SLOPE LEGEND**

- = PRIMARY GEOSYNTHETIC
- = SECONDARY GEOSYNTHETIC
- - - - - = CLASS 4, TYPE A GEOTEXTILE BACKING
- = WIRE MESH FORM
- - - - - = WIRE MESH SUPPORT STRUT
- = SLOPE ANGLE

**TYPE B SLOPE**

**TABLE A  
PERMISSIBLE SLOPE ANGLES**

GRS SLOPE TYPE	MAXIMUM SLOPE ANGLE	MINIMUM SLOPE ANGLE
A	0.5(H) : 1(V)	N/A
B	1(H) : 1(V)	N/A
C	1.25(H) : 1(V)	N/A
D	0.25(H) : 1(V)	0.5(H) : 1(V)

**NOTES:**

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PENNDOT SPECIAL PROVISIONS FOR GEOSYNTHETIC REINFORCED SOIL (GRS) SLOPES. PRIMARY GEOSYNTHETIC REINFORCEMENT CONSISTS OF A GEOGRID MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 738.1 AND 738.2 CLASS 1, TYPE A OR B. SECONDARY REINFORCEMENT CONSISTS OF CLASS 4, TYPE A GEOTEXTILE MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 735.
  2. FOR SLOPES CONSTRUCTED IN A FLOODPLAIN OR WHEN OTHER HIGH MOISTURE BEHIND GRS IS ANTICIPATED, ADEQUATE SUBSURFACE DRAINAGE IS TO BE PROVIDED. SEE CONTRACT DRAWINGS FOR DETAILS.
  3. SLOPES CONSTRUCTED AGAINST OR OVER SEEPS OR SPRINGS ARE TO HAVE AN OPEN-GRADED DRAINAGE GALLERY TYPICALLY CONSISTING OF AASHTO NO. 8 OR AASHTO NO. 57 COARSE AGGREGATE, COLLECTION PIPES, AND CLASS 4 TYPE A GEOTEXTILE SEPARATION BETWEEN COARSE AGGREGATES AND SOILS. THE NEED FOR A DRAINAGE GALLERY MUST BE DETERMINED ACCORDING TO SITE SPECIFIC CONDITIONS, AND WHEN REQUIRED, MUST BE DESIGNED TO ACCOMMODATE SITE SPECIFIC NEEDS.
  4. PORTIONS OF SLOPES BELOW THE 500-YEAR FLOODPLAIN ELEVATION MUST USE AASHTO NO. 8 COARSE AGGREGATE FOR THE REINFORCED BACKFILL. PROVIDE CLASS 4, TYPE A GEOTEXTILE ON THE PREPARED FOUNDATION TO PREVENT MIGRATION OF FINES INTO THE NO. 8 COARSE AGGREGATE. WHEN USING A NO. 8 COARSE AGGREGATE REINFORCED BACKFILL, THE CLASS 4, TYPE A GEOTEXTILE SECONDARY REINFORCEMENT MUST WRAP AROUND THE NO. 8 COARSE AGGREGATE, AT BOTH THE SLOPE FACE AND AT THE BACK OF THE REINFORCED BACKFILL. THE SECONDARY REINFORCEMENT WRAPS MUST BE EMBEDDED A MINIMUM OF FOUR FEET INTO THE NEXT REINFORCEMENT LAYER. FOR LAYERS OF REINFORCED BACKFILL NOT UNDERLAIN BY SECONDARY GEOSYNTHETIC REINFORCEMENT (I.E. AT LAYERS OF PRIMARY REINFORCEMENT), USE A WRAP OF SECONDARY REINFORCEMENT EMBEDDED A MINIMUM OF FOUR FEET BOTH TOP AND BOTTOM, AT BOTH THE FACE AND AT THE BACK OF THE SLOPE. TYPE A SLOPES ARE NOT PERMITTED WITHIN A 500-YEAR FLOODPLAIN.
  5. ANY SLOPE CONSTRUCTED USING THIS STANDARD MUST BE DESIGNED ACCORDING TO "DESIGN REQUIREMENTS FOR GEOSYNTHETIC REINFORCED SOIL (GRS) SLOPES".
  6. BACKFILL GEOSYNTHETICS PRIOR TO THE END OF THE WORK DAY UNLESS OTHERWISE NOTED. PLACE GEOSYNTHETIC TO LAY FLAT, PULLED TIGHT AND ANCHORED IN PLACE UNTIL BACKFILL IS PLACED.
  7. DO NOT DUMP FILL DIRECTLY ON EXPOSED GEOSYNTHETICS. PLACE ON PREVIOUSLY SPREAD MATERIAL AND BLADE OUT.
- \* PLACE ROCK LINING AND AASHTO NO. 1 COARSE AGGREGATE IN LIFTS NOT EXCEEDING 4.5 FEET. NO MORE THAN 3 WIRE MESH FORMS ARE TO BE EXPOSED BEFORE COVERING WITH AASHTO NO. 1 COARSE AGGREGATE AND ROCK LINING.
- \*\* MINIMUM REQUIRED THICKNESS OF ROCK LINING IS 2.5 TIMES THE TOP SIZE OF ROCK SPECIFIED FOR ROCK LINING, MEASURED PERPENDICULAR TO THE SLOPE FACE.

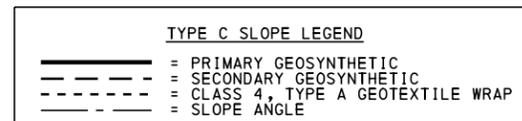
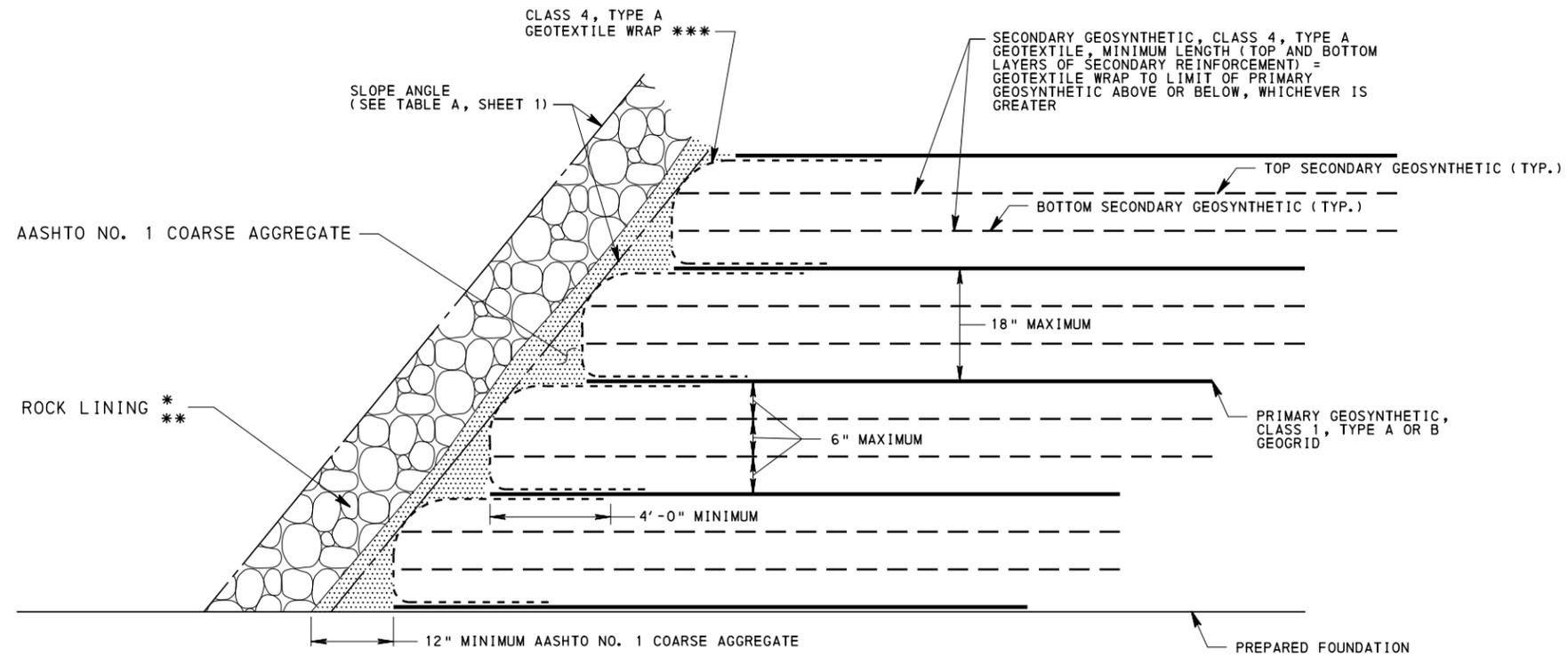
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GEOSYNTHETIC REINFORCED  
SOIL SLOPE  
TYPE A AND B SLOPE

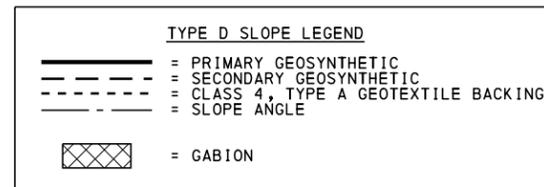
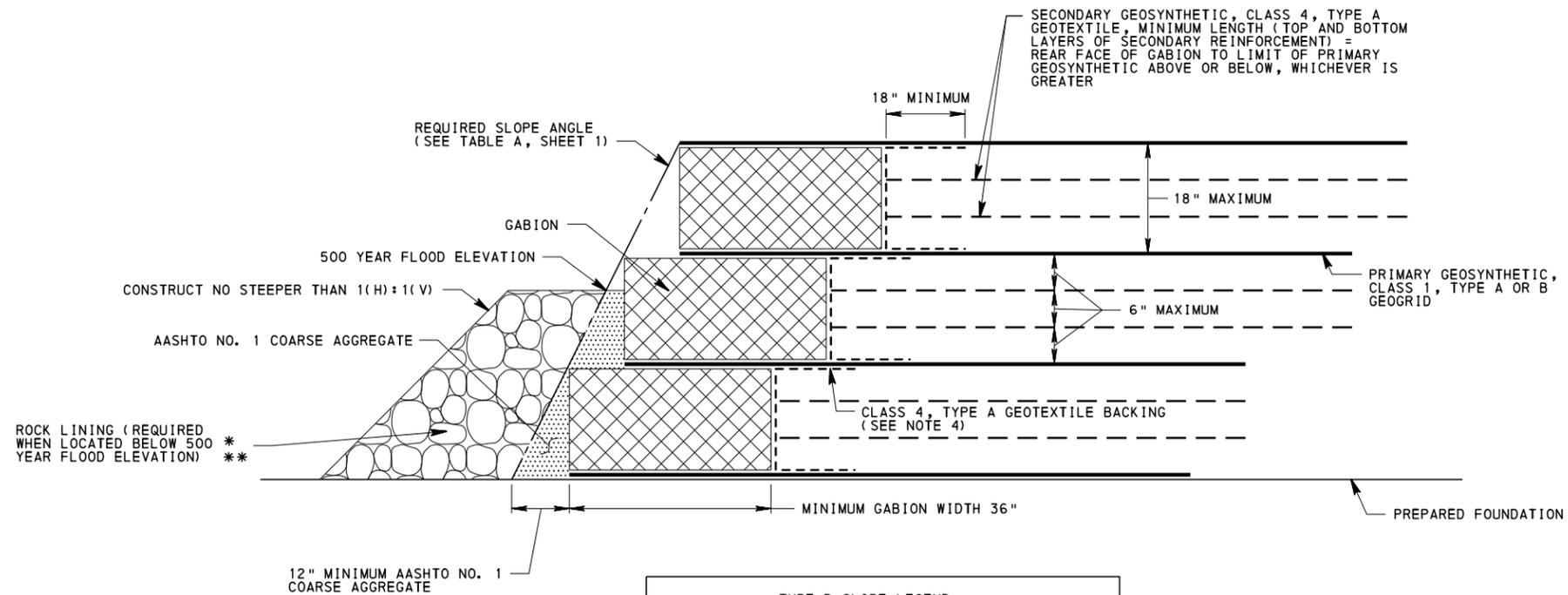
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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**TYPE C SLOPE**



**TYPE D SLOPE**

\* PLACE ROCK LINING AND AASHTO NO. 1 COARSE AGGREGATE IN LIFTS NOT EXCEEDING 4.5 FEET. NO MORE THAN 3 GEOSYNTHETIC WRAPS OR GABION BASKETS ARE TO BE EXPOSED BEFORE COVERING WITH AASHTO NO. 1 COARSE AGGREGATE AND ROCK LINING.

\*\* MINIMUM REQUIRED THICKNESS OF ROCK LINING IS 2.5 TIMES THE TOP SIZE OF ROCK SPECIFIED FOR ROCK LINING, MEASURED PERPENDICULAR TO THE SLOPE FACE.

\*\*\* DO NOT LEAVE GEOSYNTHETIC FACE EXPOSED FOR MORE THAN 7 DAYS. PLACE A UV PROTECTIVE COVER OVER ANY GEOSYNTHETIC EXPOSED FOR MORE THAN 7 DAYS UNTIL BACKFILL IS IN PLACE.

FOR ADDITIONAL NOTES, SEE SHEET 1

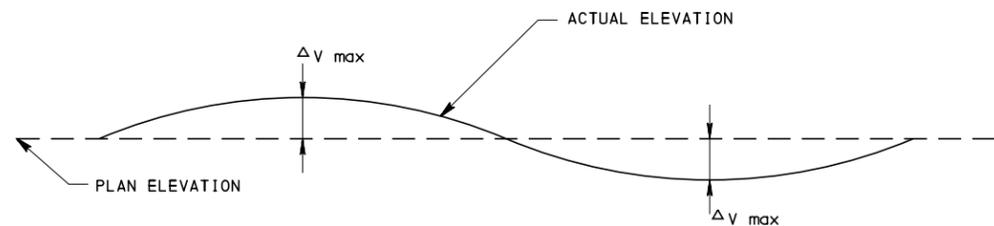
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GEOSYNTHETIC REINFORCED  
SOIL SLOPE  
TYPE C AND D SLOPE

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

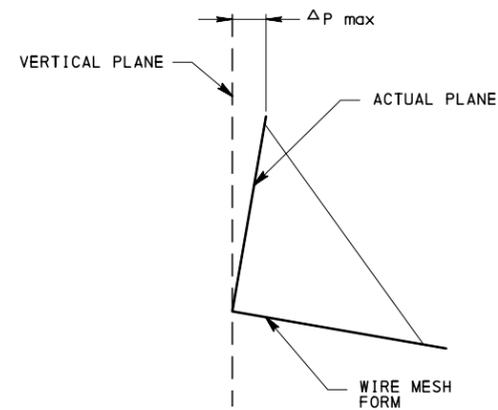
RECOMMENDED SEPT. 15, 2016  
*Brian J. Johnson*  
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SHT 2 OF 3  
RC-14M

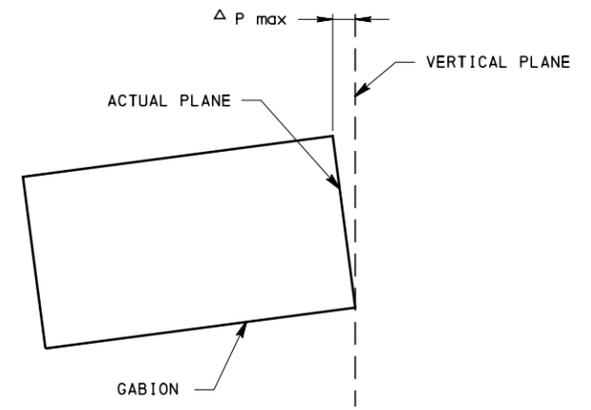


$\Delta V_{max}$	
PRIMARY AND SECONDARY REINFORCEMENT	$\pm 1/2"$
WIRE MESH FORM	$\pm 1/2"$
GABION BASKETS	$\pm 1"$

**CONSTRUCTION TOLERANCES  
ELEVATION VIEW**



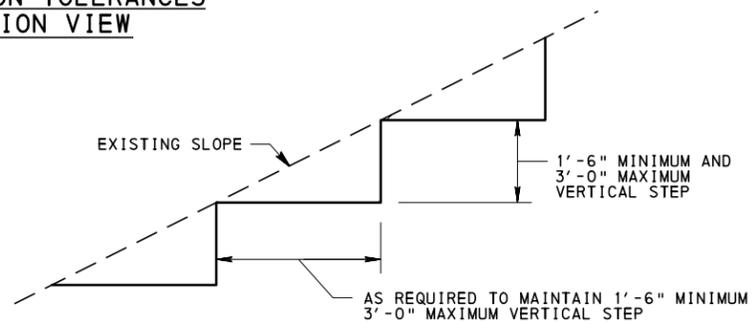
**TYPE A OR TYPE B SLOPES**



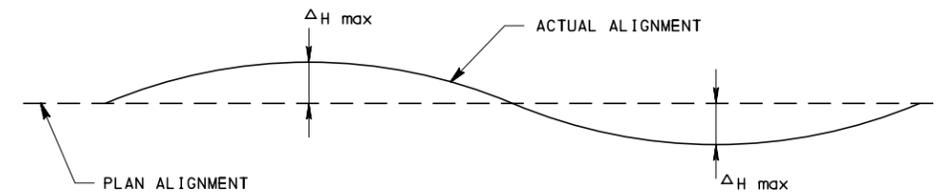
**TYPE D SLOPE**

$\Delta P_{max}$	
WIRE MESH FORM FACE	$\pm 1/4"$
GABION FACE	$\pm 1/2"$

**CONSTRUCTION TOLERANCES  
PLUMBNESS (VERTICALITY) REQUIREMENTS**

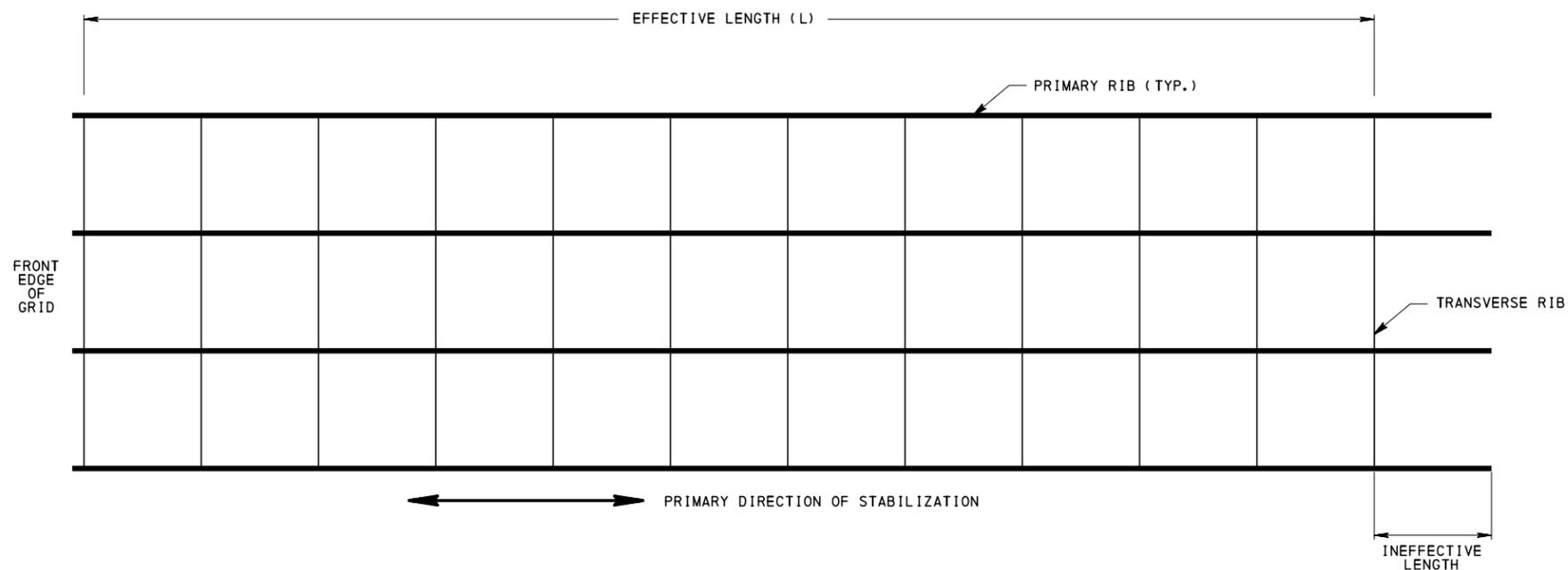


**BENCHING REQUIREMENTS  
FOR EXISTING SLOPE**



$\Delta H_{max}$	
WIRE MESH FORM	$\pm 1"$
GABION BASKETS	$\pm 1"$
GEOTEXTILE WRAP (TYPE C SLOPES)	$\pm 2"$

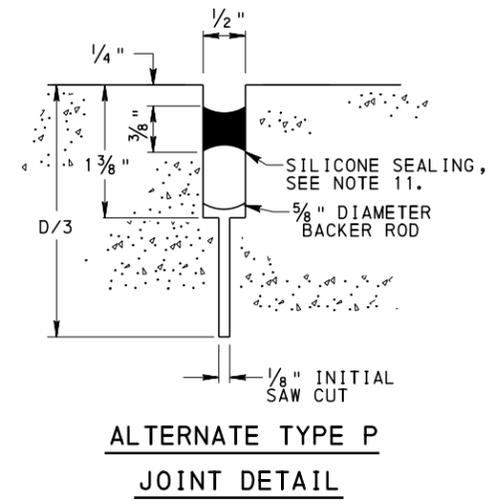
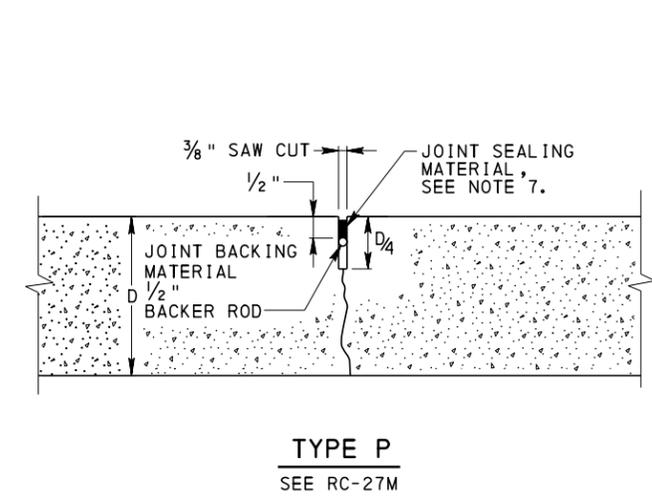
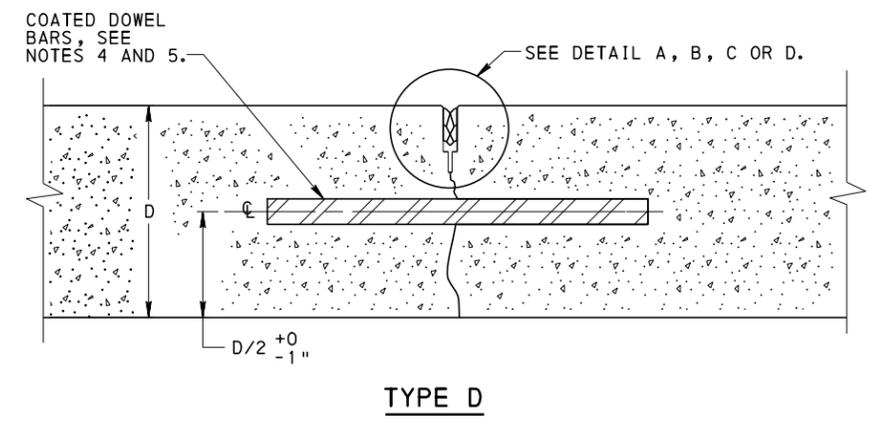
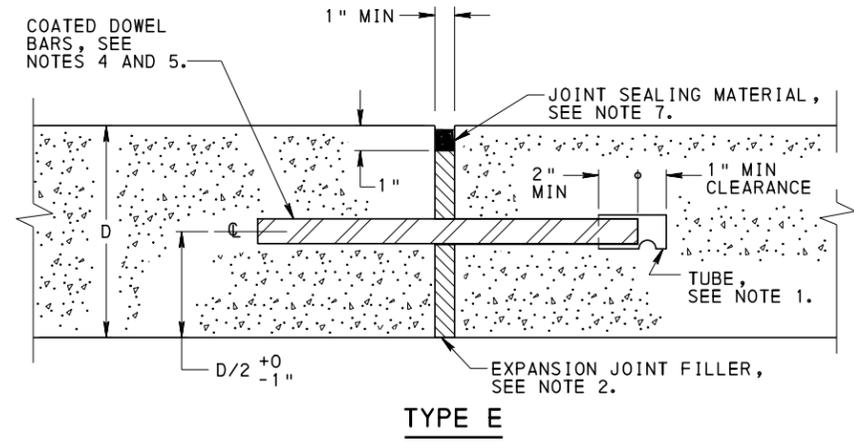
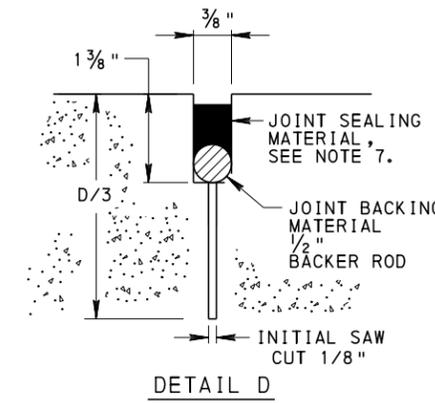
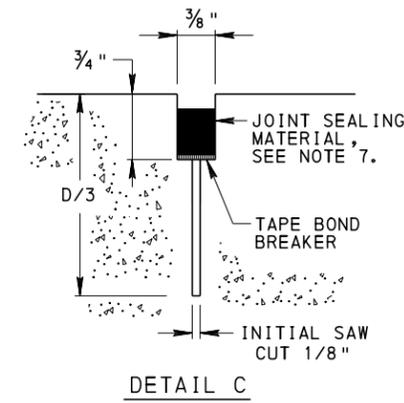
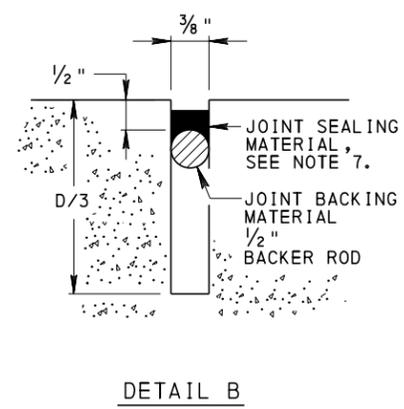
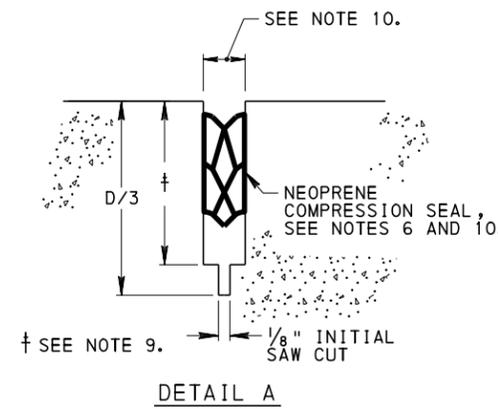
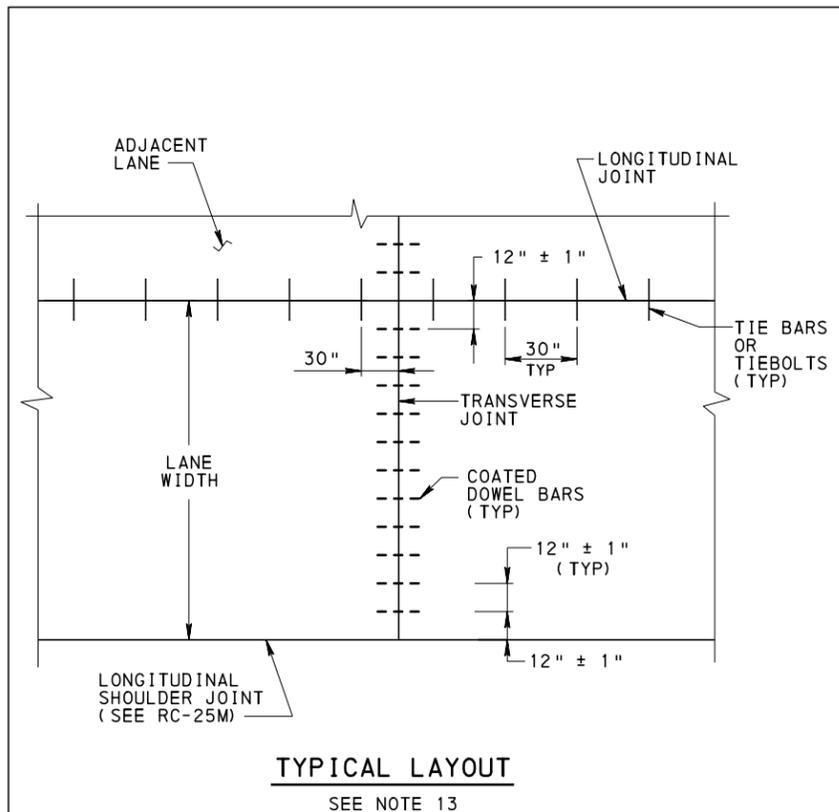
**CONSTRUCTION TOLERANCES  
HORIZONTAL VIEW**



**MEASURING THE EFFECTIVE LENGTH OF GEOGRID REINFORCEMENT**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GEOSYNTHETIC REINFORCED SOIL SLOPE  
EFFECTIVE LENGTH,  
CONSTRUCTION TOLERANCES, AND  
BENCHING REQUIREMENTS FOR  
EXISTING SLOPES



**NOTES**

- PLACE A TUBE FROM A MANUFACTURER LISTED IN BULLETIN 15 OVER THE LUBRICATED END OF ALL DOWEL BARS USED IN TYPE E JOINTS AND PROVIDE A MINIMUM 1" CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE.
- CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND FURNISH IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. MAKE THE TOP SURFACE SMOOTH AND HAVE HOLES PUNCHED FOR THE DOWEL BARS. PROVIDE A SNUG FIT WITHOUT LOSS IN THICKNESS OF THE MATERIAL.
- CONSTRUCT ALL TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE.
- USE MINIMUM 1/4"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1/2"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED. COATED DOWEL BARS TO BE EITHER GRADE 40 OR GRADE 60.
- PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB.
- USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL FROM 1/4" TO 3/8" BELOW THE LEVEL OF THE PAVEMENT SURFACE. MAKE THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL AT THE SAME ELEVATION.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT POURED JOINTS.
- THE INITIAL SAW CUT FOR TYPE D JOINT IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
- SAW DEPTHS OF NEOPRENE SEALS:  
SEAL SIZE      SAW CUT DEPTHS  
1"                    1 7/8" - 2"  
1 1/4"                2" - 2 1/8"
- ADJUST THE WIDTH OF THE SECOND SAW CUT ACCORDING TO THE SEAL SIZE AND PAVEMENT SURFACE TEMPERATURE AT THE TIME OF SAWING, AS FOLLOWS:

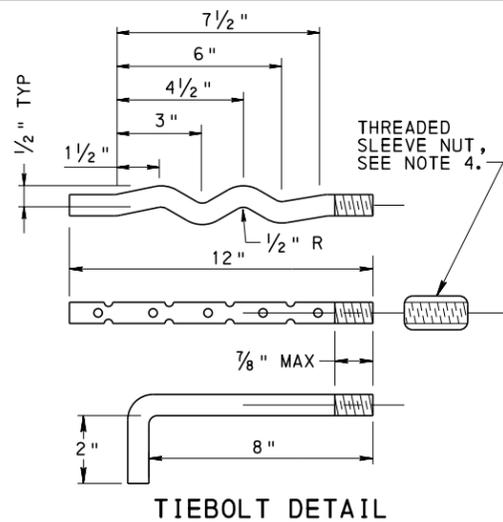
JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<60°F	60°F TO 80°F	>80°F
15' & 20'	1"	5/8"	9/16"	1/2"
30'	1 1/4"	3/4"	5/8"	1/2"

- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(c), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408.
- ALIGN CONCRETE PAVEMENT JOINTS WITH INLET JOINTS, CURB JOINTS AND ANY OTHER ADJACENT STRUCTURES. CONSTRUCT THE JOINT BETWEEN THEM WITH 1/4" POLYSTYRENE BONDBREAKER BOARD AND SEAL WITH ASPHALT SEALING MATERIAL.
- VARIANCE IN DIMENSIONS ARE ALLOWED FOR BOTH STANDARD WIDTH PAVEMENT AND OTHER WIDTH PAVEMENT AS LONG AS THE DISTANCE FROM THE EDGE OF PAVEMENT TO THE FIRST DOWEL IS NO LESS THAN 6" AND NO MORE THAN 12", AND THAT THE SPACING BETWEEN ALL DOWELS ARE 12" ON CENTER.

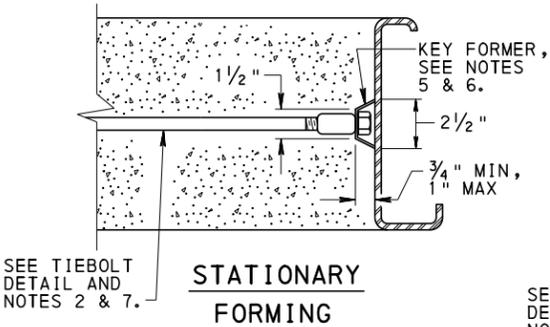
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF PROJECT DELIVERY

**CONCRETE PAVEMENT JOINTS**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt J. Dyer</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 12 <b>RC-20M</b>
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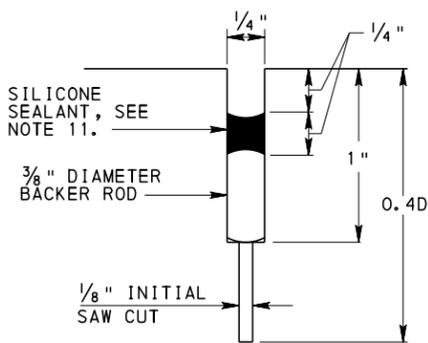


MAKE TIEBOLTS  $\frac{9}{16}$ "  $\phi$  BAR WITH ROLLED THREADS OR  $\frac{5}{8}$ "  $\phi$  BAR WITH CUT THREADS. PERMIT ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15. SEE PUBLICATION 408, SECTIONS 709.1 AND 705.2(b).

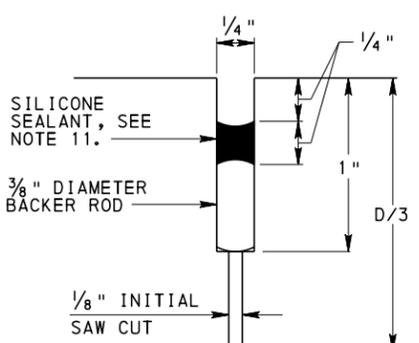


SEE TIEBOLT DETAIL AND NOTES 2 & 7.

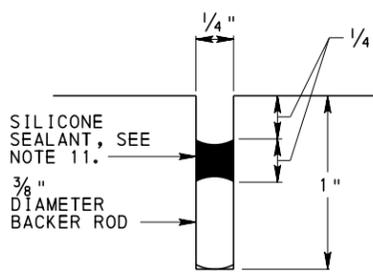
**STATIONARY FORMING**



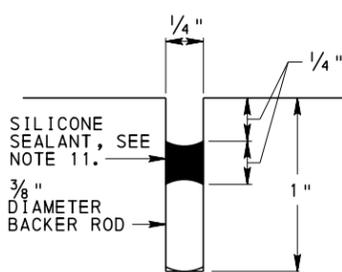
**ALTERNATE TYPE L CONTRACTION JOINT**



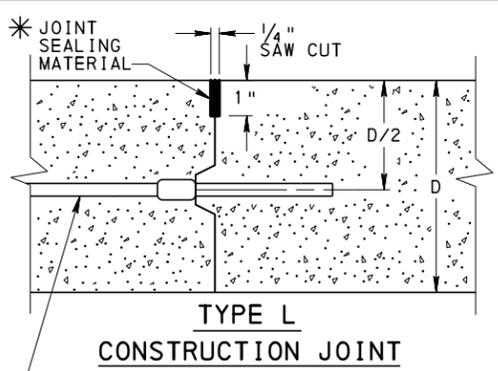
**ALTERNATE TRANSVERSE SHOULDER JOINT**



**ALTERNATE TYPE L CONSTRUCTION JOINT**

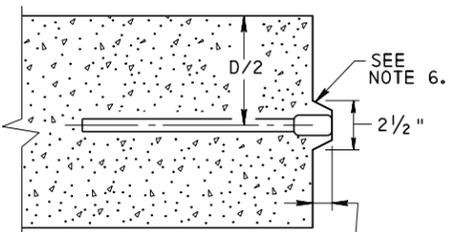


**ALTERNATE LONGITUDINAL SHOULDER JOINT**

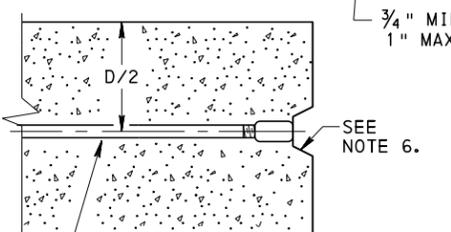


**TYPE L CONSTRUCTION JOINT**

SEE TIEBOLT DETAIL AND NOTES 2 & 7.



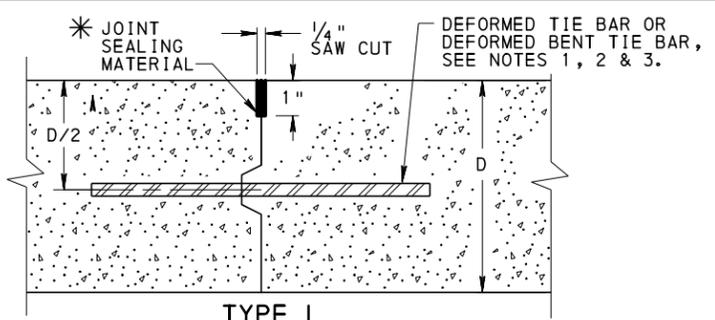
SEE NOTE 6.



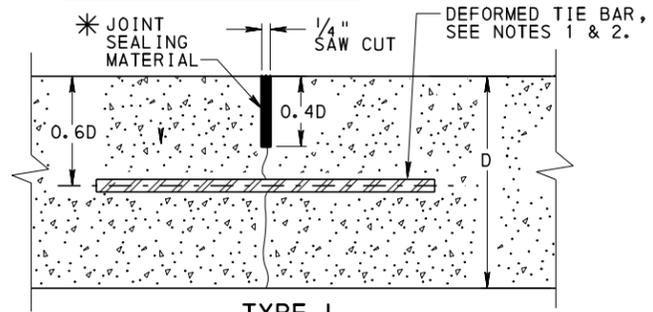
SEE NOTE 6.

**SLIP FORMING**

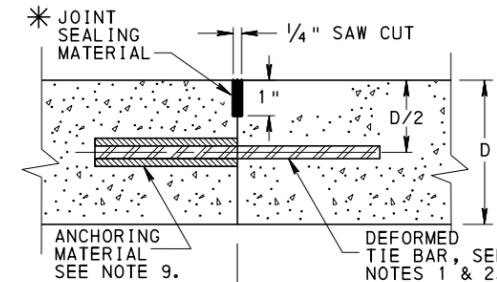
SEE TIEBOLT DETAIL AND NOTES 2, 7 & 10.



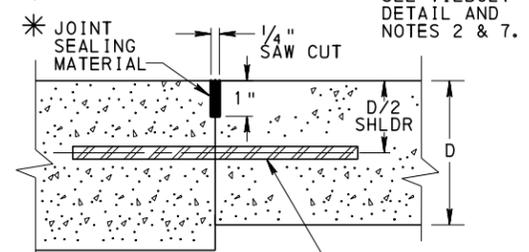
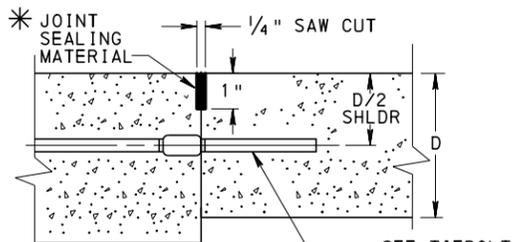
**TYPE L CONSTRUCTION JOINT**



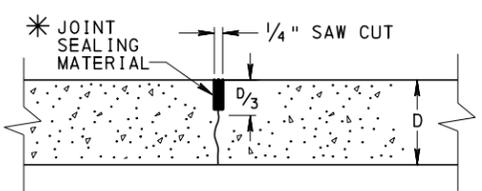
**TYPE L CONSTRUCTION JOINT**



**LONGITUDINAL JOINT WHEN TYING INTO EXISTING CONCRETE PAVEMENT/SOULDER**



**LONGITUDINAL SHOULDER JOINTS**  
SEE NOTE 8



**TRANSVERSE SHOULDER JOINT**

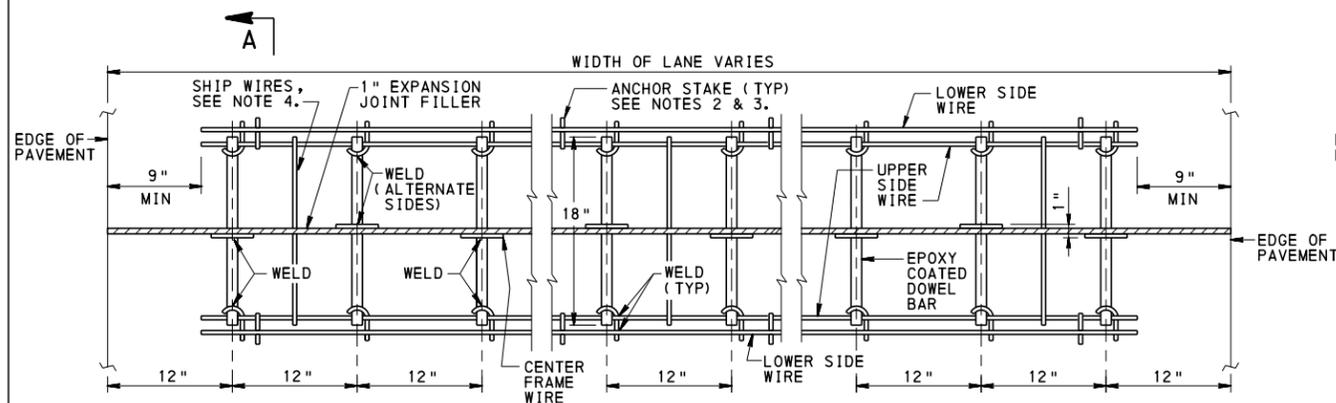
(\*) DENOTES, SEE NOTE 12.

**NOTES**

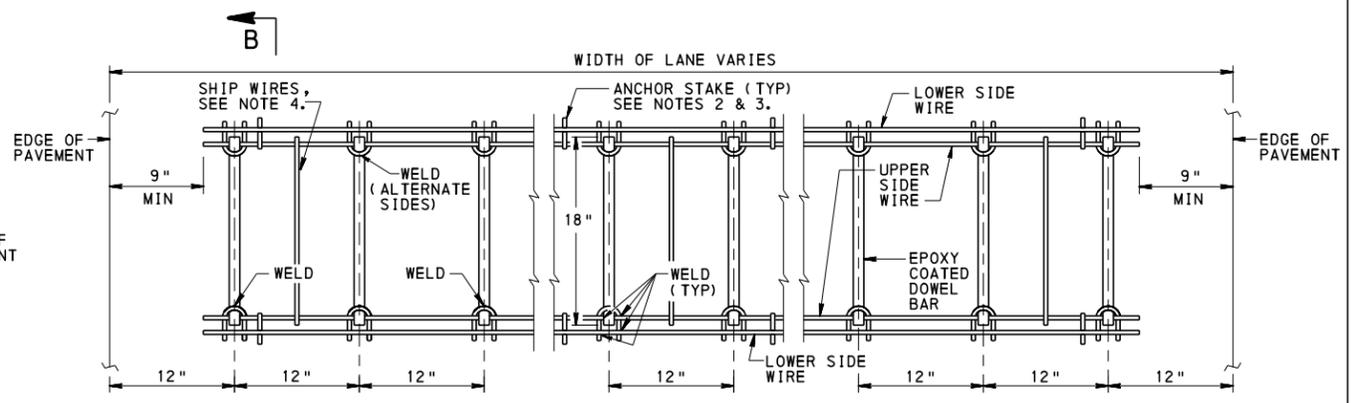
- SPECIFY #5 TIE BARS 30"  $\pm$  1/4" LONG, SPACED 30" CENTER TO CENTER MAXIMUM. PLACE PERPENDICULAR TO AND CENTERED OVER THE LONGITUDINAL JOINT  $\pm$  1". EMBED TIE BARS  $D/2 \pm 3/4$ " OR 4"  $\pm$  1/2", WHICHEVER IS GREATER, EXCEPT FOR TYPE L CONTRACTION JOINTS. FOR TYPE L CONTRACTION JOINTS EMBED TIE BARS 0.6D. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. TIE BARS MUST MEET THE MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j).
- EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c). EPOXY COAT OR GALVANIZE TIEBOLTS AND THREADED SLEEVE NUTS, EXCLUDING THREADS, AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c) OR SECTION 1105.02(s) RESPECTIVELY. STRAIGHT TIE BARS TO BE EITHER GRADE 40 OR GRADE 60. BENT TIE BARS TO BE GRADE 40 ONLY.
- STRAIGHTEN DEFORMED BENT TIE BARS SO THAT THE ANGLE MADE WITH THE LONGITUDINAL JOINT IS AT LEAST 60 DEGREES.
- MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR  $1\frac{1}{16}$ "  $\phi$  x  $1\frac{1}{8}$ " LONG OR HIGH STRENGTH STEEL BAR  $2\frac{7}{32}$ "  $\phi$  x 2" LONG.
- SECURELY FASTEN THE KEY FORMER TO THE STEEL FORM. THE CONTRACTOR SHALL HAVE A METHOD, ACCEPTABLE TO THE ENGINEER, OF TEMPORARILY SECURING THE TIEBOLT TO THE KEY FORMER OR FORM DURING PLACEMENT OF THE CONCRETE.
- FORM MALE OR FEMALE KEYWAYS AS INDICATED FOR PAVEMENT DEPTHS GREATER THAN 10".
- PLACE TIEBOLTS AT 30" CENTER TO CENTER MAXIMUM SPACING. EMBED TIEBOLTS  $D/2 \pm 3/4$ " OR 4"  $\pm$  1/2", WHICHEVER IS GREATER. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. SCREW TIEBOLTS UNTIL SNUG. FOR 6", 7" AND 8" PAVEMENTS AND/OR SHOULDERS, MAKE THE WIGGLE OR HOOK PORTION OF THE TIEBOLT PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIEBOLTS SO THAT THE HOOK OR WIGGLE IS PARALLEL TO THE GRADE.
- AT THE CONTRACTOR'S OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, USE A TYPE L CONTRACTION JOINT.
- USE AN APPROVED EPOXY ANCHORING MATERIAL TO WITHSTAND THE NECESSARY MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j). TIE BAR HOLE DIAMETER IN EXISTING PAVEMENT, AS PER MANUFACTURER'S RECOMMENDATION. USE ROTARY IMPACT DRILL TO AVOID IMPACTING FINES INTO HOLE.
- DO NOT USE THE HOOK COMPONENT OF THE TIEBOLT ASSEMBLY WHEN SLIP FORMING.
- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(c), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE PAVEMENT SURFACE.

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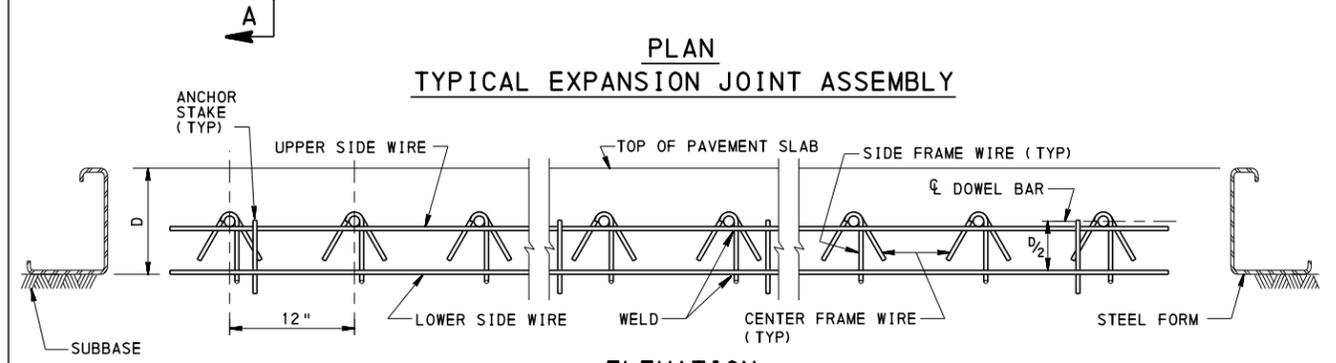
**CONCRETE PAVEMENT JOINTS**



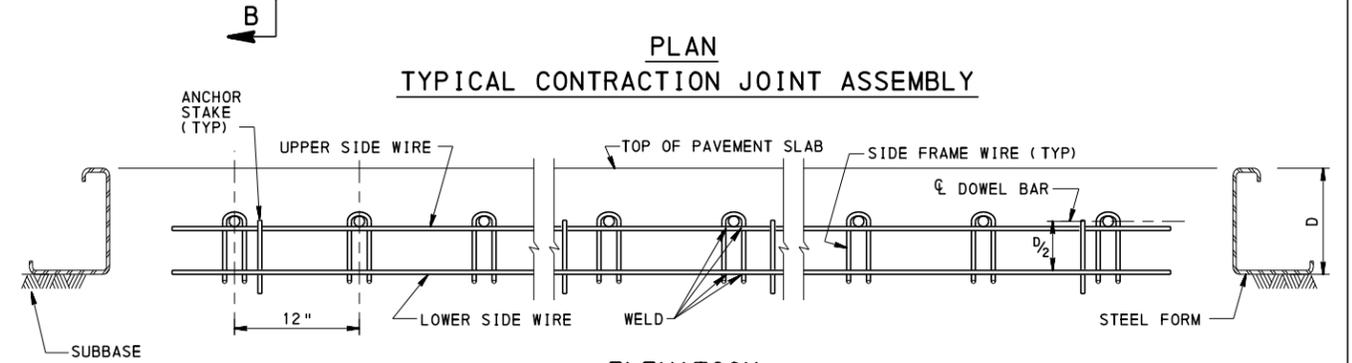
**PLAN**  
**TYPICAL EXPANSION JOINT ASSEMBLY**



**PLAN**  
**TYPICAL CONTRACTION JOINT ASSEMBLY**



**ELEVATION**  
**EXPANSION JOINT ASSEMBLY**

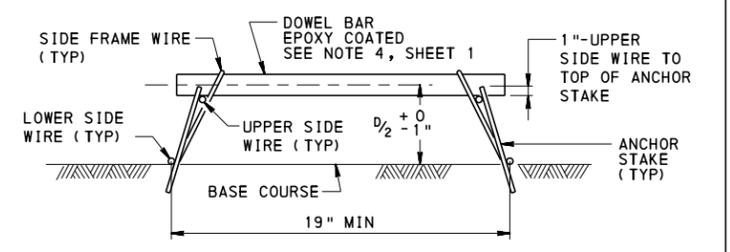


**ELEVATION**  
**CONTRACTION JOINT ASSEMBLY**

**NOTES**

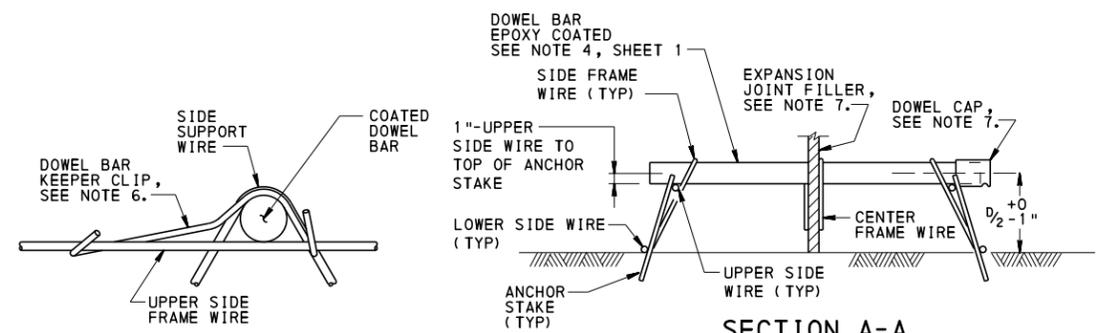
1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. ANCHOR STAKES SHOULD NOT TOUCH ANY DOWEL BAR AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. USE A MINIMUM OF EIGHT STAKES PER 12'-0" LANE UNIT (4 STAKES PER SIDE) THAT EXTEND 1" ABOVE THE UPPER SIDE WIRE. STAKES SHOULD NOT TOUCH DOWEL BARS AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
3. PROVIDE #4 DEFORMED REINFORCEMENT BARS OR 1/2" SMOOTH RODS AS ANCHOR STAKES. STAKES SHALL BE OF SUFFICIENT LENGTH SUCH THAT A MINIMUM OF 8" WILL BE EMBEDDED IN THE BASE COURSE (OGS, ASPHALT TREATED PERMEABLE BASE COURSE, CEMENT TREATED PERMEABLE BASE COURSE OR 2A). WHEN LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY IS DESIGNED, PROVIDE SUFFICIENT ANCHORAGE TO PREVENT MOVEMENT OF THE BASKET ASSEMBLY. THIS MAY INCLUDE ANCHOR PINS, HILTI NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES.
5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

PAVEMENT THICKNESS	UPPER AND LOWER SIDE FRAME WIRES	"J" SIDE SUPPORT WIRES	"A" SIDE SUPPORT WIRES
10" OR LESS	0.331"Ø MIN 2/0 GAUGE	0.400"Ø MIN	0.331"Ø MIN 2/0 GAUGE
GREATER THAN 10"	0.362"Ø MIN 3/0 GAUGE	0.437"Ø MIN	0.362"Ø MIN 3/0 GAUGE

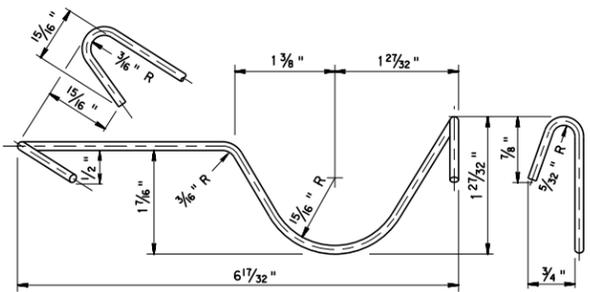


**SECTION B-B**  
**CONTRACTION JOINT ASSEMBLY**

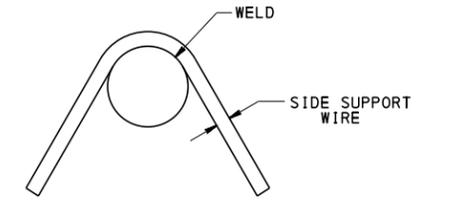
LANE WIDTH	OVERALL UNIT LENGTH (MAX)	NO. OF DOWELS
9'-0"	7'-6"	8
10'-0"	8'-6"	9
11'-0"	9'-6"	10
12'-0"	10'-6"	11



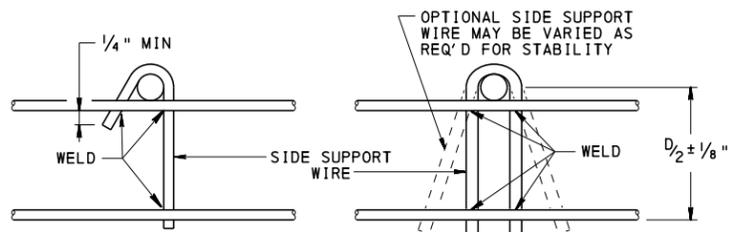
**SECTION A-A**  
**EXPANSION JOINT ASSEMBLY**



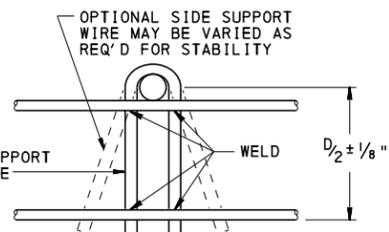
**DOWEL BAR KEEPER CLIP**



**CENTER FRAME WIRE DETAIL**



**"J" DESIGN**  
**TYPICAL SIDE FRAME DETAILS**

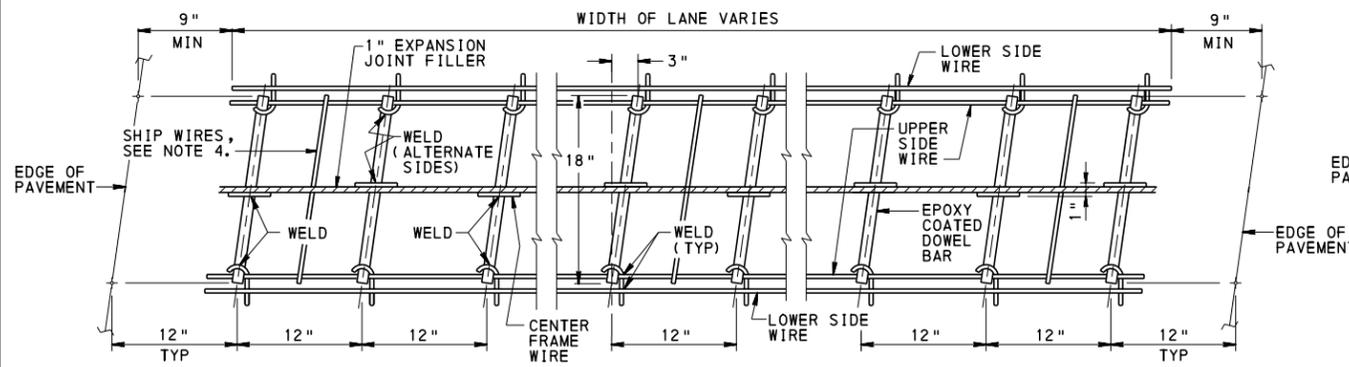


**"A" DESIGN**

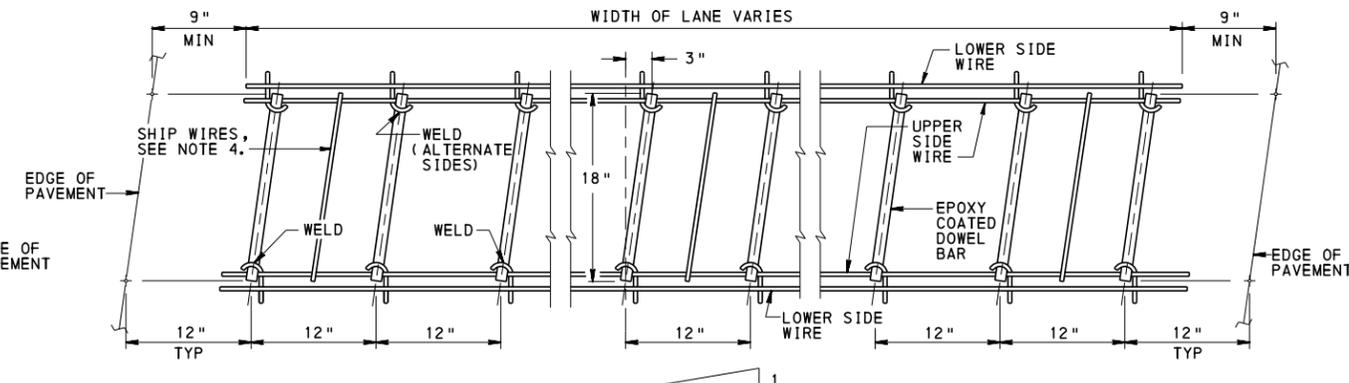
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF PROJECT DELIVERY**

**CONCRETE PAVEMENT JOINTS**  
**NON-SKEWED**  
**LOAD TRANSFER ASSEMBLIES**

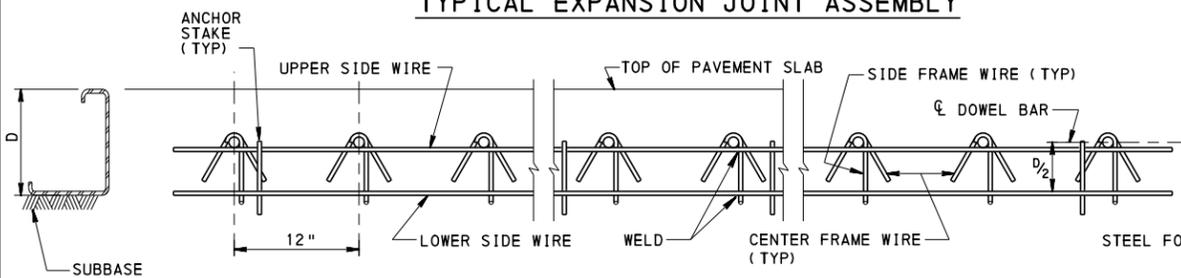
PAVEMENT THICKNESS	UPPER & LOWER WIRE TO "A" & "J" SIDE SUPPORT	DOWEL TO SUPPORT ASSEMBLY
10" OR LESS	794 lb	1190 lb
GREATER THAN 10"	1190 lb	1984 lb



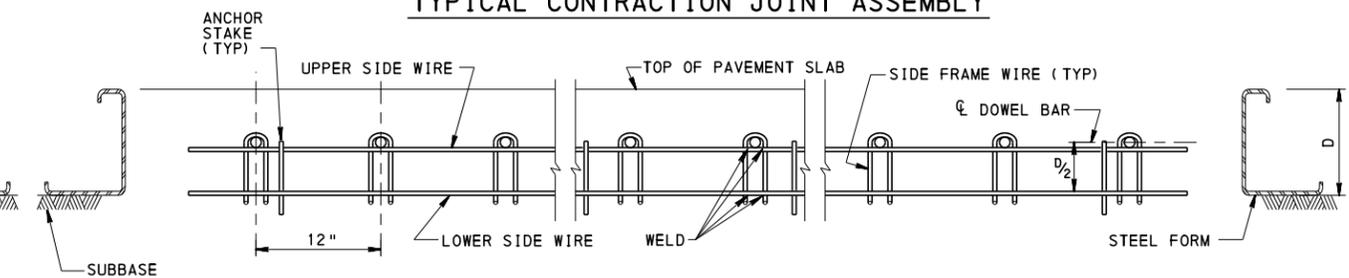
PLAN  
TYPICAL EXPANSION JOINT ASSEMBLY



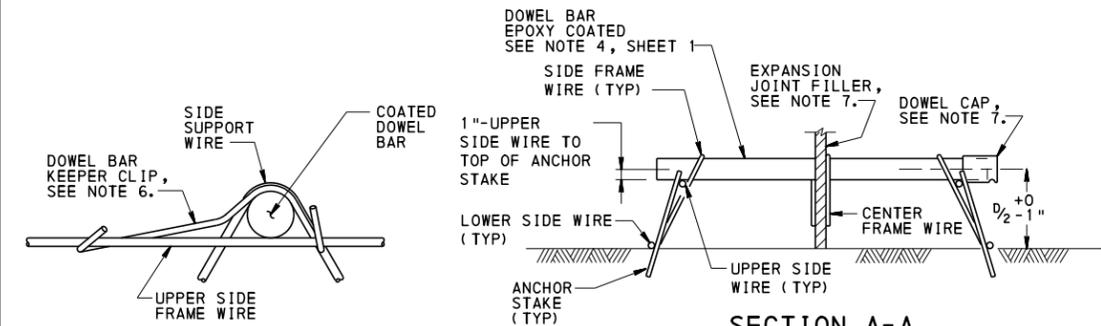
PLAN  
TYPICAL CONTRACTION JOINT ASSEMBLY



ELEVATION  
EXPANSION JOINT ASSEMBLY

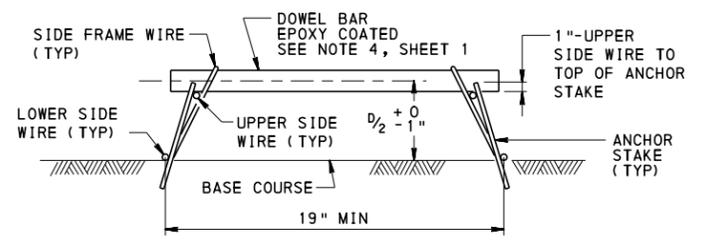


ELEVATION  
CONTRACTION JOINT ASSEMBLY

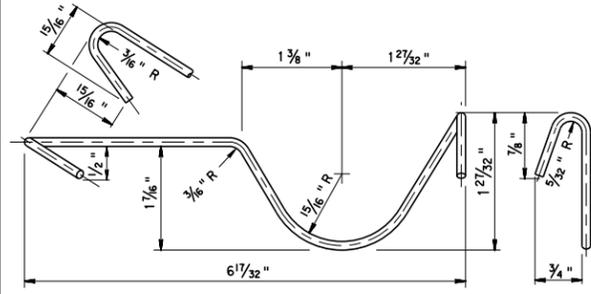


SECTION A-A  
EXPANSION JOINT ASSEMBLY

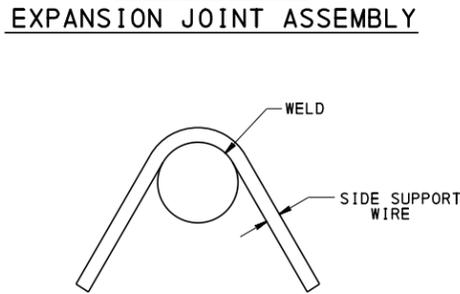
- NOTES
1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. ANCHOR STAKES SHOULD NOT TOUCH ANY DOWEL BAR AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
  2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. USE A MINIMUM OF EIGHT STAKES PER 12'-0" LANE UNIT (4 STAKES PER SIDE) THAT EXTEND 1" ABOVE THE UPPER SIDE WIRE. STAKES SHOULD NOT TOUCH DOWEL BARS AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
  3. PROVIDE #4 DEFORMED REINFORCEMENT BARS OR 1/2" SMOOTH RODS AS ANCHOR STAKES. STAKES SHALL BE OF SUFFICIENT LENGTH SUCH THAT A MINIMUM OF 8" WILL BE EMBEDDED IN THE BASE COURSE (OGS, ASPHALT TREATED PERMEABLE BASE COURSE, CEMENT TREATED PERMEABLE BASE COURSE OR 2A). WHEN LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY IS DESIGNED PROVIDE SUFFICIENT ANCHORAGE TO PREVENT MOVEMENT OF THE BASKET ASSEMBLY. THIS MAY INCLUDE ANCHOR PINS, HILTI NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
  4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES.
  5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:



SECTION B-B  
CONTRACTION JOINT ASSEMBLY



DOWEL BAR KEEPER CLIP

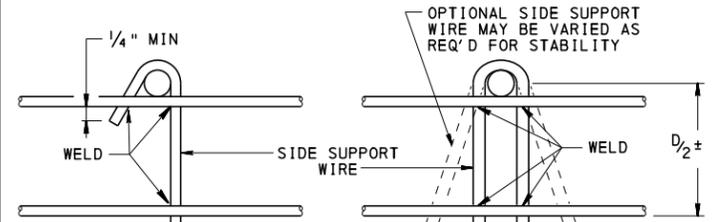


CENTER FRAME WIRE DETAIL

PAVEMENT THICKNESS	UPPER AND LOWER SIDE FRAME WIRES	"J" SIDE SUPPORT WIRES	"A" SIDE SUPPORT WIRES
10" OR LESS	0.331" Ø MIN 2/0 GAUGE	0.400" Ø MIN	0.331" Ø MIN 2/0 GAUGE
GREATER THAN 10"	0.362" Ø MIN 3/0 GAUGE	0.437" Ø MIN	0.362" Ø MIN 3/0 GAUGE

6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONTRACTION AND EXPANSION JOINT ASSEMBLIES.
7. FABRICATE AND SHIP NEST ALL DOWEL, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES. ASSEMBLE EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS IN THE FIELD.
8. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. MAKE TOLERANCE OF THIS PLACEMENT WITHIN ±1/4" PER DOWEL BAR.
9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.
10. WELD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.
11. WIRE TOLERANCES PER ASTM 510M IS 0.003".

PAVEMENT THICKNESS	UPPER & LOWER WIRE TO "A" & "J" SIDE SUPPORT	DOWEL TO SUPPORT ASSEMBLY
10" OR LESS	794 lb	1190 lb
GREATER THAN 10"	1190 lb	1984 lb



"J" DESIGN  
TYPICAL SIDE FRAME DETAILS

"A" DESIGN  
TYPICAL SIDE FRAME DETAILS

TYPICAL LOAD TRANSFER ASSEMBLY		
LANE WIDTH	OVERALL UNIT LENGTH (MAX)	NO. OF DOWELS
9'-0"	7'-6"	8
10'-0"	8'-6"	9
11'-0"	9'-6"	10
12'-0"	10'-6"	11

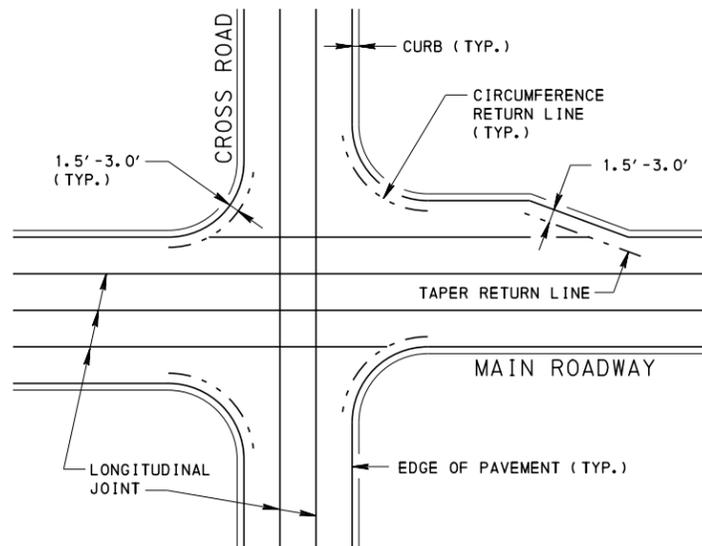
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT JOINTS  
6:1 SKEWED  
LOAD TRANSFER ASSEMBLIES

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Dyer*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

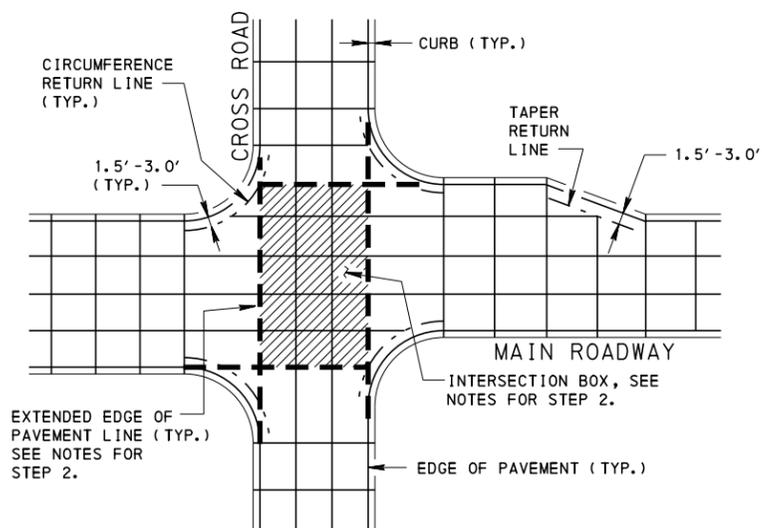
SHT 4 OF 12  
RC-20M



PLAN - INTERSECTION

STEP 1:

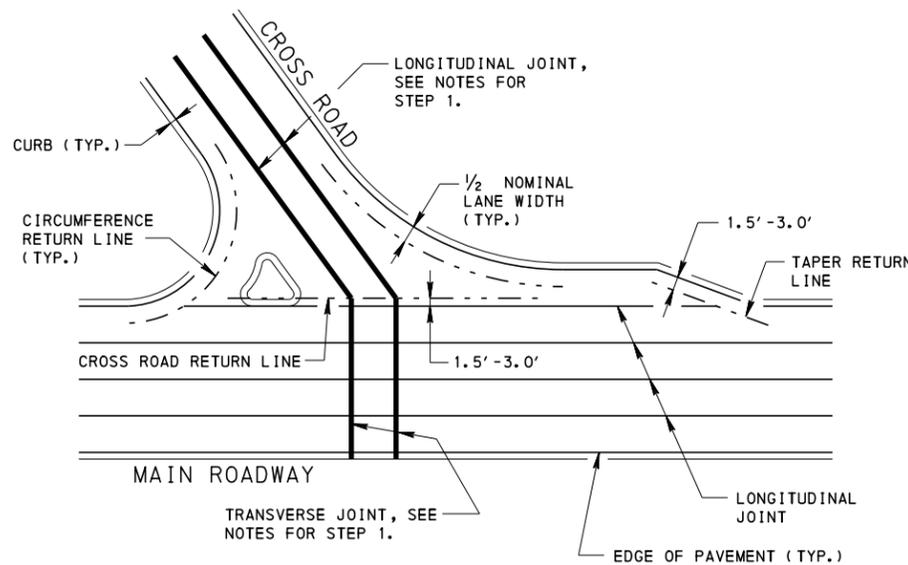
- LAYOUT THE "CIRCUMFERENCE RETURN LINE(S)", "TAPER RETURN LINE", AND "CROSS ROAD RETURN LINE", THE LONGITUDINAL JOINTS ON THE MAIN ROADWAY AND CROSS ROAD DO NOT EXTEND PAST THESE LINES.
- FOR SKEWED INTERSECTIONS EXTEND THE CROSS ROAD LONGITUDINAL JOINTS TO THE "CROSS ROAD RETURN LINE", WHERE THEY INTERSECT PLACE TRANSVERSE JOINTS NORMAL TO THE CENTERLINE OF THE MAIN ROADWAY.



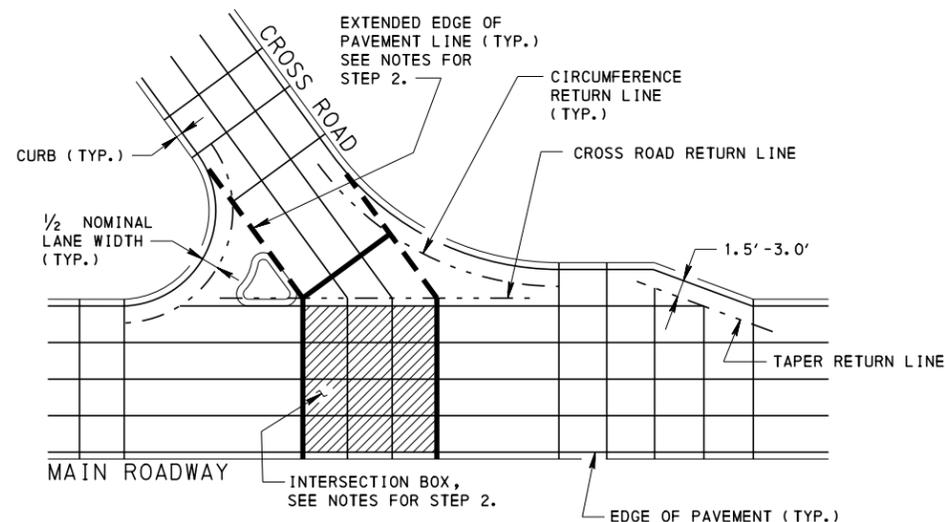
PLAN - INTERSECTION

STEP 2:

- ESTABLISH THE "INTERSECTION BOX" BY EXTENDING THE EDGE OF PAVEMENT LINES FOR THE MAIN ROADWAY AND CROSS ROAD. WHERE THERE IS A TURNING LANE, EXTEND THE EDGE OF PAVEMENT LINE FOR THE TURNING LANE TO DEFINE THE "INTERSECTION BOX".
- TO ESTABLISH THE "INTERSECTION BOX" FOR SKEWED INTERSECTIONS, THE EDGE OF PAVEMENT LINE FOR THE TURNING LANE IS NOT EXTENDED. INSTEAD, EXTEND THE CROSS ROAD EDGE OF PAVEMENT LINES TO THE "CROSS ROAD RETURN LINE". WHERE THEY INTERSECT, PLACE TRANSVERSE JOINTS NORMAL TO THE CENTERLINE OF THE MAIN ROADWAY.
- USE THE CROSS ROAD EDGE OF PAVEMENT LINE THAT IS NEAREST TO THE ACUTE ANGLE OF THE SKEWED INTERSECTION TO LOCATE A TRANSVERSE JOINT NORMAL TO THE CENTERLINE OF THE CROSS ROAD. PLACE THE TRANSVERSE JOINT BY STARTING FROM WHERE THE EDGE OF PAVEMENT LINE INTERSECTS THE "CROSS ROAD RETURN LINE".



PLAN - SKEWED INTERSECTION



PLAN - SKEWED INTERSECTION

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. USE A TYPE L JOINT FOR ALL LONGITUDINAL JOINTS. SEE SHEET 2 FOR DETAILS.
3. USE A TYPE D JOINT FOR ALL TRANSVERSE JOINTS. SEE SHEET 1 FOR DETAILS.
4. THESE INTERSECTION LAYOUT DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN INTERSECTION JOINT LAYOUTS. THEY ARE NOT INTENDED TO COVER EVERY FIELD SITUATION.

DEFINITIONS

- DOGLEGS: CONSTRUCTION BLOCK-OUTS AT POINTS WHERE THE PAVEMENT CHANGES WIDTH.
- CIRCUMFERENCE RETURN LINE: A LINE 1.5' TO 3.0' FROM THE FACE OF THE GUTTER LINE ALONG THE CURVE BETWEEN THE EDGES OF THE INTERSECTION ROADS. FOR OBTUSE ANGLES, THE LINE IS 1/2 THE NORMAL LANE WIDTH FROM THE GUTTER. ANY JOINT THAT MEETS THE CIRCUMFERENCE RETURN LINE IS BROUGHT ALONG THE CURVE'S RADIUS TO THE BACK OF THE CURB AND GUTTER.
- TAPER RETURN LINE: A LINE 1.5' TO 3.0' FROM THE FACE OF THE GUTTER AT THE START OF A TURN LANE TAPER. ANY LONGITUDINAL JOINT THAT MEETS A TAPER-RETURN LINE DEFINES A LOCATION FOR A DOGLEG IN THE GUTTER.
- CROSS ROAD RETURN LINE: A LINE 1.5' TO 3.0' FROM THE EDGE OF THE MAINLINE ROADWAY AT A SKEWED INTERSECTION. ANY CROSS ROAD LONGITUDINAL JOINT WILL MEET A TRANSVERSE JOINT FOR THE MAINLINE ROADWAY AT THE CROSS ROAD RETURN LINE.
- INTERSECTION BOX: THE BOX FORMED BY THE EDGE OF THE MAINLINE AND INTERSECTING PAVING LINES, INCLUDING TURNING LANES.

COMMONWEALTH OF PENNSYLVANIA  
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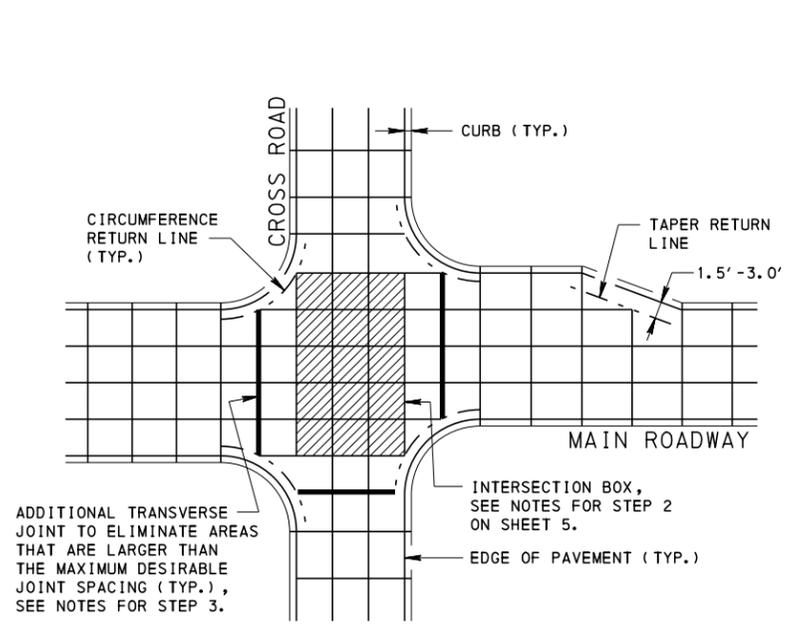
CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

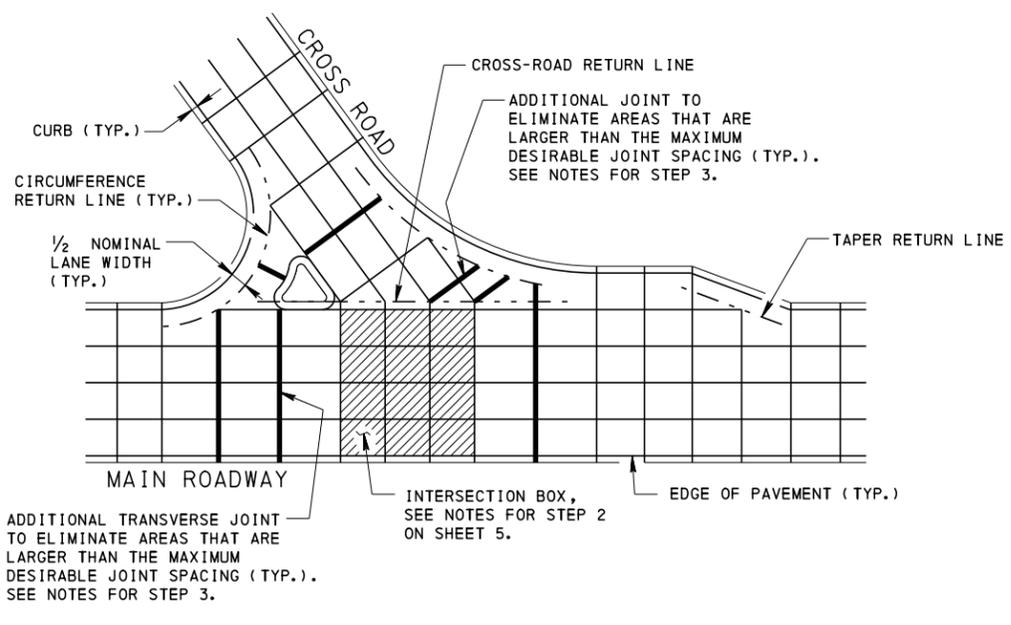
RECOMMENDED SEPT. 15, 2016  
*Brian J. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 5 OF 12

RC-20M



**PLAN - INTERSECTION**

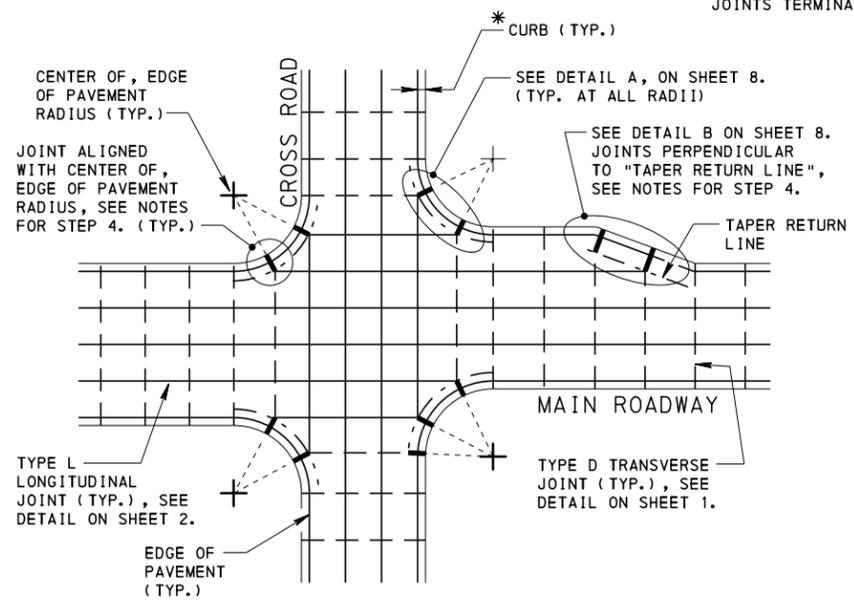


**PLAN - SKEWED INTERSECTION**

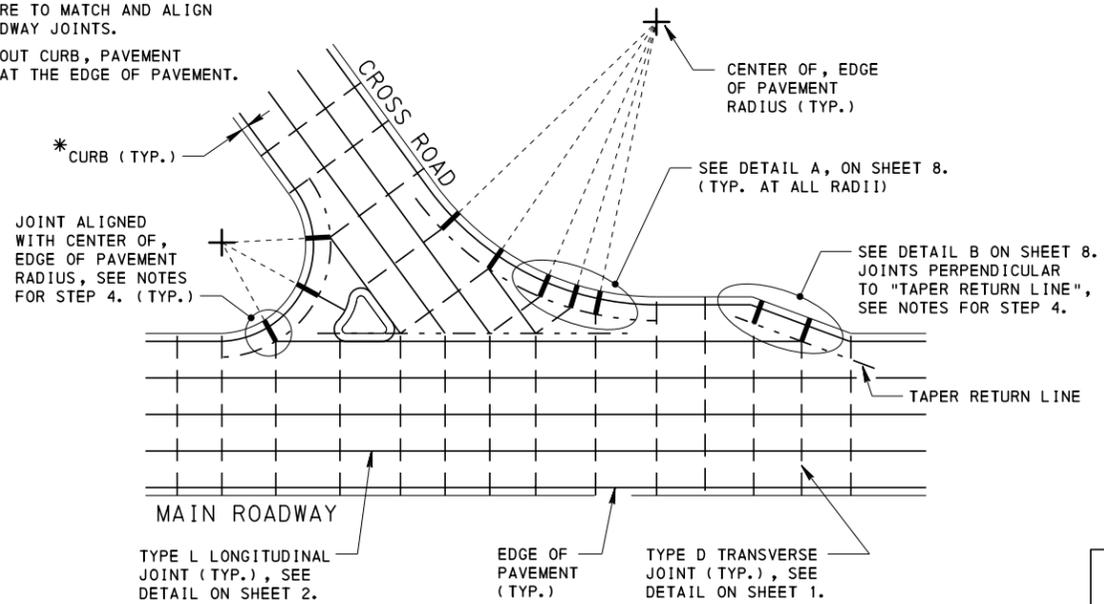
- STEP 3:**
- THE MAXIMUM DESIRABLE JOINT SPACING IS 15' BETWEEN TRANSVERSE JOINTS AND 12' BETWEEN LONGITUDINAL JOINTS. NO LEG SHOULD BE LONGER THAN 15'.
  - IF THE DISTANCE BETWEEN THE "INTERSECTION BOX" AND SURROUNDING JOINTS IS MORE THAN THE MAXIMUM DESIRABLE JOINT SPACING, ADD TRANSVERSE JOINT(S) AT AN EQUAL SPACING.
  - IN THE AREAS ADJACENT TO THE EDGE OF PAVEMENT RADIUS OF SKEWED INTERSECTIONS, WHERE THERE IS SPACE GREATER THAN THE MAXIMUM DESIRABLE JOINT SPACING, PLACE JOINTS IN A MANNER THAT IS CONSISTENT WITH THE SURROUNDING JOINTS WHILE TRYING TO AVOID DOGLEGS.
  - THESE JOINTS DO NOT EXTEND PAST THE "CIRCUMFERENCE RETURN LINES", "THE TAPER RETURN LINE" OR THE "CROSS ROAD RETURN LINE".

- LEGEND**
- TYPE D JOINT, SEE SHEET 1
  - TYPE L JOINT, SEE SHEET 2

- \*NOTES:**
1. ALL CURB JOINTS ARE TO MATCH AND ALIGN WITH ADJACENT ROADWAY JOINTS.
  2. FOR ROADWAYS WITHOUT CURB, PAVEMENT JOINTS TERMINATE AT THE EDGE OF PAVEMENT.



**PLAN - INTERSECTION**



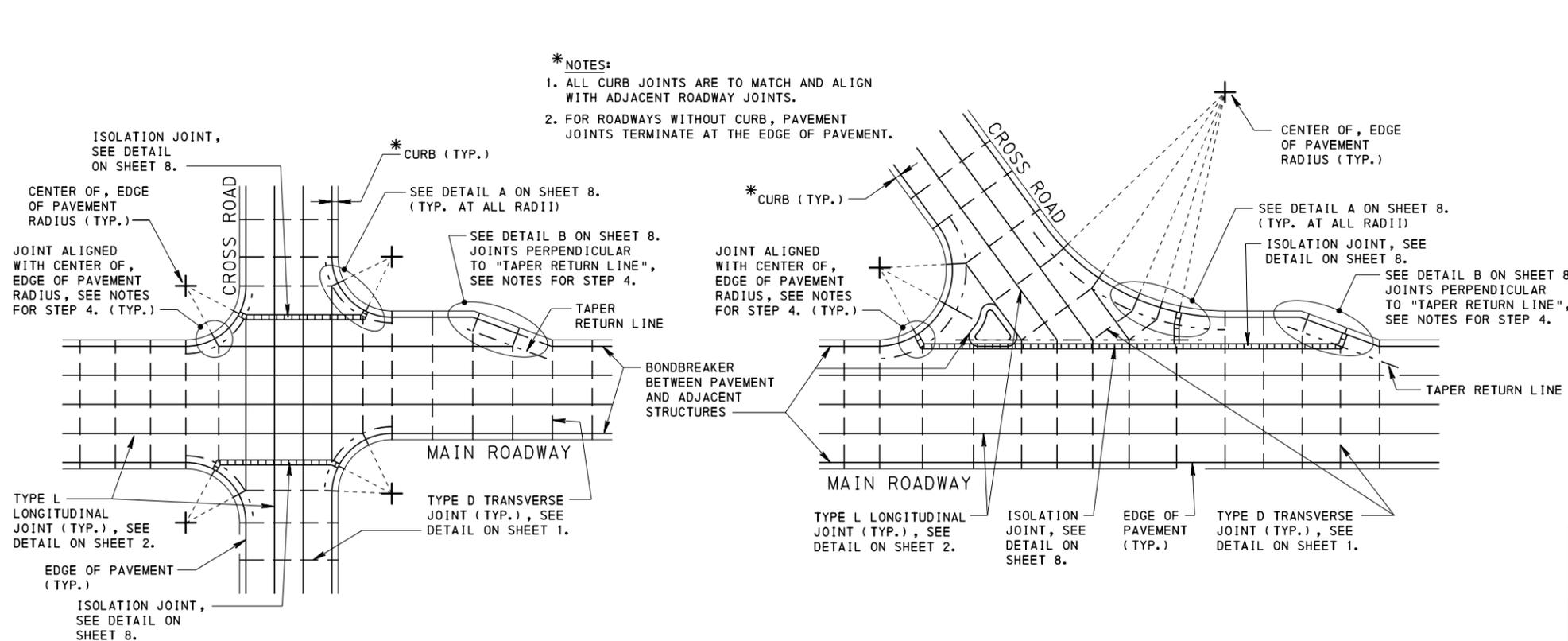
**PLAN - SKEWED INTERSECTION**

- STEP 4:**
- EXTEND LINES FROM THE CENTER OF THE EDGE OF PAVEMENT RADIUS TO THE POINTS DEFINED BY THE "INTERSECTION BOX" AND TO THE POINTS CREATED BY INTERMEDIATE JOINTS SURROUNDING THE "INTERSECTION BOX".
  - EXTEND LINES FROM THE CENTER OF THE EDGE OF PAVEMENT RADIUS TO THE POINTS ESTABLISHED BY ANY JOINTS IN THE RADIUS AREA OF A SKEWED INTERSECTION AND TO POINT(S) ALONG ANY ISLAND.
  - JOINTS ARE TO BE ADDED ALONG THE ABOVE MENTIONED LINES.
  - PLACE JOINTS AT THE POINTS ESTABLISHED ALONG THE "TAPER RETURN LINE", THESE JOINTS SHOULD BE PERPENDICULAR TO THE "TAPER RETURN LINE".
  - ADJUST ANY JOINTS TO ELIMINATE DOGLEGS IN THE MAIN ROADWAY EDGES.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Bruce J. Iversen</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 6 OF 12 RC-20M
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- \*NOTES:**
1. ALL CURB JOINTS ARE TO MATCH AND ALIGN WITH ADJACENT ROADWAY JOINTS.
  2. FOR ROADWAYS WITHOUT CURB, PAVEMENT JOINTS TERMINATE AT THE EDGE OF PAVEMENT.

**LEGEND**

— —	TYPE D JOINT, SEE SHEET 1
— — — —	TYPE L JOINT, SEE SHEET 2
	ISOLATION JOINT, SEE SHEET 8

**PLAN - INTERSECTION**

**PLAN - SKEWED INTERSECTION**

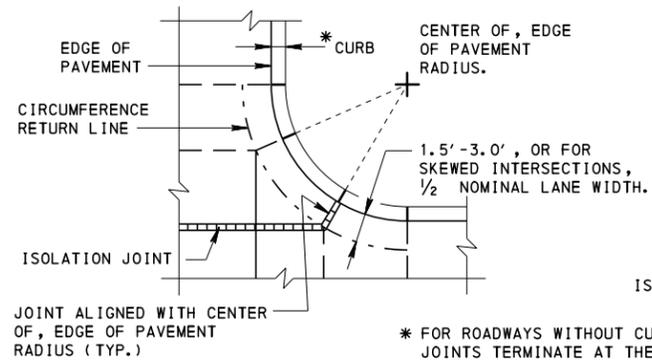
**NOTE:**

- THE ISOLATION JOINT IS TO COMPLETELY SEPARATE SLABS CONSTRUCTED TO ALLOW MOVEMENT IN ONE DIRECTION FROM SLABS CONSTRUCTED TO ALLOW MOVEMENT IN ANOTHER DIRECTION. THE ISOLATION JOINT MAY BE LOCATED ALONG A DIFFERENT JOINT THAN WHAT IS SHOWN FOR CONSTRUCTIBILITY. HOWEVER, IT IS CRITICAL TO CONSTRUCT TYPE D AND TYPE L JOINTS SIMILAR TO THAT OF THE ADJACENT PAVEMENT ON EACH SIDE OF THE ISOLATION JOINT.

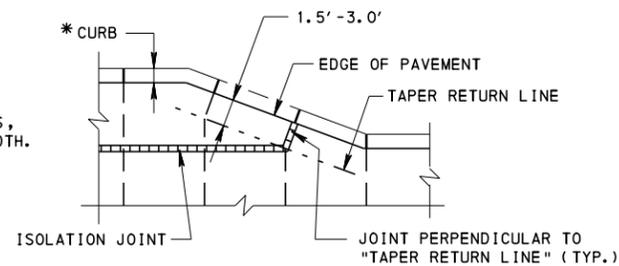
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF PROJECT DELIVERY

**CONCRETE PAVEMENT JOINTS**  
**INTERSECTION JOINT LAYOUT**

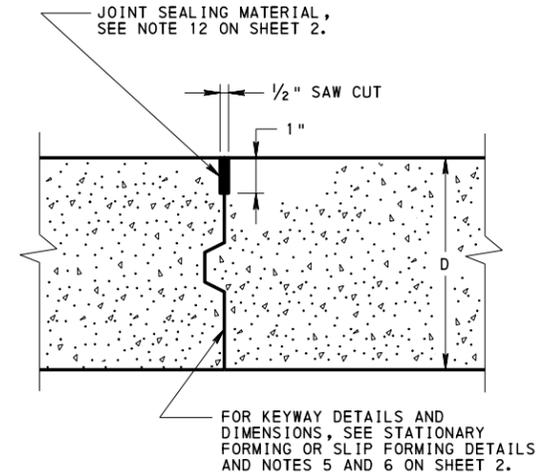
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt J. Igo</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 7 OF 12 <b>RC-20M</b>
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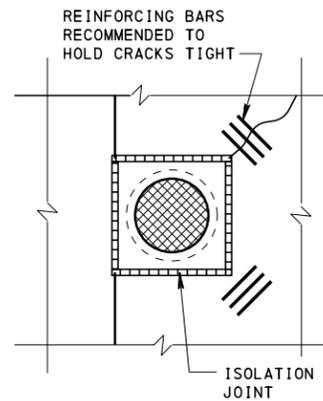
**DETAIL A**



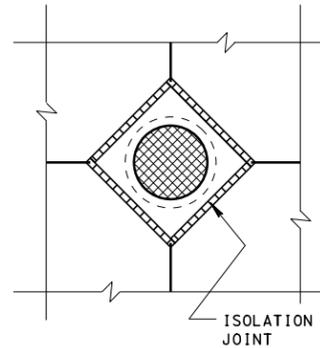
**DETAIL B**



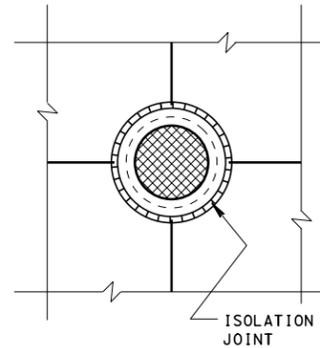
**ISOLATION JOINT**



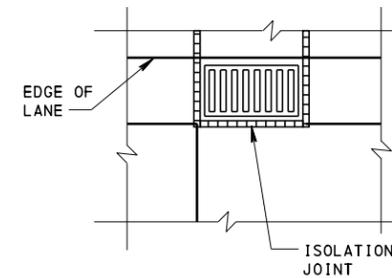
**SQUARE MANHOLE BOXOUT**



**DIAGONAL MANHOLE BOXOUT**



**CIRCULAR MANHOLE BOXOUT**



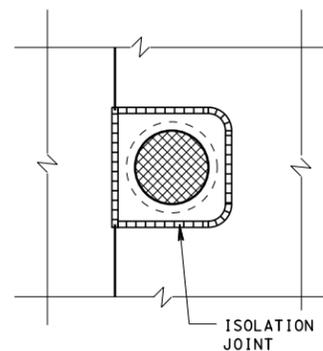
**INLET NO BOXOUT**

**LEGEND**

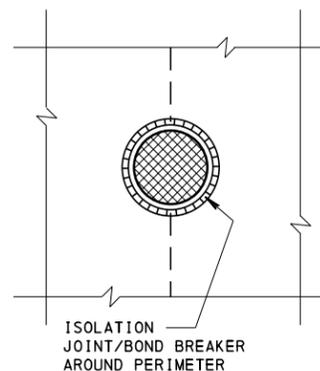
- TYPE D JOINT, SEE SHEET 1
- TYPE L JOINT, SEE SHEET 2
- ▬ ISOLATION JOINT, SEE THIS SHEET

**NOTE:**

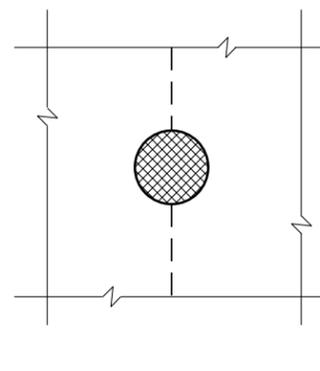
ALL OF THE JOINT DETAILS AND BOXOUT DETAILS ON THIS SHEET PERTAIN TO ONLY THE INTERSECTION LAYOUTS AS DEPICTED ON SHEETS 5, 6, AND 7.



**SQUARE MANHOLE WITH FILLETS**



**MANHOLE NO BOXOUT**



**TELESCOPING MANHOLE NO BOXOUT OR ISOLATION JOINT NECESSARY**

**BOXOUT DETAILS**

MAINTAIN 1.0' MINIMUM BETWEEN ISOLATION JOINT AND FIXTURE

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT  
BOXOUT DETAILS

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 8 OF 12

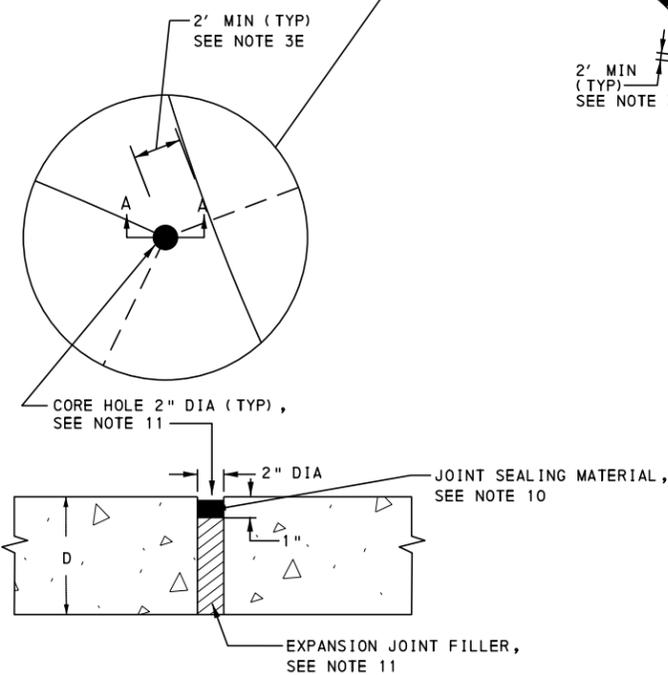
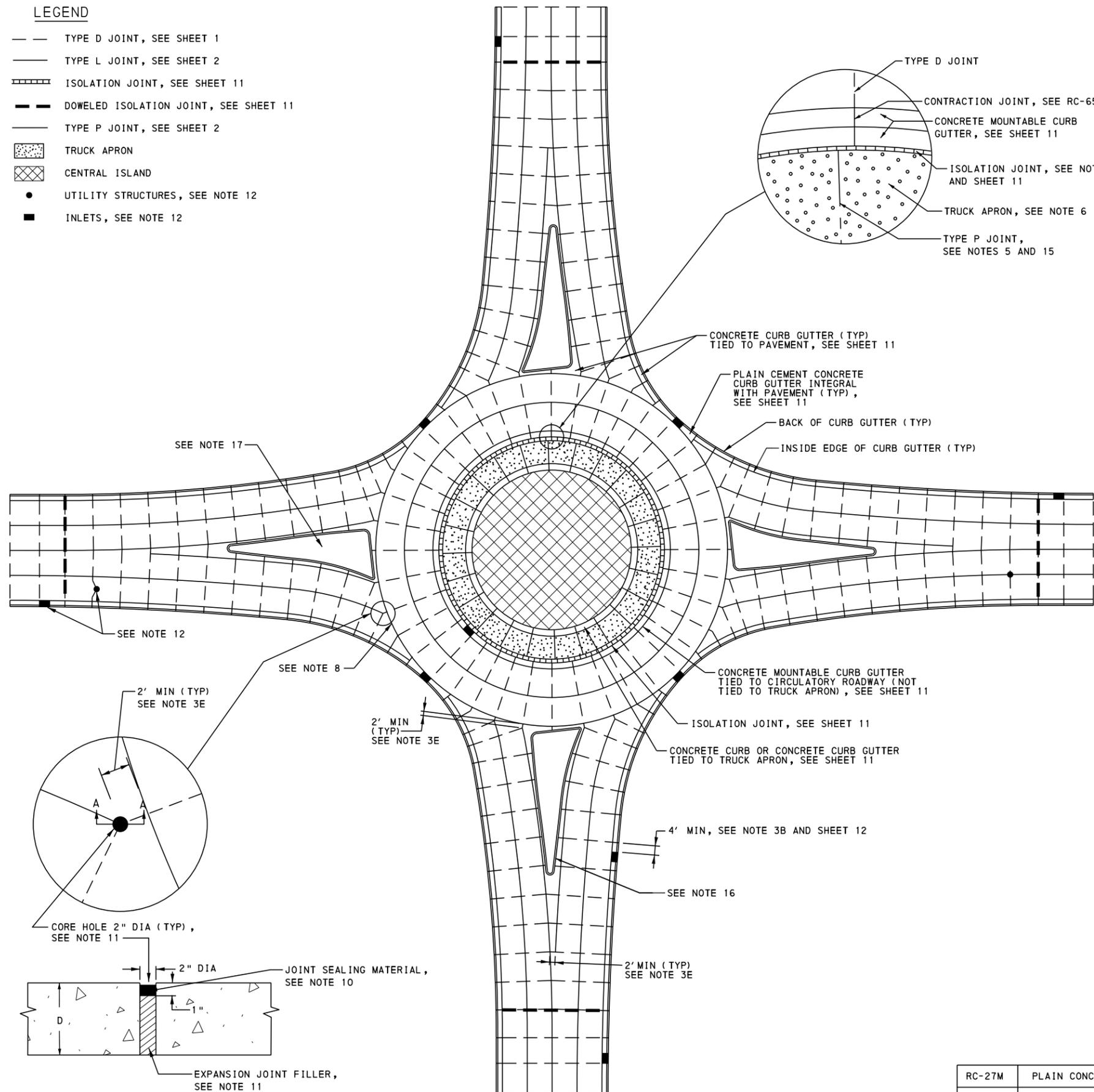
RC-20M

**NOTES**

1. PROVIDE MATERIALS AND WORKMANSHIP MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. TWO JOINT LAYOUT METHODS ARE ACCEPTABLE FOR CONCRETE ROUNDABOUTS: THE ISOLATED CIRCLE METHOD AND THE PINWHEEL METHOD. THE TWO ACCEPTED ROUNDABOUT JOINT LAYOUT METHODS ARE ILLUSTRATED IN THIS STANDARD DRAWING AND ARE NOT INTENDED TO COVER EVERY FIELD SITUATION. DEVELOP AND SUBMIT A DETAILED JOINT LAYOUT PLAN INCLUDING DETAILS FOR STAGING OF PAVING OPERATIONS FOR APPROVAL BY DISTRICT ADE-CONSTRUCTION PRIOR TO CONCRETE PLACEMENT. FOLLOW THE GUIDANCE CONTAINED IN THESE STANDARD DRAWINGS FOLLOWING THE SIX STEP JOINT LAYOUT PROCESS OUTLINED ON SHEET 12.
3. RULES FOR JOINT LAYOUT:
  - A. ALIGN NEW JOINTS WITH EXISTING JOINTS OR CRACKS, LOCATION AND TYPE, WHERE SLAB MOVEMENTS ARE NOT ISOLATED.
  - B. PLACE JOINTS TO MEET IN-PAVEMENT STRUCTURES, UTILITIES AND INLETS EXCEPT AS NOTED ON SHEET 12.
  - C. SEE SHEET 11 FOR MAXIMUM JOINT SPACING.
  - D. JOINT LOCATIONS MAY REQUIRE MINOR ADJUSTMENT IN THE FIELD. APPROVAL BY INSPECTOR-IN-CHARGE IS REQUIRED.
  - E. MINIMUM SLAB LENGTH OR WIDTH IS 2'.
  - F. MAXIMUM SLAB WIDTH IS 15', APPLIES TO ROUNDABOUTS AND TURNING ROADWAYS.
  - G. TRANSVERSE JOINTS ARE PERPENDICULAR TO THE TRAVEL LANES.
  - H. USE ANGLES OF 90° WHERE POSSIBLE. AVOID ANGLES LESS THAN 60°. WHEN LESS THAN 60° ANGLES CANNOT BE AVOIDED, USE DEFORMED TIE BARS.
  - I. AVOID CREATING INTERIOR CORNERS, L-SHAPED SLABS.
  - J. AVOID ODD SHAPES. KEEP SLABS NEAR SQUARE OR PIE SHAPED.
4. SEE PAVEMENT DEPTH AND JOINT SPACING TABLE ON SHEET 11 FOR TRANSVERSE JOINT SPACING. JOINT SPACING IS MAXIMUM AND ACTUAL SPACING CAN BE ADJUSTED TO ACCOMMODATE ROUNDABOUT GEOMETRY. APPLY THE JOINT SPACING TO THE ROADWAY PAVEMENT AND THE TRUCK APRON PAVEMENT.
5. DO NOT DOWEL OR TIE THE TRUCK APRON TRANSVERSE JOINTS.
6. THE TRUCK APRON MINIMUM DEPTH OF PCC PAVEMENT IS 8". PAVING ADDITIONAL DEPTH TO MATCH CURB DEPTH IS AT THE CONTRACTOR'S OPTION WITH NO ADDITIONAL PAYMENT.
7. CORRELATE LONGITUDINAL JOINTS WITH LANE LINES IF POSSIBLE.
8. AN ISOLATION JOINT MAY BE CONSTRUCTED BETWEEN THE CIRCULATORY ROADWAY AND THE APPROACH LEGS WHEN THE RADIAL JOINTS OF THE CIRCLE CAN NOT BE MATCHED TO THE LONGITUDINAL JOINTS OF THE APPROACH LEGS. DEVELOP AN ALTERNATE LAYOUT THAT PROVIDES LOAD TRANSFER SUCH AS A CEMENT OR ASPHALT TREATED PERMEABLE BASE COURSE.
9. CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE MOUNTABLE CURB GUTTER. FURNISH IN STRIPS EQUAL TO OR LONGER THAN THE TRUCK APRON SLABS.
10. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT OR CURB GUTTER. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT POURED JOINTS.
11. PROVIDE A 2" DIAMETER CORE HOLE WHERE LONGITUDINAL JOINTS TERMINATE AT TRANSVERSE JOINTS. CUT EXPANSION JOINT FILLER MATERIAL TO FILL CORE HOLE WITH A SNUG FIT, FULL DEPTH OF CONCRETE PAVEMENT, (D), RECESSED 1" BELOW TOP OF PAVEMENT TO PROVIDE A RESERVOIR FOR JOINT SEALING MATERIAL. SEE NOTE 10.
12. INLET AND UTILITY LOCATIONS AS SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL LOCATIONS ARE AS DESIGNED. SEE NOTE 3B AND SHEET 12.
13. PAVEMENT MARKINGS AND SIGNING AS PER CONTRACT DOCUMENTS.
14. TRUCK APRON DESIGN AS PER CONTRACT DOCUMENTS.
15. TRUCK APRON TRANSVERSE JOINTS CAN BE SPACED INDEPENDENT FROM ROADWAY PAVEMENT JOINTS.
16. GUTTER WIDTH VARIES FROM 1' TO 3' ALONG SPLITTER ISLANDS OR IN ACCORDANCE WITH CONTRACT DOCUMENTS. SEE SHEET 11.
17. FOR CONCRETE PAVED SPLITTER ISLANDS, PROVIDE ISOLATION JOINT AT BACK OF CURB. PROVIDE TYPE P JOINTS.

**LEGEND**

- TYPE D JOINT, SEE SHEET 1
- TYPE L JOINT, SEE SHEET 2
- ||||| ISOLATION JOINT, SEE SHEET 11
- DOWELED ISOLATION JOINT, SEE SHEET 11
- TYPE P JOINT, SEE SHEET 2
- ▒ TRUCK APRON
- ▒ CENTRAL ISLAND
- UTILITY STRUCTURES, SEE NOTE 12
- INLETS, SEE NOTE 12



SECTION A-A

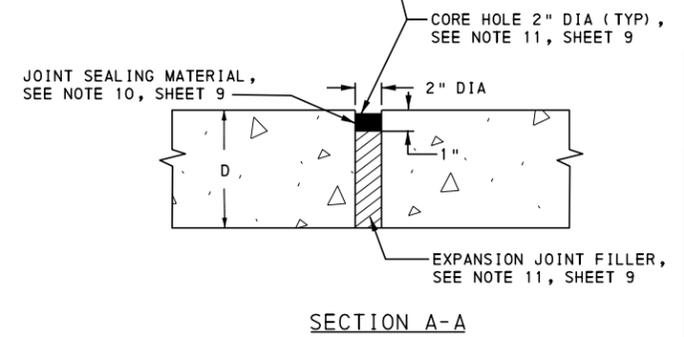
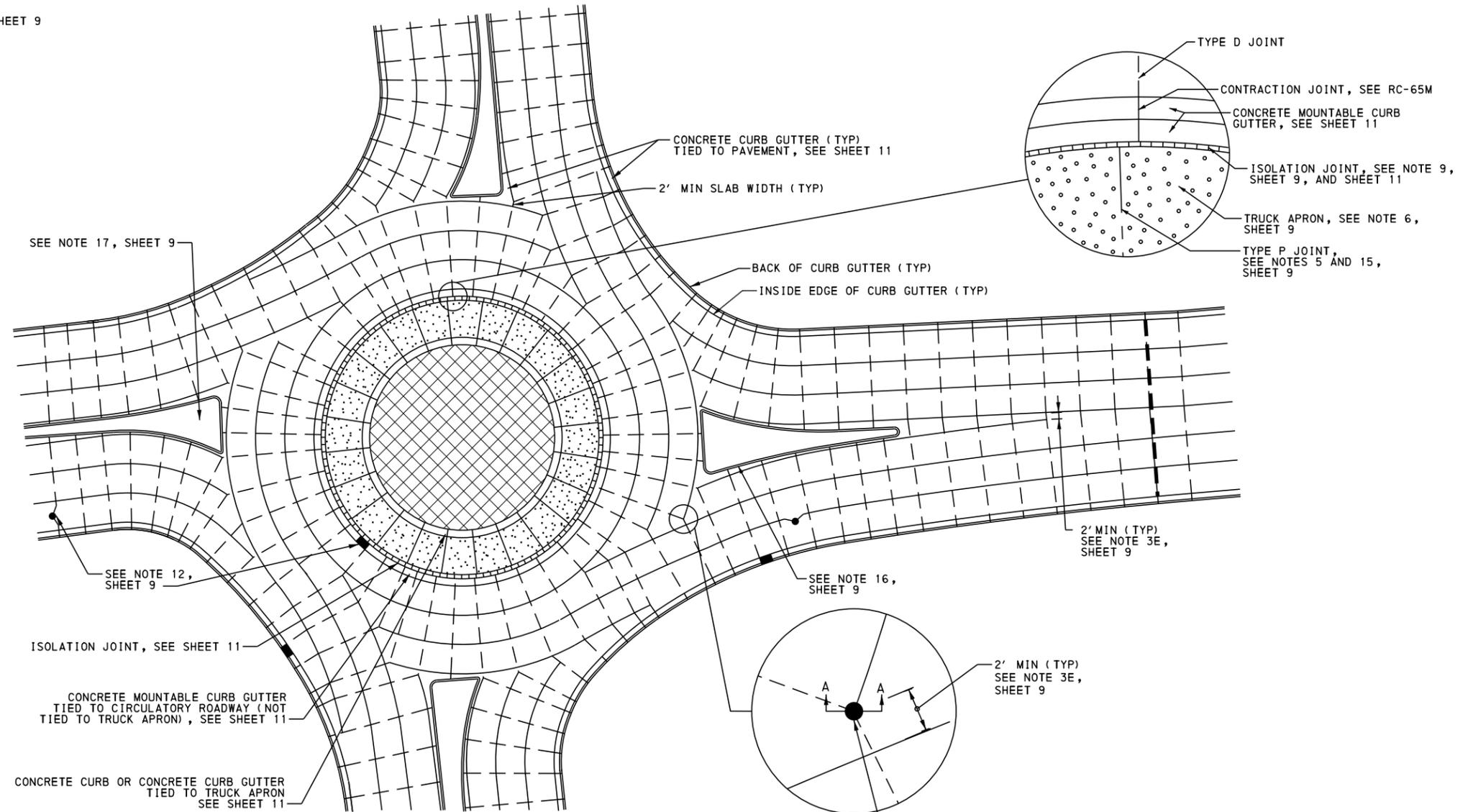
**ISOLATED CIRCLE JOINT LAYOUT FOR ROUNDABOUTS**

RC-27M	PLAIN CONCRETE PAVEMENT
RC-64M	CURBS AND GUTTERS
RC-65M	CONCRETE MOUNTABLE CURB
REFERENCE DRAWINGS	

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
CONCRETE PAVEMENT JOINTS ROUNDABOUTS ISOLATED CIRCLE JOINT LAYOUT		
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Tolan</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 9 OF 12 <b>RC-20M</b>

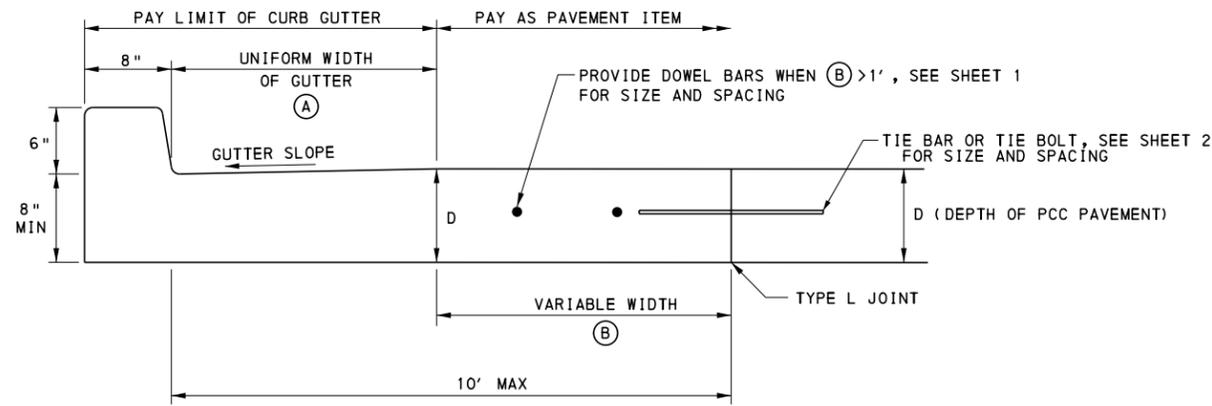
**LEGEND**

- — TYPE D JOINT, SEE SHEET 1
- — TYPE L JOINT, SEE SHEET 2
- ▤ ISOLATION JOINT, SEE SHEET 11
- ▬ DOWELED ISOLATION JOINT, SEE SHEET 11
- — TYPE P JOINT, SEE SHEET 1
- ▨ TRUCK APRON
- ▩ CENTRAL ISLAND
- UTILITY STRUCTURES, SEE NOTE 12, SHEET 9
- INLETS, SEE NOTE 12, SHEET 9



**PINWHEEL JOINT LAYOUT FOR ROUNDABOUTS**

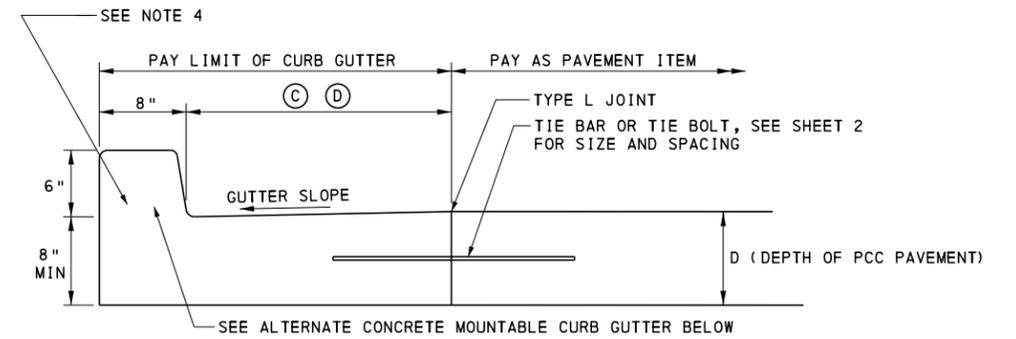
<p><b>COMMONWEALTH OF PENNSYLVANIA</b>  <b>DEPARTMENT OF TRANSPORTATION</b>          BUREAU OF PROJECT DELIVERY</p>		
<p><b>CONCRETE PAVEMENT JOINTS</b>  <b>ROUNDABOUTS</b>  <b>PINWHEEL JOINT LAYOUT</b></p>		
<p>RECOMMENDED SEPT. 15, 2016  <i>Melissa J. Betub</i>          CHIEF, HWY. DELIVERY DIVISION</p>	<p>RECOMMENDED SEPT. 15, 2016  <i>Burt E. Tolan</i>          DIRECTOR, BUREAU OF PROJECT DELIVERY</p>	<p>SHT 10 OF 12  <b>RC-20M</b></p>



**PLAIN CEMENT CONCRETE CURB GUTTER  
INTEGRAL WITH PCC PAVEMENT**

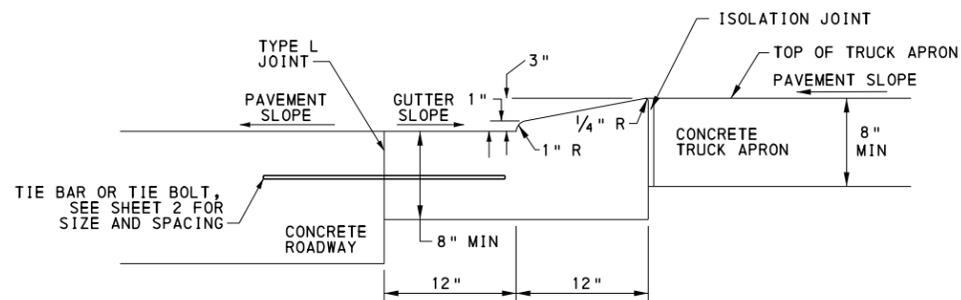
FOR USE IN ODD SHAPED AREAS IN CONCRETE PAVED  
ROUNDBABOUTS AND INTERSECTIONS

- (A) 1' TO 2' TYPICAL, AS PER CONTRACT DOCUMENTS
- (B) 0' TO 9' WHEN (A) = 1'
- (B) 0' TO 8' WHEN (A) = 2'

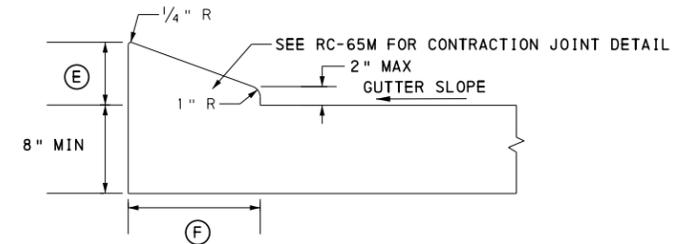


**PLAIN CEMENT CONCRETE CURB GUTTER  
TIED TO CONCRETE PAVEMENT  
ROADWAY OR TRUCK APRON**

- (C) GUTTER WIDTH VARIES FROM 1' TO 3' ALONG SPLITTER ISLANDS,  
OR IN ACCORDANCE WITH CONTRACT DOCUMENTS.
- (D) GUTTER WIDTH IS UNIFORM ALONG OUTSIDE ROADWAY  
LANES. WIDTH DETERMINED PER CONTRACT DOCUMENTS.



**CONCRETE MOUNTABLE CURB GUTTER  
TIED TO CIRCULATORY  
ROADWAY**

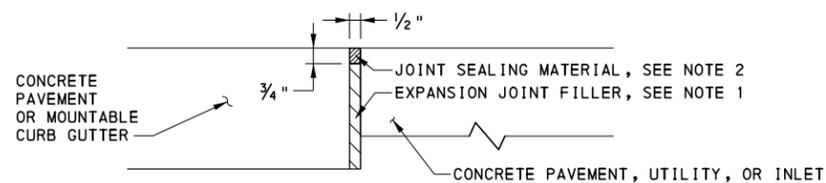


**ALTERNATE CONCRETE MOUNTABLE CURB GUTTER**

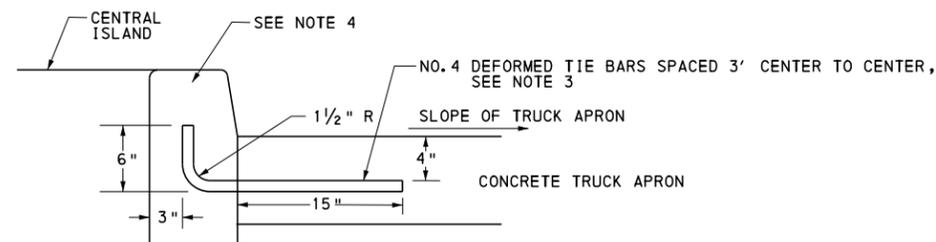
- (E) 6" TYPE A  
7" TYPE B
- (F) 12" TYPE A  
15" TYPE B

**NOTES**

1. CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE CONCRETE PAVEMENT OR MOUNTABLE CURB GUTTER. FURNISH IN STRIPS EQUAL TO OR LONGER THAN THE ADJACENT PAVEMENT SLABS.
2. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT OR CURB GUTTER. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT Poured JOINTS.
3. BENT TIE BARS TO BE GRADE 40. EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(C).
4. SEE RC-64M FOR CONTRACTION JOINT DETAILS AND OTHER DIMENSIONS.
5. CONSTRUCT DOWELED ISOLATION JOINT ON THE APPROACH ROADWAY IF THE APPROACH ROADWAY IS CONCRETE PAVEMENT. LOCATE AT THE RADIUS TO TANGENT POINT.
6. ALL OF THE JOINT DETAILS AND BOXOUT DETAILS ON THIS SHEET PERTAIN TO ONLY THE ROUNDBABOUT LAYOUTS AS DEPICTED ON SHEETS 9 AND 10.



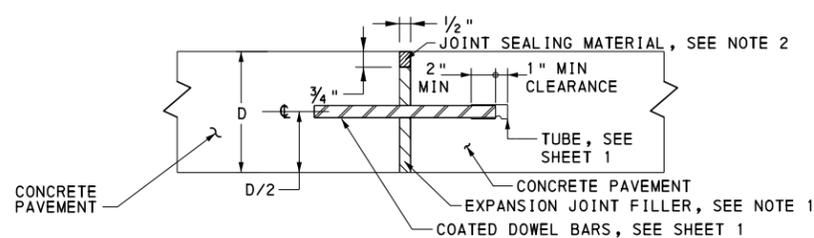
**ROUNDBABOUT ISOLATION JOINT**



**PLAIN CEMENT CONCRETE CURB  
TIED TO CONCRETE TRUCK APRON**

PAVEMENT DEPTH (D)	MAXIMUM TRANSVERSE JOINT SPACING
7"	12'
8"	14'
9" & ABOVE	15'

TRANSVERSE JOINT SPACING IS BASED ON USING STABILIZED SUBBASE (TPBC)  
**PAVEMENT DEPTH AND JOINT SPACING TABLE**



**DOWELED ISOLATION JOINT**

SEE NOTE 5

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

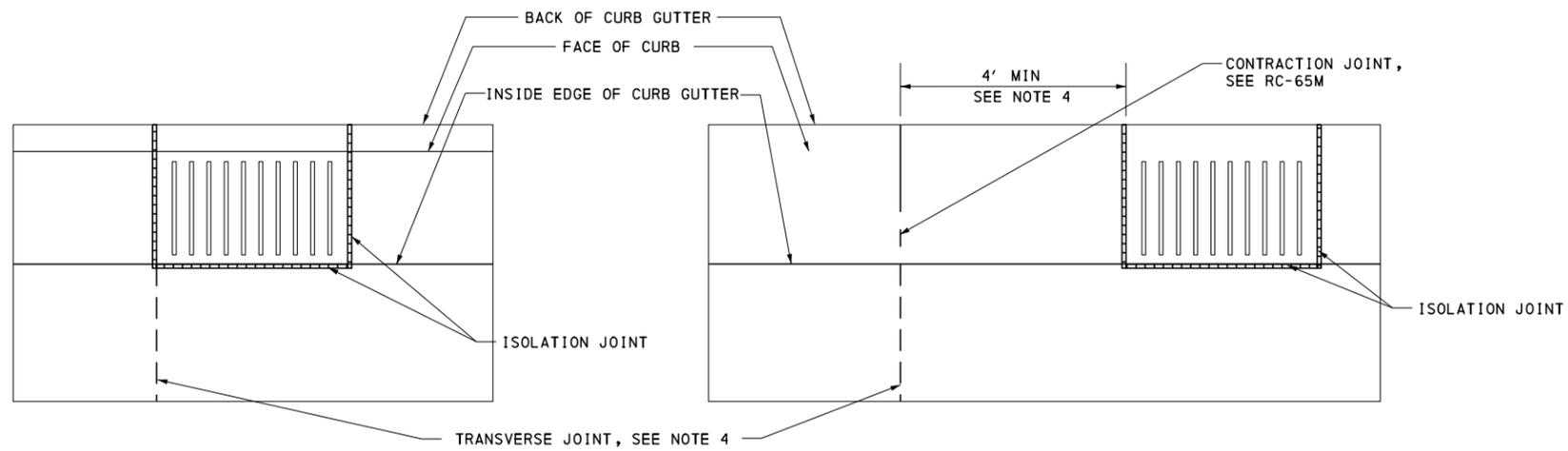
CONCRETE PAVEMENT JOINTS  
ROUNDBABOUTS  
CURB AND JOINT DETAILS

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

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*Burt J. Tappan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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**INLET WITH TRANSVERSE JOINT**

**INLET LOCATED BETWEEN TRANSVERSE JOINTS**

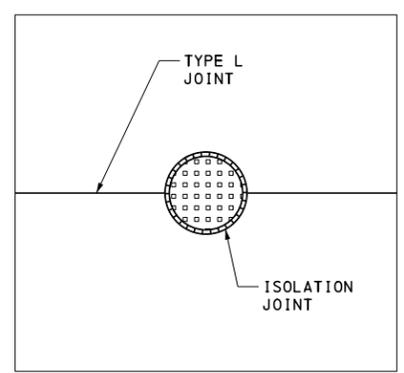
- LEGEND**
- TYPE D JOINT, SEE SHEET 1
  - TYPE L JOINT, SEE SHEET 2
  - ▤ ISOLATION JOINT, SEE SHEET 11
  - TYPE P JOINT, SEE SHEET 2

**NOTES**

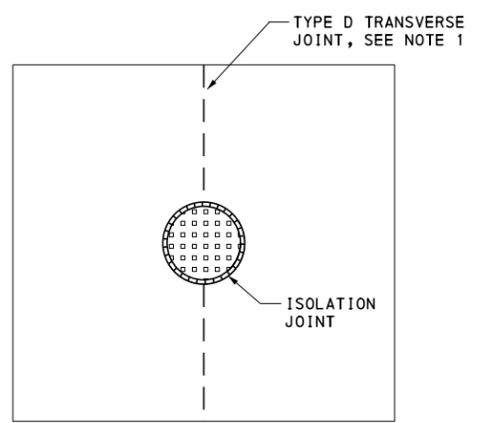
1. ADJUST TRANSVERSE JOINT TO INTERSECT MANHOLE IF POSSIBLE.
2. IF DISTANCE BETWEEN THE LONGITUDINAL JOINT AND THE EDGE OF MANHOLE IS 2' OR LESS, DIVERT THE LONGITUDINAL JOINT AT 2:1 TAPER RATE TO THE CENTER OF THE MANHOLE. IF THE DISTANCE IS GREATER THAN 2', DO NOT DIVERT THE JOINT AND SAW AS NORMAL.
3. IF DISTANCE FROM THE EDGE OF MANHOLE TO NEAREST TRANSVERSE JOINT IS 4' OR LESS, REDIRECT JOINT TO INTERSECT THE CENTER OF THE MANHOLE. AVOID JOINT ANGLES LESS THAN 60°. IF DISTANCE IS GREATER THAN 4', DO NOT DIVERT THE JOINT AND SAW AS NORMAL.
4. ALIGN TRANSVERSE JOINT WITH ONE EDGE OF INLET WHEN PRACTICAL, AND WHEN DISTANCE FROM EDGE OF INLET TO NEAREST TRANSVERSE JOINT IS LESS THAN 4'.
5. ALL OF THE JOINT DETAILS AND BOXOUT DETAILS ON THIS SHEET PERTAIN TO ONLY THE ROUNDABOUT LAYOUTS AS DEPICTED ON SHEETS 9 AND 10.

**CONCRETE PAVED ROUNDABOUTS, SIX STEP JOINT LAYOUT PROCESS**

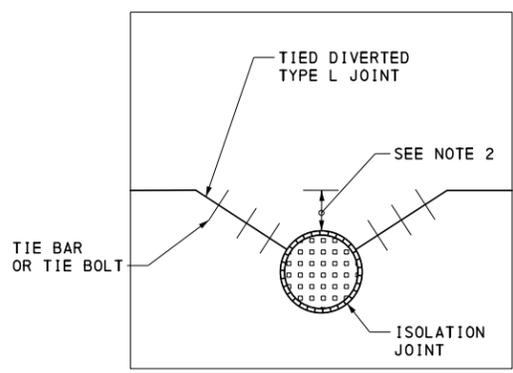
- STEP 1. DRAW ALL PAVEMENT EDGE AND BACK OF CURB LINES IN THE PLAN VIEW. DRAW LOCATIONS OF ALL MANHOLES, DRAINAGE INLETS, AND VALVE COVERS SO THAT JOINTS CAN INTERSECT THESE.
- STEP 2. DRAW ALL LANE LINES ON THE LEGS AND IN THE CIRCULAR PORTION. IF USING THE "ISOLATED CIRCLE" METHOD, DO NOT EXTEND LEG LINES INTO THE CIRCLE. IF USING THE "PINWHEEL" METHOD, DETERMINE WHICH EXITING LEGS WILL BE PAVED THROUGH AND EXTEND LANE LINES INTO THE CIRCLE. ASSURE THAT WIDTHS DO NOT EXCEED 15'. LANE WIDTHS EXCEEDING 15' MAY REQUIRE OFFSETTING THE LONGITUDINAL JOINT LINES OR THE ADDITION OF LONGITUDINAL JOINT LINES RUNNING PARALLEL TO THE LANE LINES.
- STEP 3. IN THE CIRCLE, ADD TRANSVERSE JOINTS RADIATING OUT FROM THE CENTER OF THE CIRCLE. ALIGN TRANSVERSE JOINTS WITH INLETS AND UTILITIES IN ACCORDANCE WITH THIS STANDARD DRAWING. ADD TRANSVERSE JOINTS THAT INTERSECT APPROACH LEG LONGITUDINAL JOINTS. ADJUST JOINT LOCATIONS AND INTERSECTING POINTS TO AVOID ANGLES LESS THAN 60° AND SLAB DIMENSIONS LESS THAN 2'. ADD TRANSVERSE JOINTS BETWEEN THE PREVIOUSLY DESCRIBED JOINTS WHERE REQUIRED FOR PROPER SPACING. EXTEND THESE JOINTS THROUGH THE BACK OF CURB, MOUNTABLE CURB, AND/OR CURB GUTTER. TRUCK APRON TRANSVERSE JOINTS DO NOT NEED TO ALIGN WITH CIRCULAR ROADWAY JOINTS BECAUSE OF THE ISOLATION JOINT.
- STEP 4. ON THE LEGS, ADD TRANSVERSE JOINTS AT ALL LOCATIONS WHERE A WIDTH CHANGE OCCURS IN THE PAVEMENT, E.G.: SPLITTER ISLAND APPROACHES, BEGIN AND END OF CURVES, TAPERS, TANGENTS, CURB RETURNS, ETC. EXTEND THESE JOINTS THROUGH THE BACK OF CURB GUTTER.
- STEP 5. ADD TRANSVERSE JOINTS BEYOND AND BETWEEN THOSE ADDED IN STEP 4. SPACE JOINTS OUT EVENLY BETWEEN OTHER JOINTS, MAKING SURE TO NOT VIOLATE MAXIMUM JOINT SPACING.
- STEP 6. MAKE ADJUSTMENTS FOR IN-PAVEMENT OBJECTS, UTILITIES, DRAINAGE FEATURES AND TO ELIMINATE L-SHAPES, SMALL TRIANGULAR SLABS, ETC. CHECK SLAB DIMENSIONS, JOINT ANGLES AND LOCATIONS, ADJUST AS REQUIRED.



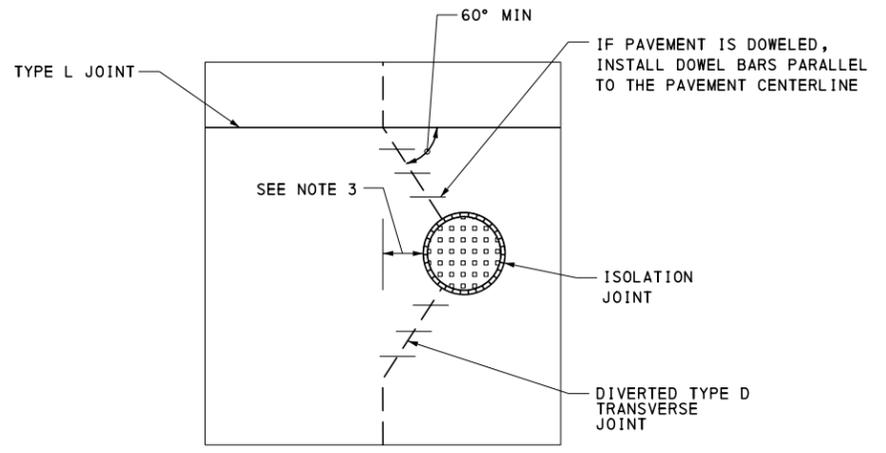
**UTILITY WITH LONGITUDINAL JOINT**



**UTILITY WITH TRANSVERSE JOINT**



**UTILITY WITH DIVERTED LONGITUDINAL JOINT**



**UTILITY WITH DIVERTED TRANSVERSE JOINT**

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF PROJECT DELIVERY

**CONCRETE PAVEMENT JOINTS**  
**ROUNDABOUTS**  
**JOINTING AT UTILITY**  
**STRUCTURES AND INLETS**

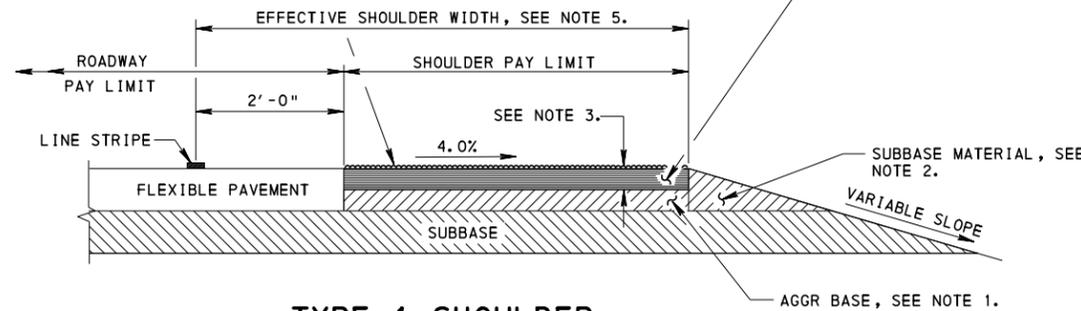
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 12 OF 12 <b>RC-20M</b>
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**NOTES**

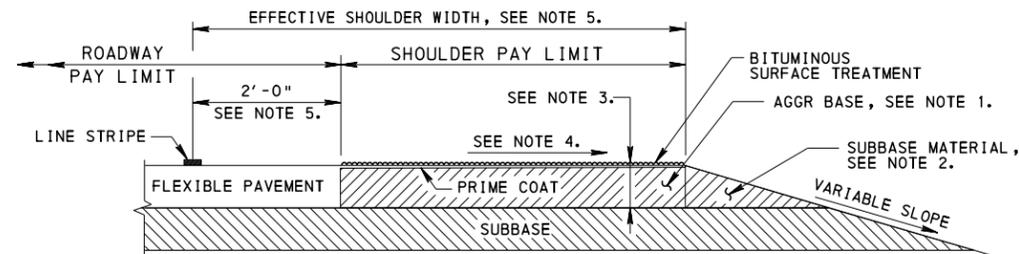
1. CONSTRUCT AGGREGATE BASE AS SPECIFIED IN PUBLICATION 408, SECTION 350.3 AND CONSIDER AS PART OF THE SHOULDER.
2. PAYMENT FOR THIS AREA OF SUBBASE MATERIAL INCIDENTAL TO THE SHOULDER.
3. MAKE DEPTH OF SHOULDER THE COMBINED DEPTH OF SURFACE AND BASE COURSE.
4. SLOPE SHOULDER AT 6.0% FOR EFFECTIVE SHOULDER WIDTHS  $\leq 8'-0"$ . SLOPE SHOULDER AT 4.0% FOR EFFECTIVE SHOULDER WIDTHS  $> 8'-0"$ .
5. FOR EFFECTIVE SHOULDER WIDTHS  $6'-0"$  AND LESS, PAVE OUT-TO-OUT OF SHOULDERS WITH FULL DEPTH ROADWAY PAVEMENT.
6. FOR SHOULDERS THAT SPECIFY RUMBLE STRIPS INSTALLATIONS, USE ONLY BITUMINOUS WEARING COURSE SUPERPAVE, 9.5 mm OR 12.5 mm, HMA OR WMA WEARING COURSE,  $1\frac{1}{2}"$  DEPTH MINIMUM.
7. WHEN INSTALLING RUMBLE STRIPS ON A TYPE 1-SP SHOULDER, CONSTRUCT THE PAVEMENT/SHOULDER JOINT AT THE BEGINNING OF THE EFFECTIVE SHOULDER, OR PAVE FULL DEPTH INTO THE EFFECTIVE SHOULDER FAR ENOUGH SO THAT THE RUMBLE STRIPS ARE NOT CONSTRUCTED OVER THE LONGITUDINAL JOINT.
8. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.
9. PAY QUANTITIES FOR FULL DEPTH FLEXIBLE PAVEMENT SHOULDERS ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 409 OF PUB.408 PAVING ITEMS.
10. FOR ALL DIVIDED ROADWAY FACILITIES, CONSTRUCT MEDIAN SHOULDERS AS PER TYPE 1 OR TYPE 2 CONCRETE SHOULDER, SEE SHEET 3.
11. CONCRETE WIDENED LANES PLACED ADJACENT TO TRAVEL LANES ONLY.
12. IF PLACEMENT OF COURSE IS A SQUARE YARD ITEM, PAYMENT FOR SAFETY EDGE IS INCIDENTAL TO THE COURSE. IF PLACEMENT OF COURSE IS A TONNAGE ITEM, PAYMENT FOR SAFETY EDGE IS TO BE INCLUDED IN THE PROJECT QUANTITIES.
13. FOR FURTHER GUIDANCE ABOUT THE SAFETY EDGE, REFER TO PUBLICATION 13M, DM-2, CHAPTER 12.

$\frac{3}{4}"$  DEPTH, BITUMINOUS SURFACE TREATMENT, INCIDENTAL TO TYPE 1 SHOULDERS.  
 1" DEPTH, 9.5 mm FG SUPERPAVE HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 1-F SHOULDERS.  
 1 $\frac{1}{2}"$  DEPTH, 9.5 mm SUPERPAVE HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 1-SP SHOULDERS.

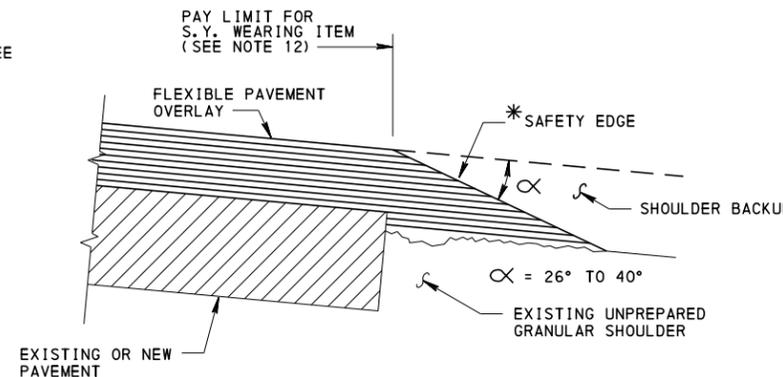
4" DEPTH, 25 mm SUPERPAVE HMA OR WMA BASE COURSE, INCIDENTAL TO TYPE 1 SHOULDERS.



**TYPE 1 SHOULDER**  
**TYPE 1-F SHOULDER**  
**TYPE 1-S SHOULDER**  
**TYPE 1-SP SHOULDER**



**TYPE 3 SHOULDER**

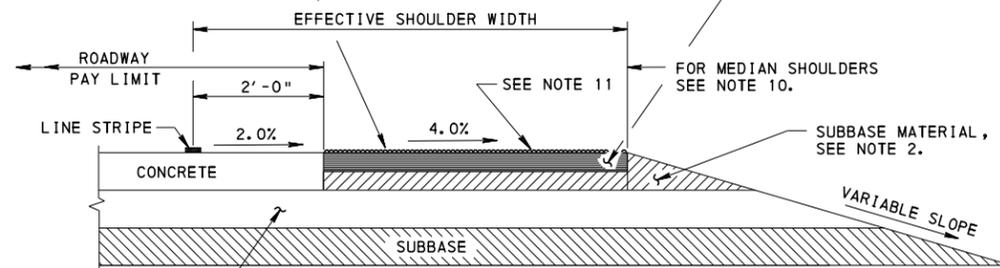


**SAFETY EDGE-WEARING COURSE**

\* NOTE: DO NOT USE SAFETY EDGE ON COURSES LESS THAN  $1\frac{1}{2}"$  DEPTH.

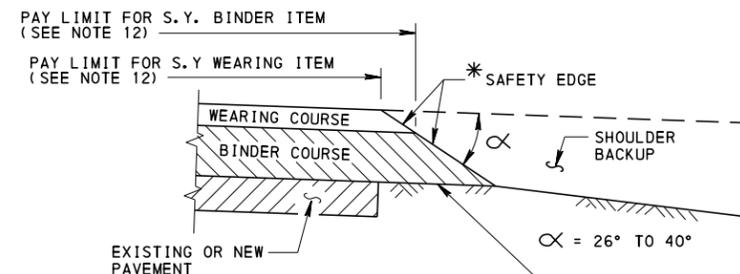
$\frac{3}{4}"$  DEPTH, BITUMINOUS SURFACE TREATMENT, INCIDENTAL TO TYPE 1 SHOULDERS.  
 1" DEPTH, 9.5 mm FG SUPERPAVE HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 1-F SHOULDERS.  
 1 $\frac{1}{2}"$  DEPTH, 9.5 mm SUPERPAVE HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 1-SP SHOULDERS.

4" DEPTH, 25 mm SUPERPAVE HMA OR WMA BASE COURSE, INCIDENTAL TO TYPE 1 SHOULDERS.



**CONCRETE WIDENED LANE**

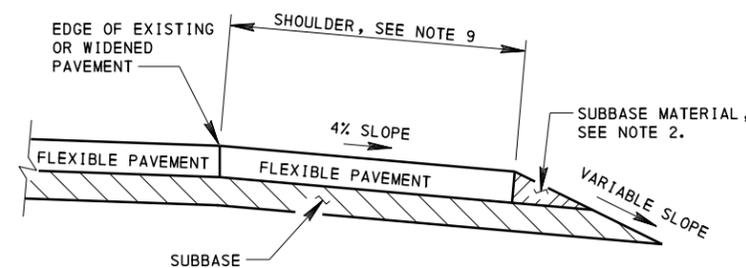
**TYPE 1 SHOULDER**  
**TYPE 1-F SHOULDER**  
**TYPE 1-S SHOULDER**  
**TYPE 1-SP SHOULDER**



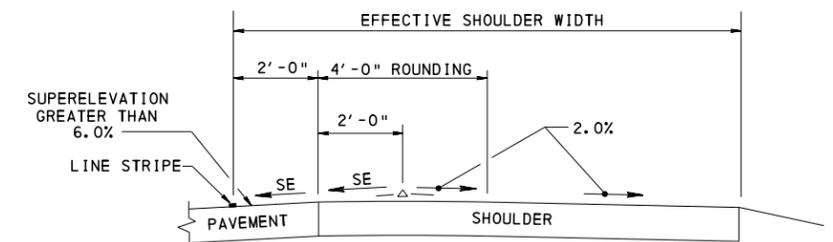
**SAFETY EDGE-WITH BINDER AND WEARING COURSE**

\* NOTE: DO NOT USE SAFETY EDGE ON COURSES LESS THAN  $1\frac{1}{2}"$  DEPTH.

REMOVE VEGETATION, GRADE AND COMPACT EXISTING OR NEW GRANULAR SHOULDER UNDER SAFETY EDGE LEVEL WITH EXISTING OR NEW PAVEMENT TO A WIDTH OF 12". SURFACE PREPARATION IS INCIDENTAL TO THE BINDER COURSE.



**FULL DEPTH FLEXIBLE PAVEMENT SHOULDERS**



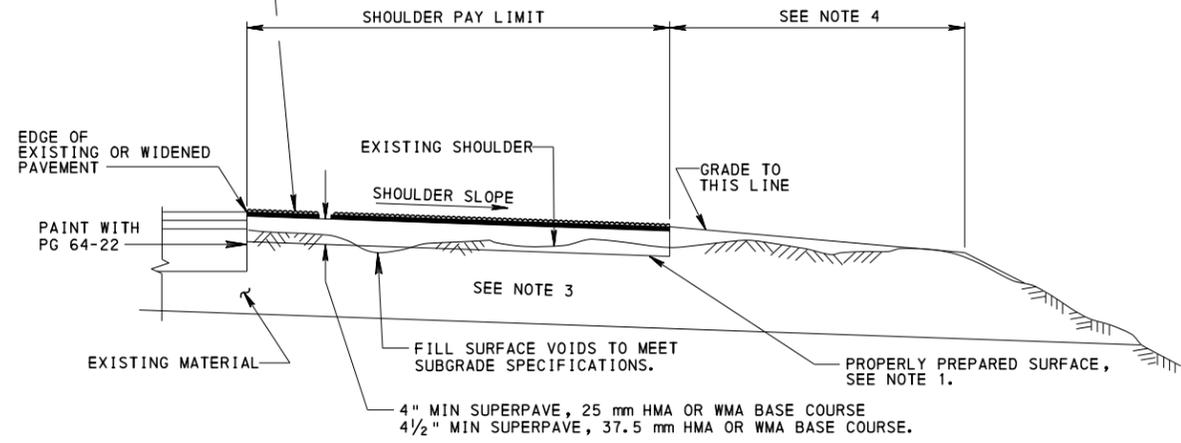
FOR SUPERELEVATION UNDER 6.0%, ELIMINATE THE 4'-0" ROUNDDING AND USE THE 2.0% SHOULDER SLOPE BEGINNING FROM THE EDGE OF PAVEMENT.

**SHOULDER ROUNDDING ON HIGH SIDE OF SUPERELEVATED CURVES**

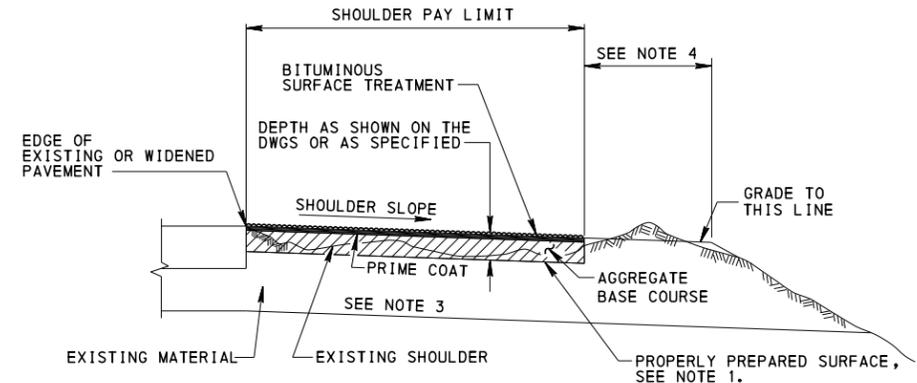
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

**SHOULDER**

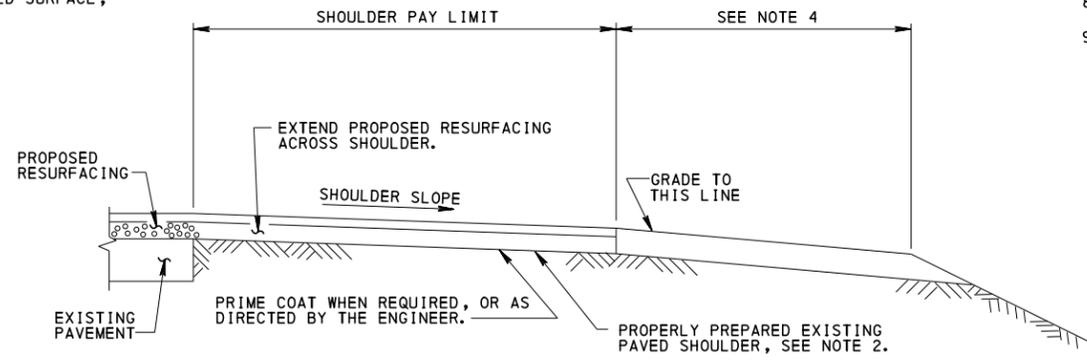
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 6 SHOULDERS, 3/4" DEPTH  
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 6-F SHOULDERS, 1" DEPTH  
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 6-S SHOULDERS, 3/4" DEPTH  
 SUPERPAVE, 9.5 mm HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 6-SP SHOULDERS, 1 1/2" DEPTH  
 SUPERPAVE, 12.5 mm HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 6-SP SHOULDERS, 1 1/2" DEPTH



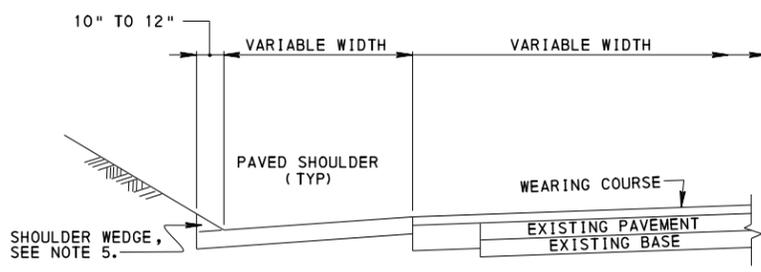
**TYPE 6 SHOULDER  
 TYPE 6-F SHOULDER  
 TYPE 6-S SHOULDER  
 TYPE 6-SP SHOULDER**



**TYPE 4 SHOULDER**



**TYPE 7 SHOULDER**



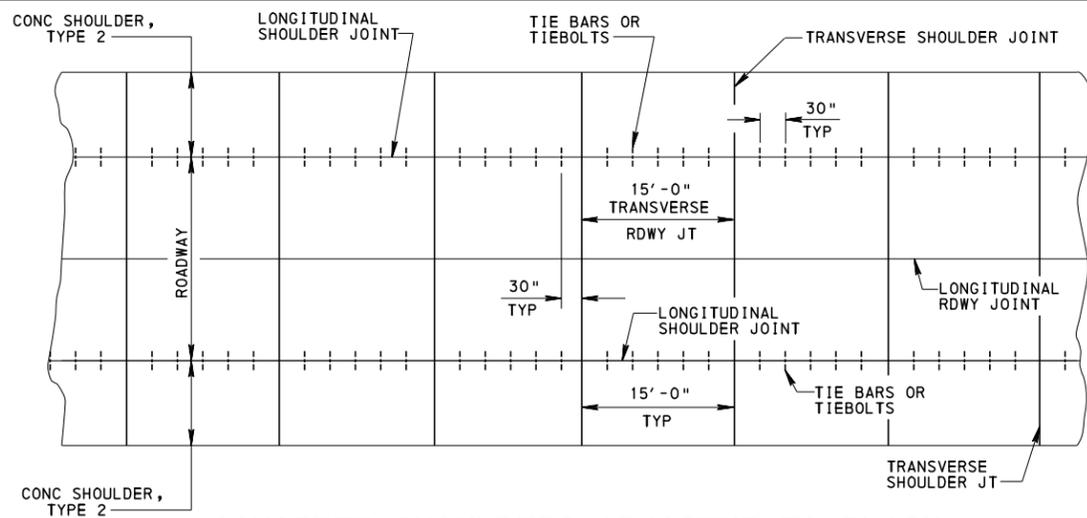
**TYPICAL SHOULDER DETAIL  
 WITH BITUMINOUS TAPER SHOULDER WEDGE**

**NOTES**

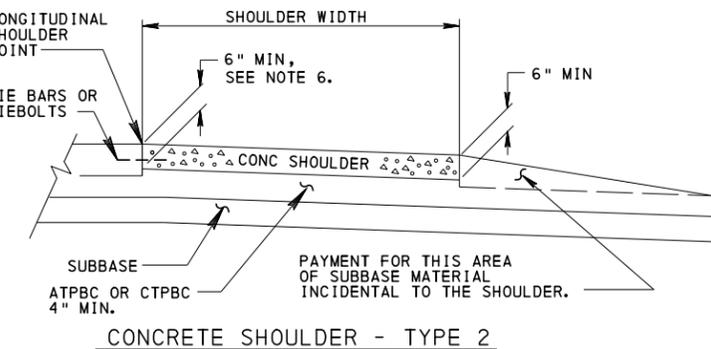
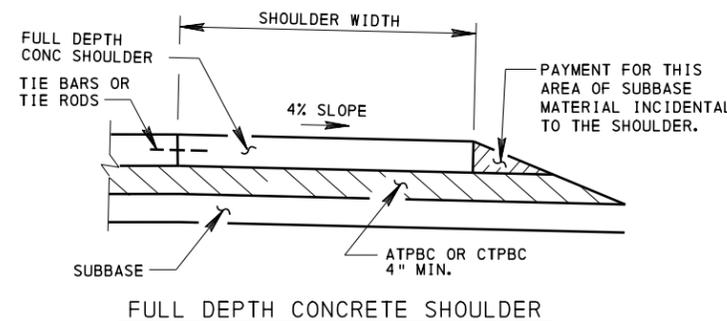
1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGREGATE BASE COURSE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.
2. FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.
3. REMOVE UNSUITABLE MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350. MEASURE AND PAY FOR SHOULDER EXCAVATION AND BACKFILL IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 654 AND 656. (CROSS SECTIONS ARE NOT REQUIRED.)
4. GRADING IS INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE GRADING OPERATION TO COMPLETE THIS OPERATION, USE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF SELECTED BORROW EXCAVATION. WHERE THERE IS AN EXCESS OF MATERIAL FROM THE SHOULDER EXCAVATION OR GRADING OPERATION, REMOVE THIS MATERIAL AS SOON AS POSSIBLE AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
5. PROVIDE BITUMINOUS TAPER SHOULDER WEDGE IN ALL CUT AREAS. WEDGE IS INCIDENTAL TO THE SHOULDER PAY ITEM.
6. "LUMP SUM" ITEMS INCLUDE ALL MATERIALS AND OPERATIONS OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.
7. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1 1/2" DEPTH MINIMUM.
8. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.
9. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL FREE OF ORGANIC MATERIALS.

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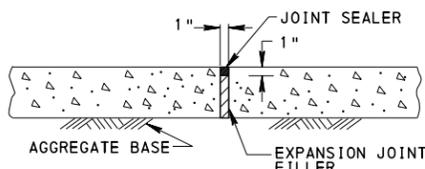
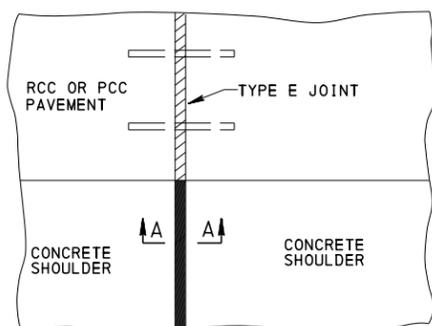
**SHOULDERS  
 (RECONSTRUCTED)**



**CONCRETE SHOULDERS ADJACENT TO PLAIN  
CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS**

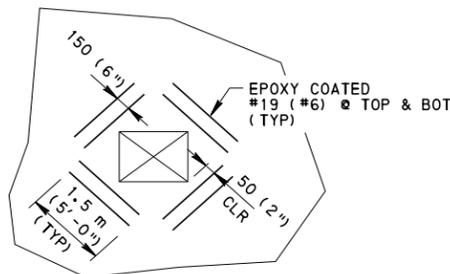


**TYPICAL SECTIONS**

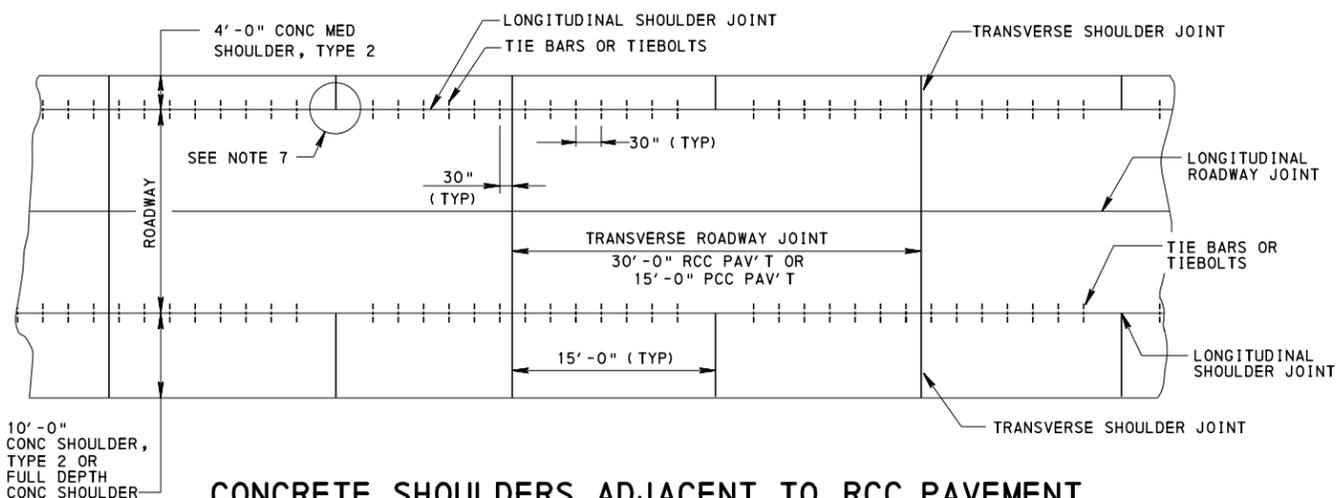


SECTION A-A

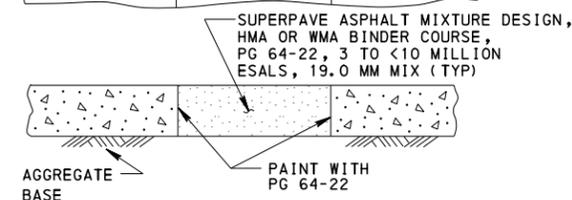
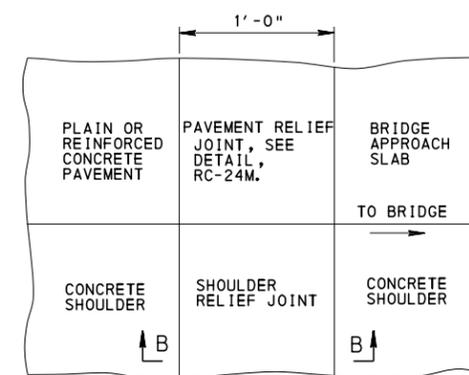
**CONCRETE SHOULDER  
EXPANSION JOINTS**



**REINFORCEMENT AT OPENINGS**



**CONCRETE SHOULDERS ADJACENT TO RCC PAVEMENT  
AND PCC PAVEMENT FOR INTERSTATE AND OTHER  
LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMP**



SECTION B-B

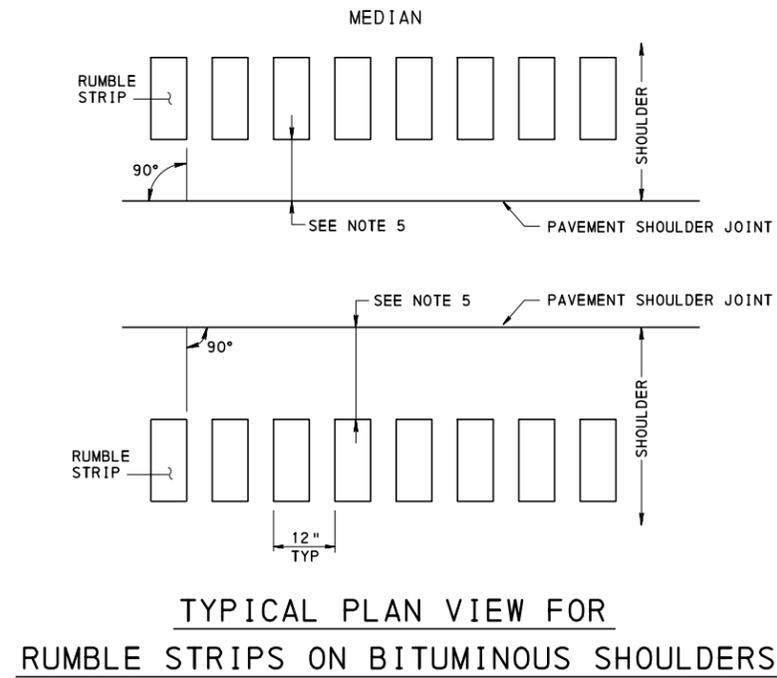
**SHOULDER  
RELIEF JOINTS**

**NOTES**

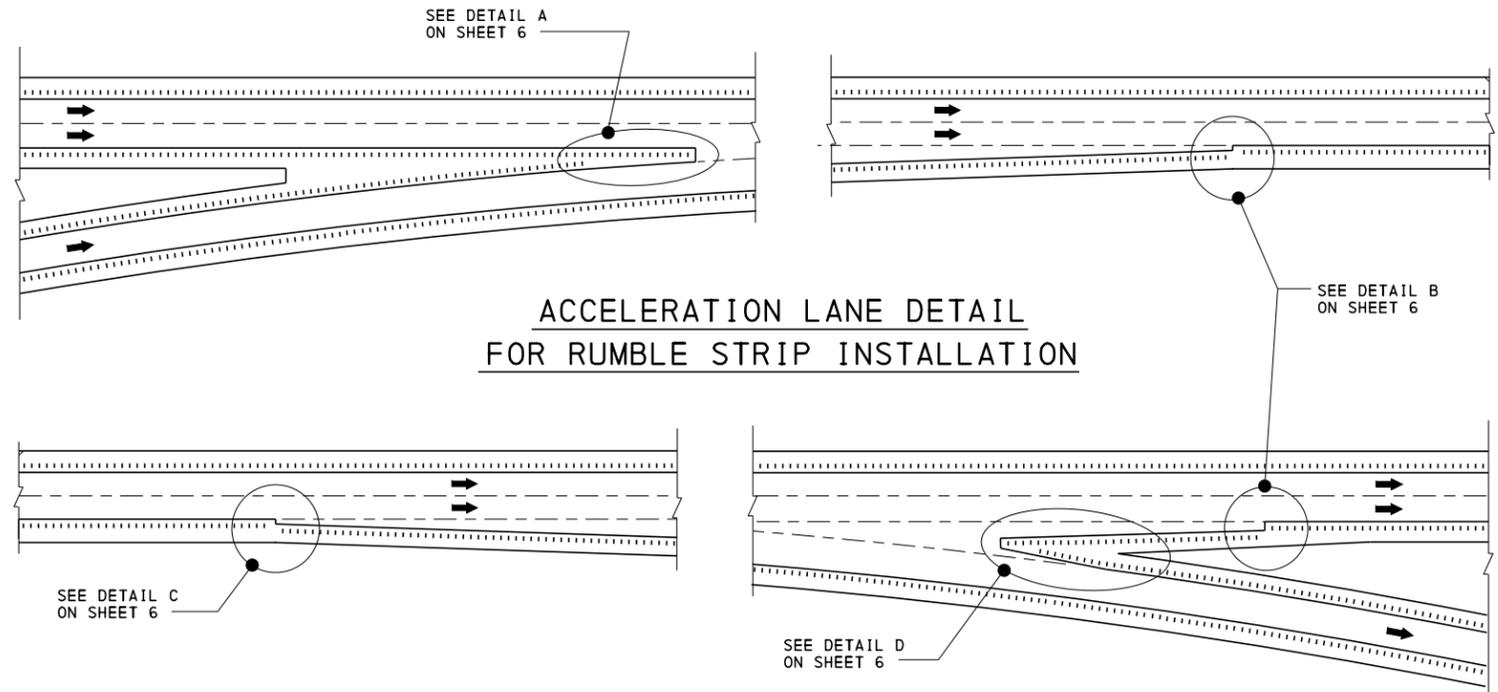
- ATPBC/CTPBC MAY BE SUBSTITUTED WITH OGS MATERIAL AS PER PUBLICATION 408, SECTION 350.3.
- SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 501.3(n).
- FOR JOINT DETAILS, SEE RC-20M.
- ALIGN SHOULDER TRANSVERSE JOINTS TO ADJACENT PAVEMENT JOINTS.
- SEE SHEET 1 FOR SHOULDER ROUNDING DETAIL ON HIGH SIDE OF SUPERELEVATION.
- AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A 6" MINIMUM DEPTH, OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
- TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS WITHIN 30" OF EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO RCC PAVEMENTS OR PCC PAVEMENT.
- WHEN THE SHOULDER IS STRUCTURALLY PART OF A BARRIER MOMENT RESISTANCE SLAB (I.E. BARRIER/SLAB ON AN MSE WALL) SEE BC-799M SHEET 3 FOR REQUIRED MINIMUM SPACING OF THE TRANSVERSE SHOULDER JOINTS.
- SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.
- FOR USE ON FULL DEPTH CONCRETE SHOULDERS. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 501 OR 506 OF PUBLICATION 408 PAVING QUANTITIES.
- CONSTRUCT ONLY RCC SHOULDER ADJACENT TO RCC PAVEMENT AND PCC SHOULDER ADJACENT TO PCC PAVEMENT UNLESS WHEN USING CONCRETE WIDENED LANES AS PER SHEET 1.
- PROTECT TRANSVERSE JOINTS PRIOR TO PLACEMENT OF SHOULDERS AS PER PUBLICATION 408, SECTION 501.3(i).
- ALIGN CONCRETE PAVEMENT JOINTS WITH INLET JOINTS, CURB JOINTS AND ANY OTHER ADJACENT STRUCTURES. CONSTRUCT THE JOINT BETWEEN THEM WITH 1/4" POLYSTYRENE BONDBREAKER BOARD AND SEAL WITH ASPHALT SEALING MATERIAL.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY**

**SHOULDERS  
(CONCRETE)**



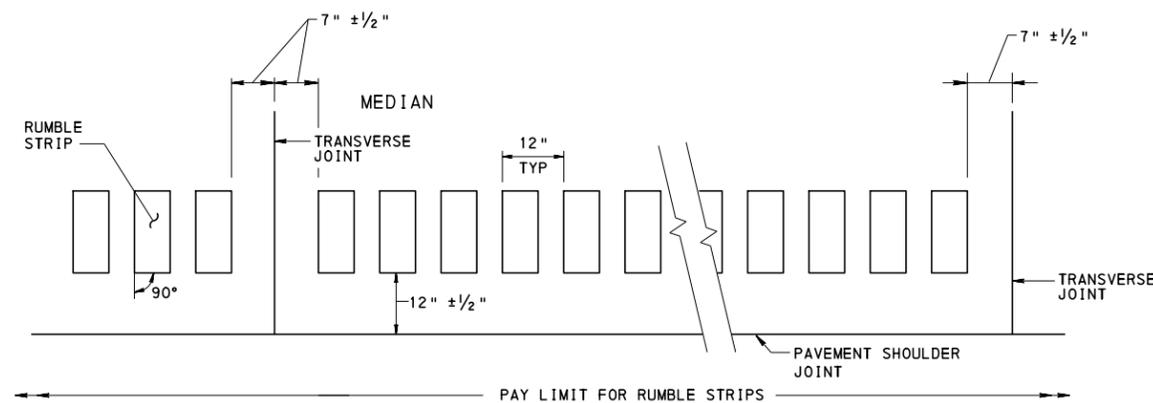
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON BITUMINOUS SHOULDERS



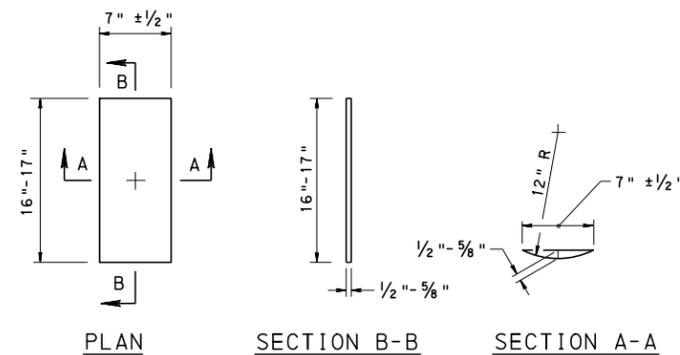
ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

DECELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

NOTE: SEE SHEET 5 FOR INTERSECTION DETAILS.



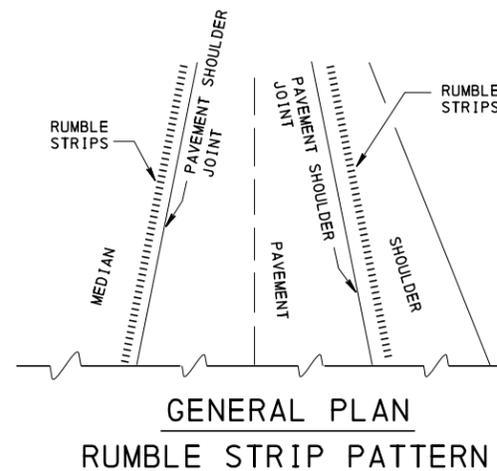
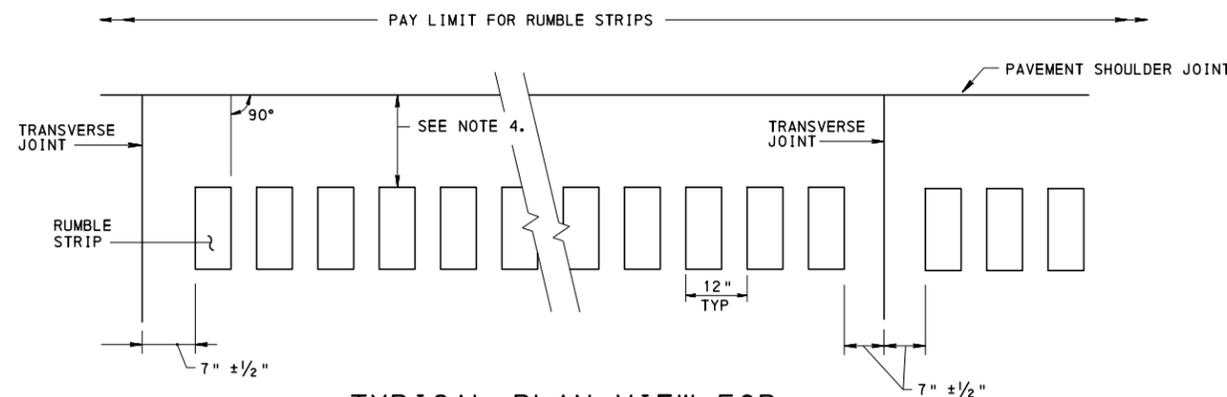
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS OR CONCRETE WIDENED LANE PAVING



SECTION DETAILS OF RUMBLE STRIP PATTERN

NOTES

1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
4. 18" ± 1/2" EXCEPT FOR CONCRETE WIDENED LANES, THEN 9" ± 1/2".
5. 12" ± 1/2" FOR LEFT (MEDIAN) SHOULDERS. 18" ± 1/2" FOR RIGHT SHOULDERS > 8'-0" WIDE. FOR RIGHT SHOULDERS LESS THAN 8'-0" WIDE, SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.



GENERAL PLAN RUMBLE STRIP PATTERN

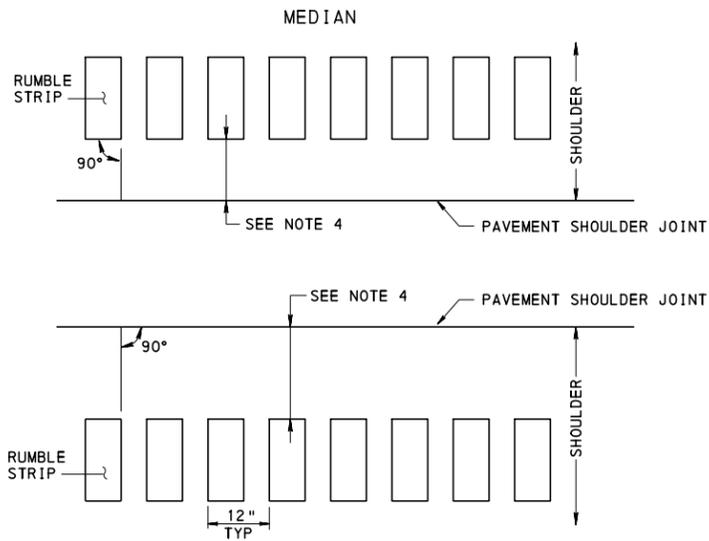
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

MILLED RUMBLE STRIPS  
SHOULDER RUMBLE STRIPS  
(LIMITED ACCESS HIGHWAYS)

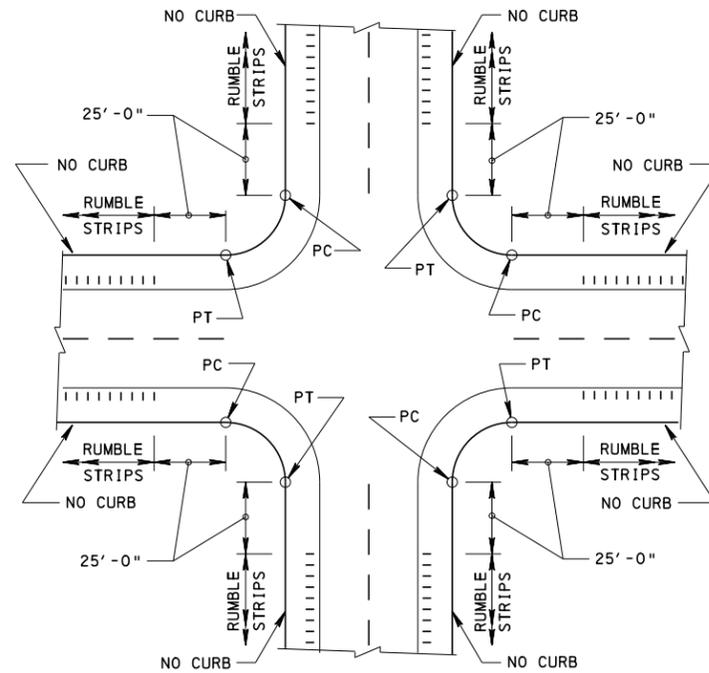
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Taylor*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

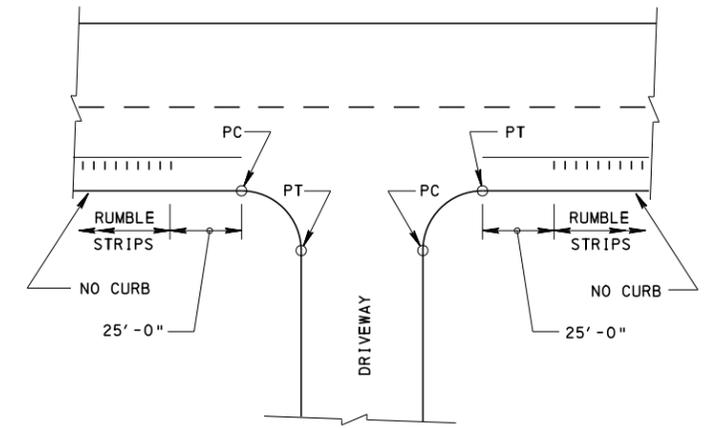
SHT 4 OF 7  
RC-25M



**TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS**



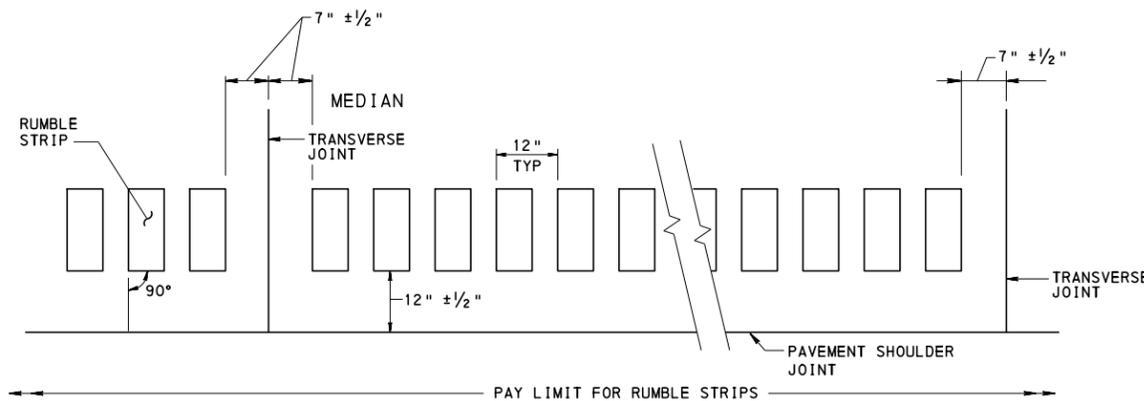
**TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION**



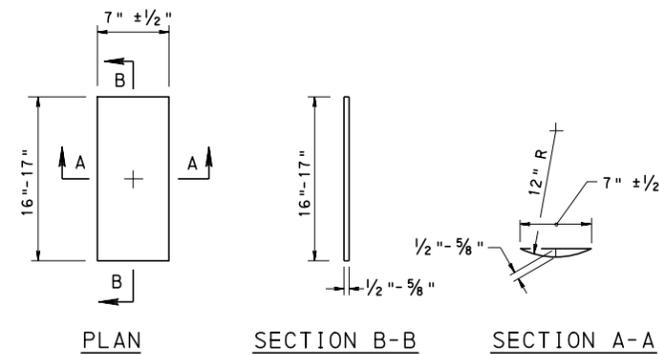
**TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION**

**NOTES**

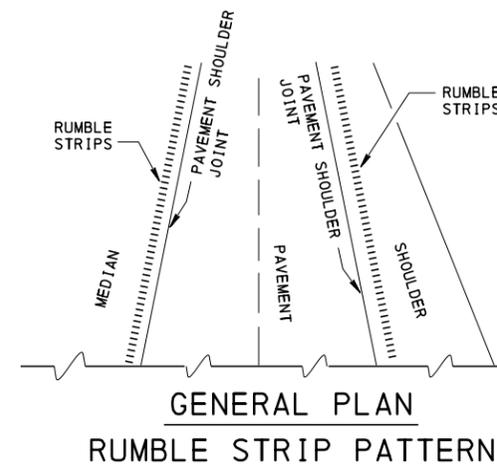
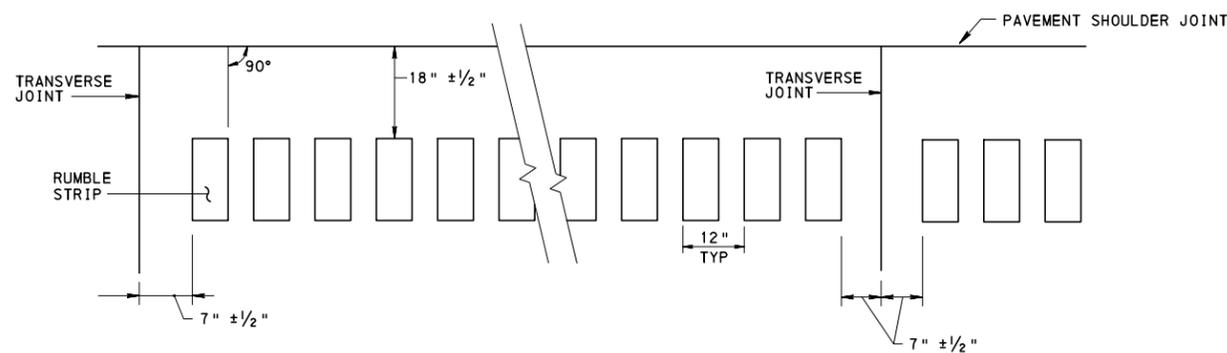
1. SHOULDER RUMBLE STRIPS FOR FREE ACCESS HIGHWAYS ARE CONSIDERED ON A PROJECT BY PROJECT BASIS AS INDICATED ON THE CONSTRUCTION PLANS.
2. CONSTRUCT RUMBLE STRIP IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
3. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
4. 12" ± 1/2" FOR LEFT (MEDIAN) SHOULDERS. 18" ± 1/2" FOR RIGHT SHOULDERS ≥ 8'-0" WIDE. FOR RIGHT SHOULDERS LESS THAN 8'-0" WIDE, SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.
5. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.



**TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS**



**SECTION DETAILS OF RUMBLE STRIP PATTERN**



**GENERAL PLAN RUMBLE STRIP PATTERN**

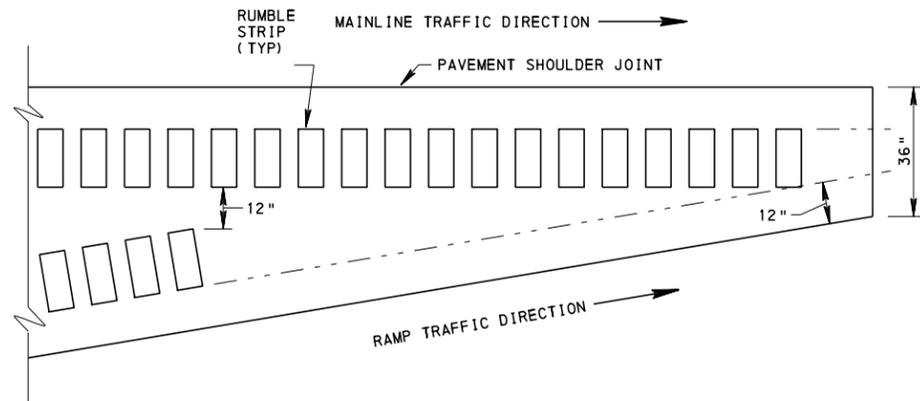
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

MILLED RUMBLE STRIPS  
SHOULDER RUMBLE STRIPS  
(FREE ACCESS HIGHWAYS)

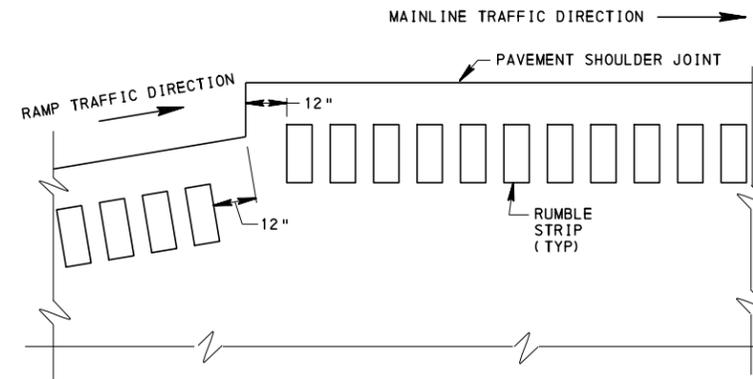
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
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RECOMMENDED SEPT. 15, 2016  
*Bruce E. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

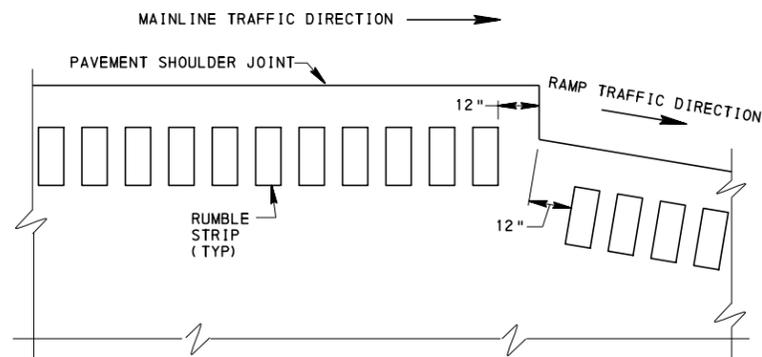
SHT 5 OF 7  
RC-25M



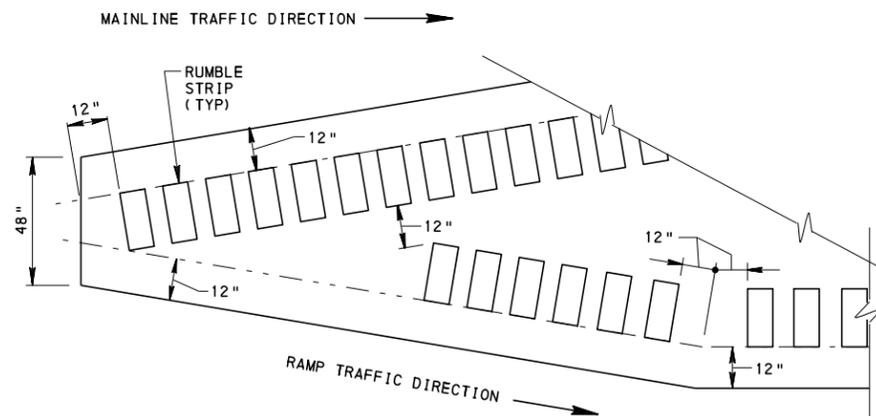
DETAIL A  
ACCELERATION LANE  
GORE AREA RUMBLE STRIPS



DETAIL B  
ACCELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL C  
DECELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL D  
DECELERATION LANE  
GORE AREA RUMBLE STRIPS

NOTES

1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
4. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
5. FORM JOINTS IN GORE AREA CONNECTING MAINLINE AND RAMP TRANSVERSE JOINTS SUCH THAT ANGLES LESS THAN 80° ARE AVOIDED IN GORE PAVEMENT WHERE POSSIBLE.

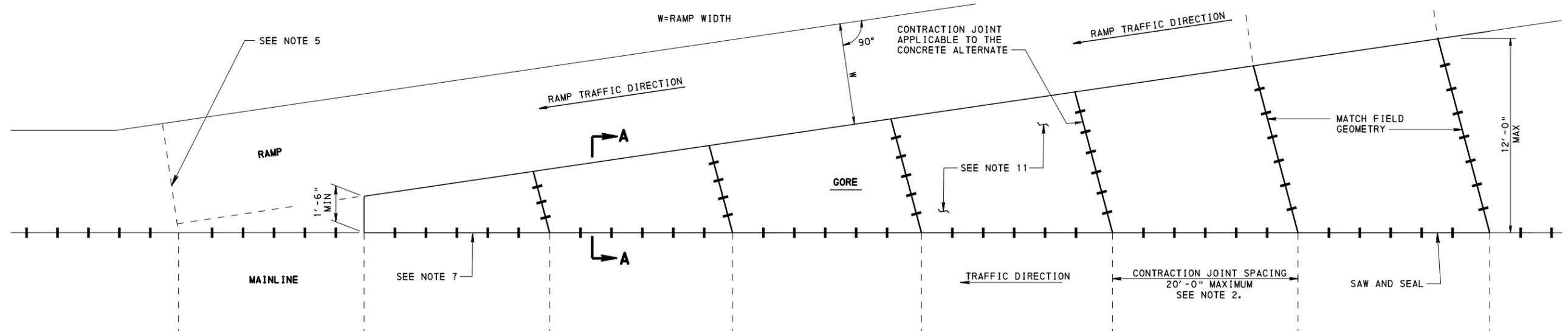
COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF PROJECT DELIVERY

MILLED RUMBLE STRIPS  
SHOULDER RUMBLE STRIPS  
(GORE AREA)

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
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RECOMMENDED SEPT. 15, 2016  
*Brian J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

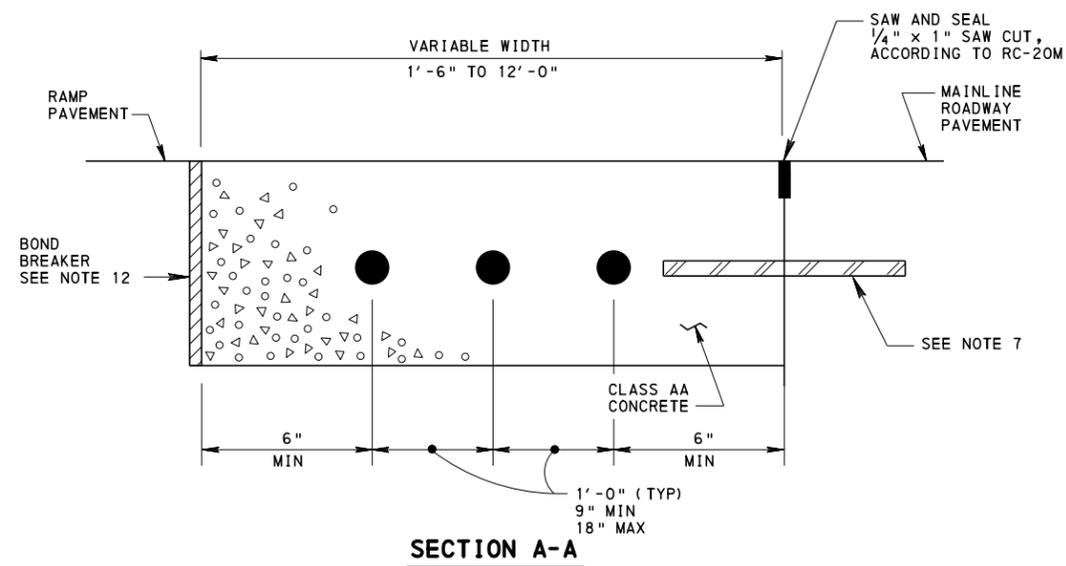
SHT 6 OF 7  
RC-25M



**RAMP GORE AREA**

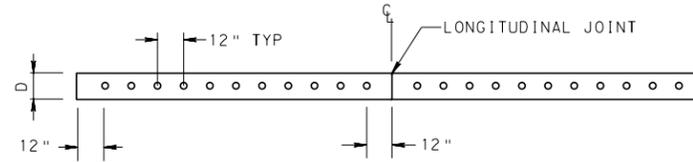
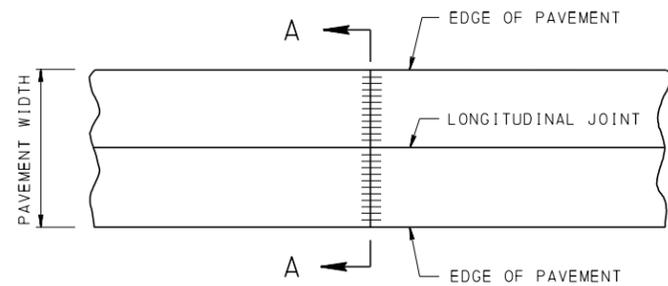
**NOTES**

1. USE MATERIALS AND CONSTRUCTION METHODS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 501 OR 658.
2. BEGIN AND END PAVEMENT AT MAINLINE TRANSVERSE JOINTS WITH A MINIMUM PAVEMENT WIDTH OF 1'-6" AND A MAXIMUM WIDTH OF 12'-0".
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
4. PLACE 3/4" PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CROSS SECTIONAL AREA.
5. WHEN RAMP OR LANE WIDTH EXCEEDS 14'-0", A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
7. CONSTRUCT GORE PAVEMENT THE SAME DEPTH AS MAINLINE SHOULDER DEPTH.
8. TIE GORE TO MAINLINE SHOULDER PAVEMENT IN ACCORDANCE WITH RC-25M.
9. CONSTRUCT GORE UTILIZING SECTION 501 OR 658 (WHICHEVER ITEM NUMBER THE MAINLINE SHOULDER IS CONSTRUCTED OF). MEASUREMENT AND PAYMENT WILL BE USING SAME ITEM NUMBER.
10. DO NOT USE LONGITUDINAL TIE BARS TO TIE GORE TO RAMP/SHOULDER PAVEMENT.
11. INSTALL MILLED RUMBLE STRIPS IN ACCORDANCE WITH SHEET 6.
12. USE LOAD TRANSFER UNITS IF MAINLINE SHOULDER IS CONSTRUCTED USING LOAD TRANSFER UNITS. INSTALL IN ACCORDANCE WITH RC-27M.
13. PLACE A 1/4", FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER.



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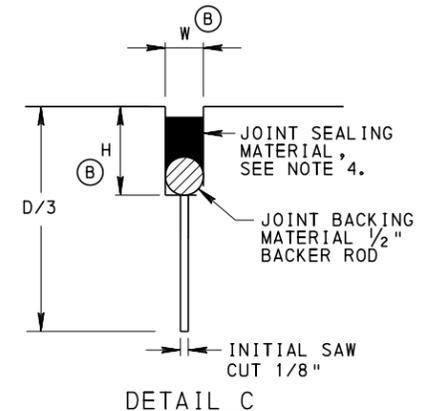
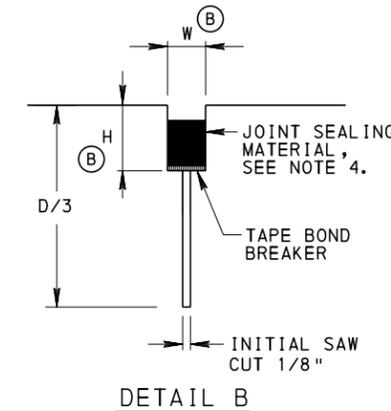
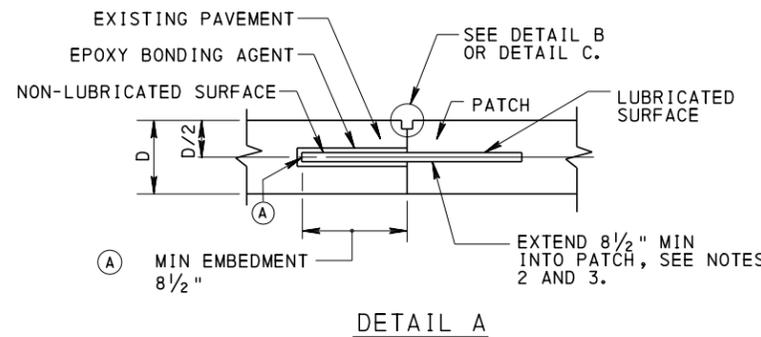
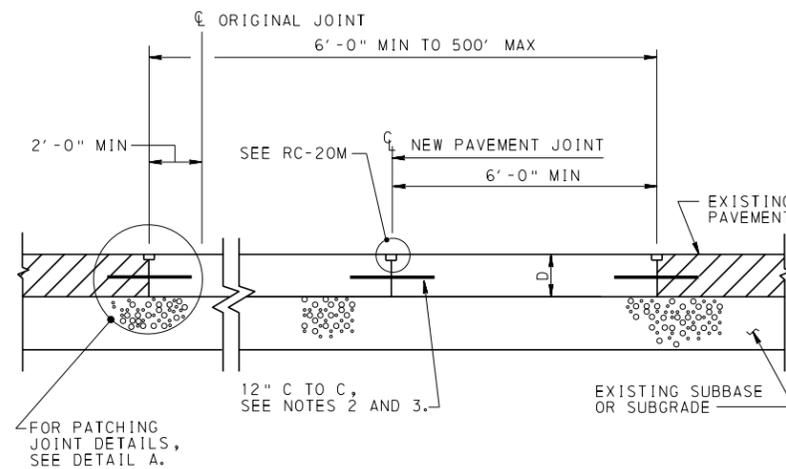
**RAMP GORE AREA**



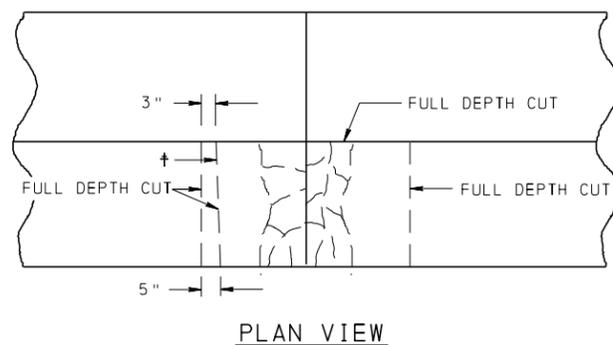
TYPICAL PAVEMENT PATCHING JOINT

**LEGEND**  
 (A) EMBEDDED END OF DOWEL BAR NEED NOT BE SQUARE. IF A CHISEL POINT IS NEEDED FOR EMBEDDING METHOD, INCREASE LENGTH OF DOWEL AND EMBEDMENT BY 1".

(B) JOINT SPACING	W	H
≥20'	3/4"	1"
<20'	3/8"	3/4"



PATCHING JOINT DETAILS



† MAKE FULL DEPTH SAWCUT TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN PAVEMENT PRIOR TO LIFTING OUT FAILED AREA. SAWCUT MAY BE OMITTED PROVIDED NO SPALLING ON SURFACE OR UNDERSIDE OF REMAINING CONCRETE PAVEMENT OCCURS. IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, MAKE ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL. FULL DEPTH SAWCUTS AT THE PATCH LIMITS WILL BE PERMITTED TO EXTEND INTO THE ADJACENT PAVEMENT UP TO D+2" UNLESS OTHERWISE PROHIBITED OR FOR CRC PATCHING. SAWCUTS MADE FOR EASE OR REMOVAL ARE NOT PERMITTED TO EXTEND BEYOND THE LIMITS OF THE PATCH.

SAW CUTS FOR LIFT OUT METHOD

NOTES

- WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL EXPANSION JOINT MATERIAL 3/4" THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM 1" CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.
- USE MINIMUM 1 1/4" Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1 1/2" Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED. COATED DOWEL BARS TO BE EITHER GRADE 40 OR GRADE 60.
- PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4".
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT.
- INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.
- SAW & SEAL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.
- VARIANCE IN DIMENSIONS ARE ALLOWED FOR BOTH STANDARD WIDTH PAVEMENT AND OTHER WIDTH PAVEMENT AS LONG AS THE DISTANCE FROM THE EDGE OF PAVEMENT TO THE FIRST DOWEL IS NO LESS THAN 6" AND NO MORE THAN 12", AND THAT THE SPACING BETWEEN ALL DOWELS ARE 12" ON CENTER.

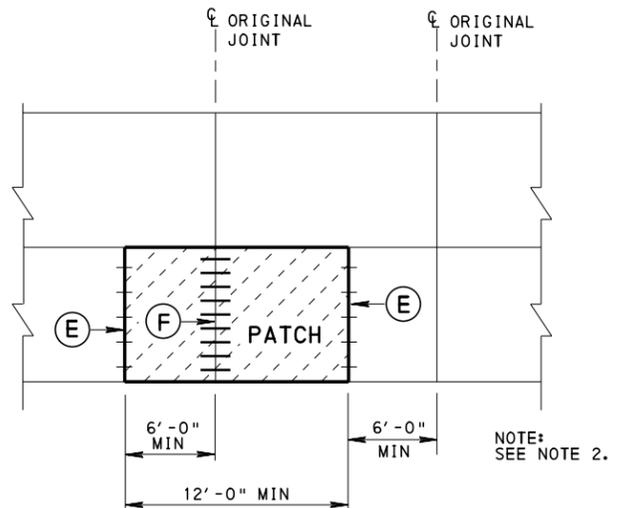
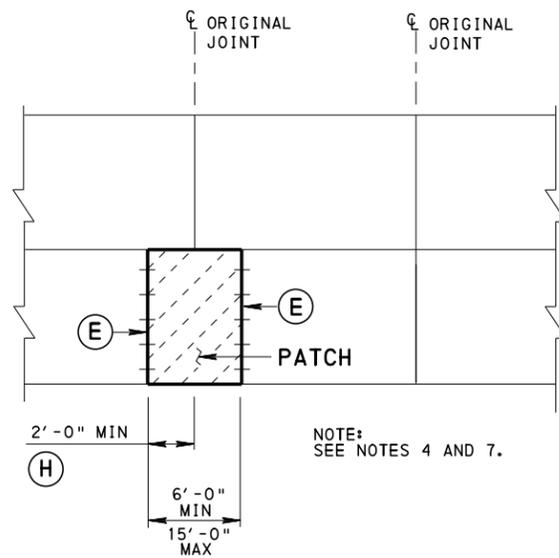
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
 REHABILITATION  
 (PATCHING)

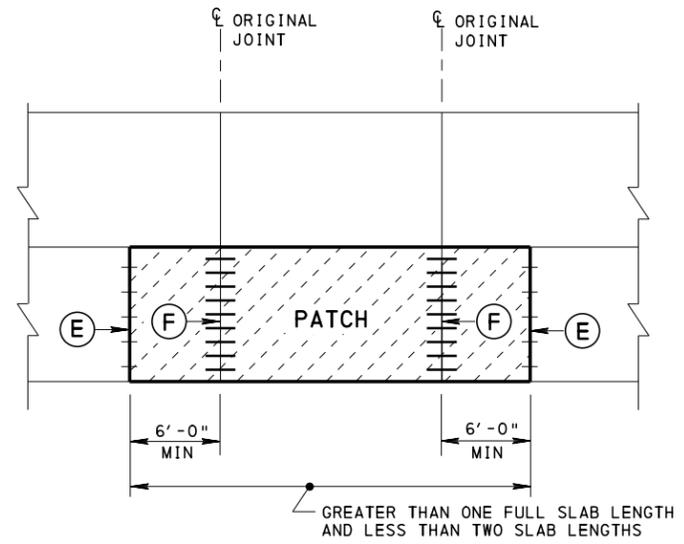
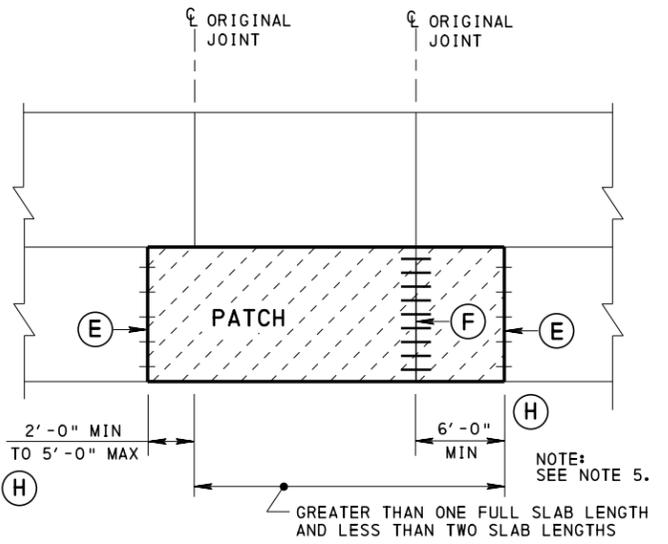
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
 CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt E. Johnson*  
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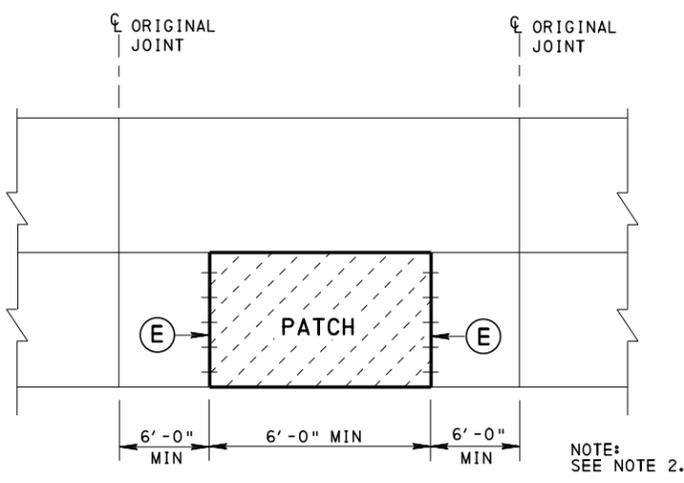
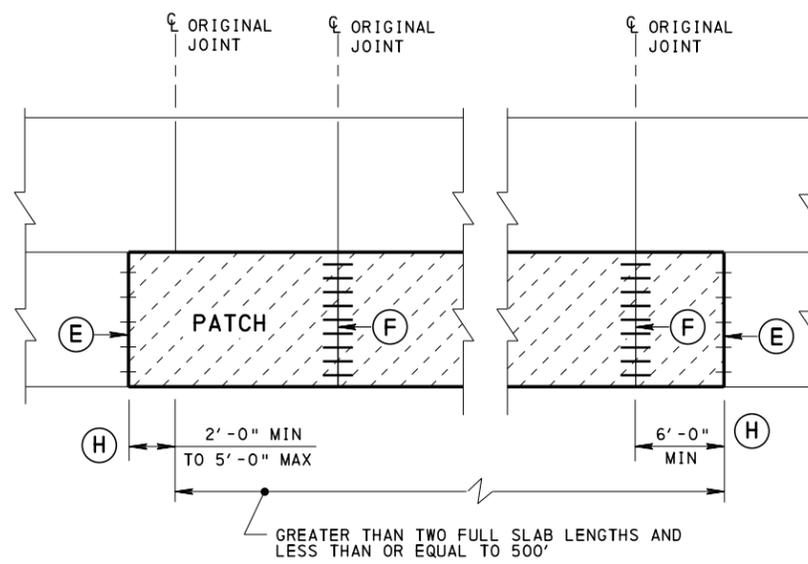
SHT 1 OF 11  
 RC-26M



- LEGEND**
- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
  - (F) NEW PAVEMENT JOINT, SEE RC-20M.
  - (H) DETAILS APPLY TO EITHER END OF PATCH.



- NOTES**
1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
  2. DO NOT LEAVE LESS THAN 6'-0" OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
  3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 1/4", FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES 65'-0" AND LESS IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
  4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 2'-0" OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
  5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 2'-0" INTO THE NEXT SLAB, REMOVE A MINIMUM OF 6'-0" AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
  6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
  7. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 5'-0" INTO NEXT SLAB. IF MORE THAN 5'-0" IS REQUIRED, REMOVE A MINIMUM OF 6'-0" AND PROVIDE NEW PAVEMENT JOINT AT ORIGINAL JOINT LOCATION.

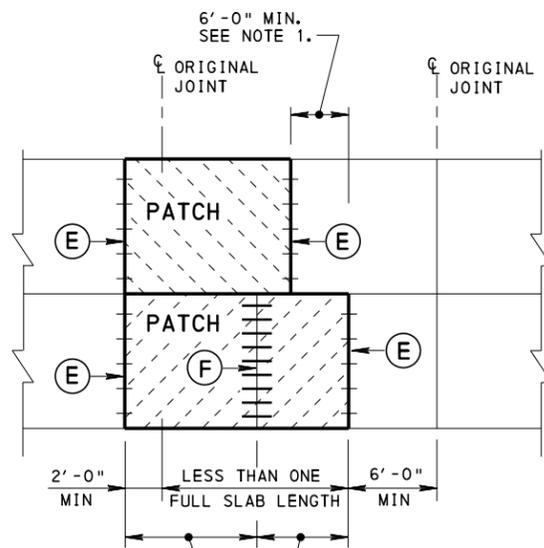


COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

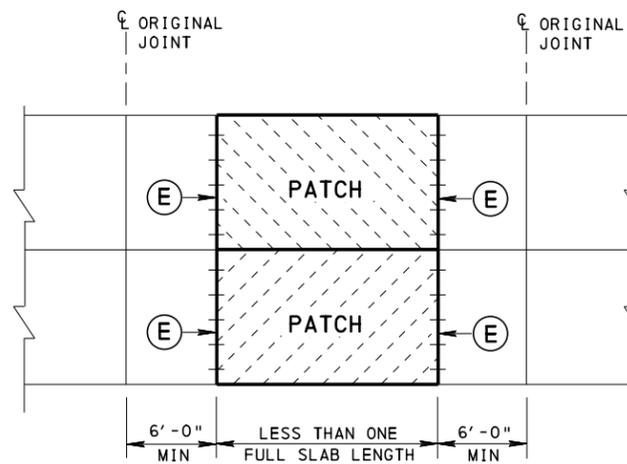
**CONCRETE PAVEMENT  
REHABILITATION  
(SINGLE LANE PATCHING)**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 2 OF 11 <b>RC-26M</b>
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SINGLE LANE PAVEMENT PATCHING



6'-0" MIN TO  
15'-0" MAX, (TYP PCC) OR  
30'-0" MAX, (TYP RCC)

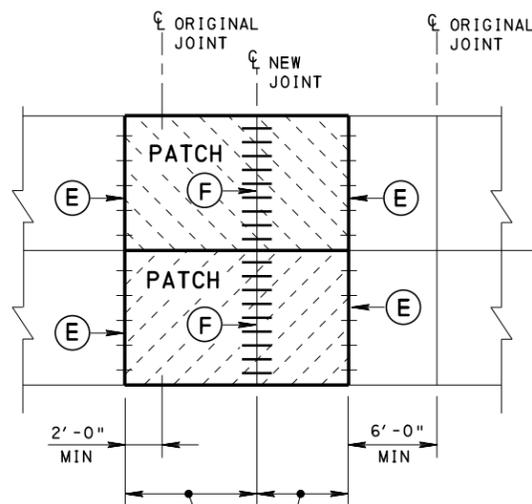


**LEGEND**

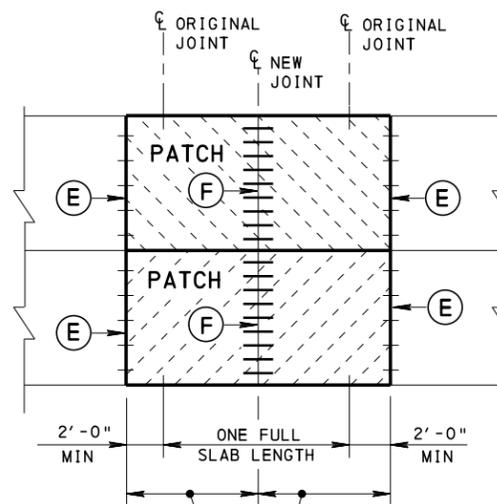
- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.
- (H) DETAILS APPLY TO EITHER END OF PATCH.

**NOTES**

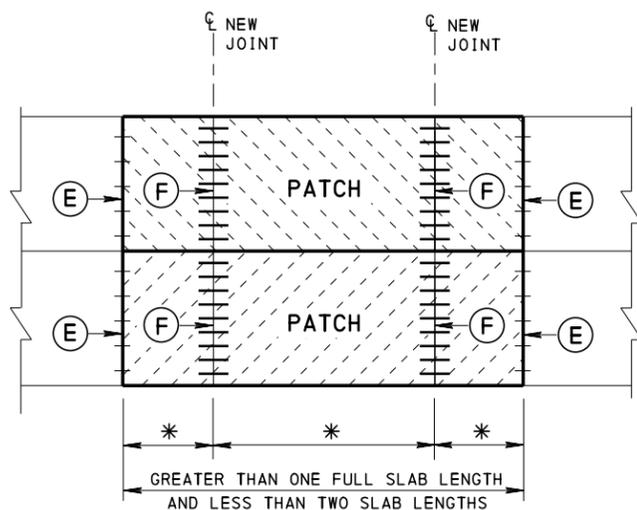
1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 6'-0" OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 1/4", FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES 65'-0" AND LESS IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 2'-0" OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 2'-0" INTO THE NEXT SLAB, REMOVE A MINIMUM OF 6'-0" AND INSTALL A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF THE ORIGINAL JOINT IN THE ADJACENT LANE.
6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 500'-0", THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21M OR RC-27M FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E., RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.



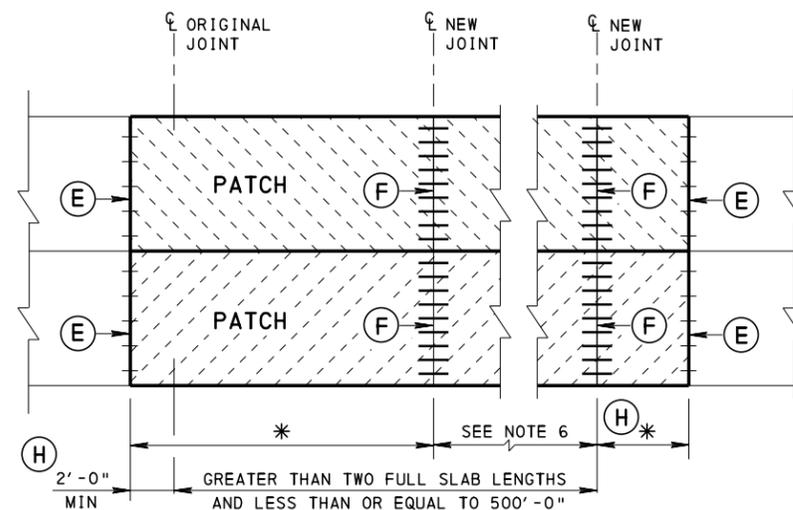
6'-0" MIN TO  
15'-0" MAX, (TYP PCC) OR  
30'-0" MAX, (TYP RCC)



6'-0" MIN TO  
15'-0" MAX, (TYP PCC) OR  
30'-0" MAX, (TYP RCC)



NOTE: \* = 6'-0" MIN TO  
15'-0" MAX, (TYP PCC) OR  
30'-0" MAX, (TYP RCC)



NOTE: \* = 6'-0" MIN TO  
15'-0" MAX, (TYP PCC) OR  
30'-0" MAX, (TYP RCC)

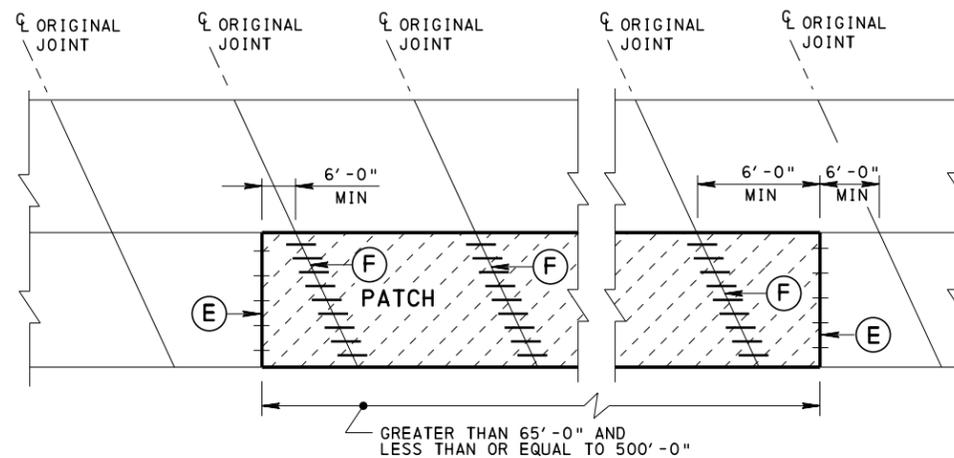
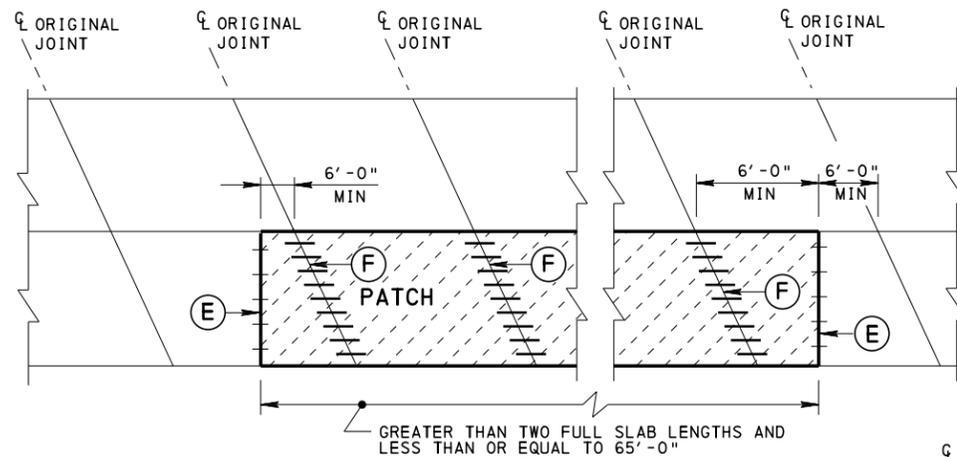
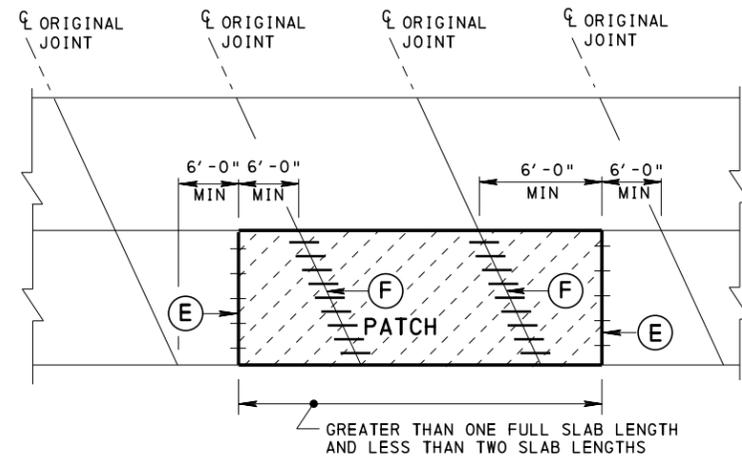
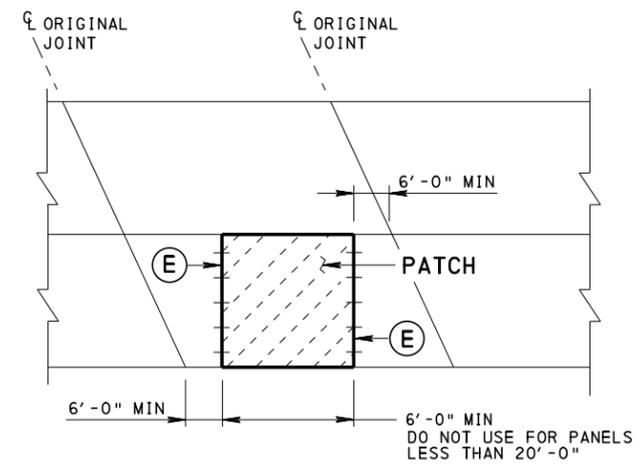
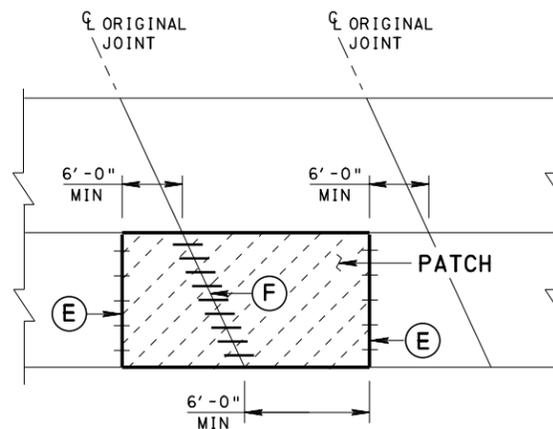
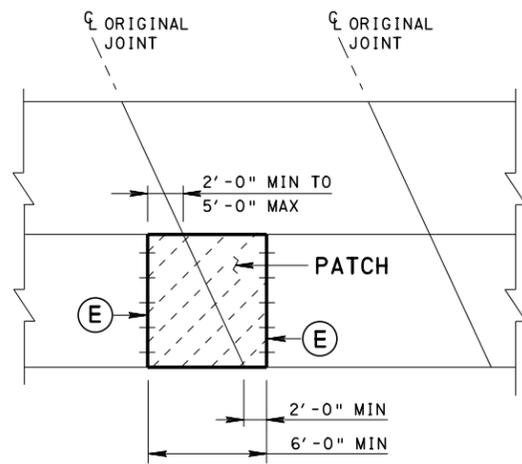
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
(MULTI-LANE PATCHING)

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 11  
RC-26M



**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.

**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 6'-0" OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 1/4", FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES 65'-0" AND LESS IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 2'-0" OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 5'-0" INTO THE NEXT SLAB, REMOVE A MINIMUM OF 6'-0" AND INSTALL A NEW PAVEMENT JOINT AT THE LOCATION OF THE ORIGINAL JOINT IN THE ADJACENT LANE.
6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.

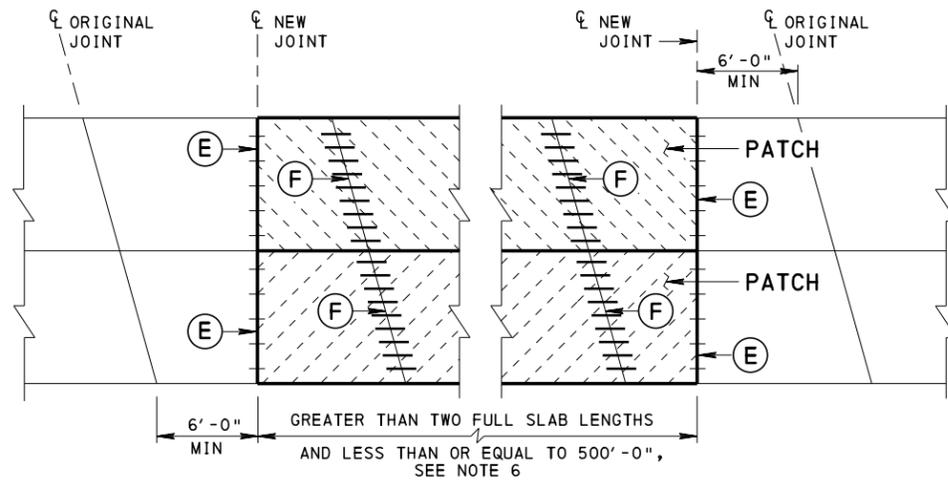
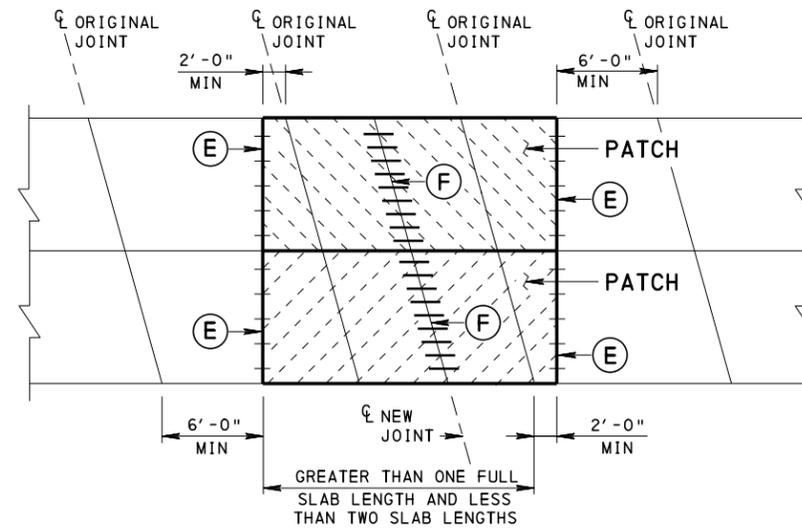
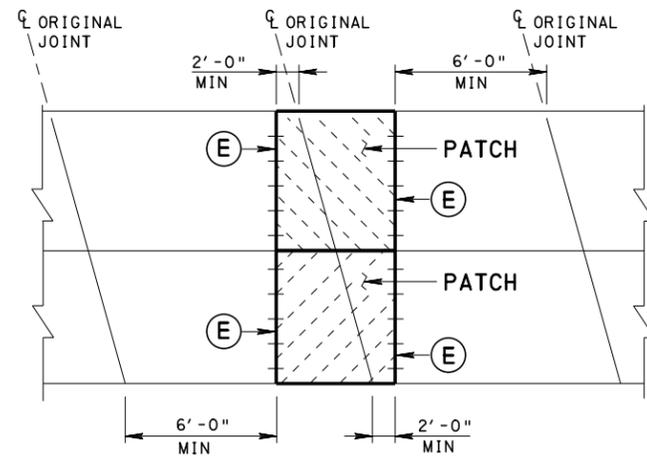
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
( SINGLE LANE PATCHING )  
SKEWED JOINTS

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 4 OF 11  
RC-26M



**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.

**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
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5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 5'-0" INTO THE NEXT SLAB, REMOVE A MINIMUM OF 6'-0" AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 500'-0", THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21M OR RC-27M FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E., RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.

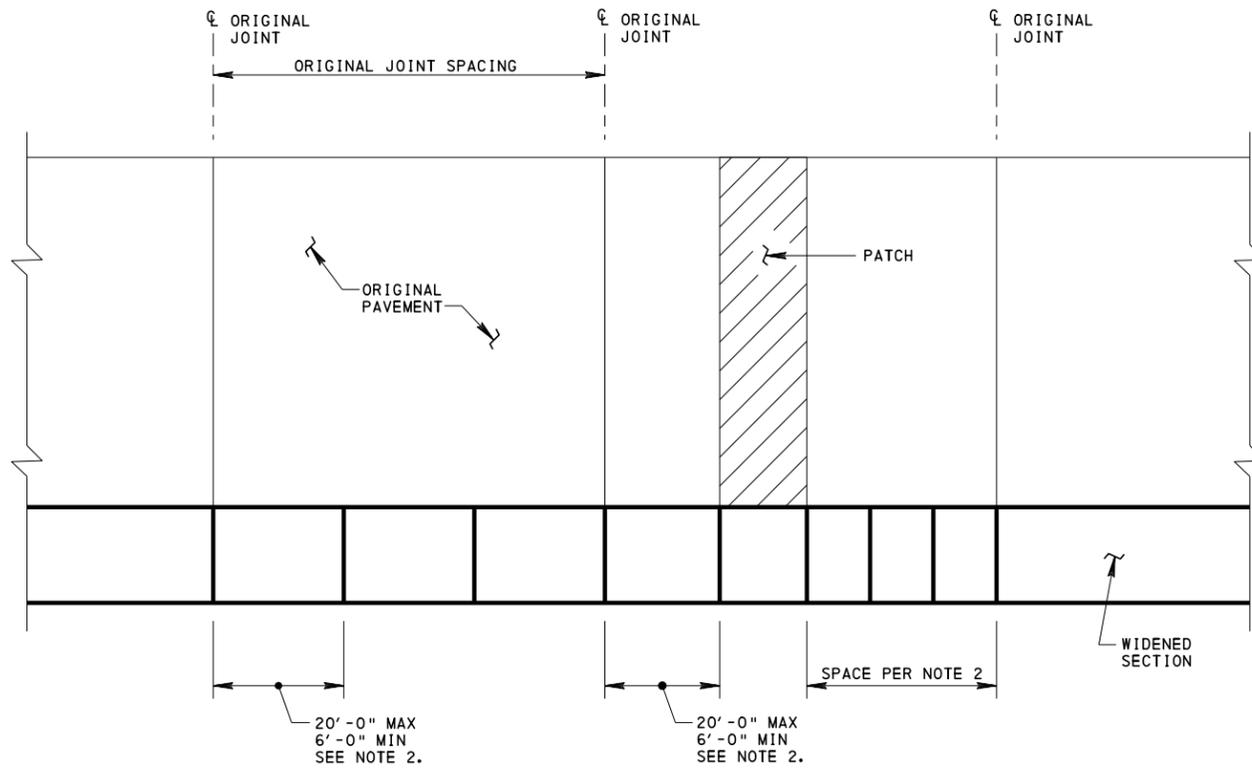
COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
(MULTI-LANE PATCHING)  
SKEWED JOINTS

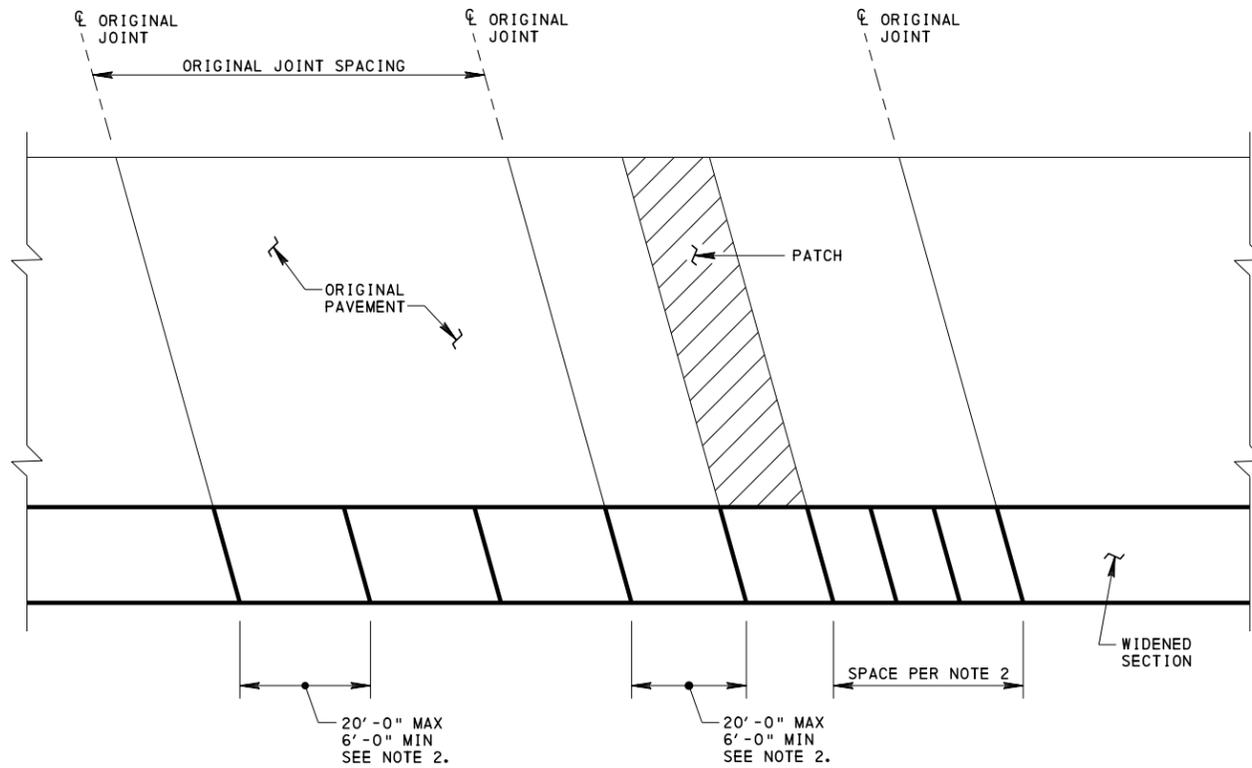
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 5 OF 11  
RC-26M



**LANE WIDENING PLAN - PERPENDICULAR JOINTS**



**LANE WIDENING PLAN - SKEWED JOINTS**

**NOTES**

1. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE EVENLY IN BETWEEN.
2. THE RATIO OF SLAB WIDTH TO LENGTH SHOULD NOT EXCEED 1.25 EXCEPT TO MATCH AN EXISTING JOINT WITHIN 5'-0".
3. SPACE TIE BARS IN ACCORDANCE WITH RC-27M.
4. SPACE LOAD TRANSFER UNIT IN ACCORDANCE WITH RC-20M.
5. FOR JOINT TYPES, SEE RC-27M. MATCH MAINLINE JOINT TYPE REQUIREMENTS, IF JOINTS ARE SPACED AT 20'-0", USE 20'-0" SPACING FOR WIDENING.

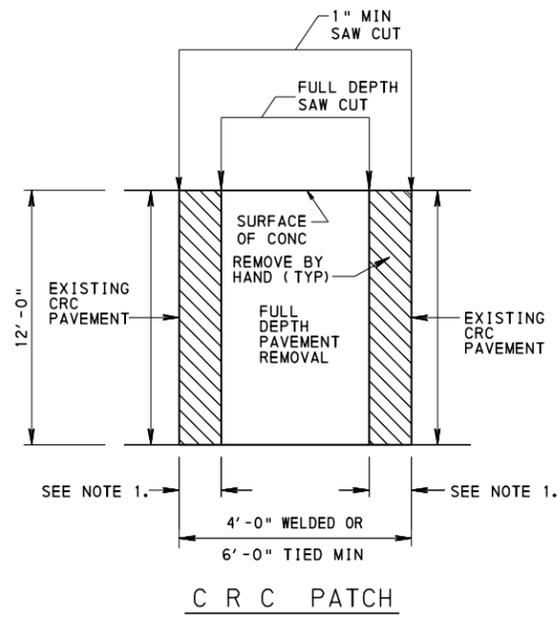
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
(LANE WIDENING)

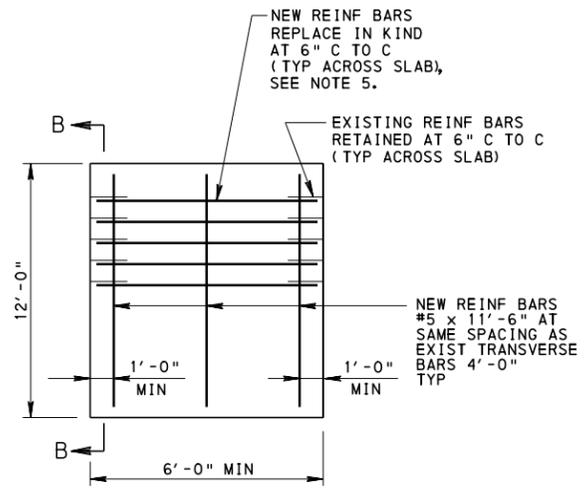
RECOMMENDED SEPT. 15, 2016  
*Melissa D. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt E. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

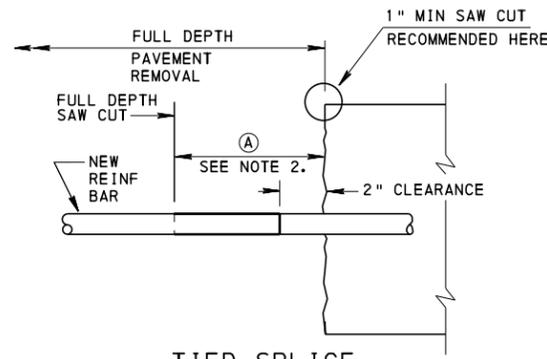
SHT 6 OF 11  
RC-26M



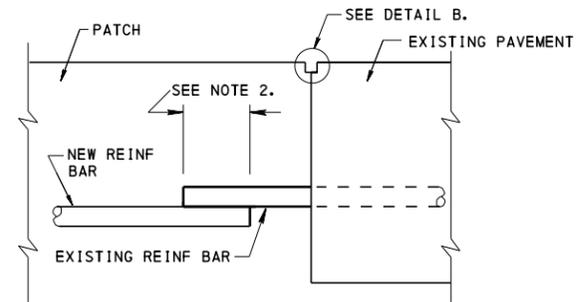
C R C PATCH



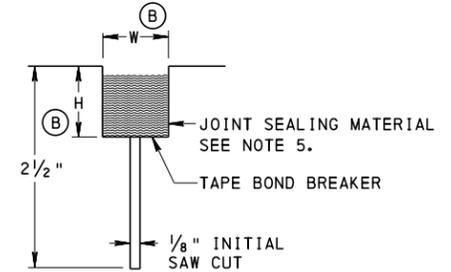
TIED SPLICE REINFORCEMENT BAR DETAIL



TIED SPLICE TYPICAL SECTION



DETAIL A PATCHING JOINT DETAILS



DETAIL B

LEGEND

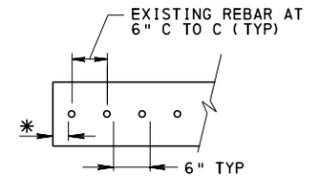
- \* MAINTAIN EXISTING EDGE CLEARANCE.
- o EXISTING REBARS
- o NEW REBARS

(A) USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:

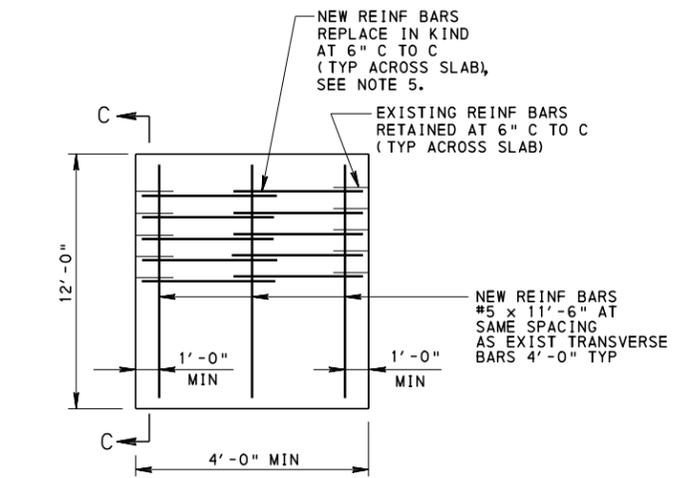
BAR SIZE	DEVELOPMENT LENGTH
#5	1'-8"
#6	1'-9"
#7	2'-3"

(B)

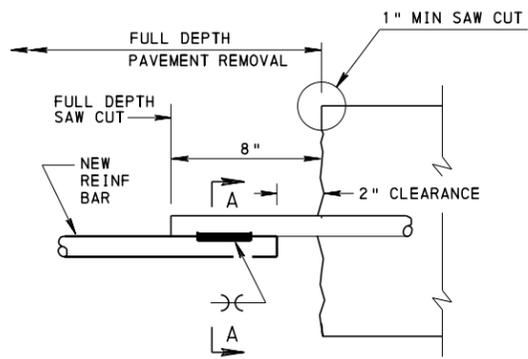
PATCH LENGTH	W	H
≥ 50'-0"	1"	1 1/4"
≥ 20'-0" & < 50'-0"	3/4"	1"
< 20'-0"	3/8"	3/4"



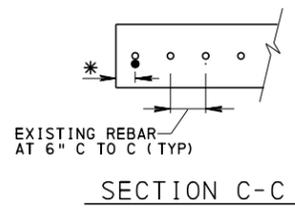
SECTION B-B



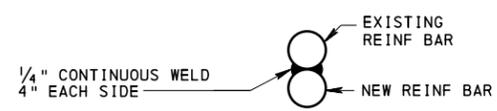
WELDED SPLICE REINFORCEMENT BAR DETAIL



WELDED SPLICE TYPICAL SECTION



SECTION C-C



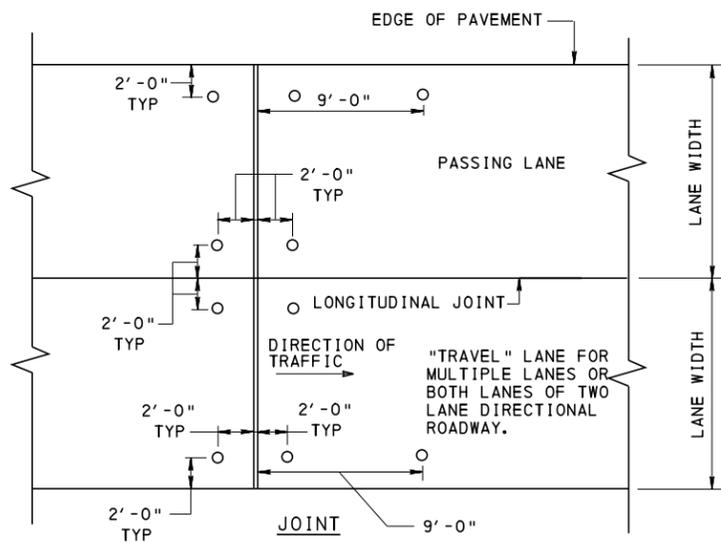
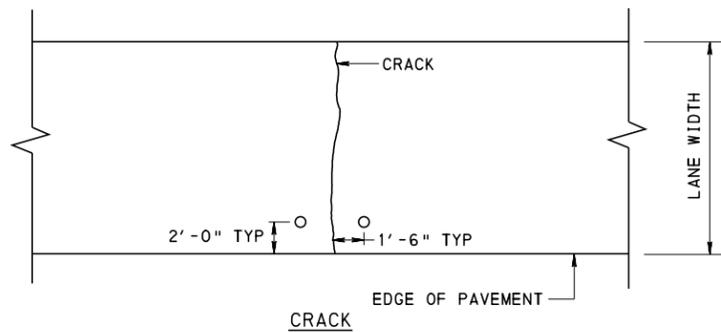
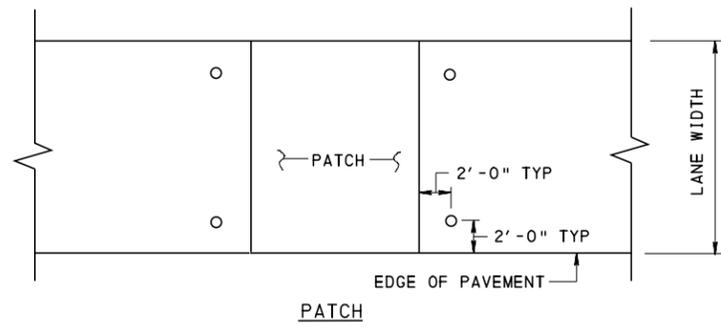
SECTION A-A

NOTES

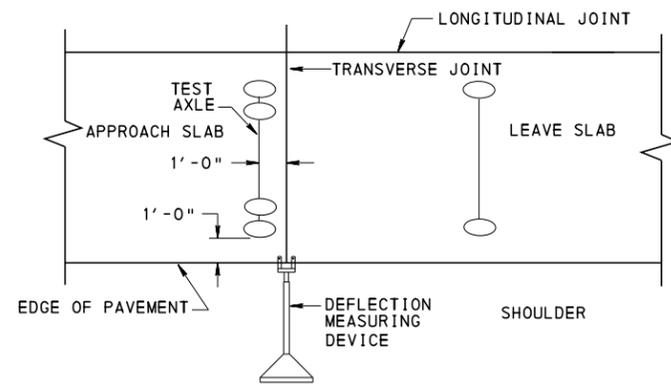
1. REMOVE 20" MIN BY HAND FOR TIED SPLICES. REMOVE 8" BY HAND FOR WELDED SPLICES.
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 6".
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 2'-0".
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 6" C TO C, MATCH EXISTING REINFORCING.
6. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE PAVEMENT SURFACE.

COMMONWEALTH OF PENNSYLVANIA  
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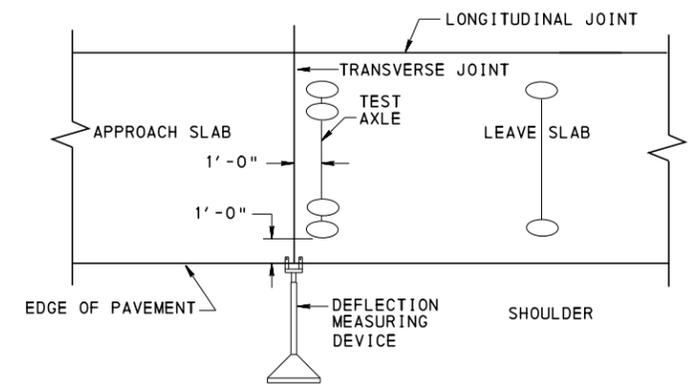
CONCRETE PAVEMENT  
REHABILITATION  
(C R C PATCHING)



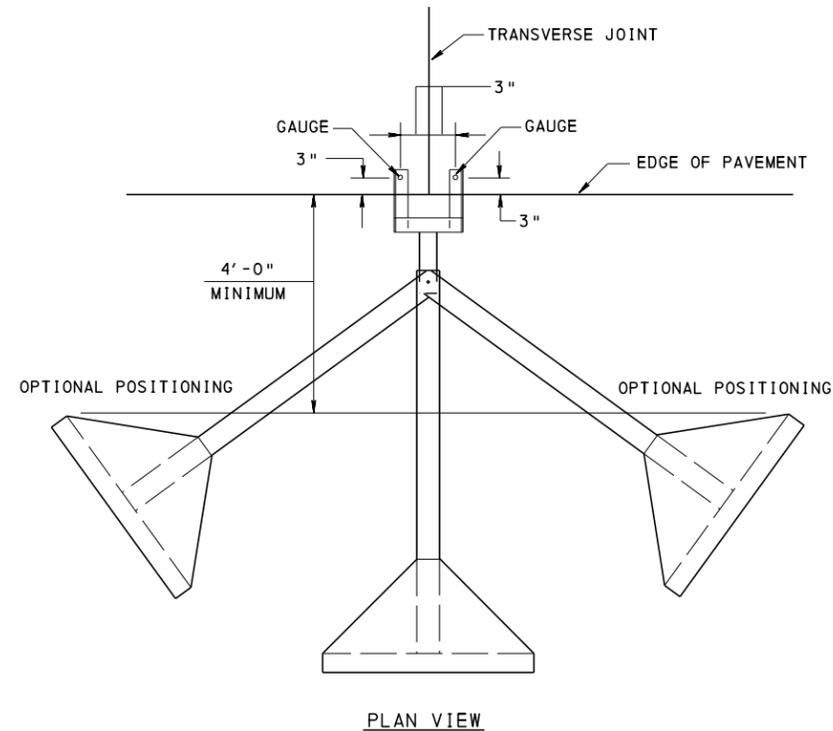
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



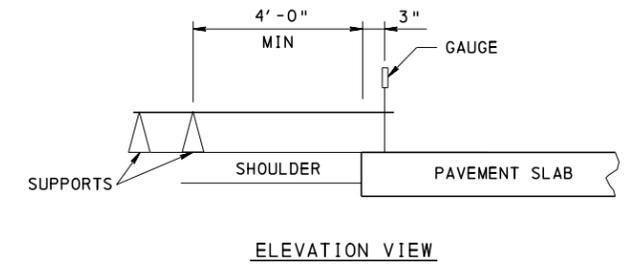
POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB



POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED LEAVE SLAB



TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT



ELEVATION VIEW

NOTE

1. DRILL NEW HOLES FOR REGROUTING 6" CLOSER TO JOINT OR CRACK.

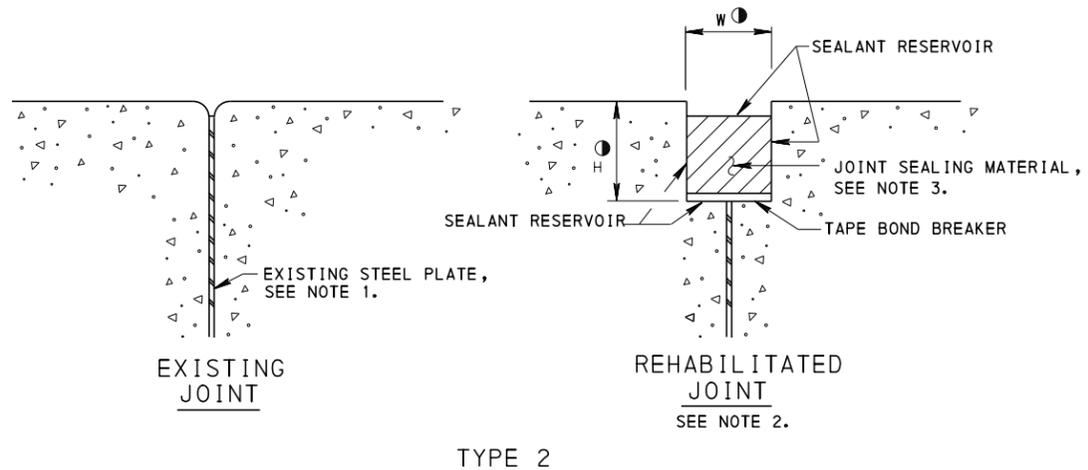
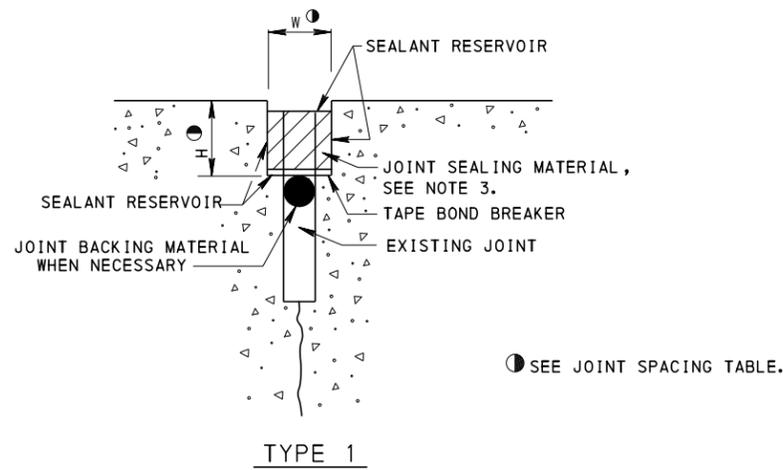
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
(SLAB STABILIZATION  
DEFLECTION TESTING)

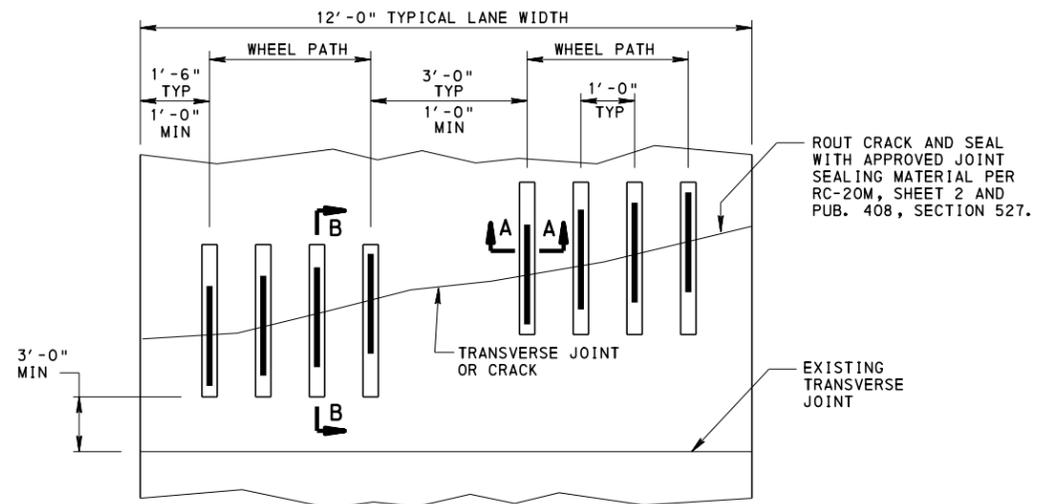
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
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RECOMMENDED SEPT. 15, 2016  
*Bruce J. Taylor*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 8 OF 11  
RC-26M



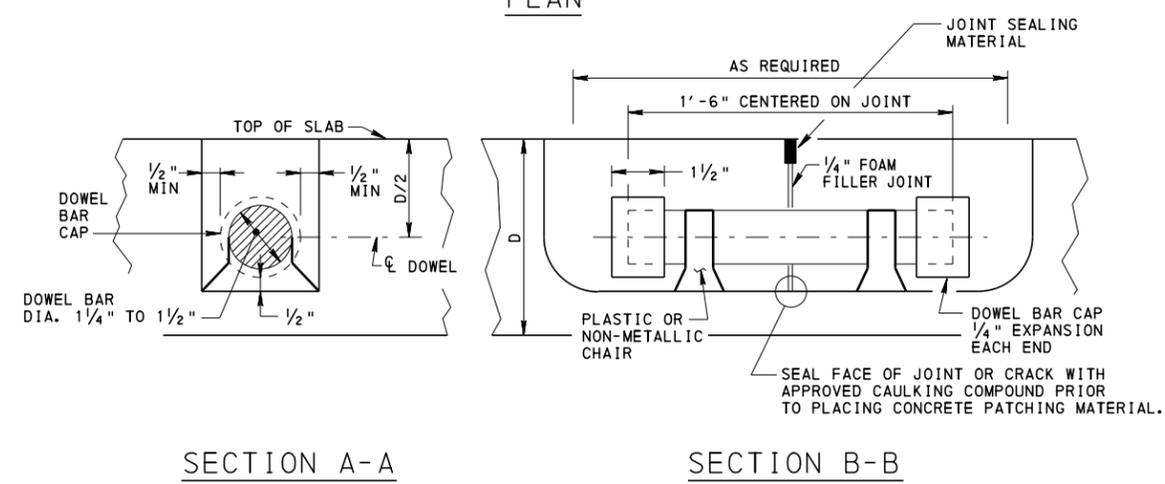
## JOINT REHABILITATION



JOINT SPACING	W	H
≥50'-0"	1"	1 1/4"
≥20'-0" AND <50'-0"	3/4"	1"
<20'-0"	3/8"	3/4"

### NOTES

- EXISTING STEEL PLATE IS EITHER 14 GAUGE WITH LAPPED TOP OR FLAT PLATE 1/8" THICK.
- REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT.

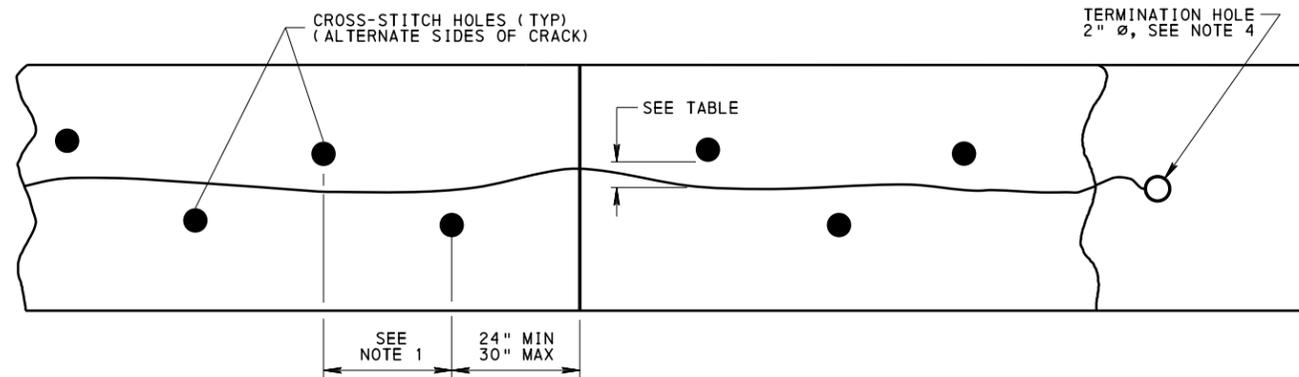


## DOWEL RETROFIT

- NOTES:
- FOR DIFFERENT LANE WIDTHS, ADJUST SPACING FROM OUTSIDE BAR TO LANE EDGE AND SPACING BETWEEN CENTER BARS.
  - SIZE DOWEL BAR AS SHOWN ON RC-20M, SHEET 1.
  - PLACE DOWEL BAR AT THE MID-DEPTH OF THE THINNER PAVEMENT SLAB WHEN REPAIR AREA SPANS DIFFERENT PAVEMENT SLABS.

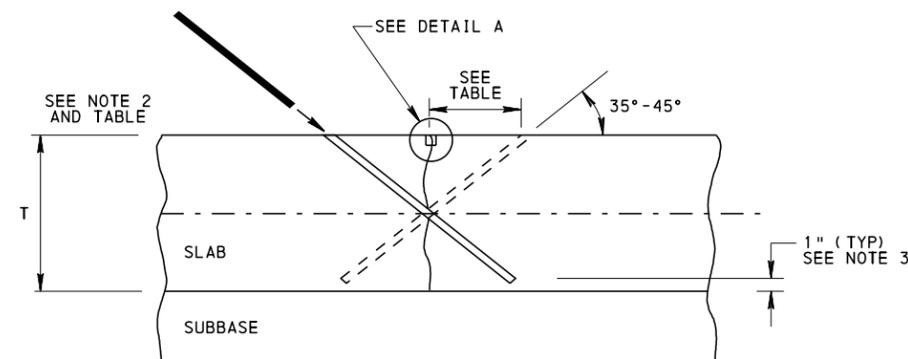
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## CONCRETE PAVEMENT REHABILITATION ( JOINTS )

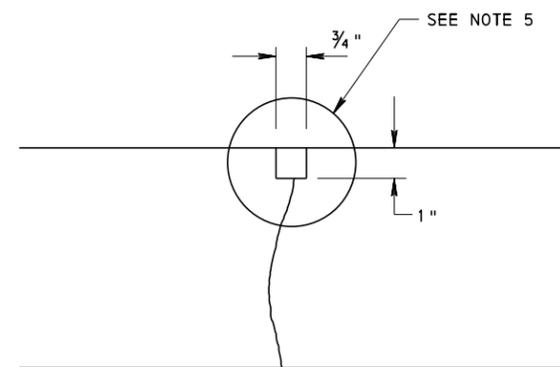


CROSS-STITCHING BAR DIMENSIONS AND LOCATION OF DRILL HOLES								
ANGLE	SLAB THICKNESS							
	8"	9"	10"	11"	12"	13"	14"	15"
	DISTANCE TO HOLE							
35°	5 3/4"	6 1/2"	7 1/4"	7 3/4"	8 1/2"			
40°				6 1/2"	7 1/4"	7 3/4"	8 1/4"	
45°					6"	6 1/2"	7"	7 1/2"
	LENGTH OF BAR							
35°	9 1/2"	11"	12 1/2"	14 1/2"	16"			
40°				12 1/2"	14"	16"	18 1/2"	
45°					12"	14"	16 1/2"	18"
	DIAMETER OF BAR							
	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"

TOP VIEW



CROSS-SECTIONAL VIEW



DETAIL A

NOTES

1. PROVIDE DISTANCE OF 18" MINIMUM, 24" MAXIMUM BETWEEN HOLES.
2. EPOXY DEFORMED BAR INTO HOLE. FOR LENGTH SHOWN IN TABLE, PROVIDE 1" COVER (TYPICAL) AT SURFACE AND BOTTOM. ASSUME DRILLING AS DESCRIBED IN NOTE 3.
3. DO NOT DRILL HOLE COMPLETELY THROUGH SLAB. STOP DRILLING SO EPOXY WILL NOT RUN OUT OF THE BOTTOM WHILE BACKFILLING.
4. IF THE CRACK IS NOT THE ENTIRE LENGTH OF THE SLAB, DRILL 2" Ø HOLES AT THE END OF THE CRACK. BACKFILL HOLE WITH APPROVED RAPID SET PATCHING MATERIAL AS SPECIFIED IN PUBLICATION 408, SECTION 525.
5. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT.

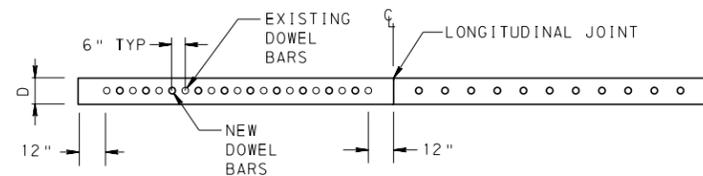
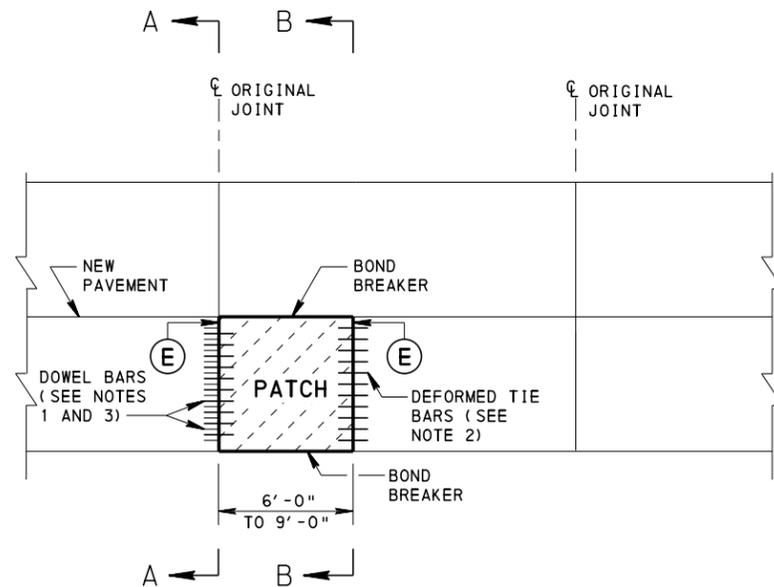
COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
( CROSS-STITCHING )

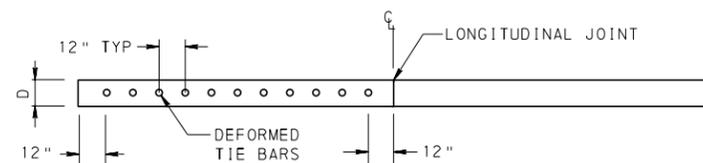
RECOMMENDED SEPT. 15, 2016  
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SHT 10 OF 11  
RC-26M



SECTION A-A



SECTION B-B

TYPICAL NEW PAVEMENT REPAIR DETAILS

**LEGEND**  
 (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

**NOTES**

1. USE MINIMUM 1 1/4"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1 1/2"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED. COATED DOWEL BARS TO BE EITHER GRADE 40 OR GRADE 60.
2. USE MINIMUM 1 1/4"Ø x 18" LONG DEFORMED TIE BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1 1/2"Ø x 18" LONG DEFORMED TIE BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DEFORMED TIE BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DEFORMED TIE BARS MAY BE USED. DEFORMED TIE BARS MAY BE EITHER GRADE 40 OR GRADE 60.
3. INSTALL NEW DOWEL BARS EQUIDISTANT (6" TYP) FROM EXISTING DOWEL BARS, AS SHOWN IN SECTION A-A.

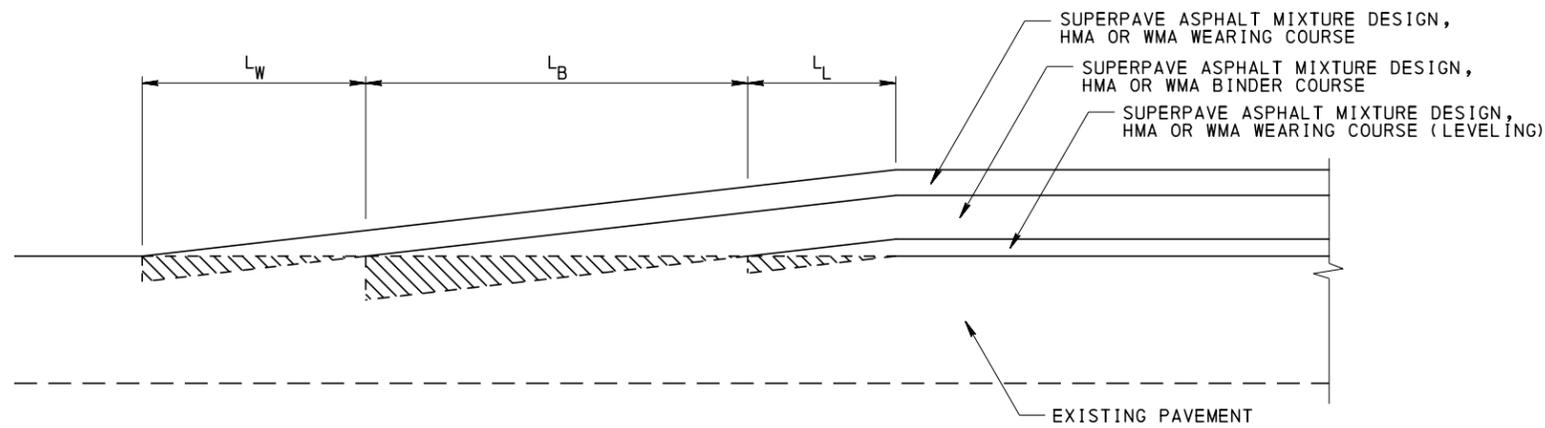
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
 REHABILITATION  
 (NEW PAVEMENT REPAIR DETAIL)

RECOMMENDED SEPT. 15, 2016  
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SHT 11 OF 11  
 RC-26M



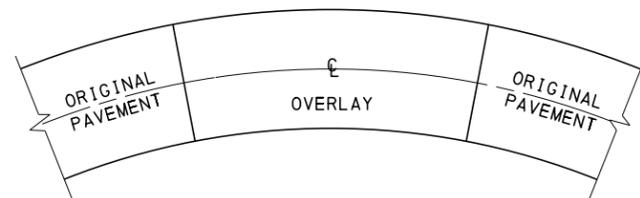
**TYPICAL PAVING NOTCH DETAIL**

**LEGEND**

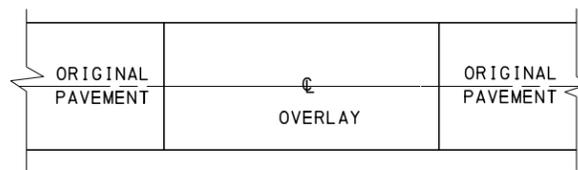


DENOTES AN AREA OF THE EXISTING PAVEMENT TO BE MILLED TO PROVIDE PROPER TRANSITION FOR THE NEW PAVEMENT COURSE. THE DEPTH SHOULD EQUAL THE NOMINAL DEPTH OF THE NEW PAVEMENT COURSE AND GRADUALLY TAPER TO NOTHING OVER A LENGTH ( $L_w$ ,  $L_b$ , OR  $L_l$ ) SHOWN IN TABLE A. THE VARIABLE DEPTH MILLING IS INCIDENTAL TO THE PAVING ITEM.

$L_w$  = THE MINIMUM LENGTH OF EXISTING PAVEMENT TO BE MILLED FOR THE WEARING COURSE.  
 $L_b$  = THE MINIMUM LENGTH OF EXISTING PAVEMENT TO BE MILLED FOR THE BINDER COURSE.  
 $L_l$  = THE MINIMUM LENGTH OF EXISTING PAVEMENT TO BE MILLED FOR THE LEVELING COURSE.

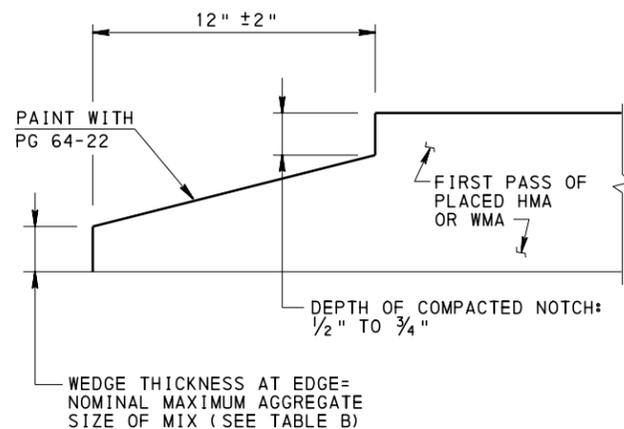


**PLAN VIEW  
SUPERELEVATION SECTION**

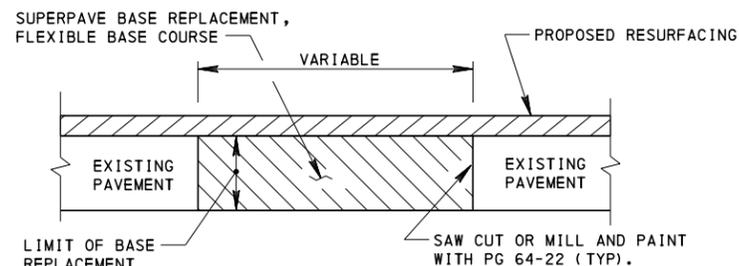


**PLAN VIEW  
TANGENT SECTION  
TWO-LANE, TWO-WAY TRAFFIC AND  
TWO-LANE DIRECTIONAL**

**OVERLAY TRANSITIONS**



**LONGITUDINAL NOTCHED WEDGE JOINT**



**ELEVATION  
SUPERPAVE BASE REPLACEMENT  
SEE NOTES 3, 4, 5 AND 6.**

**TABLE A**

REGULATORY POSTED SPEED LIMIT (mph)	MINIMUM LENGTH OF MILLING		
	$L_l$	$L_b$	$L_w$
> 65	35'	80'	80'
≥ 55 TO < 65	35'	80'	60'
≥ 45 TO < 55	25'	35'	30'
< 45	15'	25'	20'

**TABLE B**

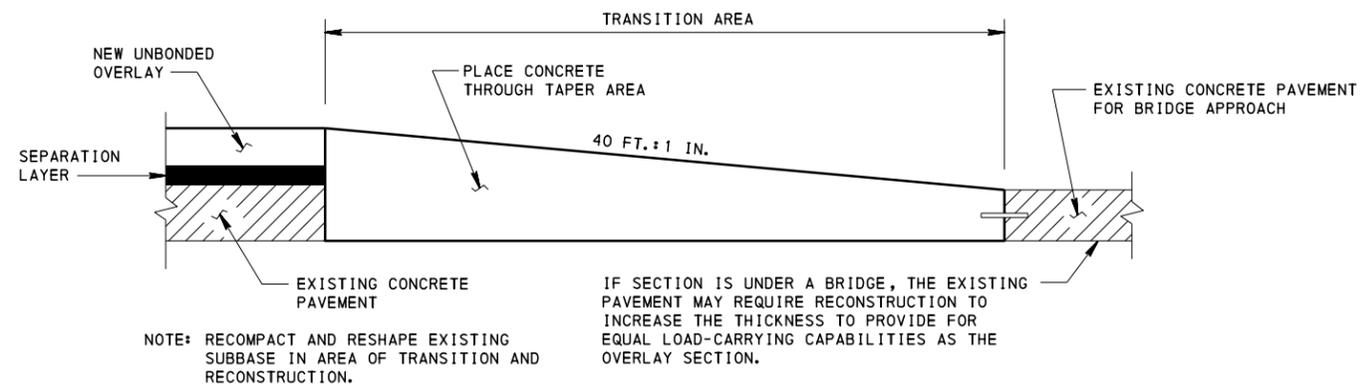
NOMINAL MAXIMUM AGGREGATE SIZE	
MIX	ENGLISH
SP9.5	3/8"
SP12.5	1/2"
SP19	3/4"

**NOTES**

1. PLACE EDGE FLUSH WITH EXISTING PAVEMENT AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 409.3(k)3.
2. CONSTRUCT FLEXIBLE BASE REPLACEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 316.
3. PREPARE EXPOSED VERTICAL AND HORIZONTAL SURFACES AS PER PUBLICATION 408, SECTION 409.3(k).
4. FOR NON-OVERLAY APPLICATIONS, THE TOP 1/2" OF BASE REPLACEMENT WILL BE SUPERPAVE WEARING COURSE.
5. FOR RESTORATION OF RIGID PAVEMENT, REFER TO PUBLICATION 408, SECTION 516 AND RC-26M.
6. FOR SUPERPAVE BASE REPLACEMENT, SAW CUTTING, EXCAVATION, HAULING AND DISPOSAL, BITUMINOUS TACK COAT, BITUMINOUS MATERIAL, AND SEALING OF THE JOINTS ARE CONSIDERED AS INCIDENTAL.

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**OVERLAY TRANSITIONS  
AND  
PAVING NOTCHES**



OVERLAY TRANSITION FOR UNBONDED  
CONCRETE OVERLAYS TO MEET BRIDGE APPROACH  
SLABS OR MAINTAIN CLEARANCE UNDER BRIDGES

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

OVERLAY TRANSITIONS  
AND  
PAVING NOTCHES

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RECOMMENDED SEPT. 15, 2016  
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SHT 2 OF 2  
RC-28M

**GENERAL NOTES:**

1. USE THIS STANDARD FOR SANITARY SEWER MANHOLES.
2. DESIGN INFORMATION PROVIDED WITHIN THIS STANDARD IS BASED ON GRAVITY TYPE SANITARY SEWER SYSTEMS. FORCED SANITARY SEWER SYSTEM MANHOLES MUST BE DESIGNED BY OTHERS.
3. DESIGN SPECIFICATIONS AND REQUIREMENTS:
  - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
  - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
  - ASTM C478 (AASHTO M199) - STANDARD SPECIFICATION FOR CIRCULAR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
  - MANHOLES ARE DESIGNED FOR AN ALLOWABLE FOUNDATION PRESSURE EQUAL TO 2.0 TONS/SQ. FT. AT THE SERVICE LIMIT STATE.
4. CONSTRUCTION SPECIFICATIONS:
  - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
  - CONSTRUCT MANHOLES IN ACCORDANCE WITH THIS STANDARD AND THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS AND REQUIREMENTS.
5. SHOP DRAWINGS FOR MANHOLES, ECCENTRIC CONES, REDUCER CONES, TOP SLABS, TRANSITION SLABS AND GRADE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
6. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF AND THE SEWER AUTHORITY FOR REVIEW AND ACCEPTANCE.
7. THE DESIGNER IS RESPONSIBLE FOR DETERMINING THE TYPE OF MANHOLE REQUIRED BASED ON THE REQUIRED PIPE SIZE(S) AND PIPE OPENING(S). THE DESIGNER IS ALSO RESPONSIBLE TO DETERMINE THE REQUIRED PAY ITEM FOR AN INSTALLATION BASED ON THE OVERALL INSTALLATION HEIGHT.
8. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIC MANHOLE ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY. INLET BOXES ARE NOT PERMITTED AS A SUBSTITUTION FOR SANITARY SEWER MANHOLES.
9. MANHOLES THAT EXCEED THE MAXIMUM HEIGHT INDICATED REQUIRE SPECIAL DESIGN AND DETAILS. DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.
10. SHOW ORIENTATION OF PIPES ON THE CONSTRUCTION DRAWINGS.
11. TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT MANHOLE SECTION.
12. WEEPHOLES ARE NOT PERMITTED IN SANITARY SEWER MANHOLES. MANHOLES MUST BE WATERTIGHT.
13. PROVIDE MANHOLE STEPS IN ALL MANHOLE ASSEMBLIES. SHALLOW RECESSES, ON THE INSIDE FACE OF THE MANHOLE, NOT GREATER THAN 3/8" IN DEPTH, FORMED BY MAGNETIC STEP FORMERS ARE ACCEPTABLE AND DO NOT REQUIRE PATCHING. ALTERNATE CONFIGURATIONS AND DIMENSIONS, AS APPROVED BY THE ENGINEER AND THE SEWER AUTHORITY, ARE PERMITTED.
14. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE CONFORMING TO THE SHAPE OF THE LOWER HALF OF THE INCOMING AND OUTGOING PIPES. PROVIDE A FULL DEPTH U-SHAPED CHANNEL WHEN NECESSARY TO REDUCE ENERGY LOSSES. REFER TO FIELD CONSTRUCTION NOTE 5.
15. IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF AND THE SEWER AUTHORITY.
16. REFER TO RC-39M - STORM WATER MANHOLES FOR THE FOLLOWING:
  - MANHOLE TYPES
  - MANHOLE ASSEMBLY DETAILS
  - GRADE ADJUSTMENTS RINGS
  - MANHOLE COVERS AND FRAMES
  - MANHOLE STEPS
  - SUBBASE PREPARATION
  - TOP SLAB DETAILS
  - TRANSITION SLAB DETAILS
  - CAST-IN-PLACE CONCRETE MANHOLE DETAILS AND DESIGN TABLES
  - PRECAST CONCRETE MANHOLE DETAILS AND DESIGN TABLES
  - PRECAST CONCRETE ECCENTRIC CONE DETAILS
  - PRECAST CONCRETE REDUCER CONE DETAILS
  - DOGHOUSE MANHOLE DETAILS

**MATERIAL NOTES:**

1. PROVIDE THE FOLLOWING CONCRETE CLASS:
  - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH, f'c = 3,000 PSI]
  - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH, f'c = 4,000 PSI]
2. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
3. REINFORCEMENT STEEL:
  - PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR A706. DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.
  - PROVIDE MINIMUM LAP AND EMBEDMENT LENGTHS FOR REINFORCING BARS IN ACCORDANCE WITH STANDARD DRAWING BC-736M. (REFER TO TABLE ON RC-39M, SHEET 3, FOR SPLICE LENGTHS.)
  - BAR SPACING:
    - MINIMUM SPACING = 3"
    - MAXIMUM SPACING = 12"
  - PERMITTED BAR SIZES
    - MANHOLES: #3, #4, #5, AND #6
    - LARGER BARS SIZES ARE PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
4. WELDED WIRE FABRIC (WWF):
  - PROVIDE GRADE 65 PLAIN WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A185 OR GRADE 70 DEFORMED WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A497.
  - PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER OF TWO GRID SPACINGS OR 12".
  - WIRE SPACING:
    - MINIMUM SPACING = 2"
    - MAXIMUM HORIZONTAL WIRE SPACING = 6"
    - MAXIMUM WIRE SPACING IN BOTTOM SLAB = 6"
  - PERMITTED WIRE SIZES
    - MAXIMUM WIRE SIZE = W20 OR D20
    - WWF IS NOT PERMITTED IN CAST-IN-PLACE MANHOLES.
    - WWF IS NOT PERMITTED IN TOP SLABS.
5. MINIMUM AREA OF STEEL REQUIREMENTS IN MANHOLES:
  - WALLS:
    - HORIZONTAL STEEL = 0.0025 TIMES THE INTERNAL DIAMETER IN INCHES
  - VERTICAL STEEL:
    - CAST-IN-PLACE MANHOLES = 0.12 IN<sup>2</sup>/FT
    - PRECAST MANHOLES: EACH LINE OF HORIZONTAL REINFORCEMENT SHALL BE ASSEMBLED INTO A CAGE THAT SHALL CONTAIN SUFFICIENT VERTICAL BARS OR MEMBERS TO MAINTAIN THE REINFORCEMENT IN SHAPE AND POSITION WITHIN THE FORM.
  - BOTTOM SLAB:
    - TOP MAT = 0.12 IN<sup>2</sup>/FT EACH WAY
    - BOTTOM MAT = 0.12 IN<sup>2</sup>/FT EACH WAY
6. NON-SHRINK GROUT:
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
7. EPOXY BONDING COMPOUND:
  - PROVIDE EPOXY BONDING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 706.1.
8. MORTAR:
  - PROVIDE MORTAR IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.7(b).
9. CAULKING COMPOUND:
  - PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.8(d).
10. BUTYL RUBBER SEALANT:
  - PROVIDE BUTYL RUBBER SEALANT IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b) 2.
11. GASKETS FOR JOINTS BETWEEN MANHOLE SECTIONS:
  - PROVIDE RUBBER GASKETS (ASTM A443) OR NEOPRENE GASKETS (ASTM C361) IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b) 1.
12. GASKETS FOR PIPE OPENINGS:
  - PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b) 3.
13. MANHOLE STEPS:
  - PROVIDE MANHOLE STEPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(c).
14. SUBBASE MATERIAL AND PREPARATION:
  - PROVIDE NO. 2A COARSE AGGREGATE IN ACCORDANCE WITH PUBLICATION 408, SECTION 703.2 AND COMPACT IN ACCORDANCE WITH SECTION 350.3(e).
  - PLACE AND COMPACT IN 4" MAXIMUM LAYERS.
  - MINIMUM DEPTH = 12"
15. PRECAST CONCRETE SETTING BLOCKS (FOR TYPE B DOGHOUSE MANHOLE):
  - PROVIDE PRECAST CONCRETE BLOCKS IN ACCORDANCE WITH PUBLICATION 408, SECTION 713.2.
16. WATERSTOPS:
  - PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(c) 2.
17. PROTECTIVE COATINGS:
  - PROVIDE INTERIOR AND EXTERIOR COATINGS IN ACCORDANCE WITH THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS.

INDEX OF SHEETS	
SHEET NO.	SHEET TITLE
1	GENERAL NOTES - 1
2	GENERAL NOTES - 2
3	DETAILS

**FIELD CONSTRUCTION NOTES:**

1. CONSTRUCT OR PLACE MANHOLES LEVEL, UNLESS OTHERWISE INDICATED OR DIRECTED.
2. CONSTRUCT OR PLACE MANHOLES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A COARSE AGGREGATE. PLACE IN 4" LAYERS TO A PROVIDE A 12" MINIMUM DEPTH.
3. LOCATE PIPE OR PIPES AS INDICATED.
4. CONNECT PIPES TO MANHOLE WITH FLEXIBLE CONNECTORS (GASKETS).
5. FORM BOTTOM OF MANHOLE TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. CHANNEL MAY BE FORMED IN THE FIELD USING CLASS A CEMENT CONCRETE OR BY THE FABRICATOR AFTER THE BASE SECTION IS FABRICATED USING CLASS AA CEMENT CONCRETE, MODIFIED.
6. TEST MANHOLES PER THE SEWER AUTHORITY SPECIFICATIONS.
7. BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE, WITH ACCEPTABLE EMBANKMENT MATERIAL.
8. THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE MANHOLE PAY ITEM: EXCAVATION, COMPACTED NO. 2A COARSE AGGREGATE, MANHOLE, TOP SLAB, TRANSITION SLAB, CHANNEL CONCRETE, BACKFILL AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE CONSTRUCTION OF THE MANHOLE.
9. THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE MANHOLE FRAME AND COVER PAY ITEM: FRAME, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SANITARY SEWER MANHOLES  
GENERAL NOTES - 1

RC-30M	SUBSTRUCTURE DRAINS
RC-39M	STORM WATER MANHOLES
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 3 <b>RC-38M</b>
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### PIPE LOCATION AND PIPE OPENING NOTES:

1. LOCATE THE TOP OF PIPE AT LEAST 6" BELOW THE ROADWAY SUBGRADE ELEVATION. FOR ADDITIONAL INFORMATION REFER TO RC-30M. (SUBGRADE IS DEFINED AS THE BOTTOM OF THE PAVEMENT STRUCTURE.)
2. PROVIDE PIPE OPENING(S) IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONNECTOR'S MANUFACTURER.
3. LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 4" OF CONCRETE BETWEEN THE TOP OR BOTTOM OF A MANHOLE SECTION AND THE PIPE OPENING.
4. LOCATE PIPE OPENINGS A MINIMUM OF 1" ABOVE THE TOP OF THE BOTTOM SLAB.
5. PIPE OPENINGS ARE NOT PERMITTED TO BE LOCATED BETWEEN MANHOLE SECTIONS.
6. LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 8" OF CONCRETE BETWEEN THE BOTTOM OF A TRANSITION SLAB AND TOP OF PIPE OPENING.
7. HORIZONTAL PIPE OPENINGS AT THE SAME DEPTH: LOCATE PIPE OPENINGS A MINIMUM OF 12" APART ALONG THE INSIDE FACE OF THE MANHOLE.
8. VERTICAL PIPE OPENINGS: LOCATE PIPE OPENINGS A MINIMUM OF 12" OR ONE HALF THE MAXIMUM PIPE OPENING APART.
9. LOCATE PIPE OPENINGS PER THE CONSTRUCTION DRAWINGS OR AS DIRECTED.
10. LOCATE PIPE OPENINGS WITHIN MANHOLE. DO NOT CUT THE TOP SLAB OR TRANSITION SLAB TO ACCOMMODATE PIPES.
11. TAPERED PIPE OPENINGS ARE PERMITTED.
12. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND PIPE OPENINGS AS INDICATED OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS 15" OR LESS. ADDITIONAL STEEL IS PERMITTED TO BE ADDED AROUND THE PIPE OPENING TO KEEP THE "HOLE FORM" IN PLACE DURING CONSTRUCTION OR FABRICATION.
13. PIPE OPENINGS ARE PERMITTED TO BE FORMED (PREFERRED) OR CORED. IF A CORED OPENING IS USED, PLACE REINFORCEMENT AROUND PROPOSED OPENING AS INDICATED OR REQUIRED. DO NOT CUT REINFORCEMENT WHEN CORING HOLES, UNLESS THE OPENING IS 15" OR LESS.

### TOP SLAB NOTES:

1. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME UNLESS AN ECCENTRIC CONE IS USED.

### ROUND TRANSITION SLAB NOTES:

1. REFER TO ROUND TRANSITION SLAB NOTES ON RC-39M.

### DOGHOUSE MANHOLE NOTES:

1. REFER TO DOGHOUSE MANHOLE NOTES ON RC-39M.

### DESIGN TABLE NOTES:

1. REFER TO DESIGN TABLES ON RC-39M.

### CAST-IN-PLACE CONCRETE MANHOLE NOTES:

1. CONSTRUCT MANHOLES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS.
2. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME.
3. ECCENTRIC CONES AND REDUCER CONES ARE NOT PERMITTED.
4. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED. (SEE ROUND TRANSITION SLAB NOTES.)
5. CLEAR COVER FOR STEEL:
  - WALLS: 2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2 1/2"
    - BOTTOM COVER: 3"
    - SIDE COVER: 2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 2"
6. MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM TRANSITION SLAB THICKNESS: 10"
  - MINIMUM WALL THICKNESS:
    - TYPE 4, 5, 6, 7 AND 8: INSIDE DIAMETER/12 + 1"
    - TYPE 10 AND 12: INSIDE DIAMETER/12
  - MINIMUM BOTTOM SLAB THICKNESS: 9"
7. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE, UNLESS A TRANSITION SLAB IS USED.
8. WALL TAPERS ARE NOT PERMITTED.
9. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE MANHOLES.
10. WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE 3" MINIMUM BETWEEN THE PIPE OPENING AND TOP OF THE BOTTOM SLAB.
11. KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
12. PROVIDE A KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE MANHOLE.
13. PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
14. PROVIDE KEYED CONSTRUCTION JOINTS BETWEEN CONCRETE POURS.
15. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.
16. SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0" (2'-0" PREFERRED)
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 8'-0"
17. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

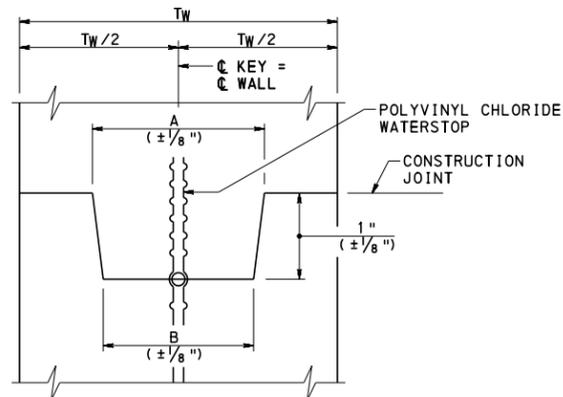
### PRECAST CONCRETE MANHOLE NOTES:

1. CONSTRUCT MANHOLES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605 AND 714 AND THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS.
2. PROVIDE PRECAST CONCRETE MANHOLES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME, UNLESS AN ECCENTRIC CONE TOP SECTION IS USED.
4. ECCENTRIC CONES ARE ONLY PERMITTED TO BE PLACED ON TOP OF A TYPE 4 MANHOLE OR ON TOP OF A TYPE 5 TO TYPE 4 REDUCER CONE OR ON TOP OF A TRANSITION SLAB.
5. REDUCER CONES MAY BE USED TO REDUCE THE MANHOLE SIZE FROM A TYPE 5 TO A TYPE 4 AND/OR A TYPE 6 TO A TYPE 5. A MAXIMUM OF TWO REDUCER CONES IS PERMITTED PER MANHOLE ASSEMBLY.
6. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED, UNLESS REDUCER CONES CAN BE USED. (SEE ROUND TRANSITION SLAB NOTES.)
7. CLEAR COVER FOR STEEL:
  - WALLS: 1 1/2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1 1/2"
    - SIDE COVER: 1 1/2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1 1/2"
8. MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM TRANSITION SLAB THICKNESS: 10"
  - MINIMUM WALL THICKNESS:
    - TYPE 4, 5, 6, 7 AND 8: INSIDE DIAMETER/12 + 1"
    - TYPE 10 AND 12: INSIDE DIAMETER/12
  - MINIMUM BOTTOM SLAB THICKNESS: 7"
9. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE, UNLESS A TRANSITION SLAB OR REDUCER CONES ARE USED.
10. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
11. LIFTING INSERTS:
  - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
  - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION.
  - PROVIDE LIFTING INSERTS WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.
12. WALL TAPERS MAY BE PROVIDED ON THE INSIDE VERTICAL FACE OF BASE SECTIONS TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN INTERNAL BOTTOM DIMENSIONS THAT ARE UP TO 2" LESS THAN THE INSIDE DIAMETER OF THE MANHOLE. THE OUTSIDE DIAMETER MUST NOT CHANGE.
13. JOINTS MAY BE CONSTRUCTED WITH EITHER THE BELL UPWARD AND SPIGOT (TONGUE) DOWNWARD OR BELL DOWNWARD AND SPIGOT (TONGUE) UPWARD. CLEAN JOINTS THOROUGHLY BEFORE PLACING NEXT SEGMENT. PLACE JOINT MATERIAL IN ACCORDANCE WITH THIS STANDARD AND MANUFACTURER'S RECOMMENDATIONS. IF A GASKET IS USED TO SEAL THE JOINT, REVISE THE JOINT DETAIL TO ACCOMMODATE THE GASKET.
14. CONTRACTOR/FABRICATOR TO DETERMINE THE TYPE OF MATERIAL USED IN THE JOINTS.
15. ALL JOINTS MUST BE WATERTIGHT.
16. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE MANHOLE.
17. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
18. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN MANHOLE SECTIONS.
19. PROVIDE A JOINT WITH A POLYVINYL CHLORIDE WATERSTOP IN THE BASE SECTION BETWEEN THE WALL AND BOTTOM SLAB IF THE BOTTOM SLAB IS NOT POURED WITH THE WALLS. (REFER TO DETAILS ON RC-39M.)
20. SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0" (2'-0" PREFERRED)
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 8'-0"
21. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

### SANITARY SEWER MANHOLES GENERAL NOTES - 2

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT <u>2</u> OF 3 <b>RC-38M</b>
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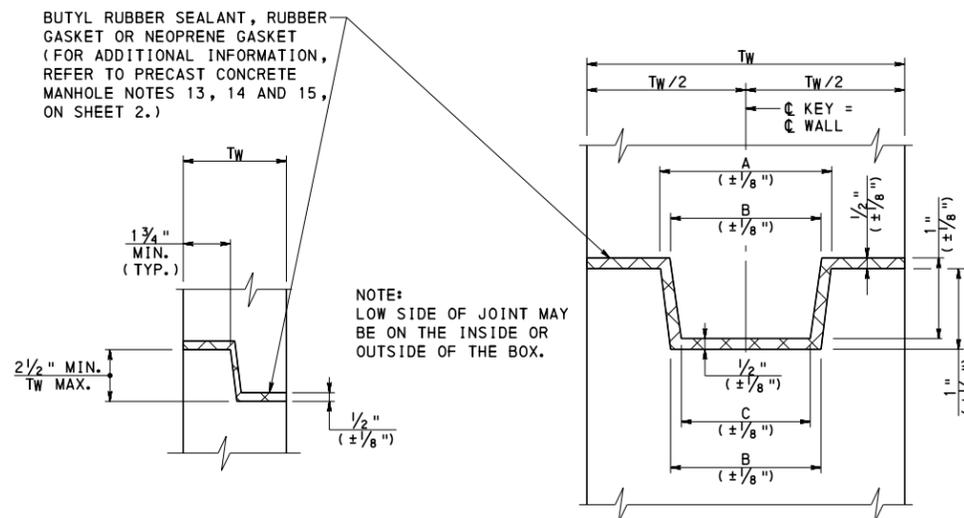


**JOINT DETAIL (CAST-IN-PLACE)**

(KEYED CONSTRUCTION JOINT)

JOINT WIDTHS		
MANHOLE TYPE	A (IN.)	B (IN.)
TYPE 4	1 1/2	1 1/4
TYPE 5	2	1 3/4
TYPE 6	2	1 3/4

**CAST-IN-PLACE MANHOLES**

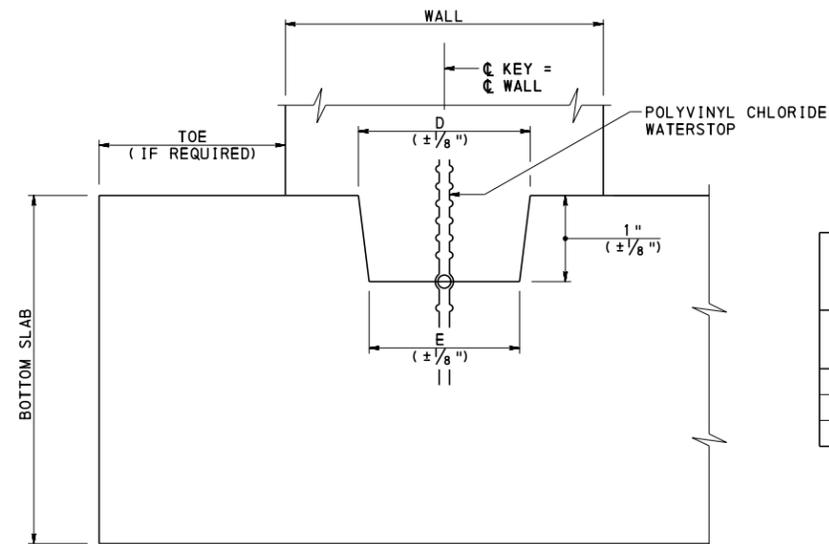


**OPTION 1 (SHIPLAP JOINT)**

**OPTION 2 (KEYED JOINT)**

**JOINT DETAILS (PRECAST)**

JOINT WIDTHS FOR KEYED JOINTS			
MANHOLE TYPE	A (IN.)	B (IN.)	C (IN.)
TYPE 4	1 1/2	1 1/4	1
TYPE 5	2	1 3/4	1 1/2
TYPE 6	2	1 3/4	1 1/2



**JOINT DETAIL BETWEEN BOTTOM SLAB AND WALL**

(REQUIRED WHEN BOTTOM SLAB IS NOT POURED WITH THE WALLS)

NOTE:  
FOR OPTIONAL DETAILS, SEE DETAIL C ON RC-39M, SHEET 25. WATERSTOP MUST BE INCLUDED.

JOINT WIDTHS		
MANHOLE TYPE	D (IN.)	E (IN.)
TYPE 4	1 1/2	1 1/4
TYPE 5	2	1 3/4
TYPE 6	2	1 3/4

**PRECAST MANHOLES**

**WATERSTOP NOTES:**

1. PROVIDE A CONTINUOUS WATERSTOP. SPLICE THE WATERSTOP PER MANUFACTURER'S RECOMMENDATIONS. LAPPING OF WATERSTOP IS NOT PERMITTED.
2. PROVIDE HOLES OR SLOTS IN WATERSTOP AS REQUIRED, WHEN NECESSARY TO ACCOMMODATE REINFORCEMENT STEEL, BUT DO NOT COMPROMISE THE SEAL.
3. PLACE WATERSTOP AT THE CENTERLINE OF THE WALL.

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 2.
2. FOR MANHOLE TYPES, SEE RC-39M, SHEET 4.
3. FOR CAST-IN-PLACE MANHOLE DETAILS AND DESIGN TABLES, SEE RC-39M, SHEETS 20 - 23.
4. FOR PRECAST MANHOLE DETAILS AND DESIGN TABLES, SEE RC-39M, SHEETS 24 - 28.
5. REINFORCEMENT NOT SHOWN IN JOINT DETAILS FOR CLARITY.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**SANITARY SEWER MANHOLES  
DETAILS**

RECOMMENDED SEPT. 15, 2016  
*Michael J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Benjamin J. ...*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 3  
RC-38M

## GENERAL NOTES:

- USE THIS STANDARD FOR STORM WATER MANHOLES.
- DESIGN SPECIFICATIONS AND REQUIREMENTS:
  - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
  - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
  - ASTM C478 (AASHTO M199) - STANDARD SPECIFICATION FOR CIRCULAR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
  - MANHOLES ARE DESIGNED FOR AN ALLOWABLE FOUNDATION PRESSURE EQUAL TO 2.0 TONS/SQ. FT. AT THE SERVICE LIMIT STATE.
- CONSTRUCTION SPECIFICATIONS:
  - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
- SHOP DRAWINGS FOR MANHOLES, ECCENTRIC CONES, REDUCER CONES, TOP SLABS, TRANSITION SLABS AND GRADE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.
- THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
- THE DESIGNER IS RESPONSIBLE FOR DETERMINING THE TYPE OF MANHOLE REQUIRED BASED ON THE REQUIRED PIPE SIZE(S) AND PIPE OPENING(S). REFER TO TABLES A AND B ON SHEET 7 FOR ADDITIONAL INFORMATION. THE DESIGNER IS ALSO RESPONSIBLE TO DETERMINE THE REQUIRED PAY ITEM FOR AN INSTALLATION BASED ON THE OVERALL INSTALLATION HEIGHT.
- THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIC MANHOLE ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
  - THE CONTRACTOR/FABRICATOR IS PERMITTED TO SUBSTITUTE AN INLET BOX FOR A MANHOLE IF ACCEPTED BY THE ENGINEER.
- MANHOLES THAT EXCEED THE MAXIMUM HEIGHT INDICATED REQUIRE SPECIAL DESIGN AND DETAILS. DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.
- SHOW ORIENTATION OF PIPES ON THE CONSTRUCTION DRAWINGS.
- TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT MANHOLE SECTIONS.
- PROVIDE 2" DIAMETER WEEPHOLES IN THE WALLS WHEN THE DEPTH BETWEEN THE FINISHED GRADE ELEVATION AND THE TOP OF THE BOTTOM SLAB ELEVATION IS GREATER THAN 10'-0".
  - VERTICAL PLACEMENT: LOCATE THE TOP WEEP HOLE 8'-0" MAXIMUM BELOW THE FINISHED GRADE ELEVATION. LOCATE ADDITIONAL WEEPHOLES AT 5'-0" MAXIMUM SPACING.
  - HORIZONTAL PLACEMENT: PLACE TWO (2) WEEPHOLES IN THE WALLS 180 DEGREES APART.
  - LOCATE WEEPHOLES A MINIMUM OF 6" FROM PIPE OPENINGS OR JOINTS.
  - LOCATE WEEPHOLES A MINIMUM OF 1'-0" ABOVE THE OUTLET PIPE INVERT.
- PROVIDE MANHOLE STEPS IN ALL MANHOLE ASSEMBLIES. SHALLOW RECESSES, ON THE INSIDE FACE OF THE MANHOLE, NOT GREATER THAN 3/8" IN DEPTH, FORMED BY MAGNETIC STEP FORMERS ARE ACCEPTABLE AND DO NOT REQUIRE PATCHING. ALTERNATE CONFIGURATIONS AND DIMENSIONS, AS APPROVED BY THE ENGINEER, ARE PERMITTED.
- FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE CONFORMING TO THE SHAPE OF THE LOWER HALF OF THE INCOMING AND OUTGOING PIPES. PROVIDE A FULL DEPTH U-SHAPED CHANNEL WHEN NECESSARY TO REDUCE ENERGY LOSSES. REFER TO FIELD CONSTRUCTION NOTE 5.
- IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF.

## FIELD CONSTRUCTION NOTES:

- CONSTRUCT OR PLACE MANHOLES LEVEL, UNLESS OTHERWISE INDICATED OR DIRECTED.
- CONSTRUCT OR PLACE MANHOLES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A COARSE AGGREGATE. PLACE IN 4" LAYERS TO PROVIDE A 12" MINIMUM DEPTH.
- LOCATE PIPE OR PIPES AS INDICATED.
- CONNECT PIPES TO MANHOLE WITH MORTAR OR FLEXIBLE CONNECTORS (GASKETS).
- FORM BOTTOM OF MANHOLE TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. CHANNEL MAY BE FORMED IN THE FIELD USING CLASS A CEMENT CONCRETE OR BY THE FABRICATOR AFTER THE BASE SECTION IS FABRICATED USING CLASS AA CEMENT CONCRETE, MODIFIED.
- BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE, WITH ACCEPTABLE EMBANKMENT MATERIAL.
- THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE MANHOLE PAY ITEM: EXCAVATION, COMPACTED NO. 2A COARSE AGGREGATE, MANHOLE, TOP SLAB, TRANSITION SLAB, CHANNEL CONCRETE, BACKFILL AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE CONSTRUCTION OF THE MANHOLE.
- THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE MANHOLE FRAME AND COVER PAY ITEM: FRAME, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.

## MATERIAL NOTES:

- PROVIDE THE FOLLOWING CONCRETE CLASS:
  - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH,  $f'c = 3,000$  PSI]
  - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH,  $f'c = 4,000$  PSI]
- A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
- REINFORCEMENT STEEL:
  - PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR A706. DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.
  - PROVIDE MINIMUM LAP AND EMBEDMENT LENGTHS FOR REINFORCING BARS IN ACCORDANCE WITH STANDARD DRAWING BC-736M. (REFER TO TABLE ON SHEET 3 FOR SPLICE LENGTHS.)
  - BAR SPACING:
    - MINIMUM SPACING = 3"
    - MAXIMUM SPACING = 12"
  - PERMITTED BAR SIZES:
    - MANHOLES: #3, #4, #5, AND #6
    - LARGER BARS SIZES ARE PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
- WELDED WIRE FABRIC (WWF):
  - PROVIDE GRADE 65 PLAIN WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A185 OR GRADE 70 DEFORMED WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A497.
  - PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER OF TWO GRID SPACINGS OR 12".
  - WIRE SPACING:
    - MINIMUM SPACING = 2"
    - MAXIMUM HORIZONTAL WIRE SPACING = 6"
    - MAXIMUM WIRE SPACING IN BOTTOM SLAB = 6"
  - PERMITTED WIRE SIZES:
    - MAXIMUM WIRE SIZE = W20 OR D20
    - WWF IS NOT PERMITTED IN CAST-IN-PLACE MANHOLES.
    - WWF IS NOT PERMITTED IN TOP SLABS OR TRANSITION SLABS.
- MINIMUM AREA OF STEEL REQUIREMENTS IN MANHOLES:
  - WALLS:
    - HORIZONTAL STEEL = 0.0025 TIMES THE INTERNAL DIAMETER IN INCHES
  - VERTICAL STEEL:
    - CAST-IN-PLACE MANHOLES = 0.12 IN<sup>2</sup>/FT
    - PRECAST MANHOLES: EACH LINE OF HORIZONTAL REINFORCEMENT SHALL BE ASSEMBLED INTO A CAGE THAT SHALL CONTAIN SUFFICIENT VERTICAL BARS OR MEMBERS TO MAINTAIN THE REINFORCEMENT IN SHAPE AND POSITION WITHIN THE FORM.
  - BOTTOM SLAB:
    - TOP MAT = 0.12 IN<sup>2</sup>/FT EACH WAY
    - BOTTOM MAT = 0.12 IN<sup>2</sup>/FT EACH WAY
- NON-SHRINK GROUT:
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
- EPOXY BONDING COMPOUND:
  - PROVIDE EPOXY BONDING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 706.1.
- MORTAR:
  - PROVIDE MORTAR IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.7(b).
- CAULKING COMPOUND:
  - PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.8(a).
- BUTYL RUBBER SEALANT:
  - PROVIDE BUTYL RUBBER SEALANT IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)2.
- GASKETS FOR JOINTS BETWEEN MANHOLE SECTIONS:
  - PROVIDE RUBBER GASKETS (ASTM C443) OR NEOPRENE GASKETS (ASTM C361) IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)1.
- GASKETS FOR PIPE OPENINGS:
  - PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)3.
- MANHOLE STEPS:
  - PROVIDE MANHOLE STEPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(c).
- SUBBASE MATERIAL AND PREPARATION:
  - PROVIDE NO. 2A COARSE AGGREGATE IN ACCORDANCE WITH PUBLICATION 408, SECTION 703.2 AND COMPACT IN ACCORDANCE WITH SECTION 350.3(e).
  - PLACE AND COMPACT IN 4" MAXIMUM LAYERS.
  - MINIMUM DEPTH = 12"
- PRECAST CONCRETE SETTING BLOCKS (FOR TYPE B DOGHOUSE MANHOLE):
  - PROVIDE PRECAST CONCRETE BLOCKS IN ACCORDANCE WITH PUBLICATION 408, SECTION 713.2.

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11	TOP SLABS - 1
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29	DOGHOUSE MANHOLES - 1
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COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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## STORM WATER MANHOLES GENERAL NOTES - 1

RC-30M	SUBSTRUCTURE DRAINS
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Benjamin J. Edman</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 30
		RC-39M

## PIPE LOCATION AND PIPE OPENING NOTES:

- LOCATE THE TOP OF PIPE AT LEAST 6" BELOW THE ROADWAY SUBGRADE ELEVATION. FOR ADDITIONAL INFORMATION REFER TO RC-30M. (SUBGRADE IS DEFINED AS THE BOTTOM OF THE PAVEMENT STRUCTURE.)
- PROVIDE A MINIMUM DROP OF AT LEAST 2" BETWEEN THE INLET PIPE INVERT ELEVATION AND THE OUTLET PIPE INVERT ELEVATION, WHENEVER POSSIBLE.
- PIPE OPENINGS:
  - WITHOUT FLEXIBLE CONNECTOR (GASKET):
    - PROVIDE OPENING(S) AT LEAST 2" BUT NOT MORE THAN 4" LARGER THAN THE OUTSIDE DIAMETER OF THE SPECIFIED PIPE.
  - WITH FLEXIBLE CONNECTOR (GASKET):
    - PROVIDE PIPE OPENING(S) IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONNECTOR'S MANUFACTURER.
- LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 4" OF CONCRETE BETWEEN THE TOP OR BOTTOM OF A MANHOLE SECTION AND THE PIPE OPENING.
- LOCATE PIPE OPENINGS A MINIMUM OF 1" ABOVE THE TOP OF THE BOTTOM SLAB. IF REINFORCED CONCRETE PIPE IS USED, THE PIPE OPENING MAY BE FORMED "FLUSH" WITH THE TOP OF THE BOTTOM SLAB.
- WHEN PROJECT CONDITIONS REQUIRE THE PIPE OPENINGS TO BE LOCATED BETWEEN MANHOLE SECTIONS, PROVIDE AN ADDITIONAL #3 HORIZONTAL BAR. LOCATE BARS 1/2" CLEAR FROM THE TOP OR BOTTOM OF THE SECTION. CUT BAR IN FIELD PRIOR TO INSTALLING PIPE. GASKETS ARE NOT PERMITTED WHEN THE OPENINGS ARE LOCATED BETWEEN MANHOLE SECTIONS.
- LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 8" OF CONCRETE BETWEEN THE BOTTOM OF A TRANSITION SLAB AND THE TOP OF THE PIPE OPENING.
- HORIZONTAL PIPE OPENINGS AT THE SAME DEPTH: LOCATE PIPE OPENINGS A MINIMUM OF 12" APART ALONG THE INSIDE FACE OF THE MANHOLE.
- VERTICAL PIPE OPENINGS: LOCATE PIPE OPENINGS A MINIMUM OF 12" OR ONE HALF THE MAXIMUM PIPE OPENING APART.
- LOCATE PIPE OPENINGS PER THE CONSTRUCTION DRAWINGS OR AS DIRECTED.
- LOCATE PIPE OPENINGS WITHIN MANHOLE. DO NOT CUT THE TOP SLAB OR TRANSITION SLAB TO ACCOMMODATE PIPES.
- TAPERED PIPE OPENINGS ARE PERMITTED.
- PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND PIPE OPENINGS AS INDICATED OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS 15" OR LESS. ADDITIONAL STEEL IS PERMITTED TO BE ADDED AROUND THE PIPE OPENING TO KEEP THE "HOLE FORM" IN PLACE DURING CONSTRUCTION OR FABRICATION.
- PIPE OPENINGS ARE PERMITTED TO BE FORMED (PREFERRED) OR CORED. IF A CORED OPENING IS USED, OR REQUIRED, PLACE REINFORCEMENT AROUND PROPOSED OPENING AS INDICATED OR REQUIRED. DO NOT CUT REINFORCEMENT WHEN CORING HOLES, UNLESS THE OPENING IS 15" OR LESS.

## TOP SLAB NOTES:

- PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME UNLESS AN ECCENTRIC CONE IS USED.
- PROVIDE A "TOP SLAB FOR INLET TOP" ONLY IF INDICATED ON THE CONTRACT DRAWINGS OR IF DIRECTED.

## CAST-IN-PLACE CONCRETE MANHOLE NOTES:

- CONSTRUCT MANHOLES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
- PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME.
- ECCENTRIC CONES AND REDUCER CONES ARE NOT PERMITTED.
- PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED. (SEE TRANSITION SLAB NOTES.)
- CLEAR COVER FOR STEEL:
  - WALLS: 2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2 1/2"
    - BOTTOM COVER: 3"
    - SIDE COVER: 2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 2"
- MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM TRANSITION SLAB THICKNESS: 10"
  - MINIMUM WALL THICKNESS:
    - TYPE 4, 5, 6, 7, AND 8: INSIDE DIAMETER/12 + 1"
    - TYPE 10 AND 12: INSIDE DIAMETER/12
  - MINIMUM BOTTOM SLAB THICKNESS: 9"
- THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE, UNLESS A TRANSITION SLAB IS USED.
- WALL TAPERS ARE NOT PERMITTED.
- WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE MANHOLES.
- WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE 3" MINIMUM BETWEEN THE PIPE OPENING AND TOP OF THE BOTTOM SLAB.
- KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
- PROVIDE A KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE MANHOLE.
- PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
- PROVIDE KEYED CONSTRUCTION JOINTS BETWEEN CONCRETE POURS.
- SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0" (2'-0" PREFERRED)
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 8'-0"
- USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

## ROUND TRANSITION SLAB NOTES:

- USE A ROUND TRANSITION SLAB TO TRANSITION A LARGER MANHOLE SIZE (LOWER SECTION) TO A TYPE 4 MANHOLE (UPPER SECTION) OR A ECCENTRIC CONE.
- THE DESIGNER IS NOT RESPONSIBLE TO SPECIFY A TRANSITION SLAB. THE DESIGNER IS ONLY RESPONSIBLE FOR DETERMINING THE MAXIMUM MANHOLE SIZE REQUIRED WITHIN A MANHOLE ASSEMBLY BASED ON THE PIPE SIZE(S) AND THE OVERALL INSTALLATION HEIGHT.
- THE CONTRACTOR/FABRICATOR IS RESPONSIBLE TO DETERMINE WHEN A TRANSITION SLAB WILL BE USED BASED ON THE REQUIREMENTS OF THIS STANDARD AND THE CONTRACT DRAWINGS.
- ONLY ONE TRANSITION SLAB IS PERMITTED WITHIN A MANHOLE ASSEMBLY.
- THE TRANSITION SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT UPPER OR LOWER MANHOLE SECTIONS.

## SQUARE TRANSITION SLAB NOTES:

- THE CONTRACTOR/FABRICATOR MAY SUBSTITUTE THE LOWER MANHOLE SECTION WITH A TYPE 6, 7, 8, 9, OR 10 SQUARE INLET BOX AND PROVIDE A SQUARE TRANSITION SLAB ALONG WITH A TYPE 4 MANHOLE FOR THE UPPER SECTION OR A ECCENTRIC CONE IF ACCEPTED BY THE ENGINEER.

THE LOWER INLET BOX MUST ACCOMMODATE THE PIPE ORIENTATIONS SHOWN ON THE CONSTRUCTION DRAWINGS AND BE PROPERLY SIZED FOR THE REQUIRED PIPE OPENINGS.

THE LOWER INLET BOX MUST BE SQUARE USING THE BASE DIMENSIONS OF THE INLET BOX. REFER TO RC-46M FOR INLET BOX REQUIREMENTS.
- THE DESIGNER IS NOT RESPONSIBLE TO SPECIFY A TRANSITION SLAB. THE DESIGNER IS ONLY RESPONSIBLE FOR DETERMINING THE MAXIMUM MANHOLE SIZE REQUIRED WITHIN A MANHOLE ASSEMBLY BASED ON THE OVERALL INSTALLATION HEIGHT.
- THE CONTRACTOR/FABRICATOR IS RESPONSIBLE TO DETERMINE WHEN A TRANSITION SLAB WILL BE USED BASED ON THE REQUIREMENTS OF THIS STANDARD AND THE CONTRACT DRAWINGS.
- ONLY ONE TRANSITION SLAB IS PERMITTED WITHIN A MANHOLE/INLET ASSEMBLY.
- THE TRANSITION SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT UPPER MANHOLE SECTION OR THE LOWER INLET BOX SECTION.
- RECTANGLE TRANSITION SLABS ARE PERMITTED IF THE CONTRACTOR/FABRICATOR CHOOSES TO USE A RECTANGLE INLET BOX. THE CONTRACTOR/FABRICATOR IS RESPONSIBLE TO SUBMIT THE DESIGN CALCULATIONS AND DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY CHIEF FOR REVIEW AND ACCEPTANCE.

## PRECAST CONCRETE MANHOLE NOTES:

- CONSTRUCT MANHOLES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605 AND 714.
- PROVIDE PRECAST CONCRETE MANHOLES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
- PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME, UNLESS AN ECCENTRIC CONE TOP SECTION IS USED.
- ECCENTRIC CONES ARE ONLY PERMITTED TO BE PLACED ON TOP OF A TYPE 4 MANHOLE OR ON TOP OF A TYPE 5 TO TYPE 4 REDUCER CONE OR ON TOP OF A TRANSITION SLAB.
- REDUCER CONES MAY BE USED TO REDUCE THE MANHOLE SIZE FROM A TYPE 5 TO A TYPE 4 AND/OR A TYPE 6 TO A TYPE 5. A MAXIMUM OF TWO REDUCER CONES IS PERMITTED PER MANHOLE ASSEMBLY.
- PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED, UNLESS REDUCER CONES CAN BE USED. (SEE TRANSITION SLAB NOTES.)
- CLEAR COVER FOR STEEL:
  - WALLS: 1 1/2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1 1/2"
    - SIDE COVER: 1 1/2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1 1/2"
- MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM TRANSITION SLAB THICKNESS: 10"
  - MINIMUM WALL THICKNESS:
    - TYPE 4, 5, 6, 7, AND 8: INSIDE DIAMETER/12 + 1"
    - TYPE 10 AND 12: INSIDE DIAMETER/12
  - MINIMUM BOTTOM SLAB THICKNESS: 7"
- THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE, UNLESS A TRANSITION SLAB OR REDUCER CONES ARE USED.
- FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
- LIFTING INSERTS:
  - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
  - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION.
  - PROVIDE LIFTING INSERTS WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.
- WALL TAPERS MAY BE PROVIDED ON THE INSIDE VERTICAL FACE OF BASE SECTIONS TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN INTERNAL BOTTOM DIMENSIONS THAT ARE UP TO 2" LESS THAN THE INSIDE DIAMETER OF THE MANHOLE. THE OUTSIDE DIAMETER MUST NOT CHANGE.
- JOINTS MAY BE CONSTRUCTED WITH EITHER THE BELL UPWARD AND SPIGOT (TONGUE) DOWNWARD OR BELL DOWNWARD AND SPIGOT (TONGUE) UPWARD. CLEAN JOINTS THOROUGHLY BEFORE PLACING NEXT SEGMENT. PLACE JOINT MATERIAL IN ACCORDANCE WITH THIS STANDARD AND MANUFACTURER'S RECOMMENDATIONS. IF A GASKET IS USED TO SEAL THE JOINT, REVISE THE JOINT DETAIL TO ACCOMMODATE THE GASKET.
- CONTRACTOR/FABRICATOR TO DETERMINE THE TYPE OF MATERIAL USED IN THE JOINTS.
- PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE MANHOLE.
- PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
- PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN MANHOLE SECTIONS.
- PROVIDE A JOINT IN THE BASE SECTION BETWEEN THE WALL AND BOTTOM SLAB IF THE BOTTOM SLAB IS NOT POURED WITH THE WALLS. REFER TO DETAILS ON SHEET 25.
- SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0" (2'-0" PREFERRED)
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 8'-0"
- USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## STORM WATER MANHOLES GENERAL NOTES - 2

RECOMMENDED SEPT. 15, 2016

*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016

*Brian J. Dwyer*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT \_2 OF 30

RC-39M

**DESIGN TABLE GENERAL NOTES:**

- SEPARATE DESIGN TABLES ARE PROVIDED FOR CAST-IN-PLACE CONCRETE AND PRECAST CONCRETE MANHOLES.

**CAST-IN-PLACE CONCRETE MANHOLE DESIGN TABLE NOTES:**

- RISER AND BASE SECTIONS WERE DESIGNED BASED ON AN 8'-0" MAXIMUM HEIGHT.
- WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE CONCRETE MANHOLES.
- BASE SECTION DESIGN REQUIREMENTS:
  - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
  - GO TO THE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT.
- RISER SECTION DESIGN REQUIREMENTS:
  - GO TO THE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION.

**PRECAST CONCRETE MANHOLE DESIGN TABLE NOTES:**

- RISER AND BASE SECTIONS WERE DESIGNED BASED ON AN 8'-0" MAXIMUM HEIGHT.
- THE MINIMUM AREA OF STEEL IS SHOWN IN THE DESIGN TABLES. FABRICATOR IS TO USE ANY COMBINATION OF WELDED WIRE FABRIC AND/OR REINFORCEMENT BARS TO MEET THE MINIMUM AREA OF STEEL. THE REINFORCEMENT MUST MEET THE REQUIREMENTS OF MATERIAL NOTES 3, 4 AND 5 ON SHEET 1.
- WELDED WIRE FABRIC IS NOT PERMITTED FOR THE L-BARS.
- BASE SECTION DESIGN REQUIREMENTS:
  - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
  - GO TO THE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT.
- RISER SECTION DESIGN REQUIREMENTS:
  - GO TO THE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION.
- PROVIDE MARKINGS ON EACH SECTION TO CLEARLY IDENTIFY THE MAXIMUM ALLOWABLE DEPTH.

**DOGHOUSE MANHOLE NOTES:**

- DOGHOUSE MANHOLES ARE ONLY PERMITTED WHEN PLACING A NEW MANHOLE OVER AN EXISTING PIPE.
- PROVIDE PRECAST CONCRETE MANHOLE BASE SECTIONS. CAST-IN-PLACE CONCRETE MANHOLE BASE SECTIONS ARE NOT PERMITTED FOR DOGHOUSE MANHOLES.
- PIPE OPENINGS FOR EXISTING PIPE:
  - PROVIDE HORIZONTAL PIPE OPENING(S) AT LEAST 4" BUT NOT MORE THAN 8" LARGER THAN THE OUTSIDE DIAMETER OF THE EXISTING PIPE.
  - PROVIDE VERTICAL PIPE OPENING(S) AS REQUIRED TO ACCOMMODATE THE MANHOLE ASSEMBLY AND EXISTING PIPE.
  - LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 12" OF CONCRETE BETWEEN THE TOP OF THE BASE SECTION AND THE TOP OF THE PIPE OPENING.
  - PIPE OPENING IS NOT PERMITTED TO BE GREATER THAN 50% OF THE INSIDE DIAMETER OF THE MANHOLE.
- EXISTING PIPE:
  - SUPPORT EXISTING PIPE AS REQUIRED DURING CONSTRUCTION OPERATIONS.
  - NEATLY CUT THE TOP HALF OF THE EXISTING PIPE ALONG THE SPRING LINE BETWEEN THE INSIDE FACE OF THE NEW MANHOLE.
- SET DOGHOUSE MANHOLE TRULY VERTICAL. ADJUST PIPE OPENING HEIGHTS AS REQUIRED TO ACCOMMODATE EXISTING PIPE SLOPE.
- PROVIDE EITHER A TYPE A OR TYPE B DOGHOUSE MANHOLE. CONTRACTOR/FABRICATOR TO DETERMINE TYPE, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
- TYPE A DOGHOUSE MANHOLE:
  - DESCRIPTION: PRECAST CONCRETE BASE SECTION WITH A BOTTOM SLAB AND OPENING FOR AN EXISTING PIPE.
  - DESIGN REQUIREMENTS:
    - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
    - GO TO THE PRECAST CONCRETE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT. PROVIDE A 6" MINIMUM TOE.
  - CONSTRUCTION SEQUENCE:
    - FABRICATE MANHOLE TO ACCOMMODATE PIPE OPENING.
    - EXCAVATE, SUPPORT EXISTING PIPE AND PLACE AND COMPACT COARSE AGGREGATE.
    - INSTALL BASE SECTION.
    - CUT TOP HALF OF EXISTING PIPE AS REQUIRED.
    - FILL AREA BELOW THE EXISTING PIPE WITH CLASS A CEMENT CONCRETE AND PLACE CONCRETE CHANNEL.
    - SEAL REMAINING OPENING AT THE TOP OF THE PIPE.
    - COMPLETE CONSTRUCTION OF MANHOLE.
- TYPE B DOGHOUSE MANHOLE:
  - DESCRIPTION: PRECAST CONCRETE BASE SECTION WITHOUT A BOTTOM SLAB WITH AN OPENING FOR AN EXISTING PIPE AND A CAST-IN-PLACE BOTTOM SLAB.
  - DESIGN REQUIREMENTS:
    - BASE SECTION:
      - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
      - GO TO THE PRECAST CONCRETE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT.
    - BOTTOM SLAB:
      - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
      - GO TO THE CAST-IN-PLACE CONCRETE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION FOR THE BOTTOM SLAB BASED ON THE ROUNDED HEIGHT. PROVIDE A 1'-0" MINIMUM TOE.
  - CONSTRUCTION SEQUENCE:
    - FABRICATE MANHOLE TO ACCOMMODATE PIPE OPENING.
    - EXCAVATE, SUPPORT EXISTING PIPE AND PLACE AND COMPACT COARSE AGGREGATE.
    - INSTALL BASE SECTION. SET BASE SECTION ON PRECAST CONCRETE BLOCKS. PROVIDE A MINIMUM OF SIX BLOCKS EQUALLY SPACED AROUND EACH HALF OF THE CIRCUMFERENCE.
    - CONSTRUCT BOTTOM SLAB.
    - CUT TOP HALF OF EXISTING PIPE AS REQUIRED.
    - PLACE CONCRETE CHANNEL INCLUDING AREA BELOW EXISTING PIPE.
    - SEAL REMAINING OPENING AT THE TOP OF PIPE.
    - COMPLETE CONSTRUCTION OF MANHOLE.

REINFORCEMENT BAR AREAS	
BAR SIZE AND SPACING	STEEL AREA (IN. <sup>2</sup> /FT.)
#3 @ 11"	0.12
#3 @ 10"	0.13
#3 @ 9 1/2"	0.14
#3 @ 9"	0.15
#3 @ 8"	0.16
#3 @ 7 1/2"	0.18
#3 @ 7"	0.19
#3 @ 6 1/2"	0.20
#3 @ 6 1/4"	0.21
#3 @ 6"	0.22
#3 @ 5 1/2"	0.24
#3 @ 5"	0.26
#3 @ 4 1/2"	0.29
#3 @ 4"	0.33
#4 @ 12"	0.20
#4 @ 11 1/2"	0.21
#4 @ 11"	0.22
#4 @ 10"	0.24
#4 @ 9"	0.27
#4 @ 8"	0.30
#4 @ 7"	0.34
#4 @ 6"	0.40
#5 @ 12"	0.31
#5 @ 11"	0.34
#5 @ 10 1/4"	0.36
#5 @ 10"	0.37
#5 @ 9"	0.41

WELDED WIRE AREAS PLAIN [DEFORMED]	
WIRE SIZE	AREA (IN. <sup>2</sup> )
W1.4 [D1.4]	0.014
W1.5 [D1.5]	0.015
W2 [D2]	0.020
W2.1 [D2.1]	0.021
W2.5 [D2.5]	0.025
W2.9 [D2.9]	0.029
W3 [D3]	0.030
W3.5 [D3.5]	0.035
W4 [D4]	0.040
W4.5 [D4.5]	0.045
W5 [D5]	0.050
W5.5 [D5.5]	0.055
W6 [D6]	0.060
W6.5 [D6.5]	0.065
W7 [D7]	0.070
W7.5 [D7.5]	0.075
W8 [D8]	0.080
W8.5 [D8.5]	0.085
W9 [D9]	0.090
W9.5 [D9.5]	0.095
W10 [D10]	0.100
W10.5 [D10.5]	0.105
W11 [D11]	0.110
W12 [D12]	0.120
W14 [D14]	0.140
W16 [D16]	0.160
W18 [D18]	0.180
W20 [D20]	0.200

W = PLAIN WIRES  
D = DEFORMED WIRES

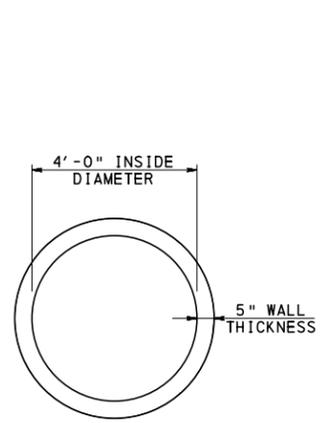
REINFORCEMENT BAR SPLICE LENGTHS		
BAR SIZE	CAST-IN-PLACE CONCRETE (CLASS A) f'c = 3000 psi	PRECAST CONCRETE (CLASS AA, MODIFIED) f'c = 4000 psi
#3	1'-4"	1'-4"
#4	1'-9"	1'-9"
#5	2'-2"	2'-2"
#6	2'-9"	2'-7"
#7	3'-9"	3'-3"
#8	4'-11"	4'-3"
#9	6'-3"	5'-5"
#10	7'-11"	6'-10"
#11	9'-9"	8'-5"

- NOTES:**
- SPLICE LENGTHS BASED ON UNCOATED DEFORMED BARS.
  - SPLICE LENGTHS BASED ON CLASS C SPLICE.

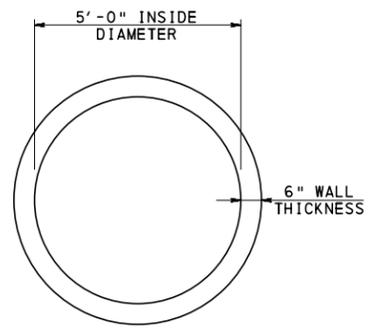
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
GENERAL NOTES - 3

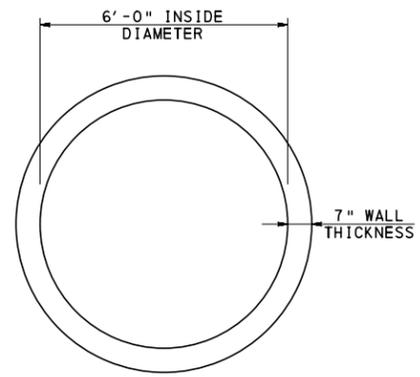
RECOMMENDED SEPT. 15, 2016 <i>Nelson J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Ben J. Tolan</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 3 OF 30 <b>RC-39M</b>
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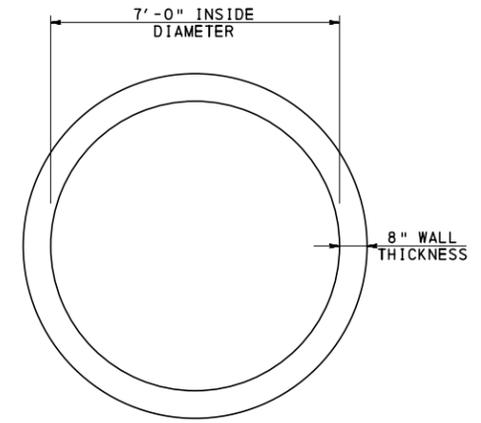
TYPE 4



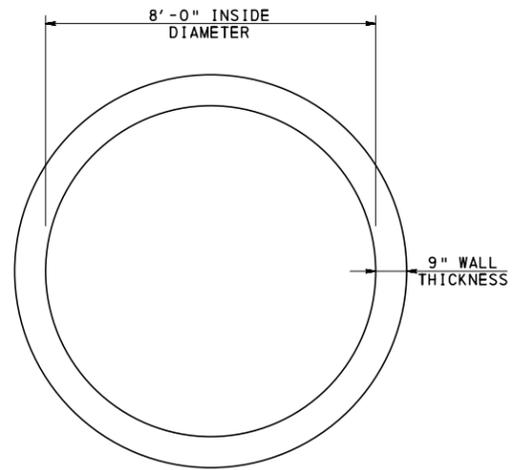
TYPE 5



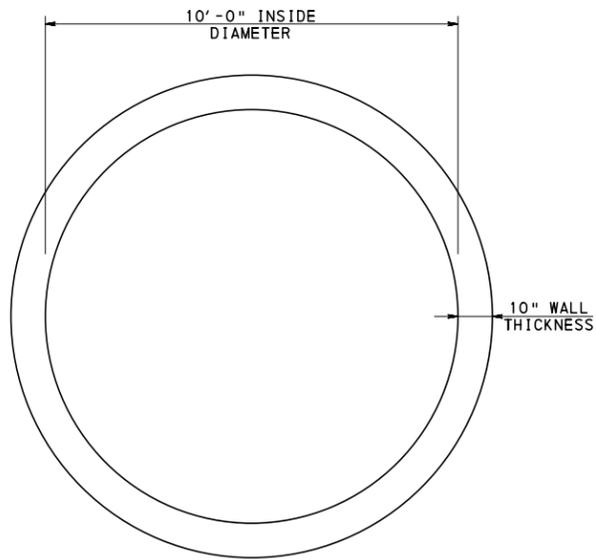
TYPE 6



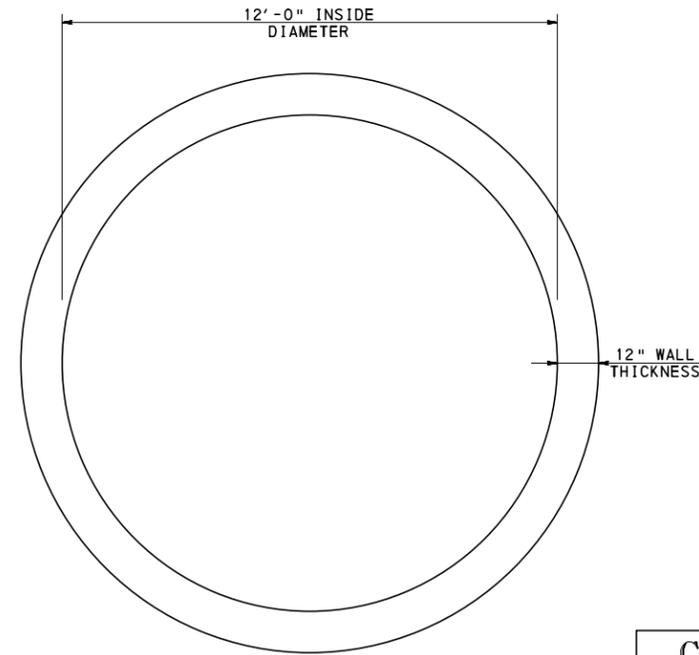
TYPE 7



TYPE 8



TYPE 10



TYPE 12

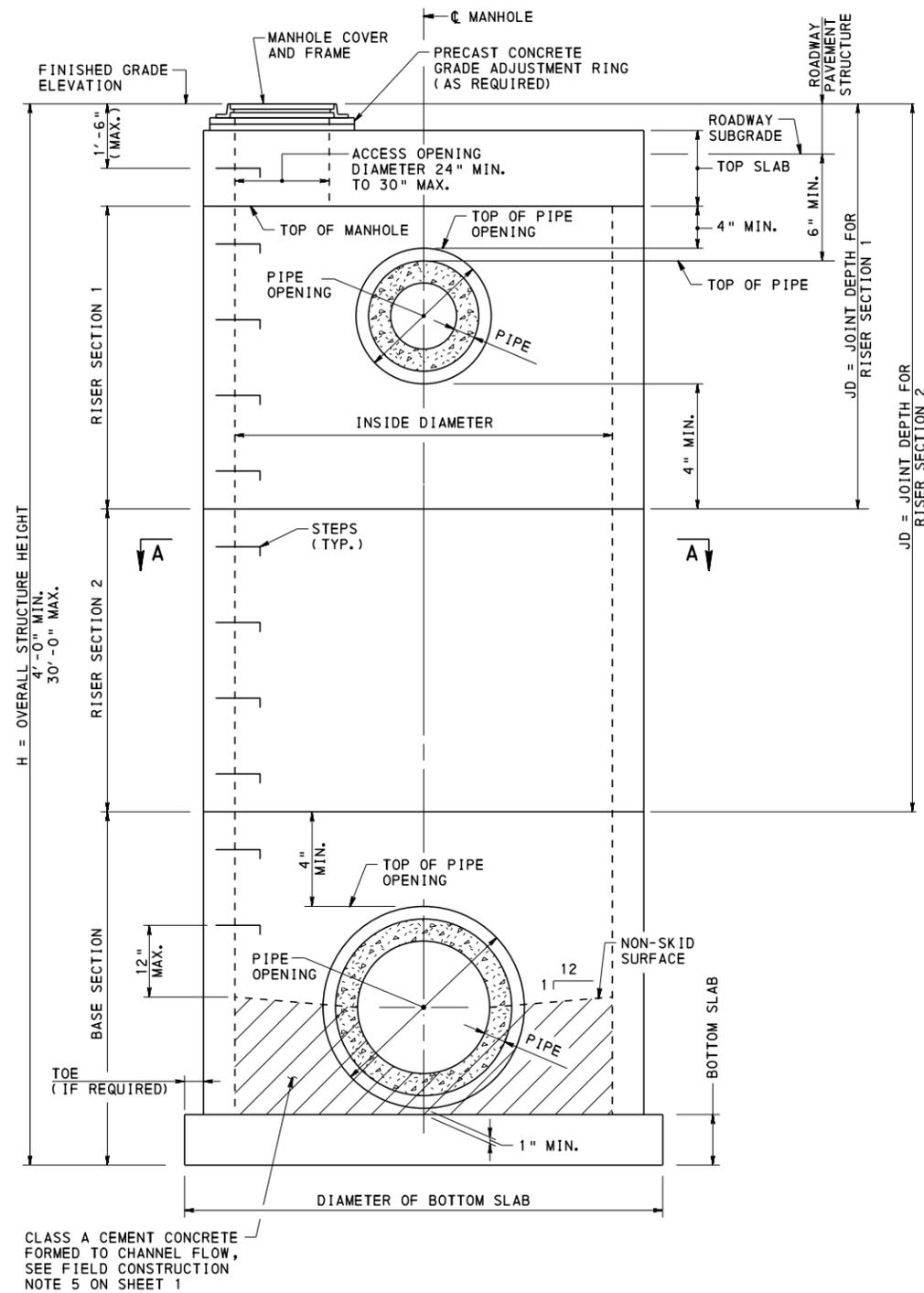
PLAN - MANHOLES

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.

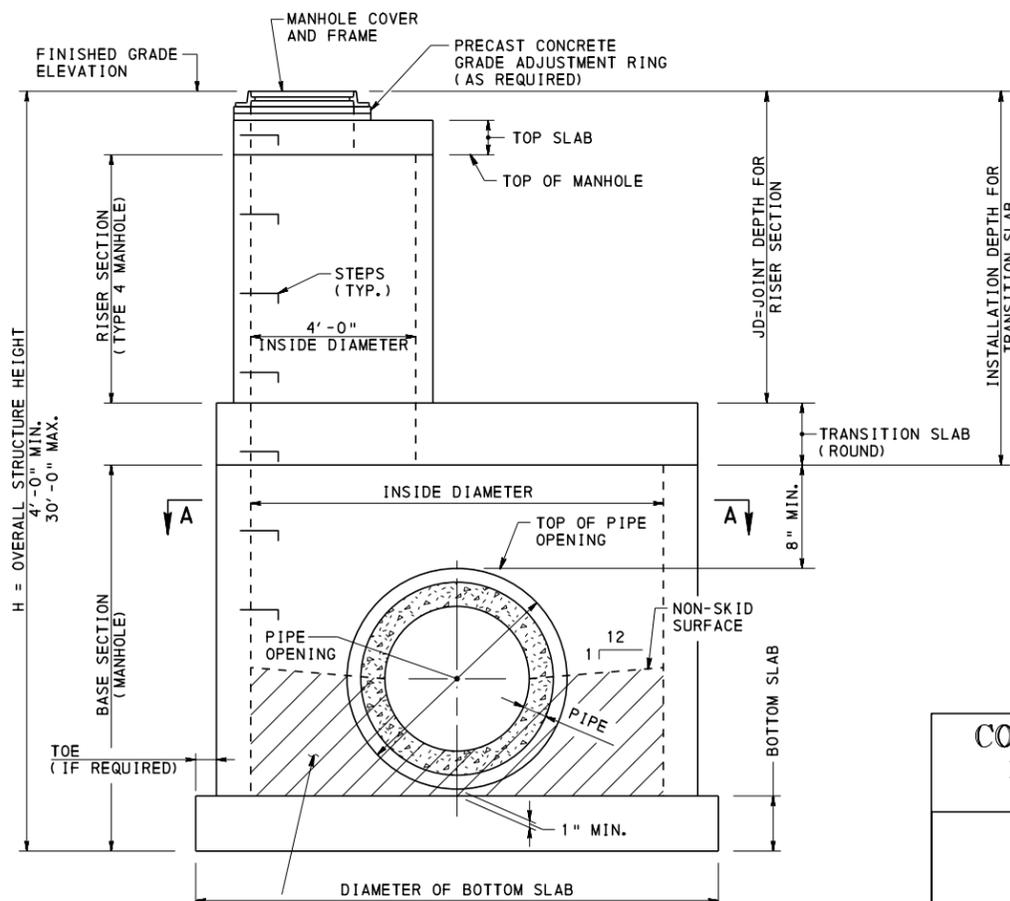
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STORM WATER MANHOLES  
MANHOLE TYPES

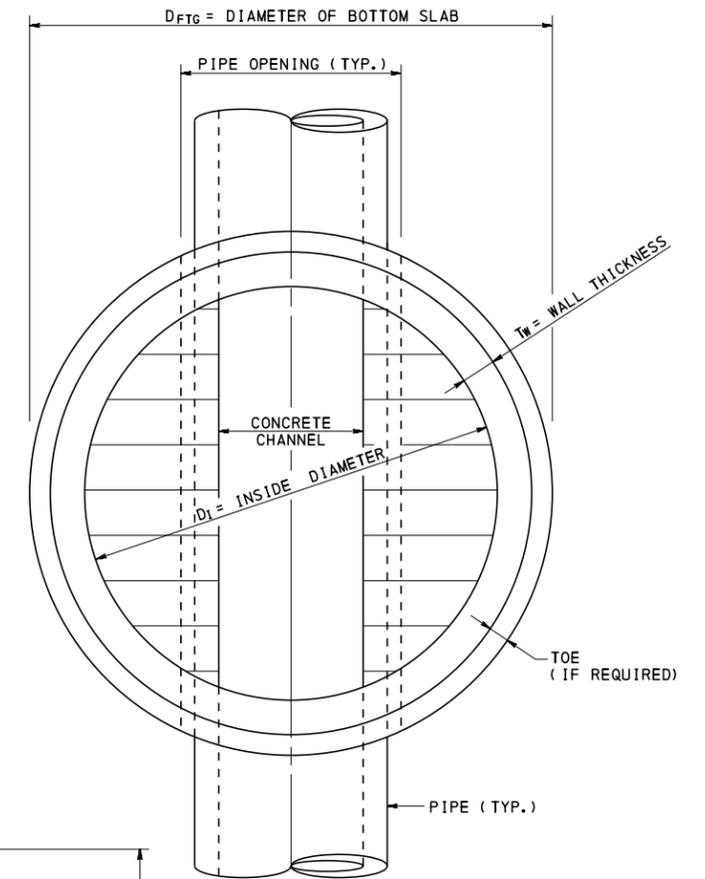


**MANHOLE ASSEMBLY**

JOINT DEPTH = FINISHED GRADE ELEVATION - JOINT ELEVATION



**MANHOLE ASSEMBLY WITH TRANSITION SLAB**



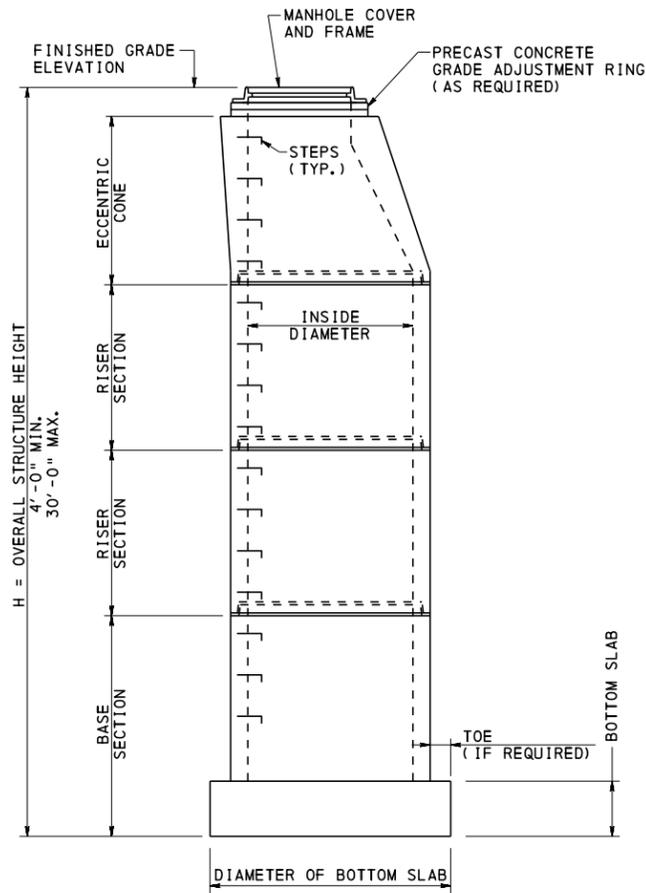
**SECTION A-A**

**NOTES:**

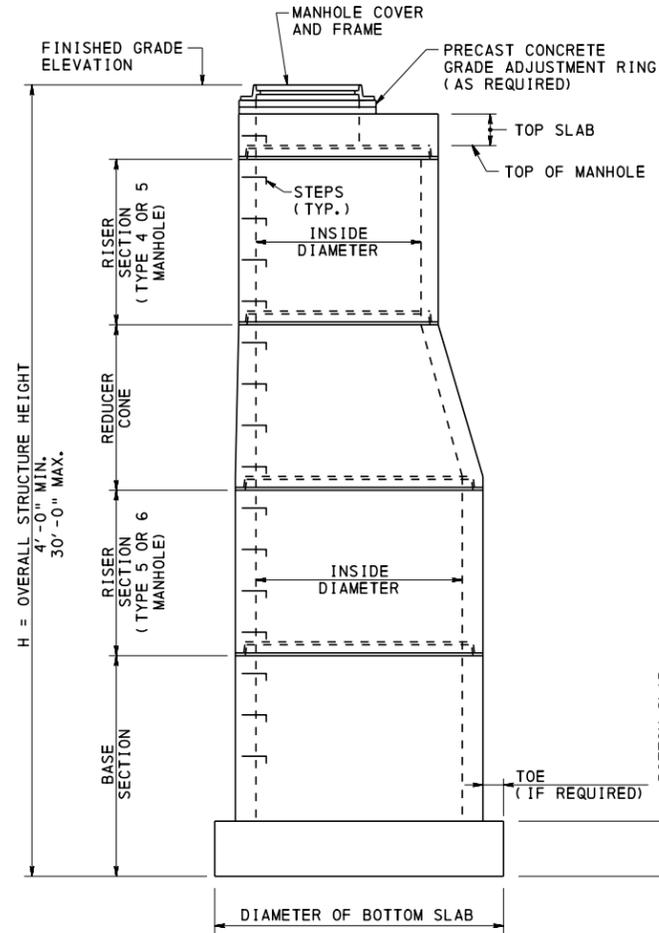
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES SEE SHEET 2.
3. FOR MANHOLE TYPES, SEE SHEET 4.
4. FOR ADDITIONAL MANHOLE ASSEMBLIES, SEE SHEET 6.
5. FOR PRECAST GRADE ADJUSTMENT RING DETAILS, SEE SHEET 8.
6. FOR MANHOLE COVER AND FRAME DETAILS, SEE SHEET 9.
7. FOR STEP DETAILS, SEE SHEET 10.
8. FOR TOP SLAB DETAILS, SEE SHEETS 11 - 15.
9. FOR ROUND TRANSITION SLAB DETAILS, SEE SHEETS 16 & 17.
10. FOR SQUARE TRANSITION SLAB DETAILS, SEE SHEETS 18 & 19.

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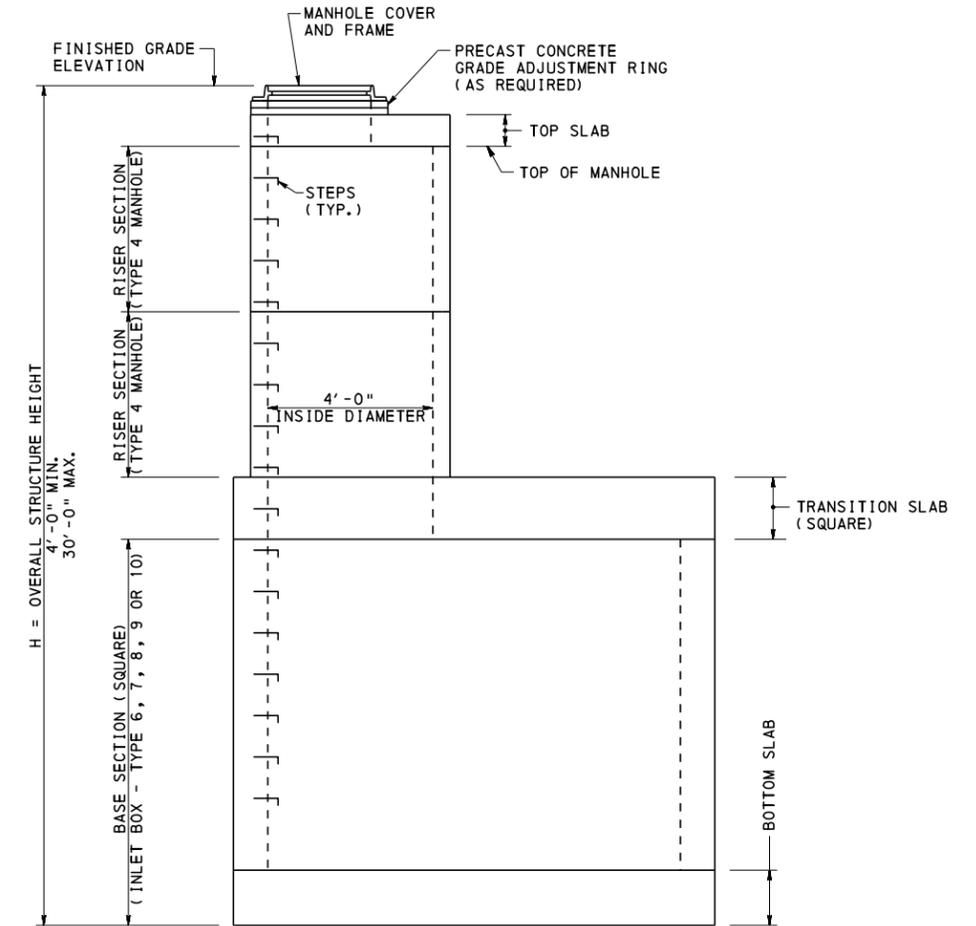
**STORM WATER MANHOLES  
MANHOLE ASSEMBLIES - 1**



**MANHOLE ASSEMBLY WITH ECCENTRIC CONE**  
(PRECAST ONLY)



**MANHOLE ASSEMBLY WITH REDUCER CONE**  
(PRECAST ONLY)



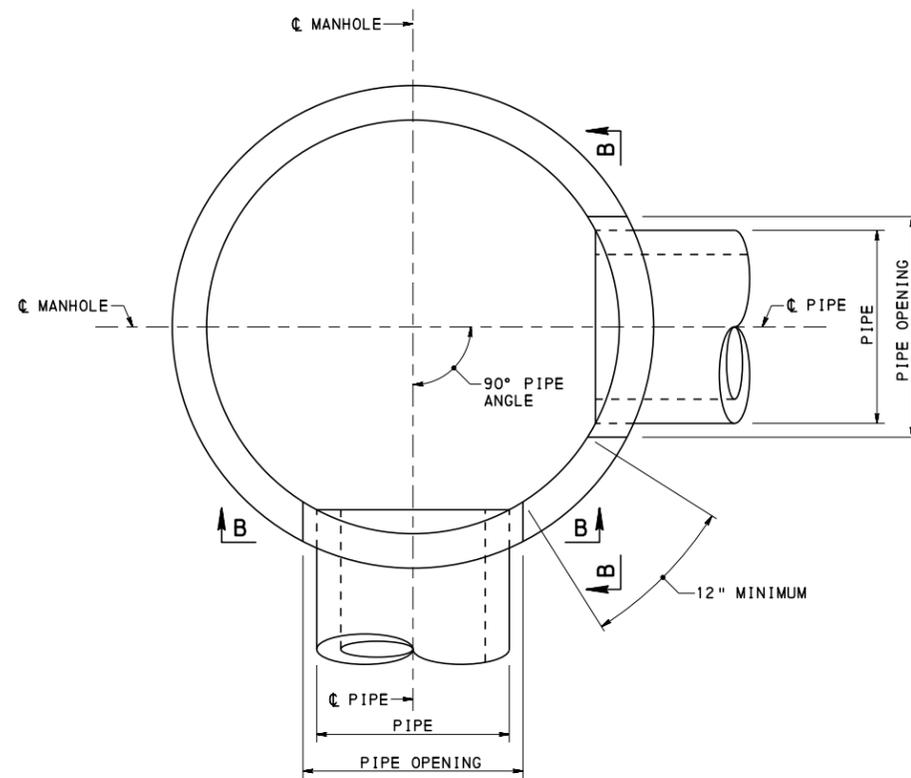
**MANHOLE ASSEMBLY WITH SQUARE INLET BOX (BOTTOM) AND TYPE 4 MANHOLE (TOP)**

**NOTES:**

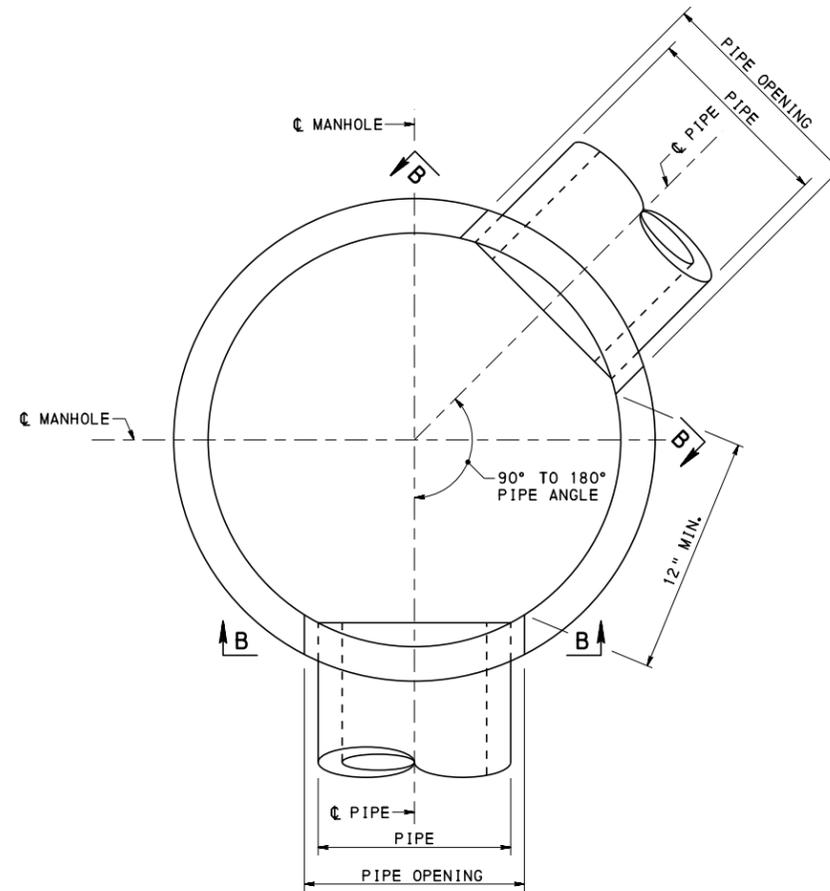
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES SEE SHEET 2.
3. FOR MANHOLE TYPES, SEE SHEET 4.
4. FOR ADDITIONAL MANHOLE ASSEMBLIES, SEE SHEET 5.
5. FOR PRECAST GRADE ADJUSTMENT RING DETAILS, SEE SHEET 8.
6. FOR MANHOLE COVER AND FRAME DETAILS, SEE SHEET 9.
7. FOR STEP DETAILS, SEE SHEET 10.
8. FOR TOP SLAB DETAILS, SEE SHEETS 11 - 15.
9. FOR ROUND TRANSITION SLAB DETAILS, SEE SHEETS 16 & 17.
10. FOR SQUARE TRANSITION SLAB DETAILS, SEE SHEETS 18 & 19.

COMMONWEALTH OF PENNSYLVANIA  
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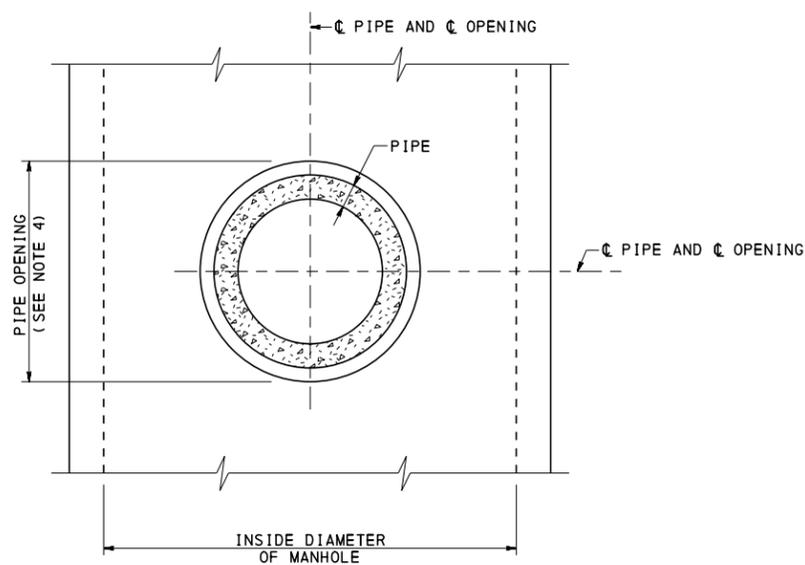
STORM WATER MANHOLES  
MANHOLE ASSEMBLIES - 2



**PLAN - PIPE ANGLE  $\leq 90^\circ$**   
 (SEE TABLES A AND B FOR INFORMATION)



**PLAN - PIPE ANGLE  $> 90^\circ$  AND  $\leq 180^\circ$**   
 (SEE TABLES A AND B FOR INFORMATION)



**SECTION B-B**

**TABLE A  
 RECOMMENDED MANHOLE TYPE BASED  
 ON REINFORCED CONC. PIPE SIZES**

MANHOLE TYPE	MAXIMUM RECOMMENDED RCP INSIDE DIAMETER	
	PIPE ANGLE $\leq 90^\circ$ (IN.)	PIPE ANGLE $> 90^\circ$ AND $\leq 180^\circ$ (IN.)
4	15	24
5	21	33
6	30	36
7	36	42
8	42	54
10	60	66
12	72	84

**TABLE B  
 RECOMMENDED MANHOLE TYPE BASED  
 ON MAXIMUM PIPE OPENINGS**

MANHOLE TYPE	MAXIMUM RECOMMENDED PIPE OPENING	
	PIPE ANGLE $\leq 90^\circ$ (IN.)	PIPE ANGLE $> 90^\circ$ AND $\leq 180^\circ$ (IN.)
4	25	36
5	34	46
6	43	50
7	52	57
8	60	71
10	78	85
12	96	106

**NOTES:**

1. TABLES A AND B BASED ON PROVIDING A 2" CLEARANCE BETWEEN THE PIPE AND PIPE OPENING.
2. RCP = REINFORCED CONCRETE PIPE

**NOTES:**

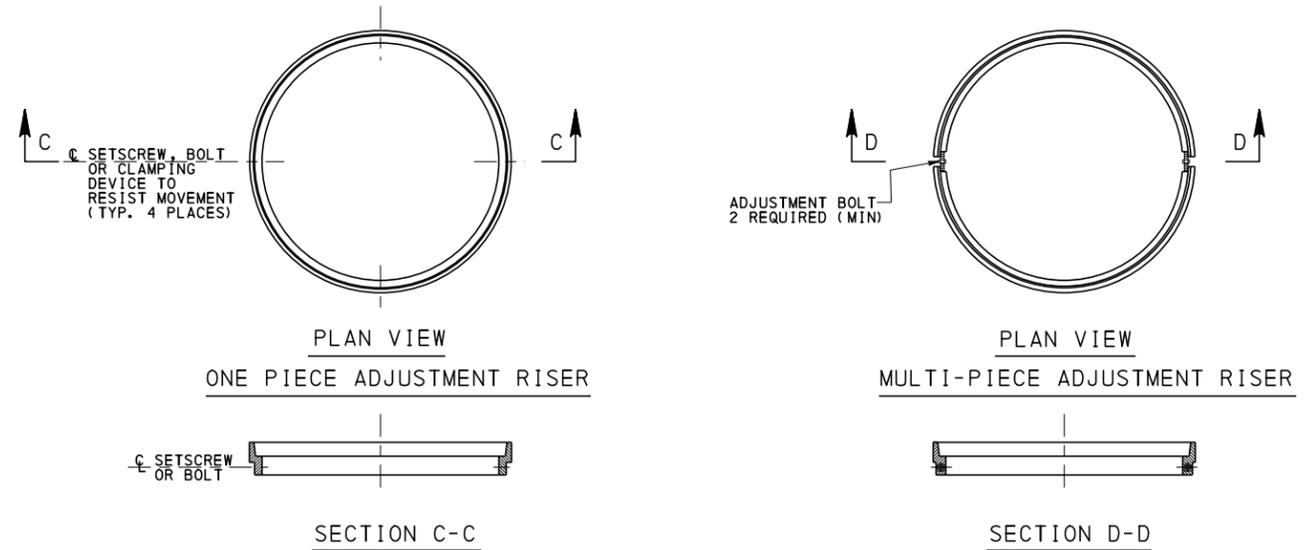
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE TYPES, SEE SHEET 4.
3. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.
4. SEE PIPE LOCATION AND PIPE OPENING NOTE 3 ON SHEET 2.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

**STORM WATER MANHOLES  
 SIZING RECOMMENDATIONS**

### GRADE ADJUSTMENT GENERAL NOTES:

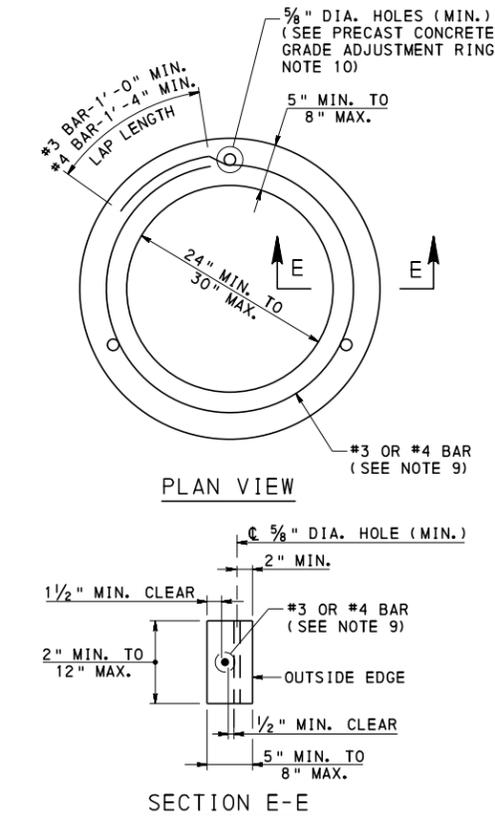
1. THE DETAILS ON THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE ADJUSTMENT RINGS/RISERS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE 1.5 AND/OR 1.1 OR 1.3, AS APPROPRIATE AND THE CONTRACT SPECIAL PROVISIONS.
4. BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.
5. ALTERNATE ADJUSTMENT RINGS:
  - HDPE OR RUBBER GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENTS IF REQUESTED BY THE CONTRACTOR AND ACCEPTED BY THE DEPARTMENT PRIOR TO INSTALLATION. PROVIDE HDPE OR RUBBER GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.



### STRUCTURAL STEEL ADJUSTMENT RISERS

### PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

1. USE PRECAST CONCRETE GRADE ADJUSTMENT RINGS FOR FINAL GRADE ADJUSTMENT.
2. A MAXIMUM OF TWO GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENT. TOTAL DEPTH OF RINGS IS LIMITED TO 12" MAXIMUM. GRADE ADJUSTMENT RINGS ARE INCIDENTAL TO THE COST OF THE MANHOLE FRAME AND COVER PAY ITEM.
3. ADJUSTMENT RING DIMENSIONS:
  - INSIDE DIAMETER TO MATCH THE OPENING IN THE TOP SLAB OR ECCENTRIC CONE.
  - OUTSIDE DIAMETER TO AT LEAST MATCH THE OUTSIDE DIAMETER OF THE MANHOLE FRAME.
4. FABRICATE GRADE ADJUSTMENT RINGS IN ONE PIECE.
5. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
6. PROVIDE CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH,  $f'_c = 4,000$  PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.
7. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
8. PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.
9. REINFORCEMENT REQUIREMENTS:
  - DEPTHS GREATER THAN OR EQUAL TO 2" AND LESS THAN 3": PROVIDE ONE #3 BAR PLACED AT THE CENTER OF THE THICKNESS.
  - DEPTHS GREATER THAN OR EQUAL TO 3" AND LESS THAN OR EQUAL TO 6": PROVIDE ONE #4 BAR PLACED AT THE CENTER OF THE THICKNESS.
  - DEPTHS GREATER THAN 6" AND LESS THAN OR EQUAL TO 12": PROVIDE ONE #4 BAR PLACED 1/2" CLEAR FROM THE TOP AND BOTTOM SURFACES FOR A TOTAL OF TWO BARS.
  - LOCATE BARS AS INDICATED IN SECTION E-E.
10. PROVIDE HOLES IN THE ADJUSTMENT RING TO ACCOMMODATE THE ATTACHMENT OF THE MANHOLE FRAME. REFER TO MANHOLE COVER AND FRAME NOTE 9 ON SHEET 9 FOR ADDITIONAL INFORMATION.
11. SET PRECAST CONCRETE GRADE ADJUSTMENT RINGS ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE. NON-SHRINK GROUT IS ALSO PERMITTED FOR CROSS SLOPE AND LONGITUDINAL GRADE ADJUSTMENTS.
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
  - MINIMUM GROUT DEPTH = 1/2"
  - MAXIMUM GROUT DEPTH = 1"
12. TAPERED PRECAST CONCRETE ADJUSTMENT RINGS ARE PERMITTED AS LONG AS THE MINIMUM AND MAXIMUM DIMENSIONS REQUIRED ARE BETWEEN 2" AND 12".



### PRECAST CONCRETE GRADE ADJUSTMENT RING

### STRUCTURAL STEEL GRADE ADJUSTMENT RISER NOTES:

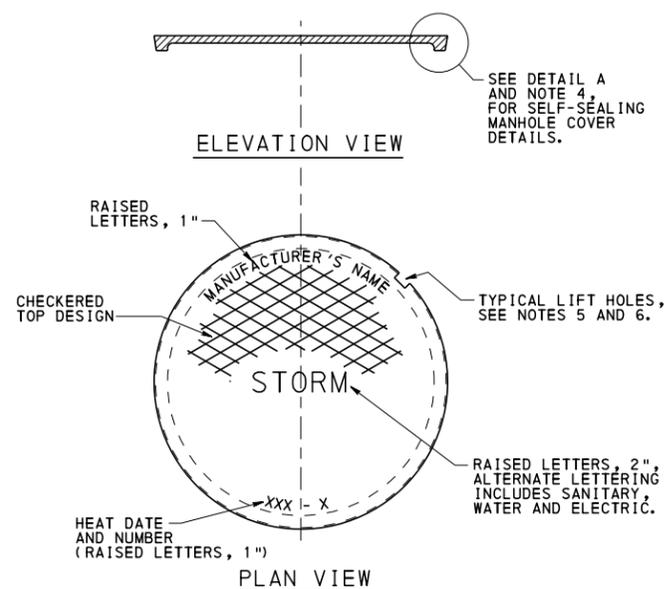
1. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 606 AND AS MODIFIED HEREIN.
2. DESIGN ADJUSTMENT RINGS FOR PHL-93 OR HS-25 LOADINGS.
3. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
4. MANUFACTURE BAR STOCK AND RETAINING CLIP FROM U.S. MADE CARBON STEEL MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS OF ASTM A-36.
5. PROVIDE FULL CIRCUMFERENTIAL WELDS BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF MANHOLE LID AND MAKE THE OUTER WELD A FILLET WELD.
6. MINIMUM WIDTH OF BOTTOM AND TOP BAR STOCK TO BE 1" AND 3/8", RESPECTIVELY.
7. ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 1" FOR MANHOLE COVER.
8. TAP THE BOTTOM BAR STOCK FOR MULTI-PIECE ADJUSTMENT RISER FOR 1/2" ADJUSTMENT BOLTS.
9. REINFORCE THE ADJUSTMENT RISER ADEQUATELY TO PREVENT BENDING.
10. PROVIDE AN ADJUSTMENT RISER WHICH IS FLUSH WITH THE COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.
11. LOCATE TOP OF ADJUSTMENT RISER 1/8" BELOW THE TOP OF THE ROADWAY SURFACE.
12. COAT STEEL ADJUSTMENT RISERS WITH AN APPROVED BITUMINOUS PAINT IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE ADJUSTMENT RISERS IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

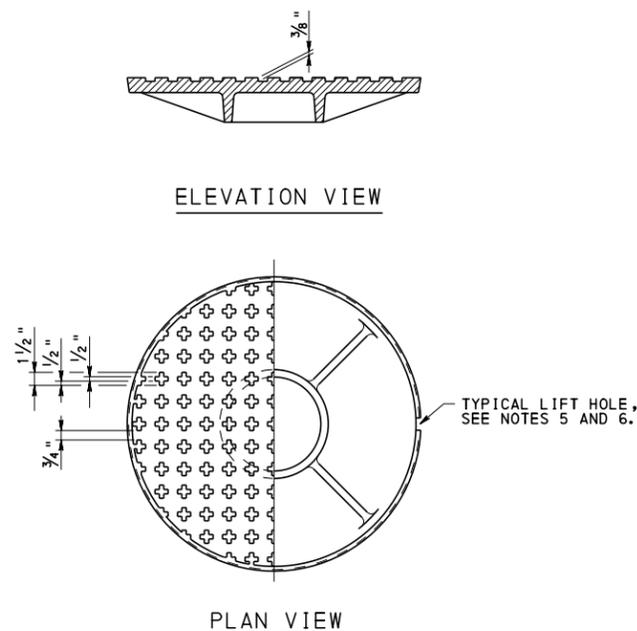
STORM WATER MANHOLES  
GRADE ADJUSTMENT RINGS

**MANHOLE COVER AND FRAME NOTES:**

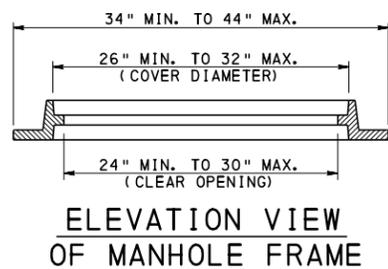
1. PROVIDE MANHOLE COVERS AND FRAMES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(b).
2. DESIGN MANHOLE COVERS AND FRAMES FOR PHL-93 OR HS-25 LOADINGS. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
3. PROVIDE GRAY CAST IRON CONFORMING TO AASHTO M105, CLASS 35B AND AASHTO M306.
4. PROVIDE MANHOLE COVERS AND FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
5. PROVIDE A GASKET SEALING SYSTEM, DOVETAIL GROOVE AND CONTINUOUS GASKET, AS INDICATED IN DETAIL A, TO PREVENT INFLOW THROUGH THE BEARING SURFACES, OF SURFACE RUNOFF WATER INTO THE MANHOLE SYSTEM, WHEN SPECIFIED. PROVIDE 1/4" DIAMETER ONE PIECE SELF-SEAL POLYISOPRENE ROUND GASKET, 40 DUROMETER GLUED IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180 DEGREES TO FACILITATE COVER REMOVAL FOR SELF-SEALING MANHOLE COVER.
6. PROVIDE TWO (2) LIFT HOLES AT 180 DEGREES TO FACILITATE COVER REMOVAL FOR NON-SEALING MANHOLE COVER.
7. FRAME TO HAVE A MINIMUM BEARING SEAT OF 1" FOR MANHOLE COVER.
8. LOCATE TOP OF FRAME 1/8" BELOW THE TOP OF THE ROADWAY SURFACE.
9. ATTACH FRAME AND/OR PRECAST CONCRETE GRADE ADJUSTMENT RINGS RIGIDLY TO THE TOP OF THE MANHOLE. USE 3-1/2" THREADED STUDS (MINIMUM) WITH HEX HEAD NUTS AND WASHERS, INSERTED THROUGH 5/8" DIAMETER HOLES (MINIMUM) THROUGH THE FRAME AND/OR RING. SPACE HOLES AT 120 DEGREES (MAXIMUM) AND 2" (MINIMUM) FROM OUTSIDE EDGE OF FRAME/RING. EMBED STUDS 4" MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE.
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
  - MINIMUM GROUT DEPTH = 1/2"
  - MAXIMUM GROUT DEPTH = 1"
10. SET THE BASE OF THE FRAME ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE. NON-SHRINK GROUT IS ALSO PERMITTED FOR CROSS SLOPE AND LONGITUDINAL GRADE ADJUSTMENTS.



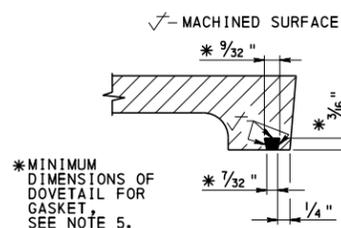
**CAST IRON MANHOLE COVER**  
(PLATEN COVER)



**CAST IRON MANHOLE COVER**  
(RIBBED COVER)  
(PLAIN COVER SHOWN, SEE PLATEN COVER DETAIL FOR LETTERING REQUIREMENTS)



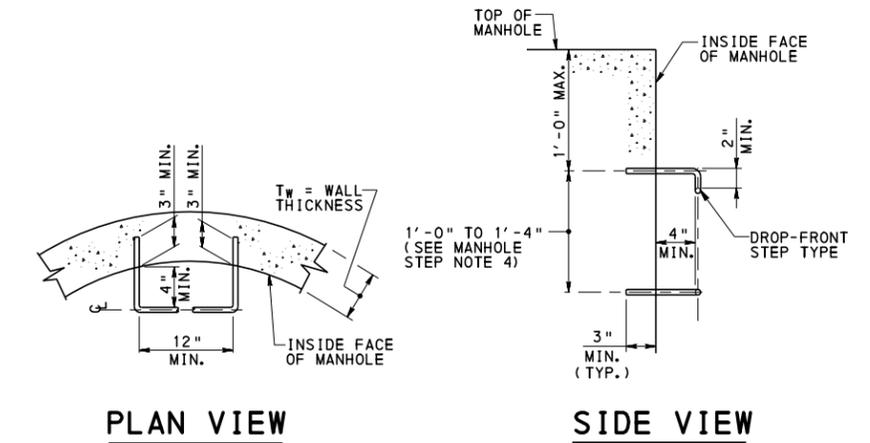
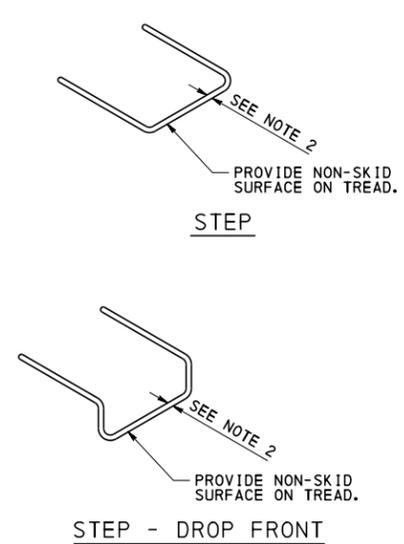
**ELEVATION VIEW OF MANHOLE FRAME**



**DETAIL A**  
GASKET SEALING SYSTEM

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

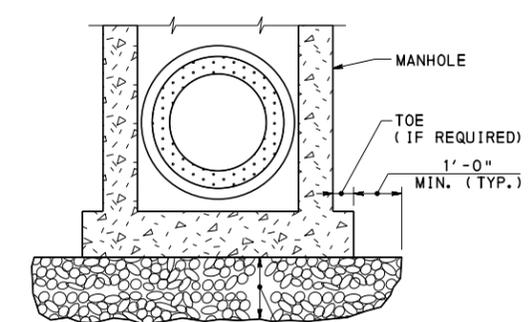
STORM WATER MANHOLES  
COVERS AND FRAMES



**TYPICAL STEP CONFIGURATION  
MANHOLE STEPS**

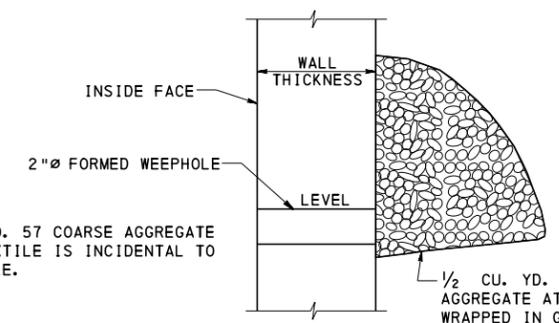
**MANHOLE STEP NOTES:**

1. PROVIDE MANHOLE STEPS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
2. PROVIDE MINIMUM 1" SECTION DIMENSION FOR METAL STEPS. PROVIDE 3/4" SECTION DIMENSION FOR NON-DETERIORATING MATERIAL STEPS.
3. SECURELY EMBED MANHOLE STEPS INTO INSERTS CAST INTO THE WALLS OR PREFORMED HOLES.
4. PROVIDE UNIFORM SPACING OF MANHOLE STEPS WITHIN A MANHOLE/INLET ASSEMBLY.
5. SEE GENERAL NOTE 12 ON SHEET 1.



**NOTE:**  
COST OF NO. 2A COARSE AGGREGATE IS INCIDENTAL TO THE MANHOLE.

**MANHOLE SUBBASE PREPARATION DETAIL**  
(SEE FIELD CONSTRUCTION NOTES ON SHEET 1)

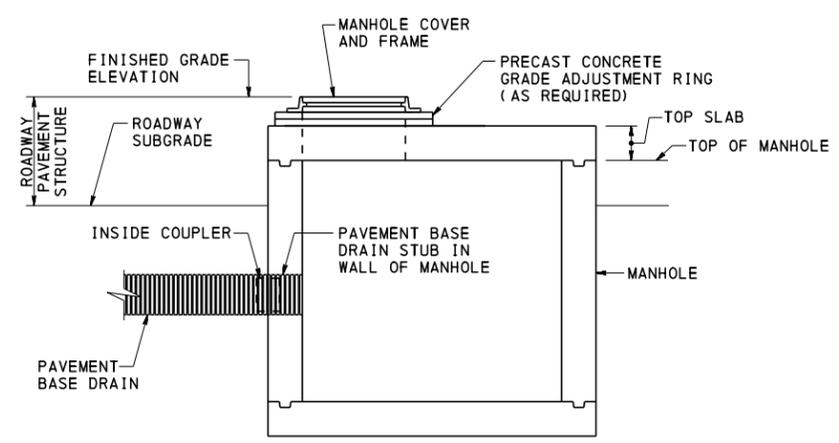


**NOTE:**  
COST OF NO. 57 COARSE AGGREGATE AND GEOTEXTILE IS INCIDENTAL TO THE MANHOLE.

**WEEPHOLE DETAIL**  
(SEE GENERAL NOTE 11 ON SHEET 1)

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.

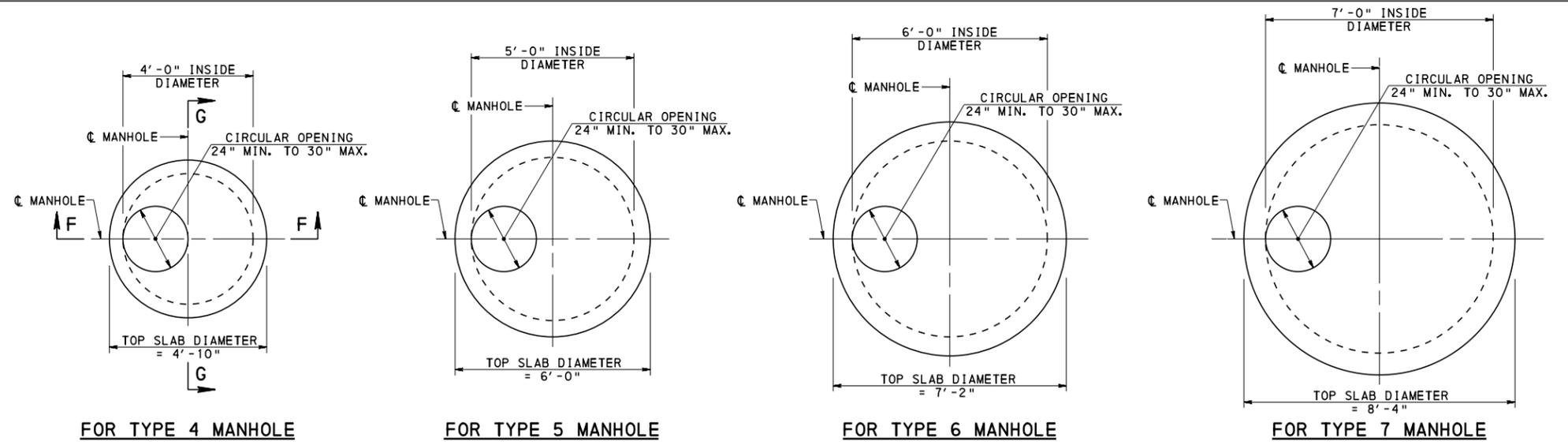


**OPTIONAL CONNECTION DETAIL  
FOR PAVEMENT BASE DRAIN**

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
MISCELLANEOUS DETAILS

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Ben J. Edman</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 10 OF 30 RC-39M
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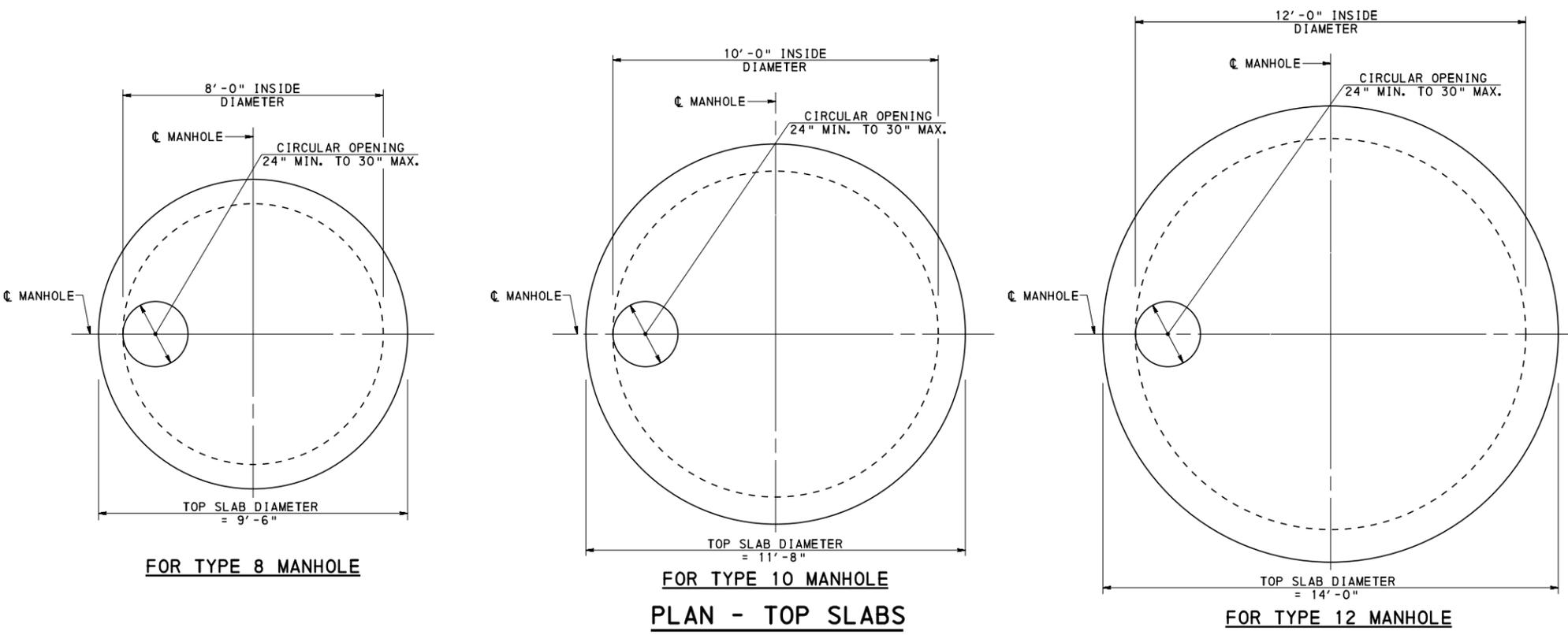


FOR TYPE 4 MANHOLE

FOR TYPE 5 MANHOLE

FOR TYPE 6 MANHOLE

FOR TYPE 7 MANHOLE



FOR TYPE 8 MANHOLE

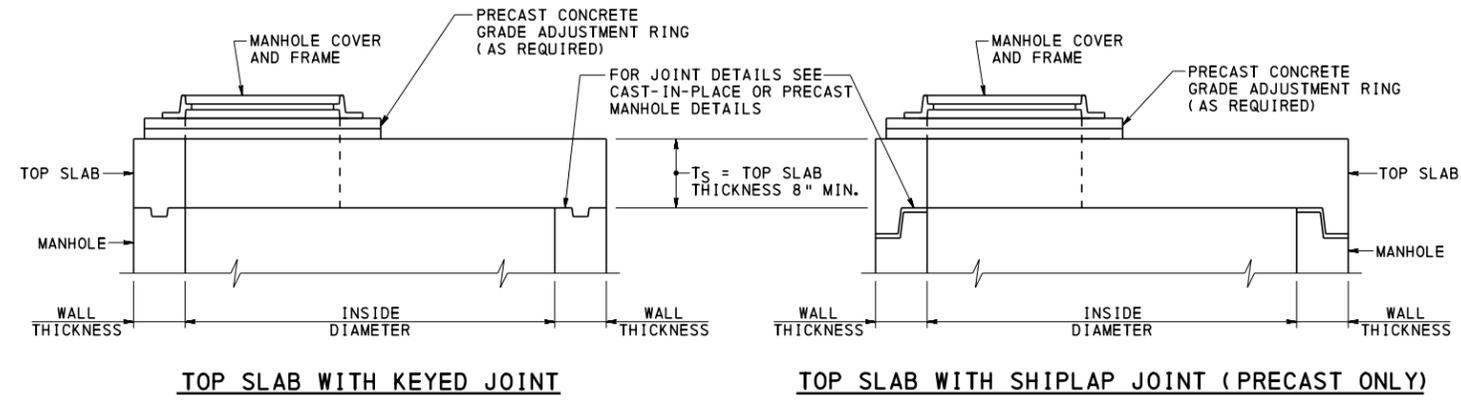
FOR TYPE 10 MANHOLE

FOR TYPE 12 MANHOLE

**PLAN - TOP SLABS**

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
3. ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
4. FOR SECTION G-G AND REINFORCEMENT REQUIREMENTS, SEE SHEET 12.



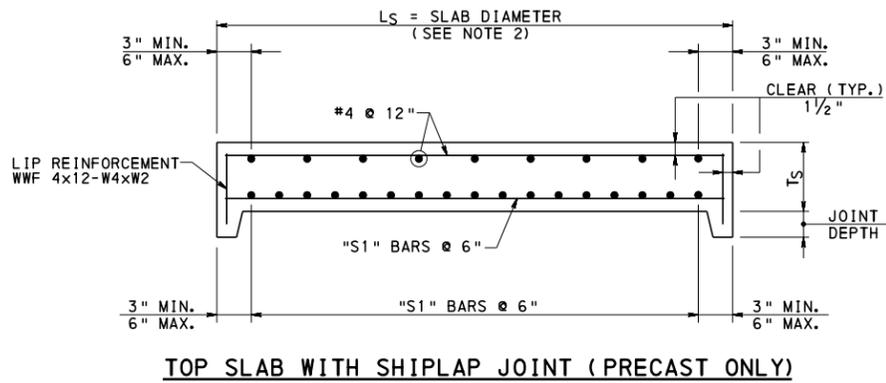
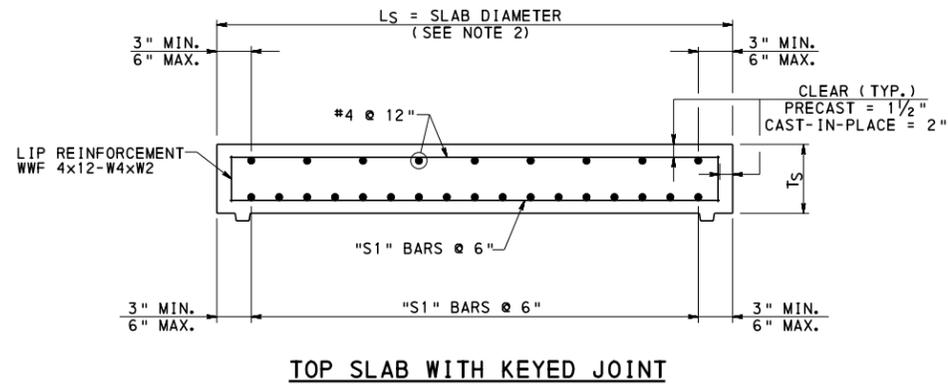
TOP SLAB WITH KEYED JOINT

TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

**SECTION F-F  
(TYPICAL)**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

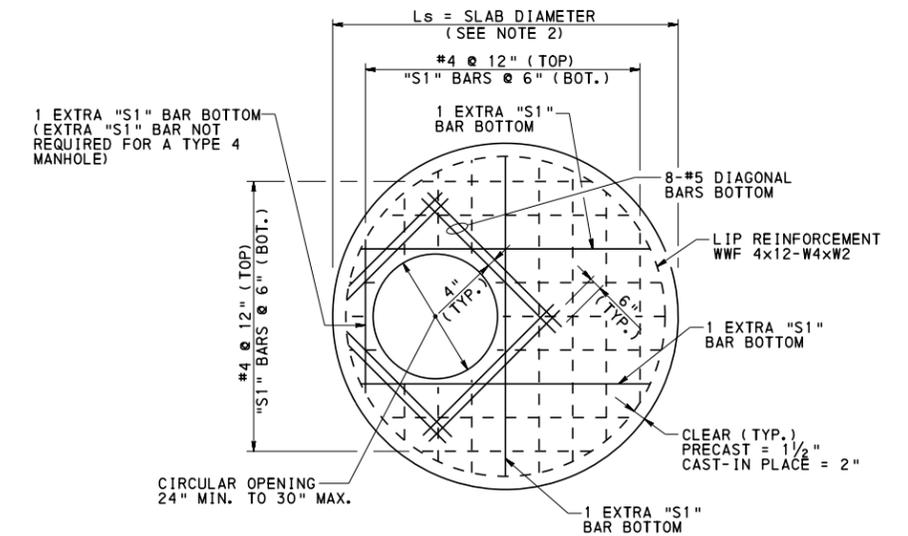
STORM WATER MANHOLES  
TOP SLABS - 1



**SECTION G-G**  
(ADDITIONAL REINFORCEMENT NOT SHOWN)

TOP SLAB CAST-IN-PLACE CONCRETE		
MANHOLE TYPE	T <sub>s</sub> (IN.)	S1 (BAR SIZE)
TYPE 4	8	#5
TYPE 5	8	#5
TYPE 6	8	#5
TYPE 7	8	#6
TYPE 8	10	#5
TYPE 10	10	#7
TYPE 12	12	#7

TOP SLAB PRECAST CONCRETE		
MANHOLE TYPE	T <sub>s</sub> (IN.)	S1 (BAR SIZE)
TYPE 4	8	#5
TYPE 5	8	#5
TYPE 6	8	#5
TYPE 7	8	#5
TYPE 8	8	#6
TYPE 10	10	#6
TYPE 12	10	#7

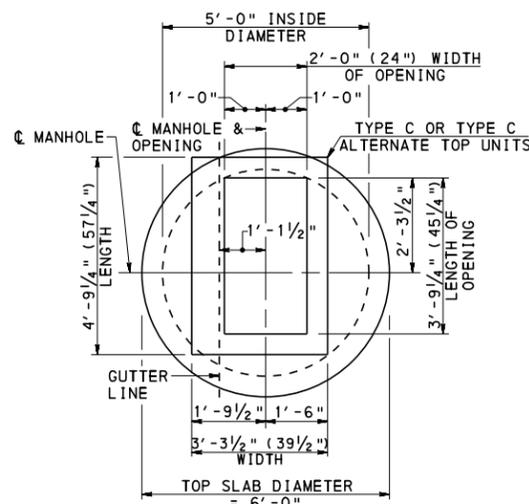


**NOTES:**

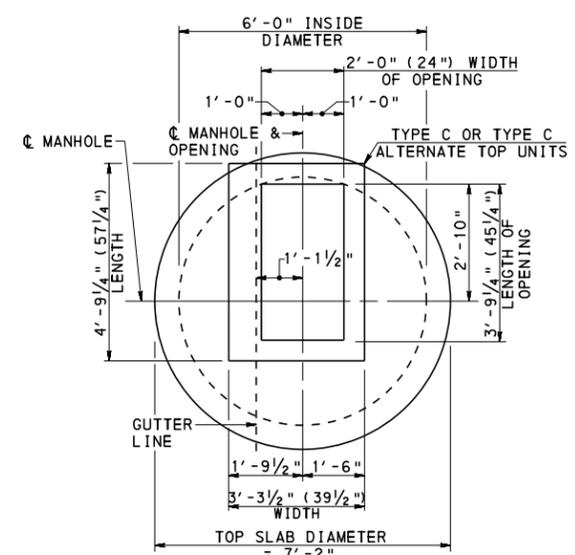
- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
- FOR JOINT DETAILS, SEE SHEETS 20 OR 24.
- ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
- SLAB THICKNESS "T<sub>s</sub>" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

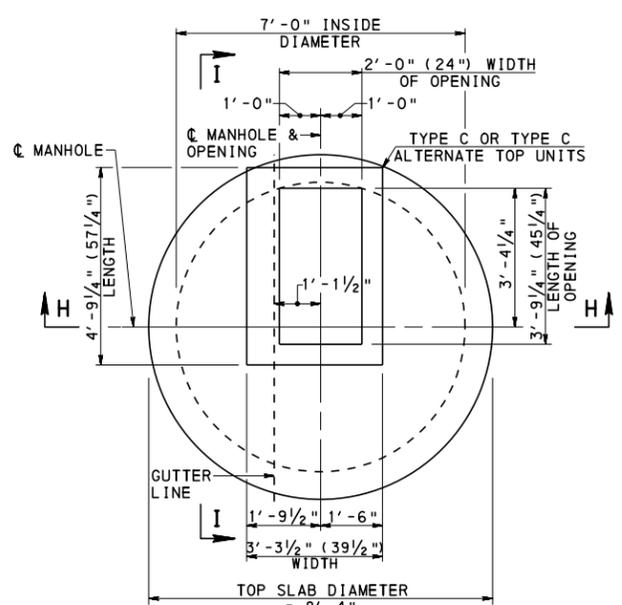
**STORM WATER MANHOLES  
TOP SLABS - 2**



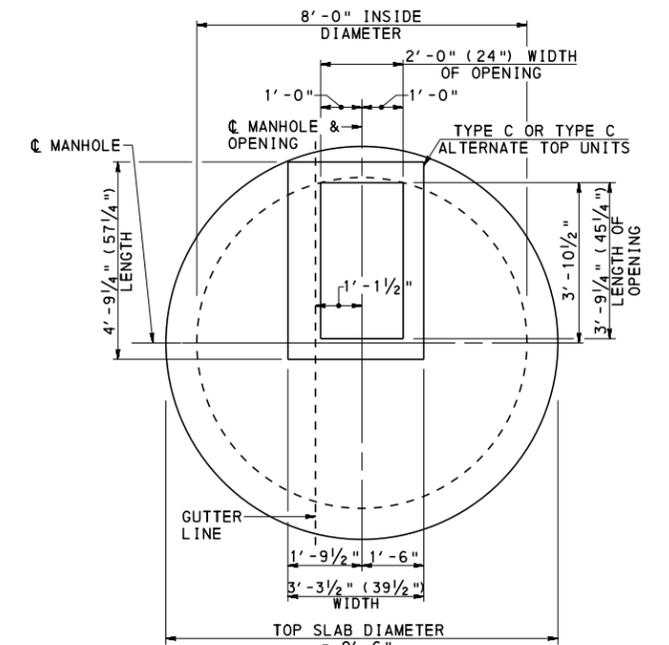
FOR TYPE 5 MANHOLE



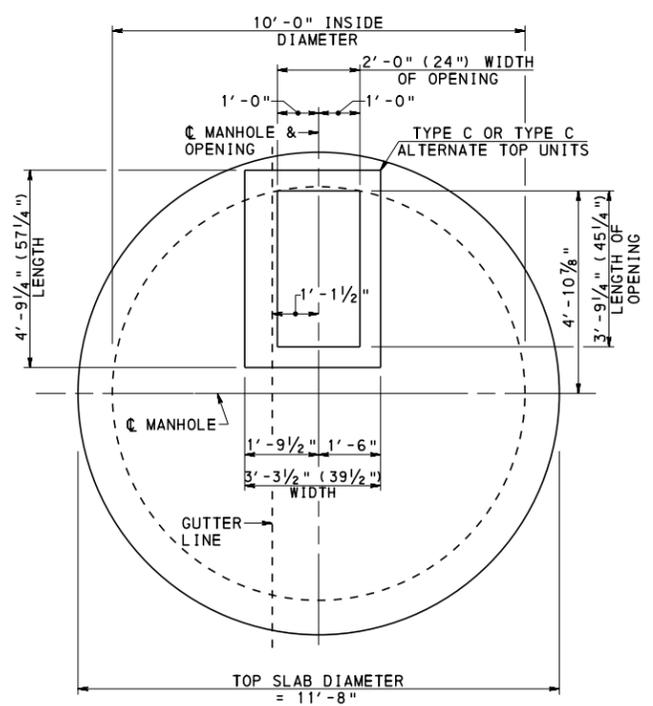
FOR TYPE 6 MANHOLE



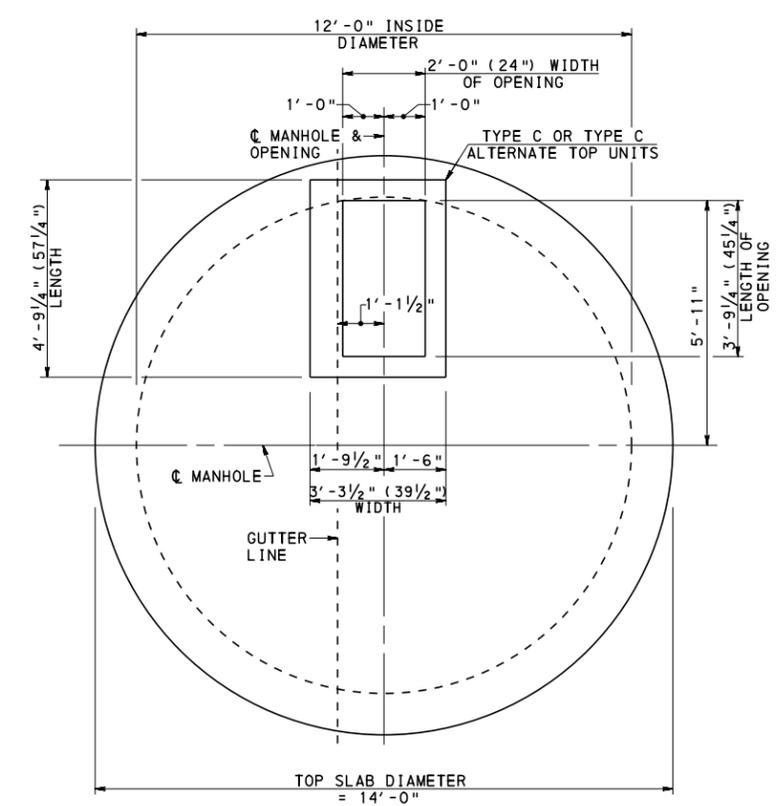
FOR TYPE 7 MANHOLE



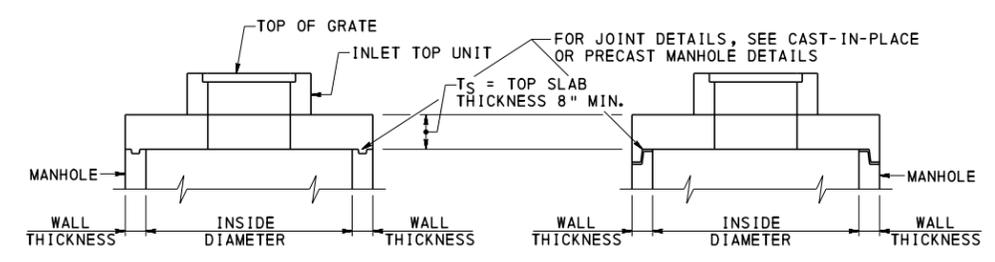
FOR TYPE 8 MANHOLE



FOR TYPE 10 MANHOLE



FOR TYPE 12 MANHOLE



TOP SLAB WITH KEYED JOINT

TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

**SECTION H-H**

(TYPICAL)

NOTE: GRADE ADJUSTMENT RINGS NOT SHOWN.

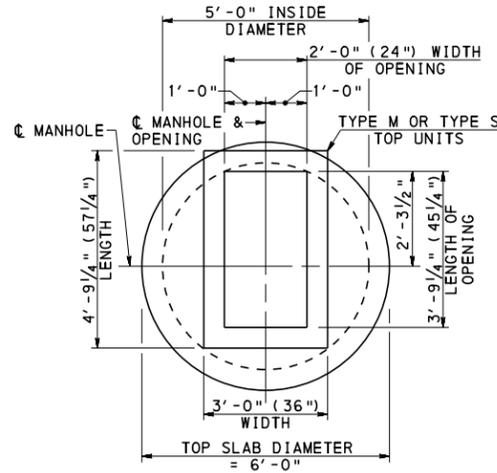
**PLAN - TOP SLABS FOR TYPE C OR TYPE C ALTERNATE CONCRETE INLET TOP UNITS**

**NOTES:**

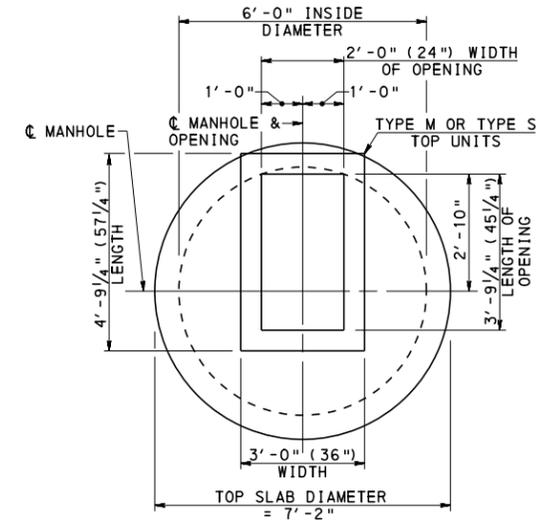
- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING AS SHOWN.
- FOR SECTION I-I AND REINFORCEMENT REQUIREMENTS, SEE SHEET 15.
- FOR CONCRETE TOP UNITS, SEE RC-45M.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

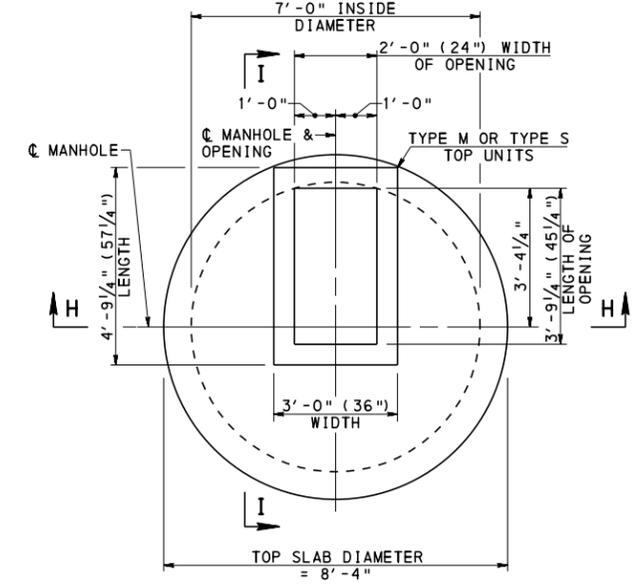
**STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 1**



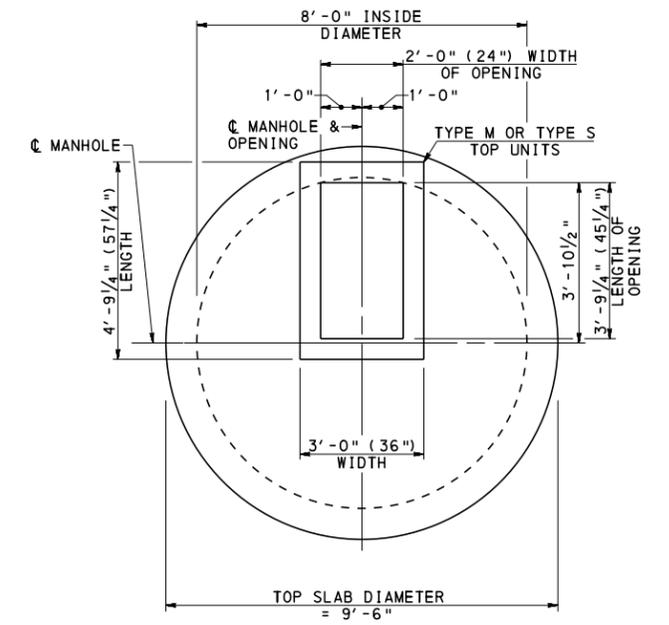
FOR TYPE 5 MANHOLE



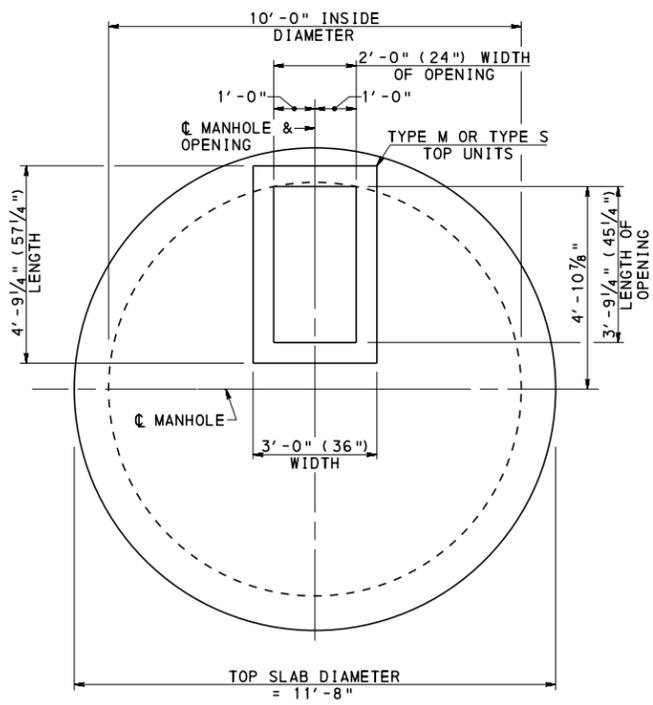
FOR TYPE 6 MANHOLE



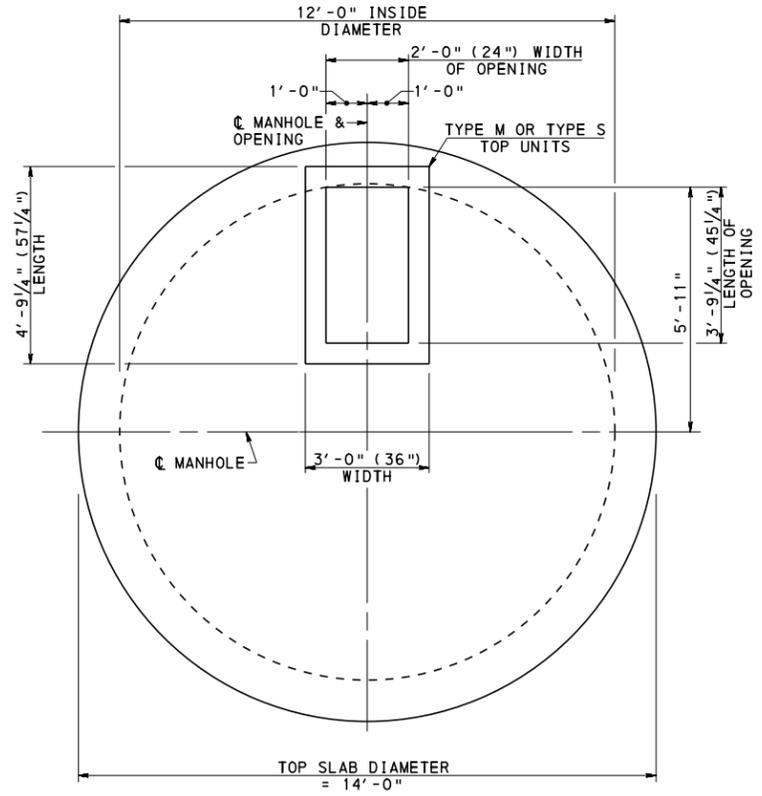
FOR TYPE 7 MANHOLE



FOR TYPE 8 MANHOLE



FOR TYPE 10 MANHOLE



FOR TYPE 12 MANHOLE

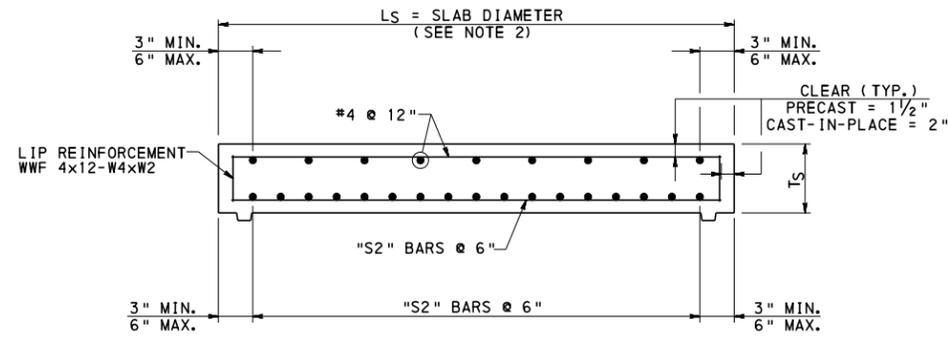
PLAN - TOP SLABS FOR TYPE M OR S  
CONCRETE INLET TOP UNITS

NOTES:

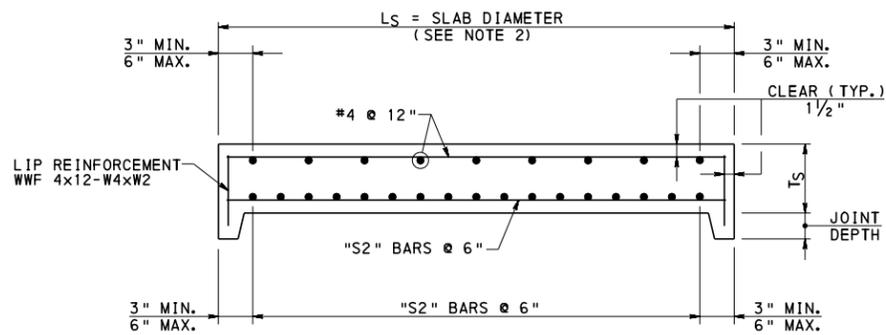
- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING AS SHOWN.
- FOR SECTION H-H, SEE SHEET 13.
- FOR SECTION I-I AND REINFORCEMENT REQUIREMENTS, SEE SHEET 15.
- FOR CONCRETE TOP UNITS, SEE RC-45M.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 2



**TOP SLAB WITH KEYED JOINT**



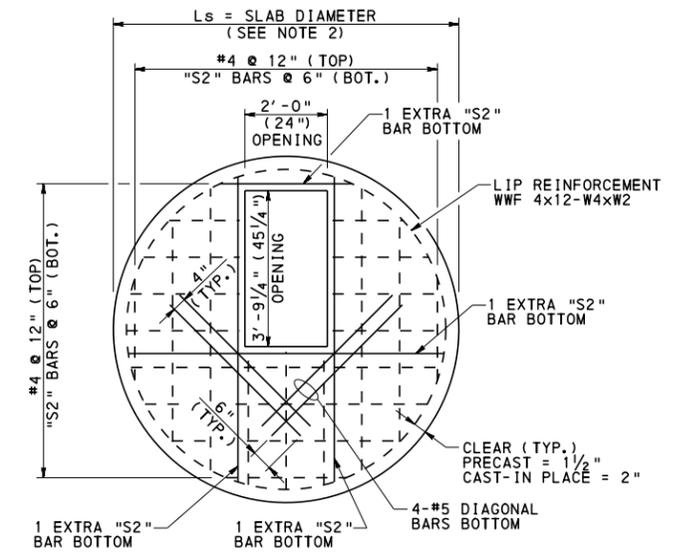
**TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)**

**SECTION I-I**

(ADDITIONAL REINFORCEMENT NOT SHOWN)

TOP SLAB CAST-IN-PLACE CONCRETE		
MANHOLE TYPE	T <sub>s</sub> (IN.)	S2 (BAR SIZE)
TYPE 5	8	#5
TYPE 6	8	#6
TYPE 7	8	#6
TYPE 8	8	#7
TYPE 10	10	#7
TYPE 12	12	#7

TOP SLAB PRECAST CONCRETE		
MANHOLE TYPE	T <sub>s</sub> (IN.)	S2 (BAR SIZE)
TYPE 5	8	#5
TYPE 6	8	#5
TYPE 7	8	#5
TYPE 8	8	#6
TYPE 10	10	#6
TYPE 12	10	#7



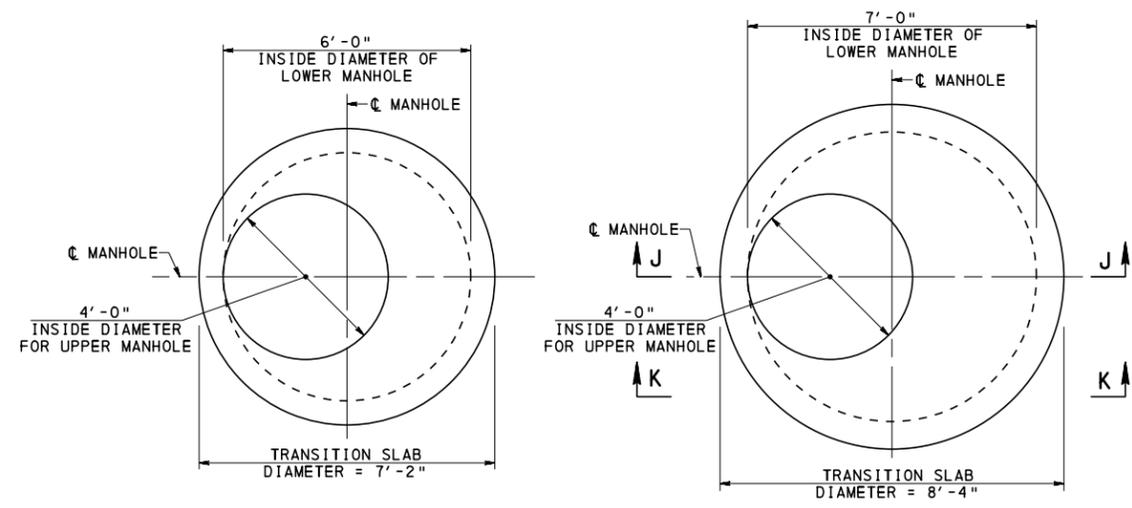
**TOP SLAB REINFORCEMENT PLAN**

**NOTES:**

- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
- FOR JOINT DETAILS, SEE SHEETS 20 OR 24.
- ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
- SLAB THICKNESS "Ts" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.

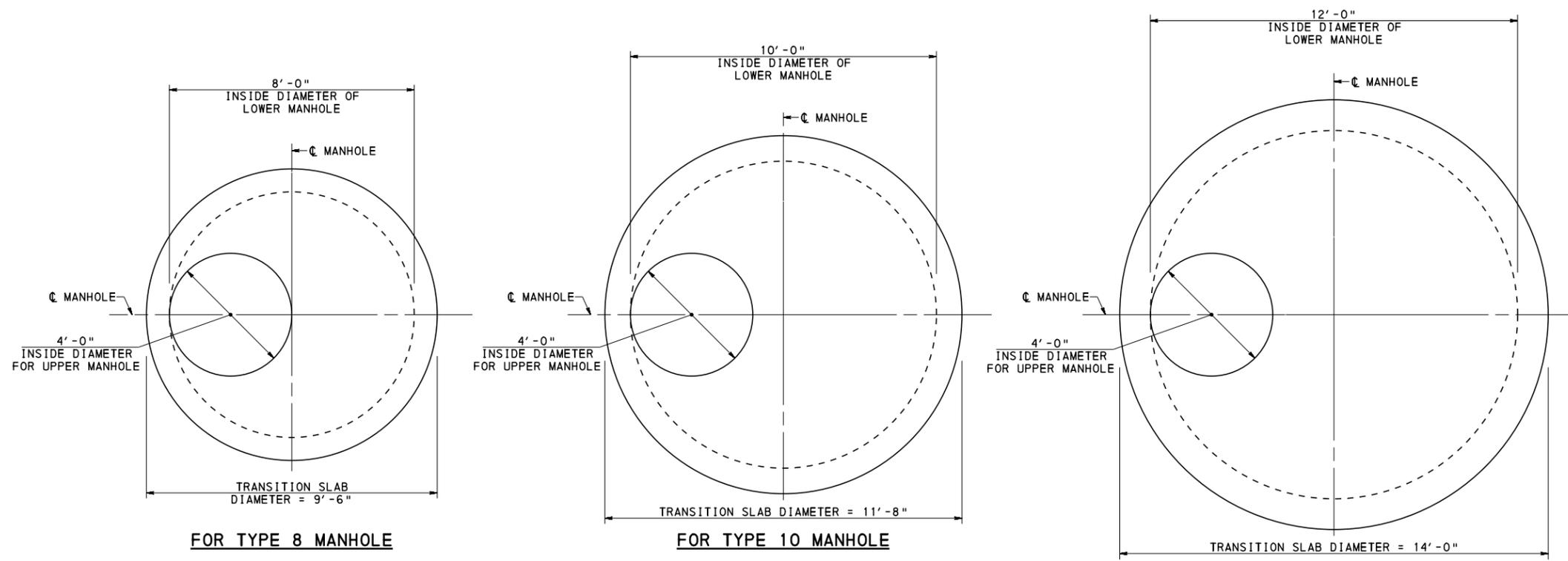
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 3



FOR TYPE 6 MANHOLE

FOR TYPE 7 MANHOLE



FOR TYPE 8 MANHOLE

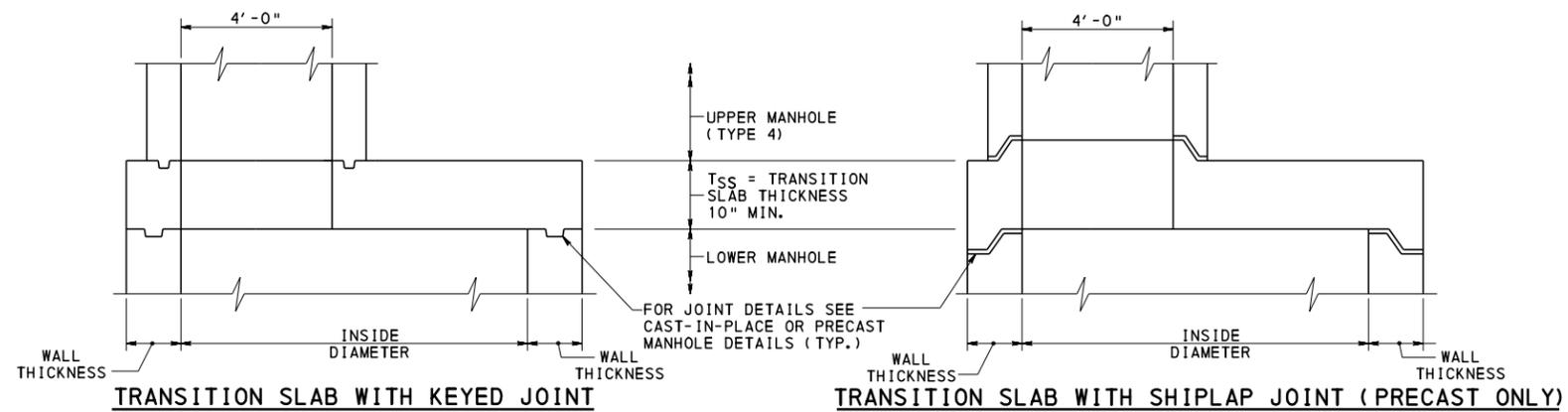
FOR TYPE 10 MANHOLE

FOR TYPE 12 MANHOLE

**PLAN - ROUND TRANSITION SLABS**

**NOTES:**

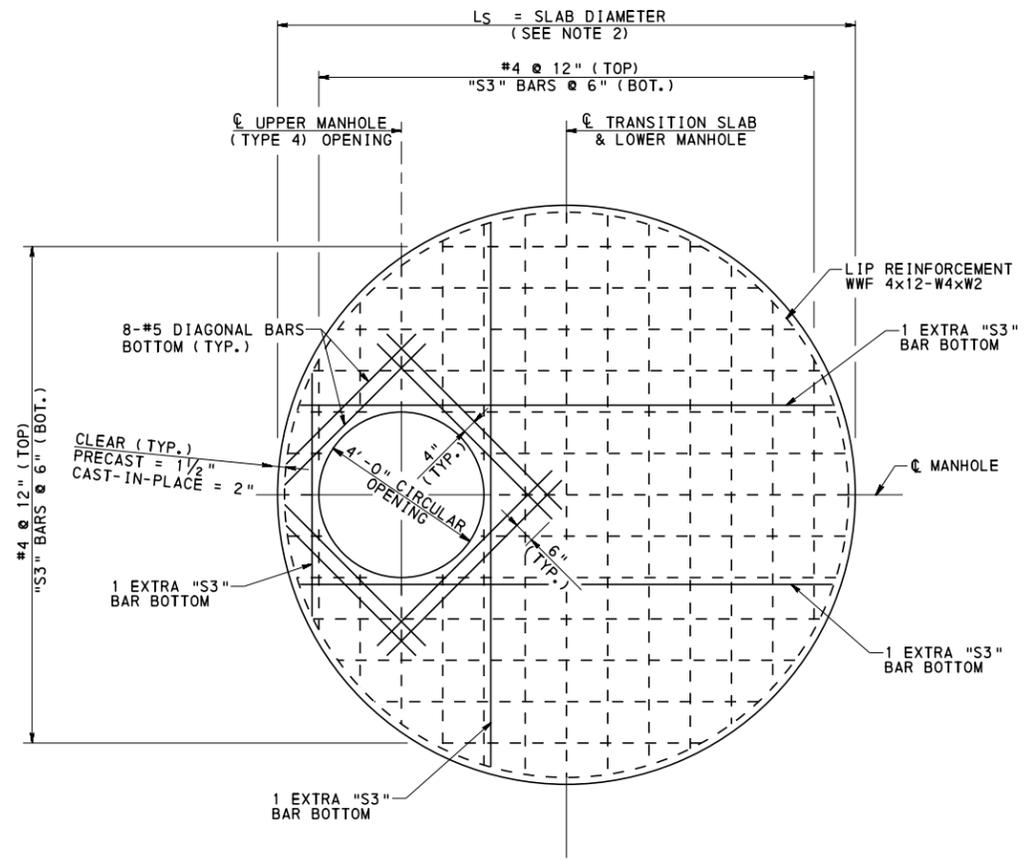
1. FOR NOTES, SEE SHEETS 1 - 3.
2. DIAMETER OF TRANSITION SLAB TO MATCH OUTSIDE DIAMETER OF LOWER MANHOLE.
3. ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
4. FOR SECTION K-K AND REINFORCEMENT REQUIREMENTS, SEE SHEET 17.
5. A TRANSITION SLAB FOR A TYPE 5 MANHOLE IS NOT PERMITTED.



**SECTION J-J  
(TYPICAL)**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
ROUND TRANSITION SLABS - 1



ROUND TRANSITION SLAB CAST-IN-PLACE CONCRETE			
MANHOLE TYPE	T <sub>SS</sub> (IN.)	S3 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.) *
TYPE 6	10	#7	25.5
TYPE 7	12	#7	25.0
TYPE 8	12	#8	24.5
TYPE 10	14	#9	23.0
TYPE 12	16	#10	22.0

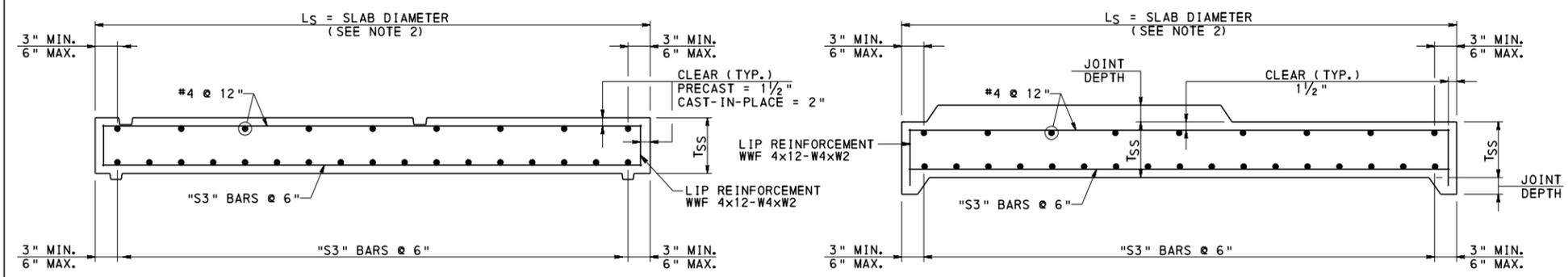
ROUND TRANSITION SLAB PRECAST CONCRETE			
MANHOLE TYPE	T <sub>SS</sub> (IN.)	S3 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.) *
TYPE 6	10	#6	25.5
TYPE 7	10	#7	25.0
TYPE 8	12	#7	24.5
TYPE 10	14	#8	23.0
TYPE 12	16	#9	22.0

\* MAXIMUM INSTALLATION DEPTH = FINISHED GRADE ELEVATION - BOTTOM OF TRANSITION SLAB ELEVATION.

**ROUND TRANSITION SLAB REINFORCEMENT PLAN**

**NOTES:**

- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
- FOR JOINT DETAILS, SEE SHEETS 20 OR 24.
- ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
- SLAB THICKNESS "T<sub>SS</sub>" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.



**TRANSITION SLAB WITH KEYED JOINT**

**TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)**

**SECTION K-K**  
(ADDITIONAL REINFORCEMENT NOT SHOWN)

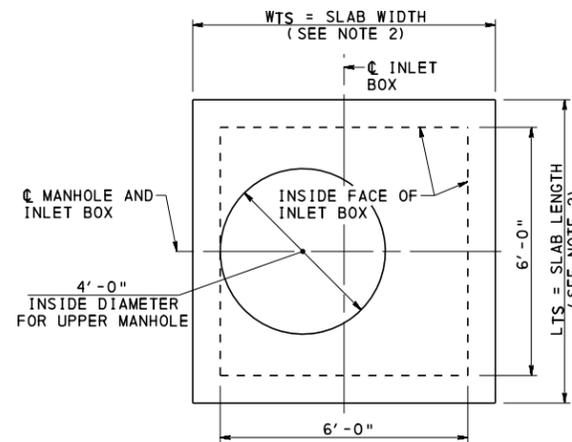
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
ROUND TRANSITION SLABS - 2

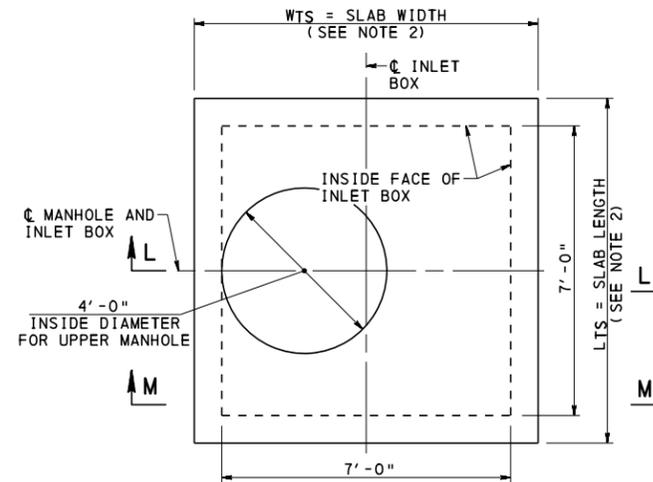
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Ben J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 17 OF 30  
RC-39M



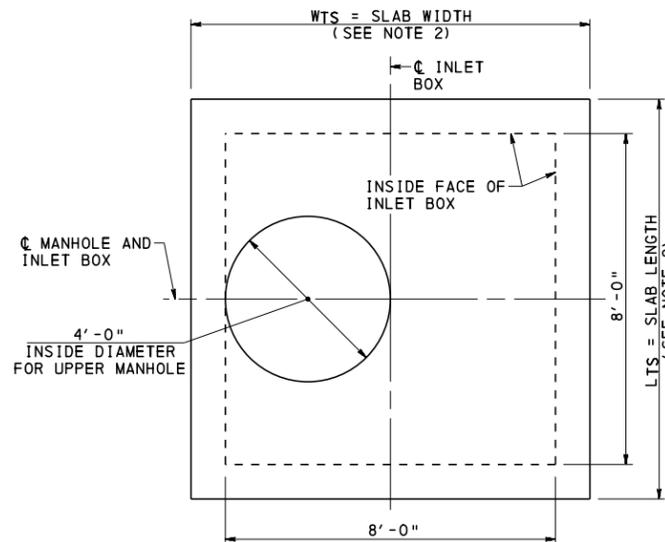
**TYPE 6 INLET BOX  
TO TYPE 4 MANHOLE**



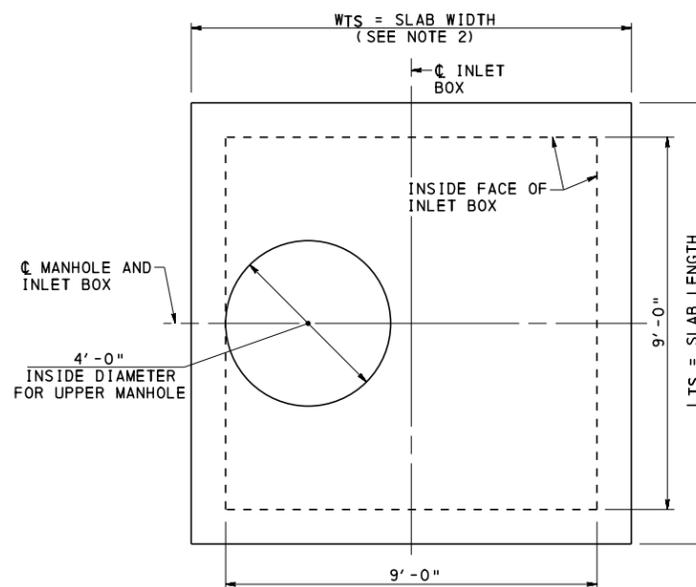
**TYPE 7 INLET BOX  
TO TYPE 4 MANHOLE**

**NOTES:**

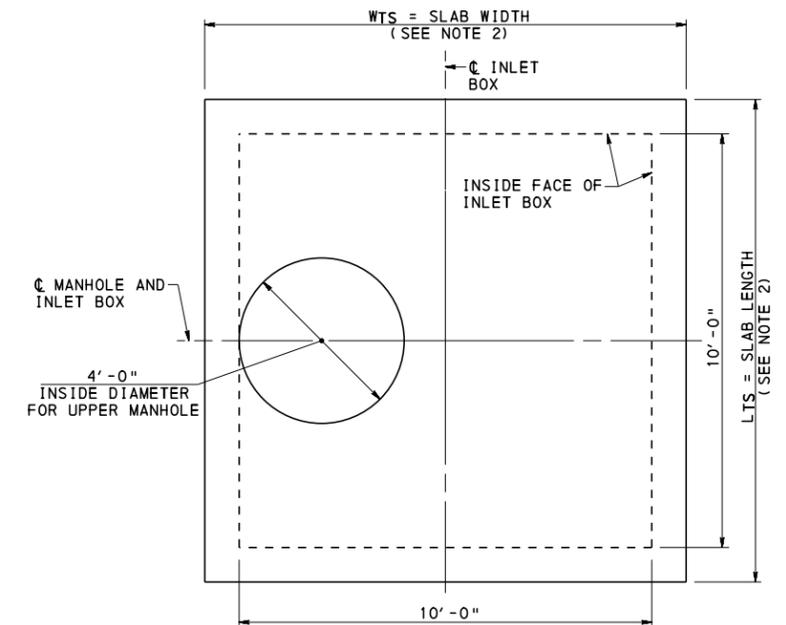
1. FOR NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS TO MATCH SIZE OF LOWER INLET BOX.
3. ALIGN OPENING WITH INSIDE FACE OF INLET BOX.
4. FOR SECTION M-M AND REINFORCEMENT REQUIREMENTS, SEE SHEET 19.



**TYPE 8 INLET BOX  
TO TYPE 4 MANHOLE**

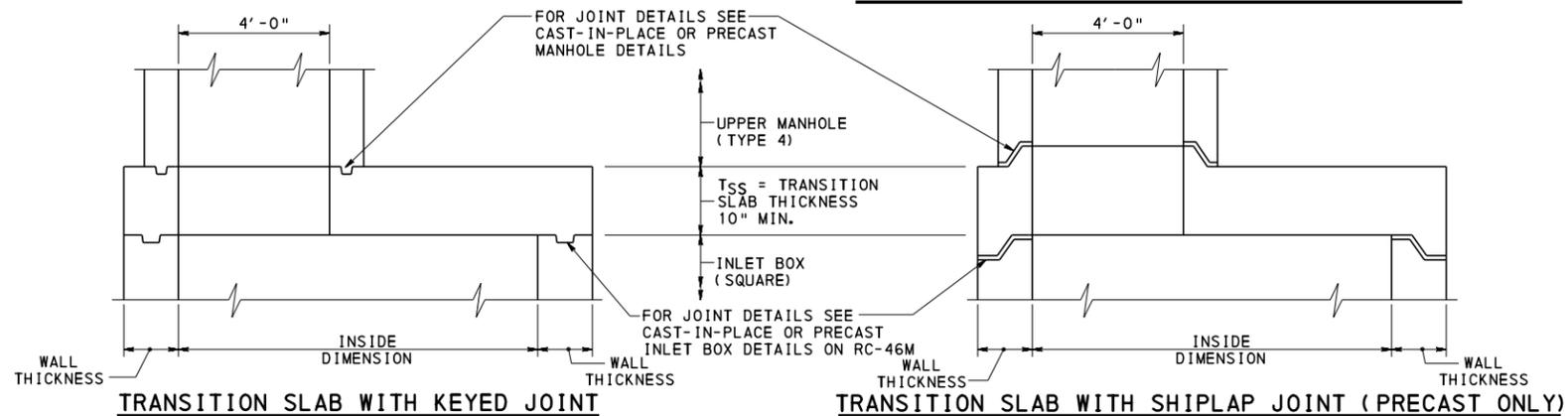


**TYPE 9 INLET BOX  
TO TYPE 4 MANHOLE**



**TYPE 10 INLET BOX  
TO TYPE 4 MANHOLE**

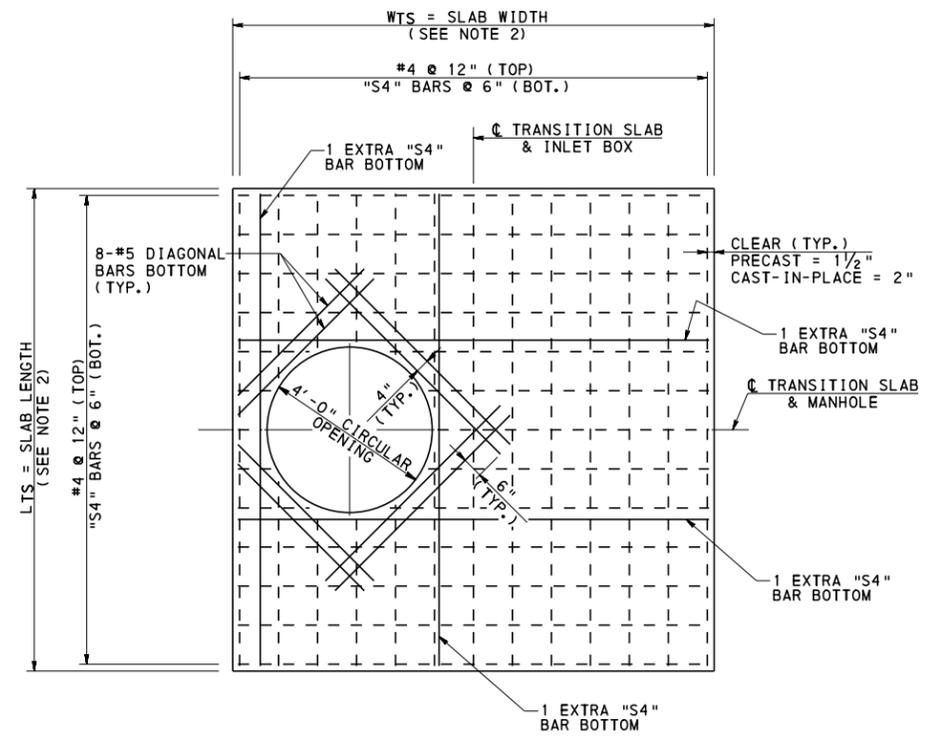
**PLAN - SQUARE TRANSITION SLABS**



**SECTION L-L  
(TYPICAL)**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
SQUARE TRANSITION SLABS - 1

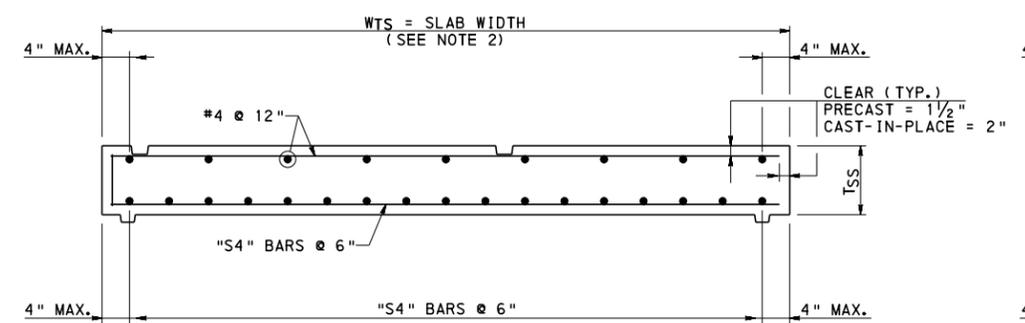


**SQUARE TRANSITION SLAB REINFORCEMENT PLAN**

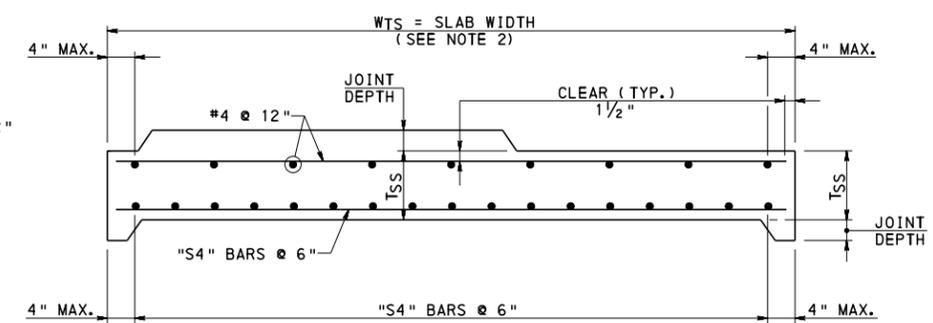
SQUARE TRANSITION SLAB CAST-IN-PLACE CONCRETE				
INLET TYPE BOTTOM SECTION	MANHOLE TYPE UPPER SECTION	T <sub>SS</sub> (IN.)	S4 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 6	TYPE 4	10	#7	23.0
TYPE 7	TYPE 4	12	#7	22.0
TYPE 8	TYPE 4	12	#7	21.0
TYPE 9	TYPE 4	12	#8	20.0
TYPE 10	TYPE 4	14	#8	19.0

SQUARE TRANSITION SLAB PRECAST CONCRETE				
INLET TYPE BOTTOM SECTION	MANHOLE TYPE UPPER SECTION	T <sub>SS</sub> (IN.)	S4 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 6	TYPE 4	10	#6	23.0
TYPE 7	TYPE 4	10	#6	22.0
TYPE 8	TYPE 4	12	#7	21.0
TYPE 9	TYPE 4	12	#8	20.0
TYPE 10	TYPE 4	14	#8	19.0

\* MAXIMUM INSTALLATION DEPTH = FINISHED GRADE ELEVATION  
- BOTTOM OF TRANSITION SLAB ELEVATION.



**TRANSITION SLAB WITH KEYED JOINT**



**TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)**

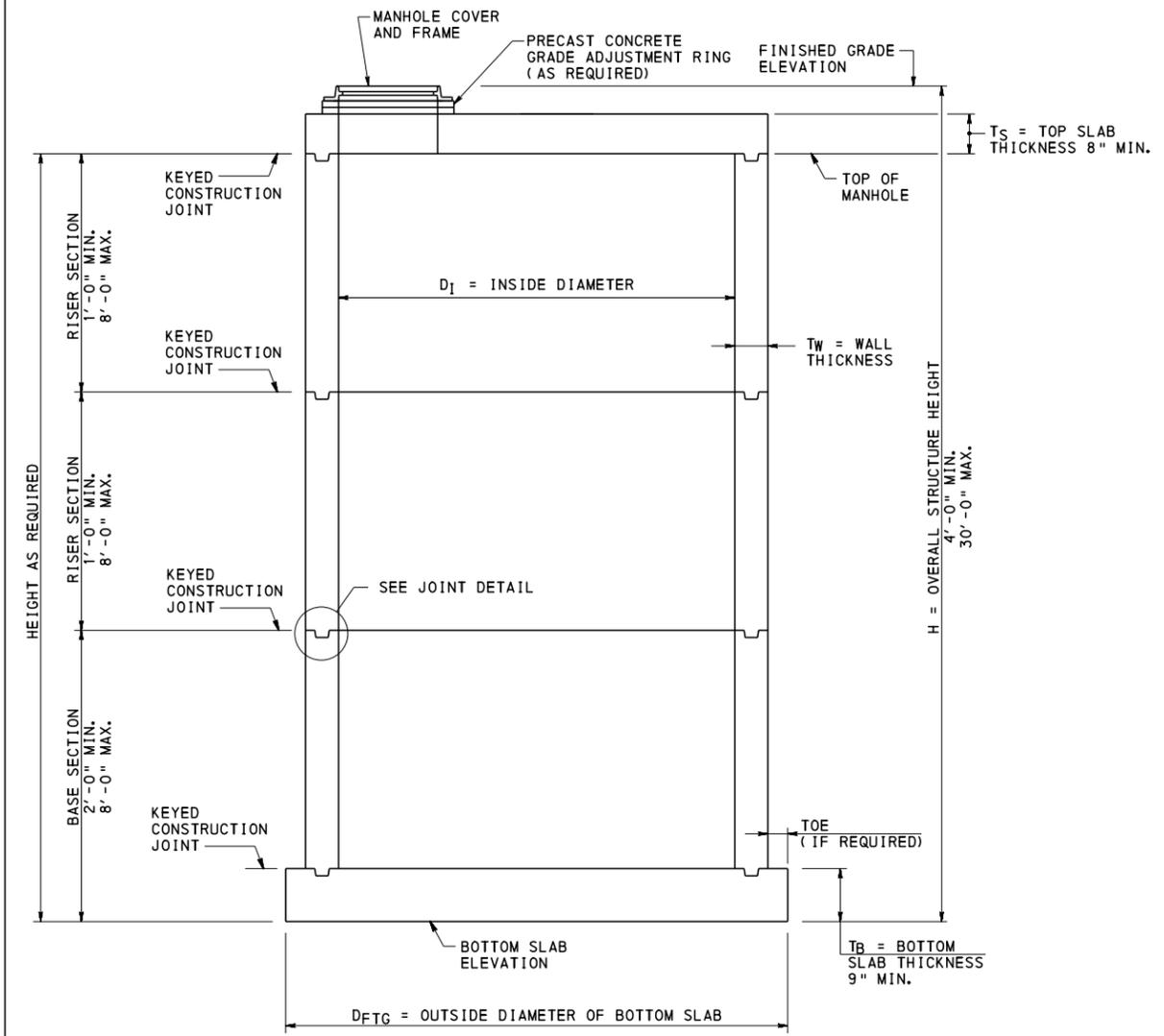
**SECTION M-M**  
(ADDITIONAL REINFORCEMENT NOT SHOWN)

**NOTES:**

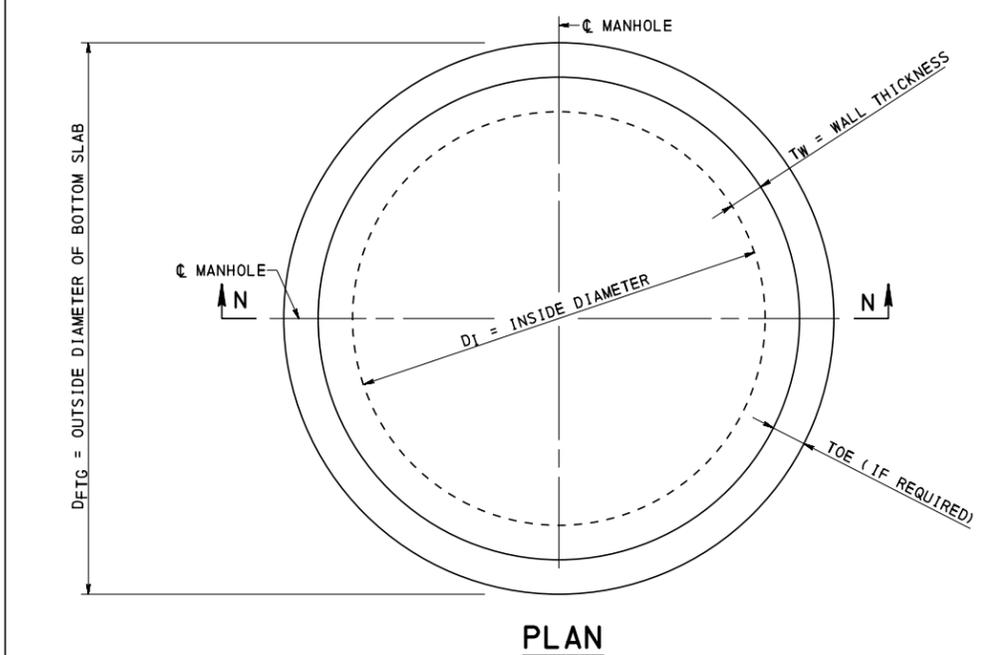
- FOR NOTES, SEE SHEETS 1 - 3.
- OUT TO OUT DIMENSIONS TO MATCH SIZE OF LOWER INLET BOX.
- ALIGN OPENING WITH INSIDE FACE OF INLET BOX.
- FOR JOINT DETAILS BETWEEN THE TRANSITION SLAB AND MANHOLE, SEE SHEETS 20 OR 24.
- FOR JOINT DETAILS BETWEEN THE TRANSITION SLAB AND INLET BOX, SEE RC-46M.
- ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
- SLAB THICKNESS "T<sub>SS</sub>" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

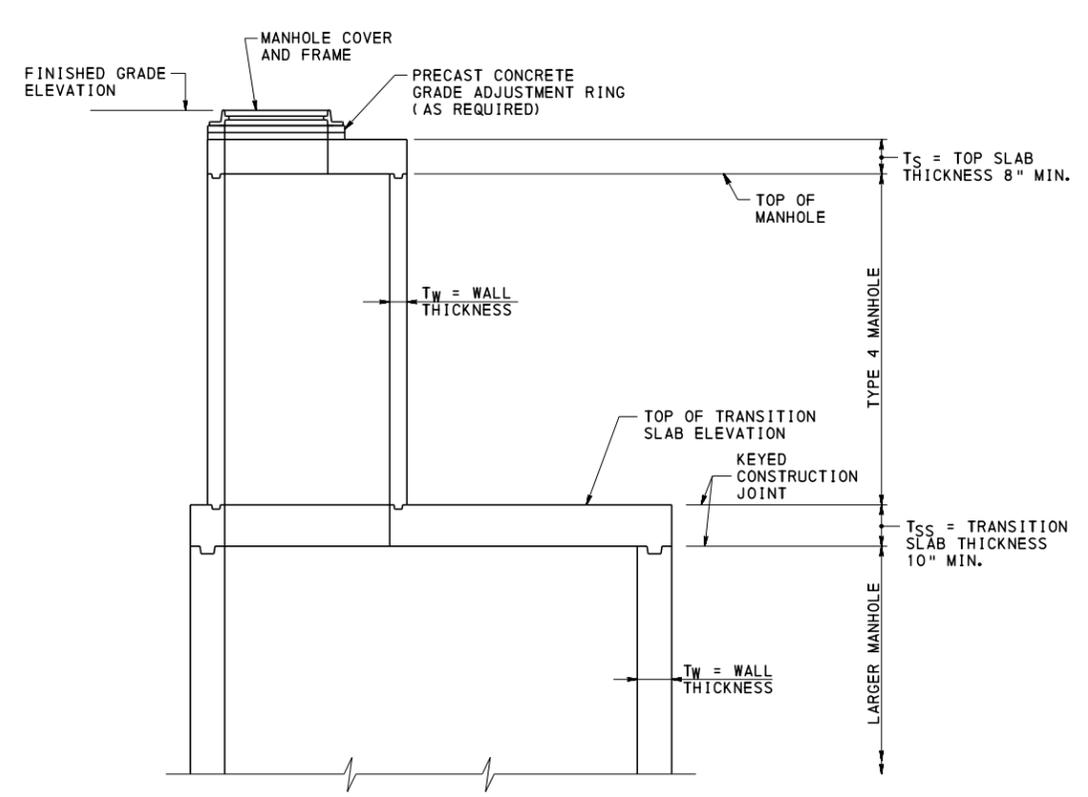
**STORM WATER MANHOLES  
SQUARE TRANSITION SLABS - 2**



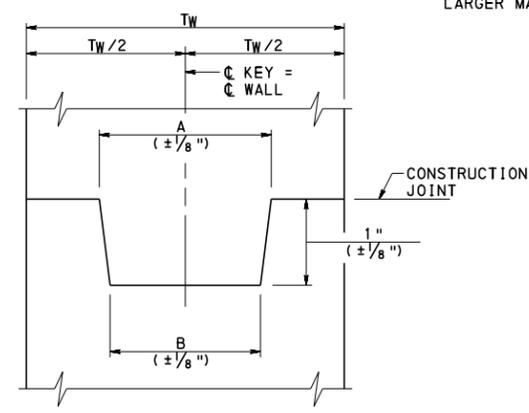
**SECTION N-N**  
SAME SIZE MANHOLE FULL HEIGHT WITH TOP SLAB AND MANHOLE COVER AND FRAME



**PLAN**



**SECTION N-N**  
LARGER MANHOLE TO TYPE 4 MANHOLE WITH TRANSITION SLAB, TOP SLAB AND MANHOLE COVER AND FRAME



**JOINT DETAIL (CAST-IN-PLACE)**  
(KEYED CONSTRUCTION JOINT)

JOINT WIDTHS		
MANHOLE TYPE	A (IN.)	B (IN.)
TYPE 4	1 1/2	1 1/4
TYPE 5	2	1 3/4
TYPE 6	2	1 3/4
TYPE 7	2	1 3/4
TYPE 8	3	2 3/4
TYPE 10	3	2 3/4
TYPE 12	4	3 3/4

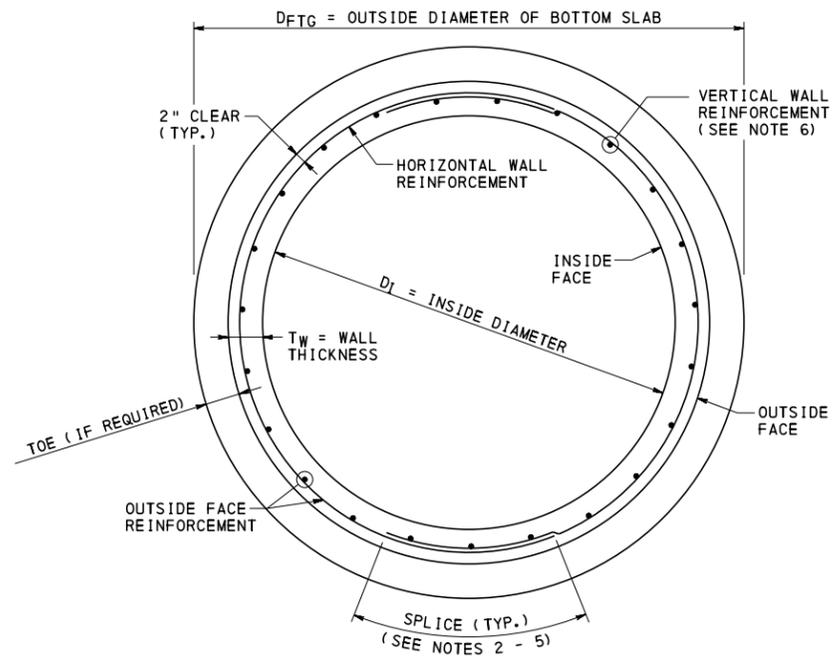
**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE TYPES, SEE SHEET 4.
3. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.
4. FOR TOP SLAB DETAILS, SEE SHEETS 11 - 15.
5. FOR TRANSITION SLAB DETAILS, SEE SHEETS 16 - 19.
6. FOR REINFORCEMENT DETAILS, SEE SHEETS 21 & 22.
7. FOR DESIGN TABLES, SEE SHEET 23.

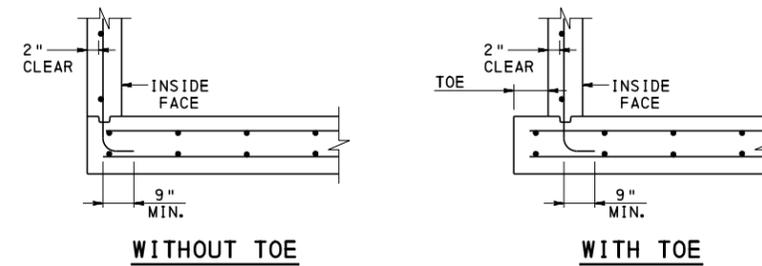
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**STORM WATER MANHOLES**  
**CAST-IN-PLACE MANHOLES - 1**

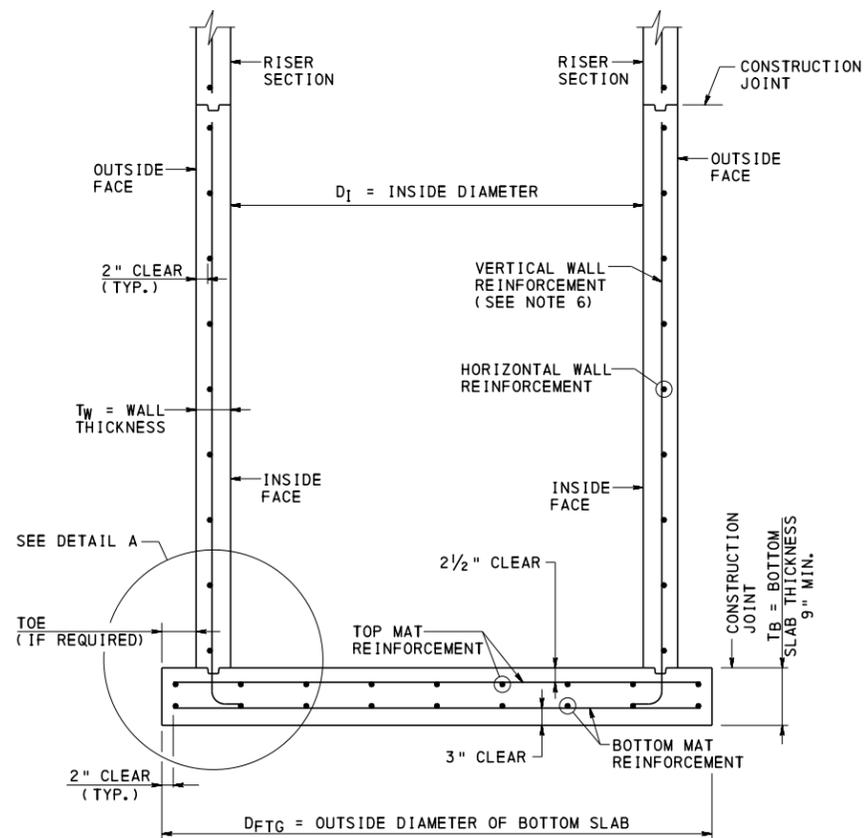
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Ben J. Edgar</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 20 OF 30 <b>RC-39M</b>
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**HORIZONTAL SECTION**  
(RISER SECTIONS AND BASE SECTIONS)



**DETAIL A**



**VERTICAL SECTION OF BASE SECTION**

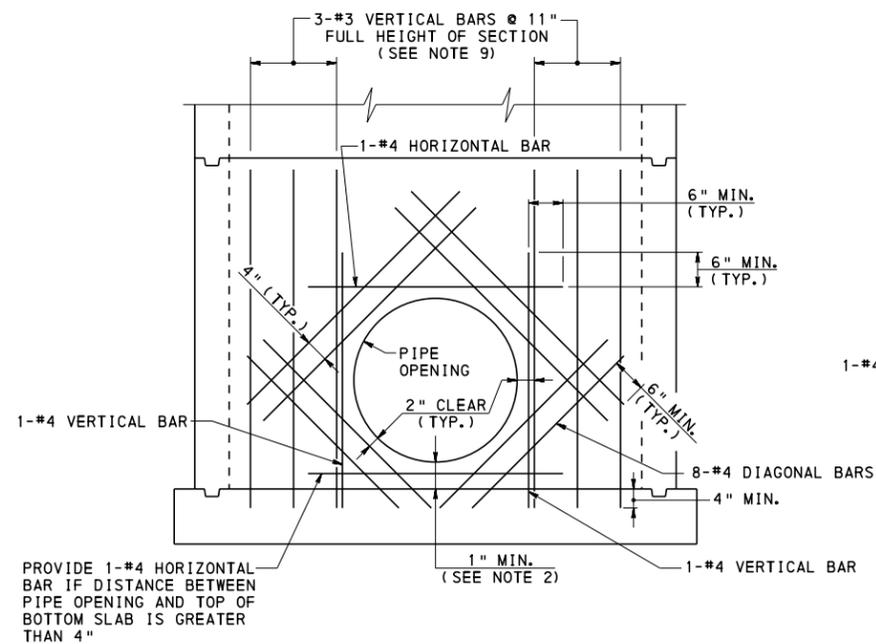
**TYPICAL SECTION**  
**CAST-IN-PLACE MANHOLES**  
**WITH REINFORCEMENT BARS**

**NOTES:**

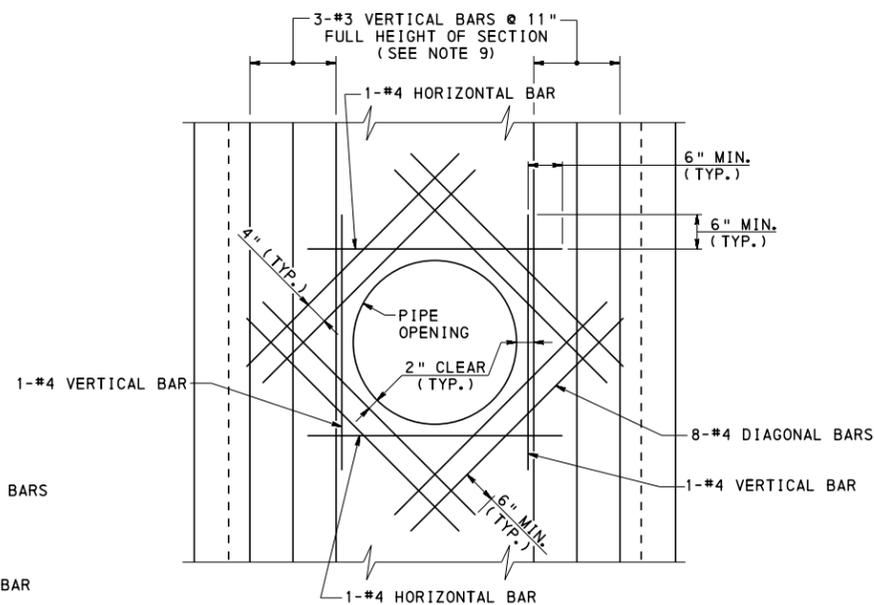
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATION(S) TO BE DETERMINED BY CONTRACTOR.
4. PROVIDE A MAXIMUM OF TWO SPLICES PER LAYER.
5. ALTERNATE SPLICE LOCATIONS.
6. EQUALLY SPACE VERTICAL BARS AROUND PERIMETER. LOCATE BARS TO CLEAR PIPE OPENINGS.
7. FOR DESIGN TABLES, SEE SHEET 23.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

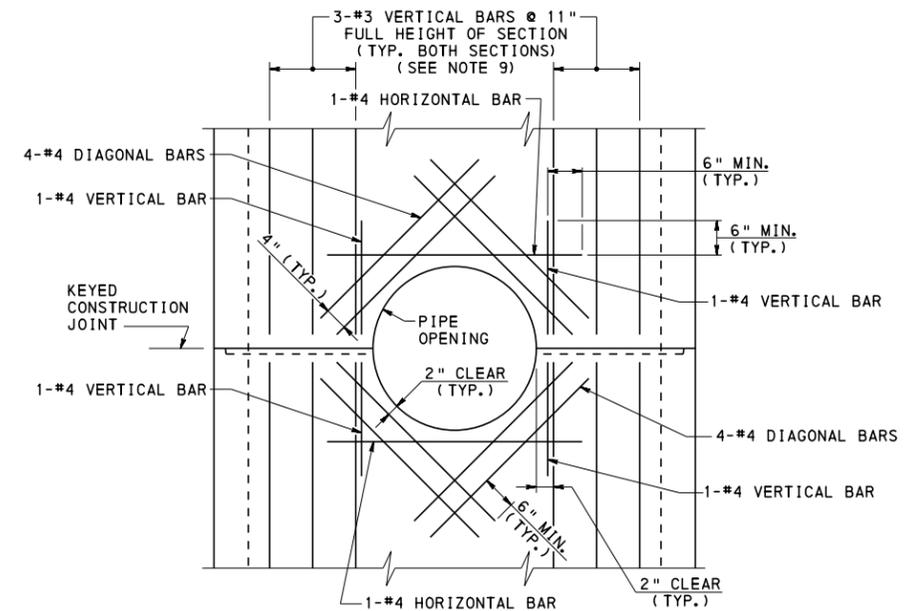
**STORM WATER MANHOLES**  
**CAST-IN-PLACE MANHOLES - 2**  
**(REINFORCEMENT BAR DETAILS)**



**AT BASE SECTION**



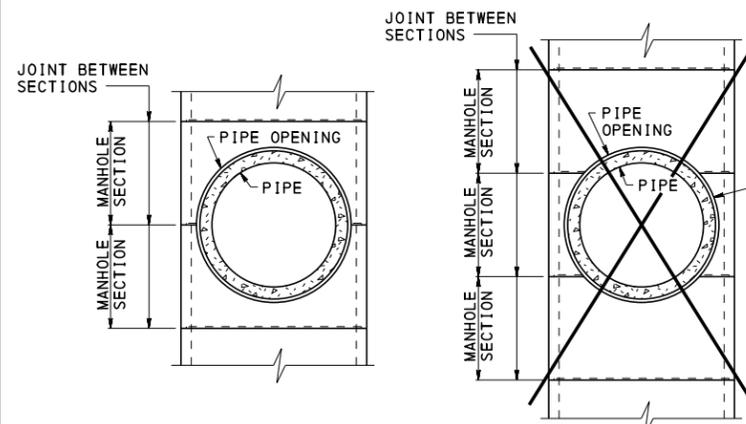
**WITHIN MANHOLE SECTION**



**AT CONSTRUCTION JOINT**  
(NOT PREFERRED)

**ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IN WALL**

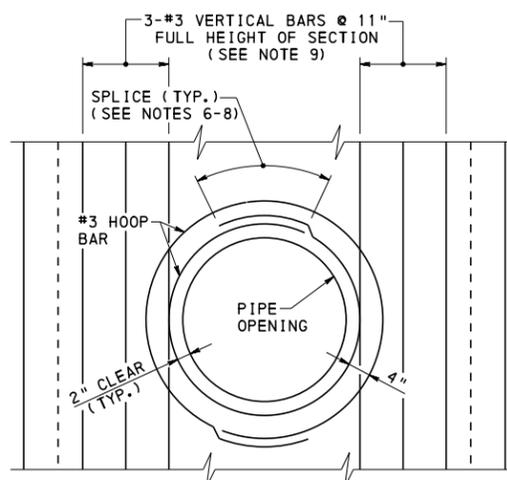
PIPE OPENING LOCATION AND SIZE AS REQUIRED



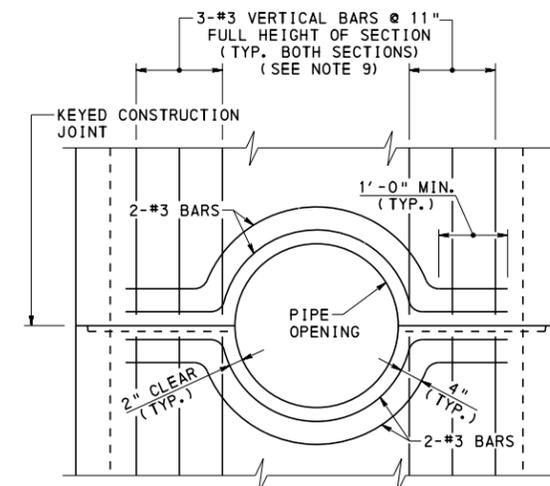
**CORRECT LOCATION**  
(NOT PREFERRED)

**WRONG LOCATION**

**LOCATION OF PIPE OPENING**



**AT BASE SECTION OR WITHIN MANHOLE SECTION**



**AT CONSTRUCTION JOINT**  
(NOT PREFERRED)

**ALTERNATE REINFORCEMENT DETAILS**

**NOTES:**

- FOR NOTES, SEE SHEETS 1 - 3.
- FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
- ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IS REQUIRED WHEN THE PIPE OPENING IS GREATER THAN 15".
- TIE ADDITIONAL REINFORCEMENT TO THE DESIGN REINFORCEMENT.
- FOR REINFORCEMENT DETAILS, SEE SHEET 21.
- FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
- SPLICE LOCATIONS TO BE DETERMINED BY CONTRACTOR.
- ALTERNATE SPLICE LOCATIONS.
- PROVIDE 3-#3 VERTICAL BARS SPACED AT 11" ON EACH SIDE OF THE PIPE OPENING FOR THE FULL HEIGHT OF THE SECTION. FOR ADJACENT PIPE OPENINGS LESS THAN 24" APART, ALONG THE INSIDE FACE, PROVIDE 6-#3 VERTICAL BARS EQUALLY SPACED BETWEEN THE ADJACENT PIPE OPENINGS FOR THE FULL HEIGHT OF THE SECTION.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**STORM WATER MANHOLES  
CAST-IN-PLACE MANHOLES - 3**

CAST-IN-PLACE CONCRETE STORM WATER MANHOLE SUMMARY TABLE							
RISER SECTIONS							
MANHOLE TYPE	MAXIMUM JOINT DEPTH (FT.)	D <sub>1</sub> (FT.)	T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
TYPE 4	28.0	4	5	#3	11	#3	11
TYPE 5	28.0	5	6	#3	9	#3	11
TYPE 6	28.0	6	7	#3	7	#3	11
TYPE 7	28.0	7	8	#4	11	#3	11
TYPE 8	28.0	8	9	#4	10	#3	11
TYPE 10	28.0	10	10	#4	8	#3	11
TYPE 12	28.0	12	12	#5	10	#3	11

CAST-IN-PLACE CONCRETE STORM WATER MANHOLE SUMMARY TABLE													
BASE SECTIONS													
MANHOLE TYPE	H (FT.)	D <sub>1</sub> (FT.)	T <sub>W</sub> (IN.)	D <sub>FTG</sub> (MINIMUM) (FT.-IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				BOTTOM SLAB REINFORCEMENT			
						HORIZONTAL		VERTICAL		TOP MAT (EW)		BOTTOM MAT (EW)	
						BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
TYPE 4	18.0	4	5	4'-10"	9	#3	11	#3	11	#3	11	#3	10
	30.0	4	5	5'-4"	9	#3	11	#3	11	#3	11	#3	10
TYPE 5	17.0	5	6	6'-0"	9	#3	9	#3	11	#3	11	#3	7
	30.0	5	6	6'-6"	9	#3	9	#3	11	#3	11	#3	7
TYPE 6	9.0	6	7	7'-2"	9	#3	7	#3	11	#3	11	#3	7
	16.0	6	7	7'-2"	10								
	19.0	6	7	7'-8"	10								
	26.0	6	7	7'-8"	11								
TYPE 7	11.0	7	8	8'-4"	9	#4	11	#3	11	#3	10	#4	10
	15.0	7	8	8'-4"	10								
	18.0	7	8	8'-10"	10								
	24.0	7	8	8'-10"	11								
TYPE 8	10.0	8	9	9'-6"	11	#4	10	#3	11	#3	9	#4	10
	15.0	8	9	9'-6"	12								
	18.0	8	9	10'-0"	12								
	25.0	8	9	10'-0"	13								
TYPE 10	8.0	10	10	11'-8"	12	#4	8	#3	11	#3	8	#4	8
	12.0	10	10	11'-8"	13								
	17.0	10	10	12'-2"	13								
	22.0	10	10	12'-2"	14								
TYPE 12	27.0	10	10	12'-2"	15	#5	10	#3	11	#4	12	#5	10
	30.0	10	10	12'-8"	16								
	6.0	12	12	14'-0"	14								
	12.0	12	12	14'-0"	15								
TYPE 12	18.0	12	12	14'-6"	16	#5	10	#3	11	#4	12	#5	10
	24.0	12	12	14'-6"	17								
	28.0	12	12	15'-0"	18								
	30.0	12	12	15'-0"	19								

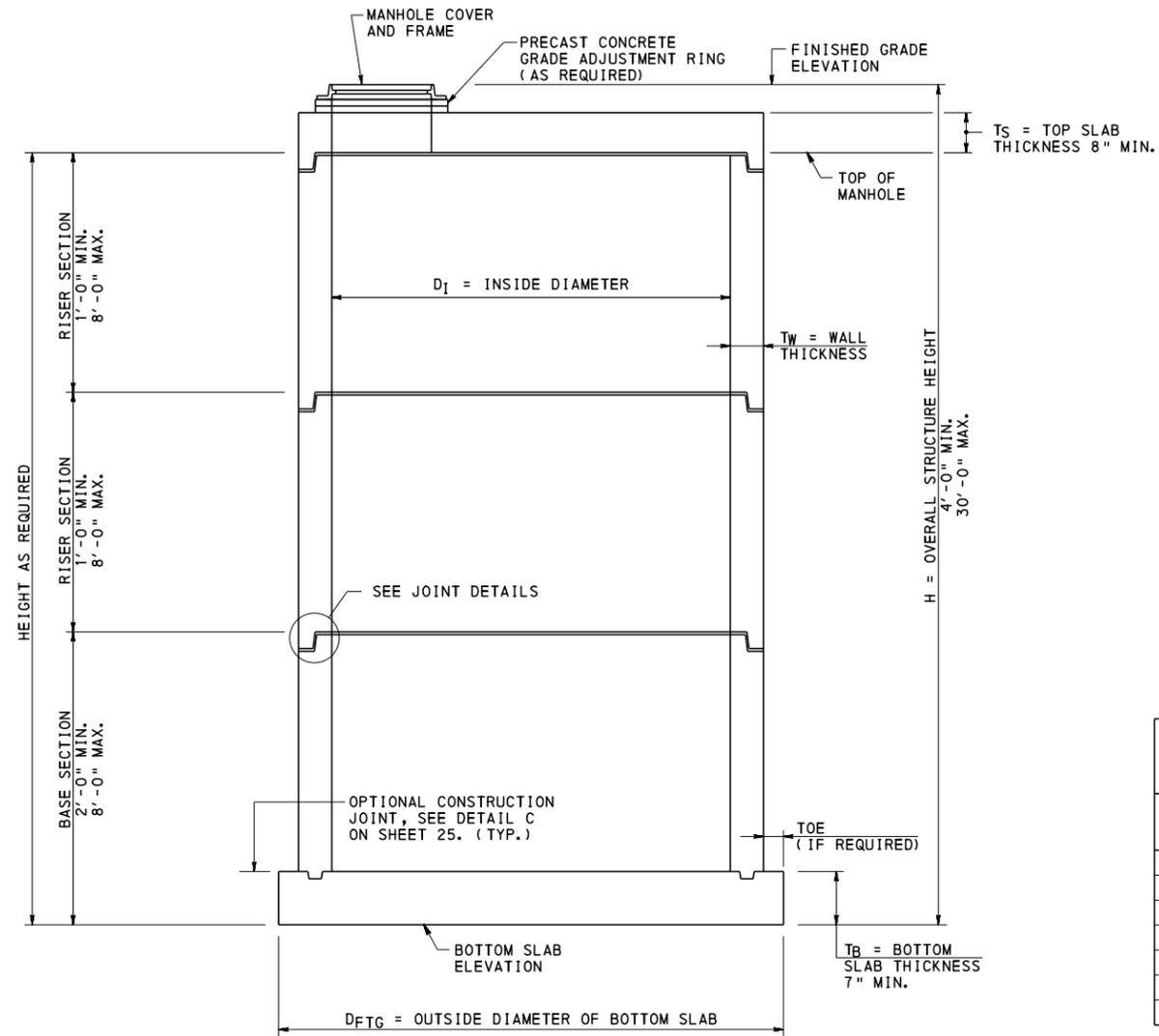
EW = EACH WAY

**NOTES:**

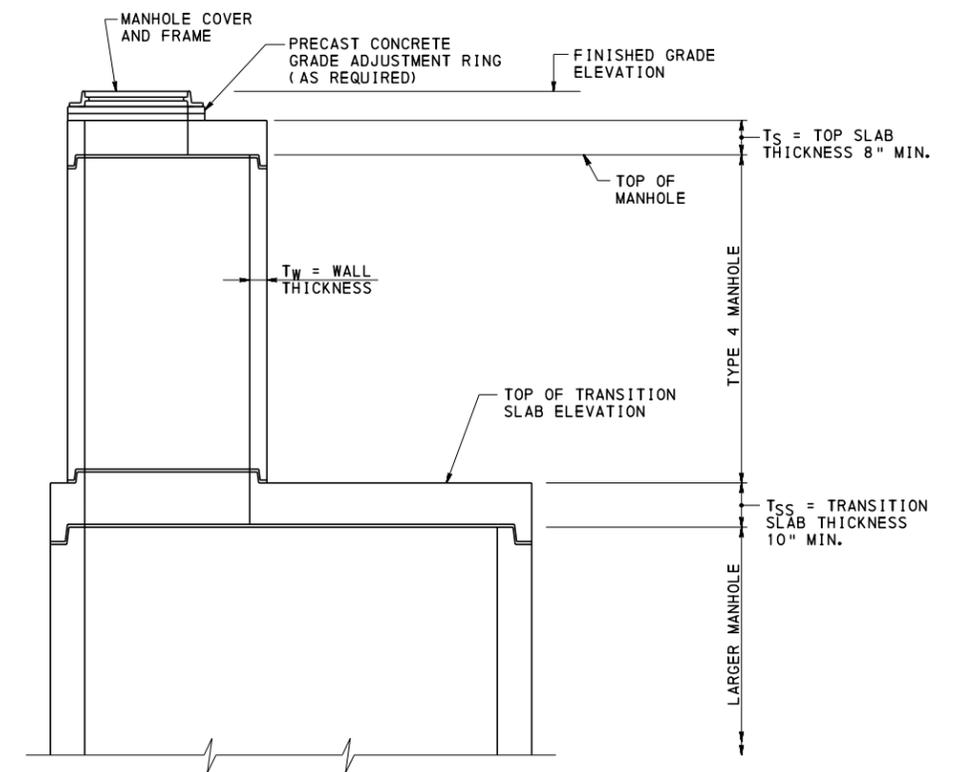
- FOR NOTES, SEE SHEETS 1 - 3.
- FOR MANHOLE TYPES, SEE SHEET 4.
- FOR DETAILS, SEE SHEETS 20 - 22.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
CAST-IN-PLACE MANHOLES  
DESIGN TABLES

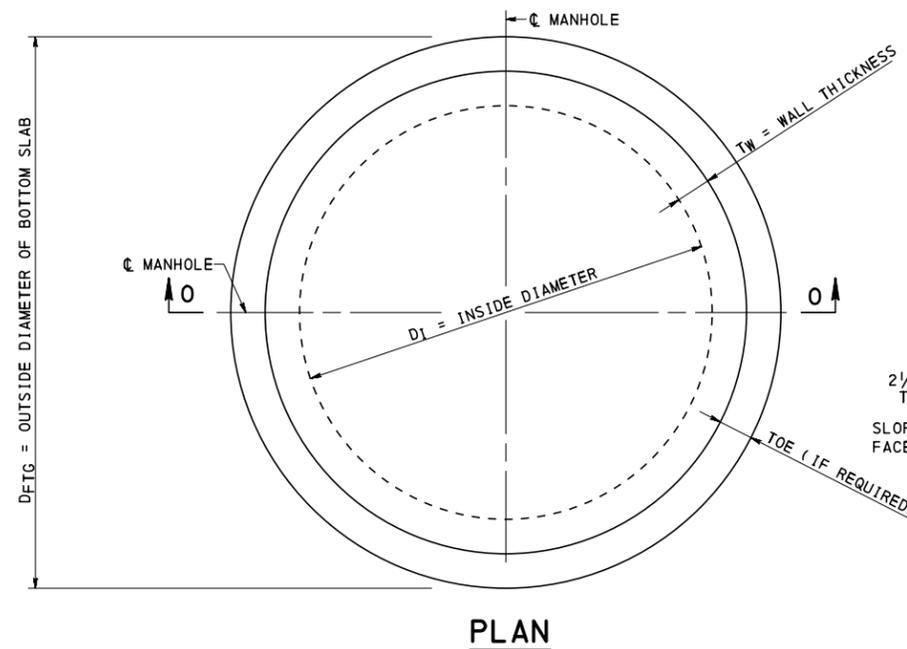


**SECTION 0-0**  
SAME SIZE MANHOLE FULL HEIGHT WITH  
TOP SLAB AND MANHOLE COVER AND FRAME

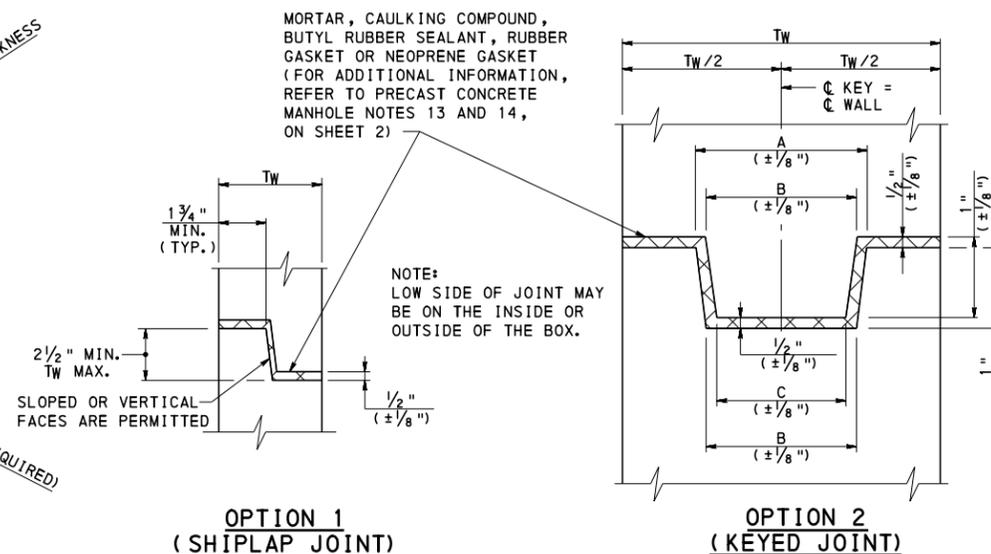


**SECTION 0-0**  
LARGER MANHOLE TO TYPE 4 MANHOLE WITH TRANSITION SLAB,  
TOP SLAB AND MANHOLE COVER AND FRAME

JOINT WIDTHS FOR KEYED JOINTS			
MANHOLE TYPE	A ( IN. )	B ( IN. )	C ( IN. )
TYPE 4	1 1/2	1 1/4	1
TYPE 5	2	1 3/4	1 1/2
TYPE 6	2	1 3/4	1 1/2
TYPE 7	2	1 3/4	1 1/2
TYPE 8	3	2 3/4	2 1/2
TYPE 10	3	2 3/4	2 1/2
TYPE 12	4	3 3/4	3 1/2



**PLAN**



**OPTION 1**  
**(SHIPLAP JOINT)**

**OPTION 2**  
**(KEYED JOINT)**

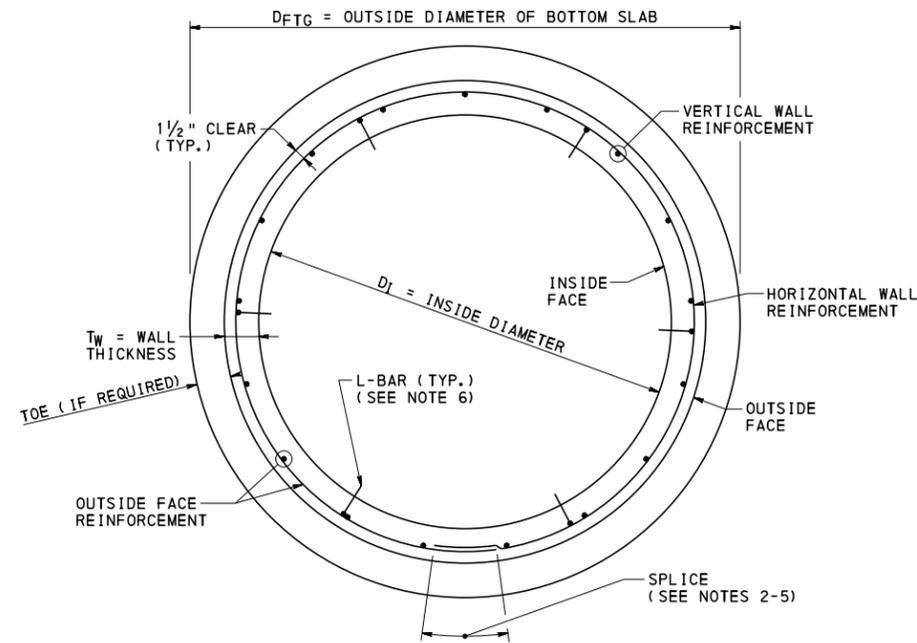
**JOINT DETAILS (PRECAST)**

**NOTES:**

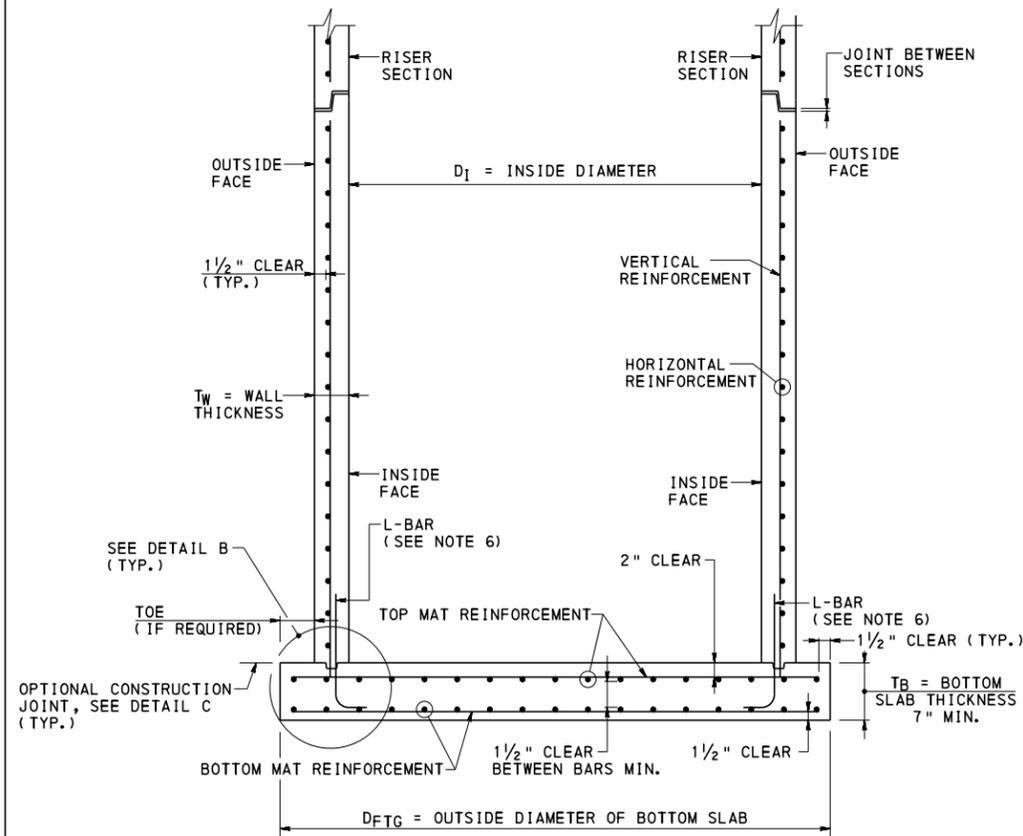
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE TYPES, SEE SHEET 4.
3. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.
4. FOR TOP SLAB DETAILS, SEE SHEETS 11 - 15.
5. FOR TRANSITION SLAB DETAILS, SEE SHEETS 16 - 19.
6. FOR REINFORCEMENT DETAILS, SEE SHEETS 25 - 27.
7. FOR DESIGN TABLES, SEE SHEET 28.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

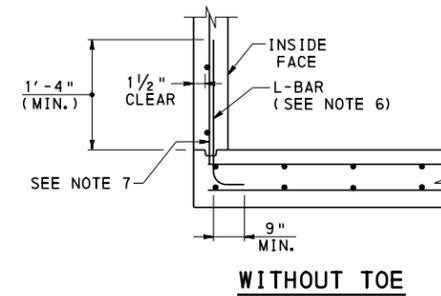
STORM WATER MANHOLES  
PRECAST MANHOLES - 1



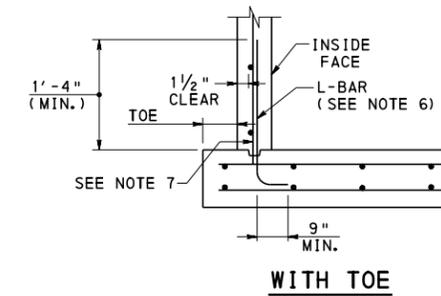
**HORIZONTAL SECTION**  
(RISER SECTIONS AND BASE SECTIONS)



**VERTICAL SECTION OF BASE SECTION**  
**TYPICAL SECTION**  
**PRECAST MANHOLES**  
**WITH REINFORCEMENT BARS**  
**OR WELDED WIRE FABRIC**

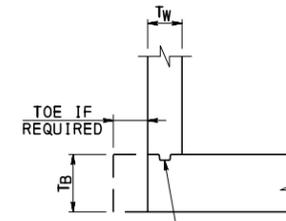


**WITHOUT TOE**

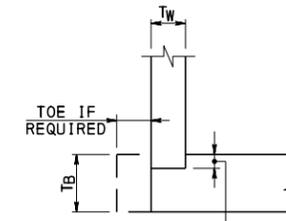


**WITH TOE**

**DETAIL B**

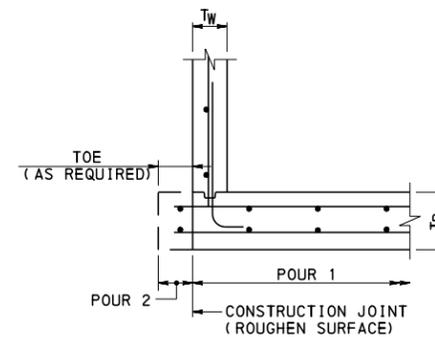


**OPTION 1**  
**(KEYED JOINT)**



**OPTION 2**  
**(EMBEDDED)**

**NOTE:**  
REINFORCEMENT NOT SHOWN  
FOR CLARITY. SEE DETAIL B  
FOR REINFORCEMENT DETAILS.



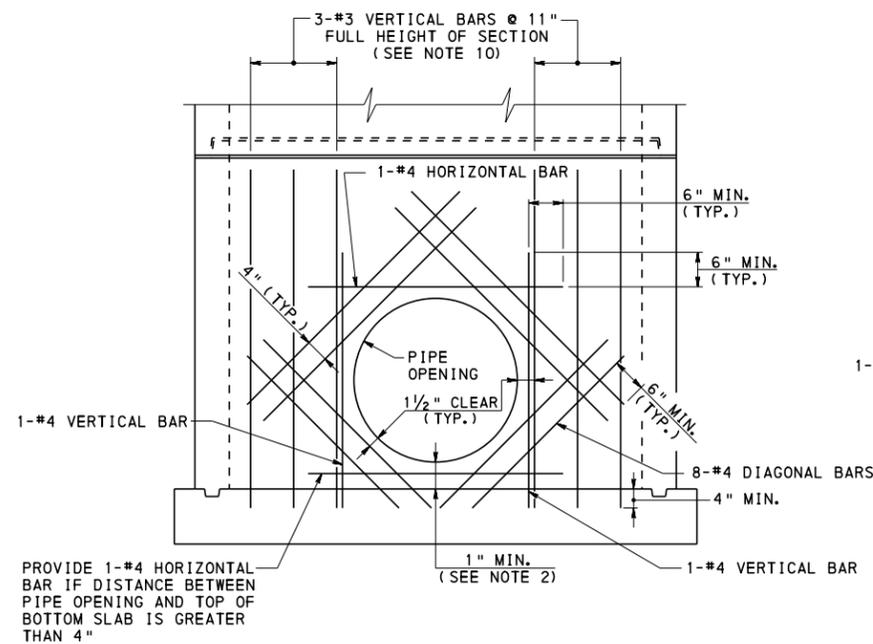
**DETAIL D**  
(OPTIONAL JOINT TO CONSTRUCT TOE  
WHEN WALL AND BASE SLAB ARE  
POURED MONOLITHICALLY)

**NOTES:**

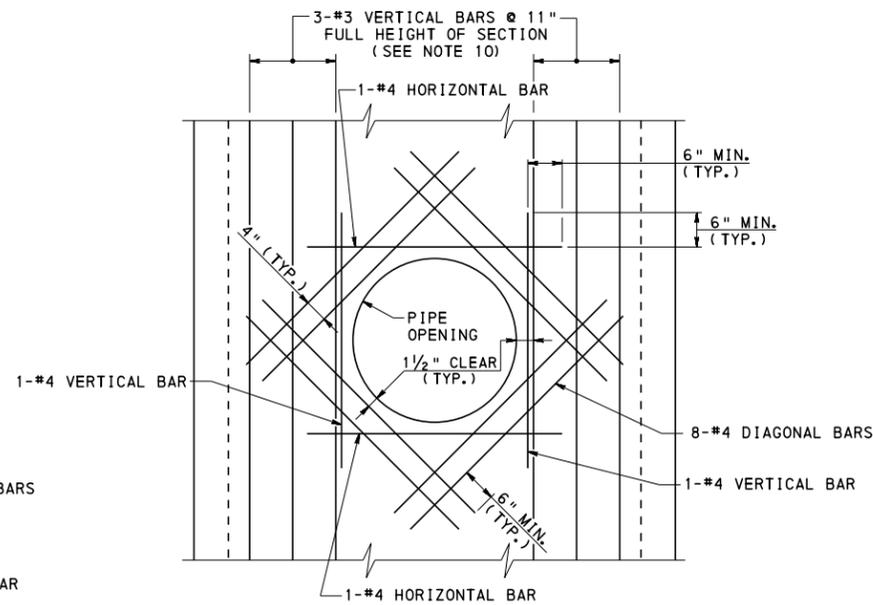
1. FOR NOTES, SEE SHEETS 1 - 3.
2. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
3. SPLICES:  
WWF: MINIMUM SPLICE LENGTH = LARGER OF 2 GRID SPACINGS OR 12".  
BARS: FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
4. PROVIDE A MAXIMUM OF TWO SPLICES PER LAYER.
5. ALTERNATE SPLICE LOCATIONS.
6. EQUALLY SPACE L-BARS AROUND THE PERIMETER. BARS ONLY, WWF NOT PERMITTED. LOCATE L-BARS TO CLEAR PIPE OPENINGS.
7. EXTEND VERTICAL REINFORCEMENT IN WALL TO TOP MAT REINFORCEMENT.
8. FOR DESIGN TABLES, SEE SHEET 28.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

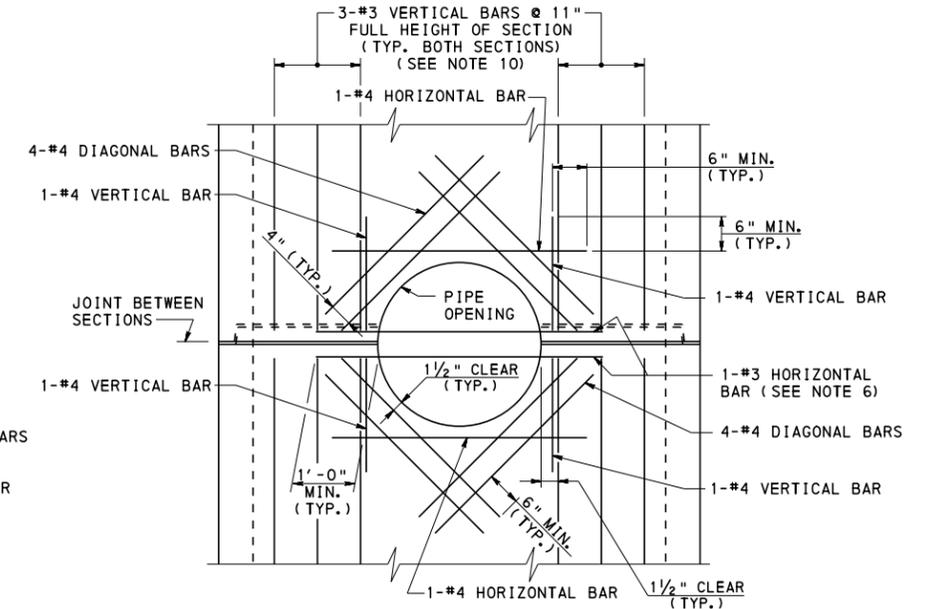
STORM WATER MANHOLES  
PRECAST MANHOLES - 2



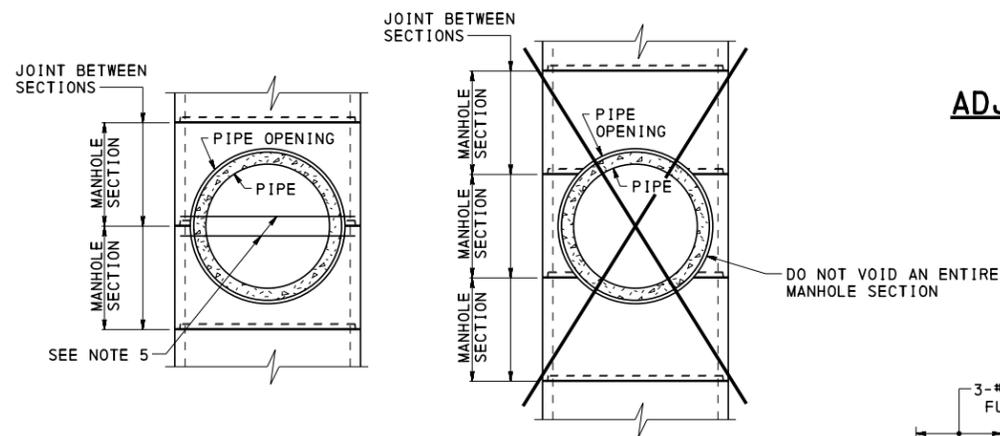
**AT BASE SECTION**



**WITHIN MANHOLE SECTION**



**BETWEEN MANHOLE SECTIONS**  
(NOT PREFERRED)



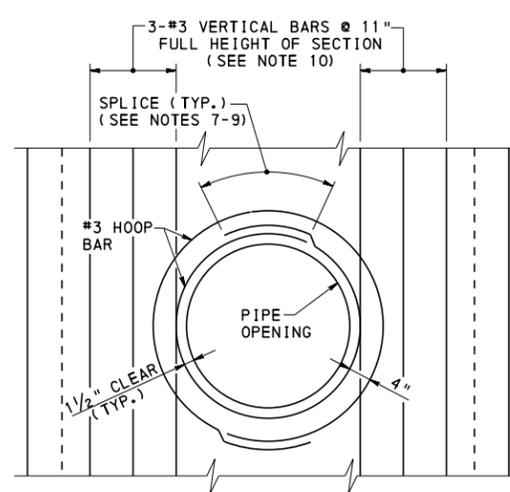
**CORRECT LOCATION**  
(NOT PREFERRED)

**WRONG LOCATION**

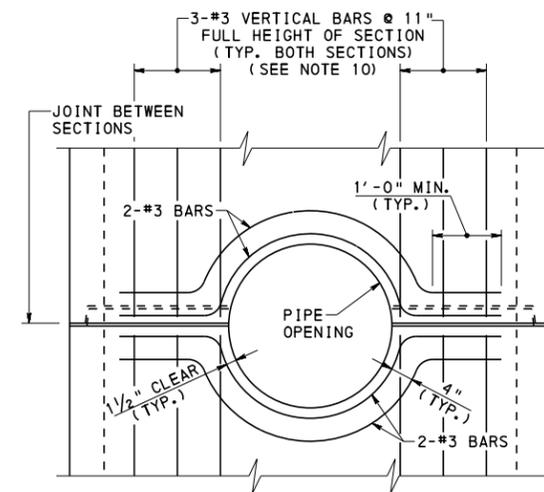
**LOCATION OF PIPE OPENING**

**ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IN WALL**

PIPE OPENING LOCATION AND SIZE AS REQUIRED



**AT BASE SECTION OR WITHIN MANHOLE SECTION**



**AT CONSTRUCTION JOINT**  
(NOT PREFERRED)

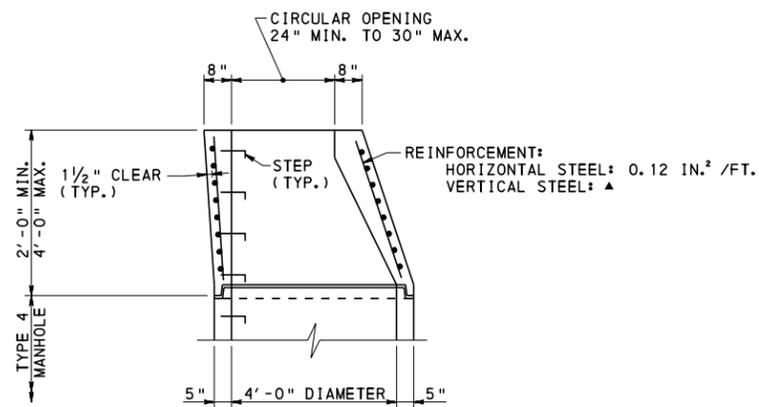
**ALTERNATE REINFORCEMENT DETAILS**

**NOTES:**

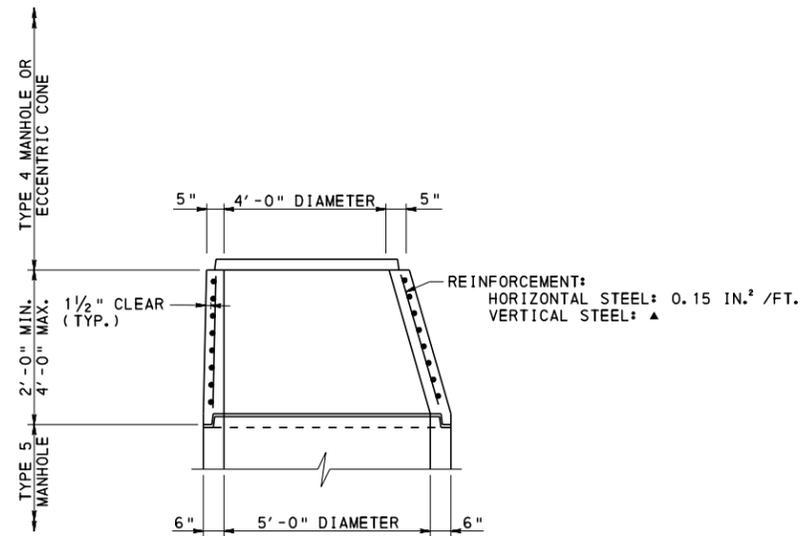
- FOR NOTES, SEE SHEETS 1 - 3.
- FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
- ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IS REQUIRED WHEN THE PIPE OPENING IS GREATER THAN 15".
- TIE ADDITIONAL REINFORCEMENT TO THE DESIGN REINFORCEMENT.
- FOR REINFORCEMENT DETAILS, SEE SHEET 25.
- PROVIDE #3 BARS TO SUPPORT THE PIPE OPENING DURING FABRICATION. LOCATE BARS 1/2" CLEAR FROM TOP OR BOTTOM OF THE SECTION. CUT BARS IN FIELD PRIOR TO INSTALLING PIPE.
- FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
- SPLICE LOCATIONS TO BE DETERMINED BY FABRICATOR.
- ALTERNATE SPLICE LOCATIONS.
- PROVIDE 3-#3 VERTICAL BARS SPACED AT 11" ON EACH SIDE OF THE PIPE OPENING FOR THE FULL HEIGHT OF THE SECTION. FOR ADJACENT PIPE OPENINGS LESS THAN 24" APART, ALONG THE INSIDE FACE, PROVIDE 6-#3 VERTICAL BARS EQUALLY SPACED BETWEEN THE ADJACENT PIPE OPENINGS FOR THE FULL HEIGHT OF THE SECTION.

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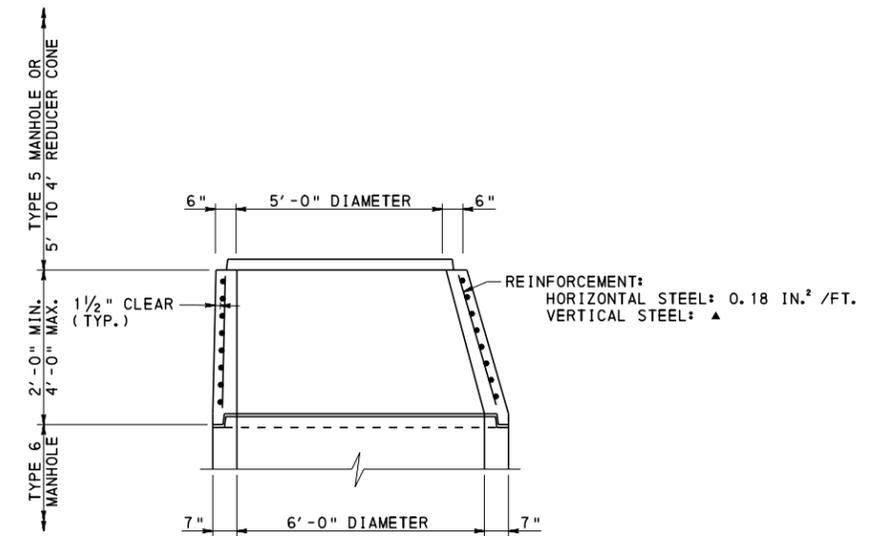
STORM WATER MANHOLES  
PRECAST MANHOLES - 3



**ECCENTRIC CONE**



**5' TO 4' REDUCER CONE**



**6' TO 5' REDUCER CONE**

**REDUCER CONES**

(NOTE: MANHOLE STEPS NOT SHOWN)

**LEGEND:**

- ▲ - VERTICAL REINFORCEMENT - EACH LINE OF HORIZONTAL REINFORCEMENT SHALL BE ASSEMBLED INTO A CAGE THAT SHALL CONTAIN SUFFICIENT VERTICAL BARS OR MEMBERS TO MAINTAIN THE REINFORCEMENT IN SHAPE AND POSITION WITHIN THE FORM.

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
PRECAST MANHOLES - 4

PRECAST CONCRETE STORM WATER MANHOLE SUMMARY TABLE					
RISER SECTIONS					
MANHOLE TYPE	MAXIMUM JOINT DEPTH (FT.)	D <sub>1</sub> (FT.)	T <sub>w</sub> (IN.)	OUTSIDE FACE REINFORCEMENT	
				STEEL AREA (IN. <sup>2</sup> /FT)	
				HORIZONTAL	VERTICAL
TYPE 4	28.0	4	5	0.12	▲
TYPE 5	28.0	5	6	0.15	▲
TYPE 6	28.0	6	7	0.18	▲
TYPE 7	28.0	7	8	0.21	▲
TYPE 8	28.0	8	9	0.24	▲
TYPE 10	28.0	10	10	0.30	▲
TYPE 12	28.0	12	12	0.36	▲

PRECAST CONCRETE STORM WATER MANHOLE SUMMARY TABLE										
BASE SECTIONS										
MANHOLE TYPE	H (FT.)	D <sub>1</sub> (FT.)	T <sub>w</sub> (IN.)	D <sub>FTG</sub> (MINIMUM) (FT.-IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT		BOTTOM SLAB REINFORCEMENT		MINIMUM NUMBER OF L-BARS
						STEEL AREA (IN. <sup>2</sup> /FT)		STEEL AREA (IN. <sup>2</sup> /FT)		
						HORIZONTAL	VERTICAL	TOP MAT (EW)	BOTTOM MAT (EW)	
TYPE 4	17.0	4	5	4'-10"	7	0.12	▲	0.12	0.14	4
	27.0	4	5	5'-4"	7					
	30.0	4	5	5'-4"	8					
TYPE 5	16.0	5	6	6'-0"	8	0.15	▲	0.12	0.16	4
	30.0	5	6	6'-6"	8					
TYPE 6	9.0	6	7	7'-2"	8	0.18	▲	0.12	0.18	6
	16.0	6	7	7'-2"	9					
	20.0	6	7	7'-8"	9					
	29.0	6	7	7'-8"	10					
	30.0	6	7	7'-8"	11					
TYPE 7	11.0	7	8	8'-4"	8	0.21	▲	0.13	0.22	8
	15.0	7	8	8'-4"	9					
	19.0	7	8	8'-10"	9					
	26.0	7	8	8'-10"	10					
	30.0	7	8	8'-10"	11					
TYPE 8	6.0	8	9	9'-6"	9	0.24	▲	0.16	0.25	10
	14.0	8	9	9'-6"	10					
	22.0	8	9	10'-0"	11					
	30.0	8	9	10'-0"	12					
TYPE 10	12.0	10	10	11'-8"	11	0.30	▲	0.19	0.30	15
	20.0	10	10	12'-2"	12					
	27.0	10	10	12'-2"	13					
	30.0	10	10	12'-8"	14					
TYPE 12	12.0	12	12	14'-0"	13	0.36	▲	0.23	0.36	20
	18.0	12	12	14'-6"	14					
	24.0	12	12	14'-6"	15					
	29.0	12	12	15'-0"	16					
	30.0	12	12	15'-0"	17					

EW = EACH WAY

**NOTES:**

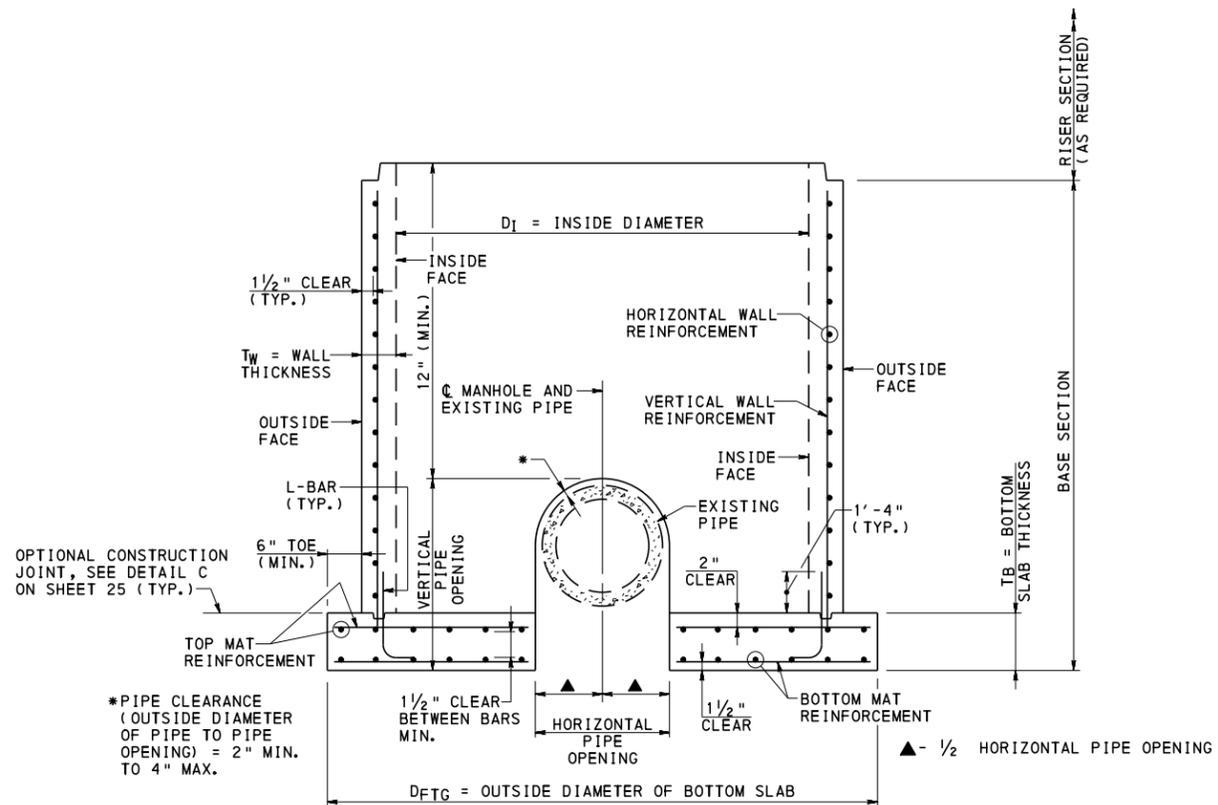
- FOR NOTES, SEE SHEETS 1 - 3.
- FOR MANHOLE TYPES, SEE SHEET 4.
- FOR DETAILS, SEE SHEETS 24 - 27.

**LEGEND:**

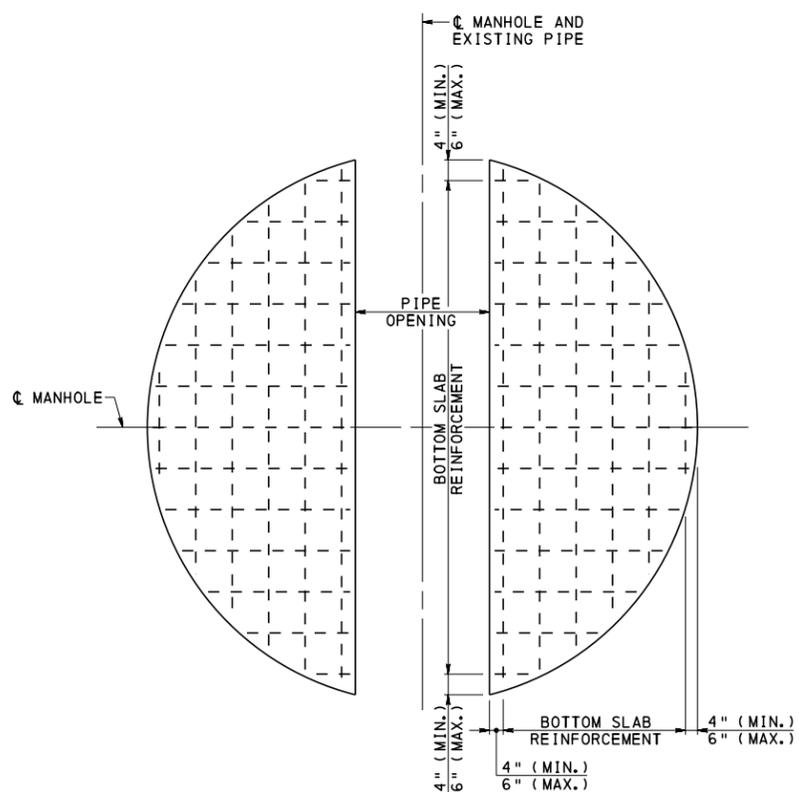
▲ - VERTICAL REINFORCEMENT - EACH LINE OF HORIZONTAL REINFORCEMENT SHALL BE ASSEMBLED INTO A CAGE THAT SHALL CONTAIN SUFFICIENT VERTICAL BARS OR MEMBERS TO MAINTAIN THE REINFORCEMENT IN SHAPE AND POSITION WITHIN THE FORM.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

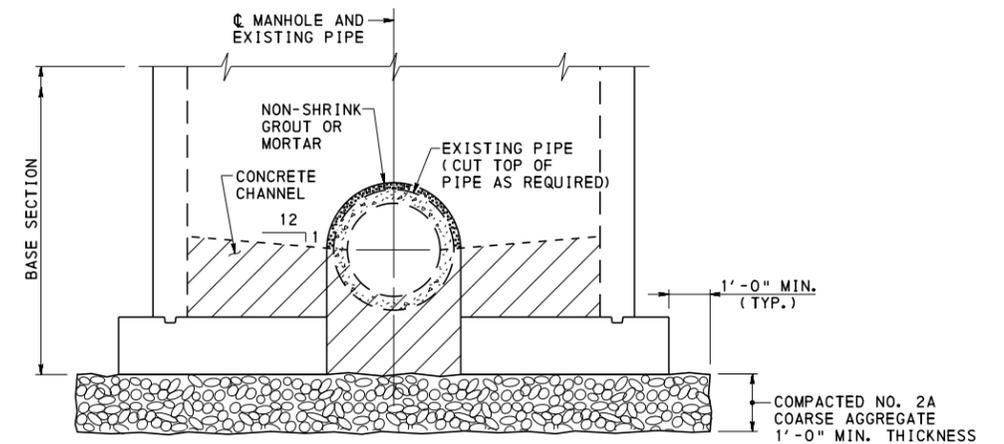
STORM WATER MANHOLES  
PRECAST MANHOLES  
DESIGN TABLES



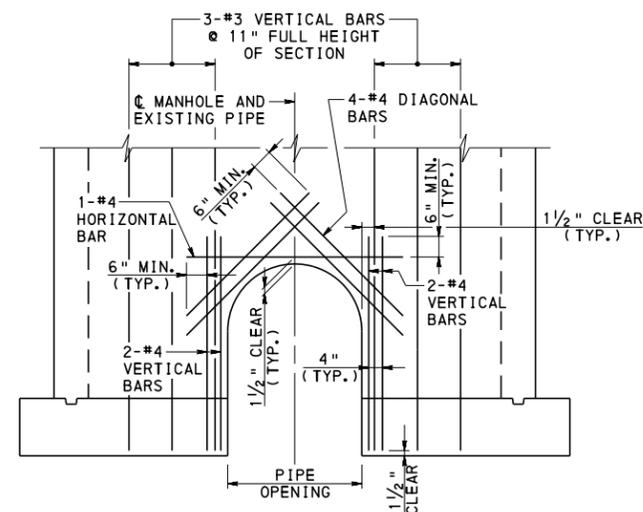
**TYPE A - DOGHOUSE MANHOLE  
(WITH BOTTOM SLAB)**  
(PRECAST BASE SECTION WITH BOTTOM SLAB)



**BOTTOM SLAB REINFORCEMENT PLAN**



**TYPE A - DOGHOUSE MANHOLE  
CONSTRUCTION DETAIL**



**ADDITIONAL REINFORCEMENT  
ADJACENT TO PIPE OPENING**

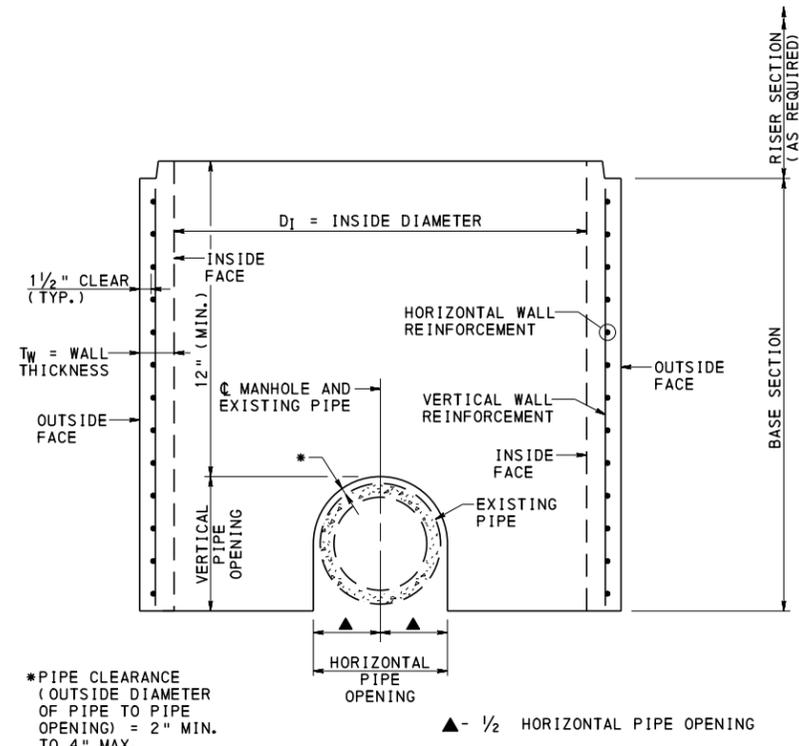
(SEE NOTE 4)

**NOTES:**

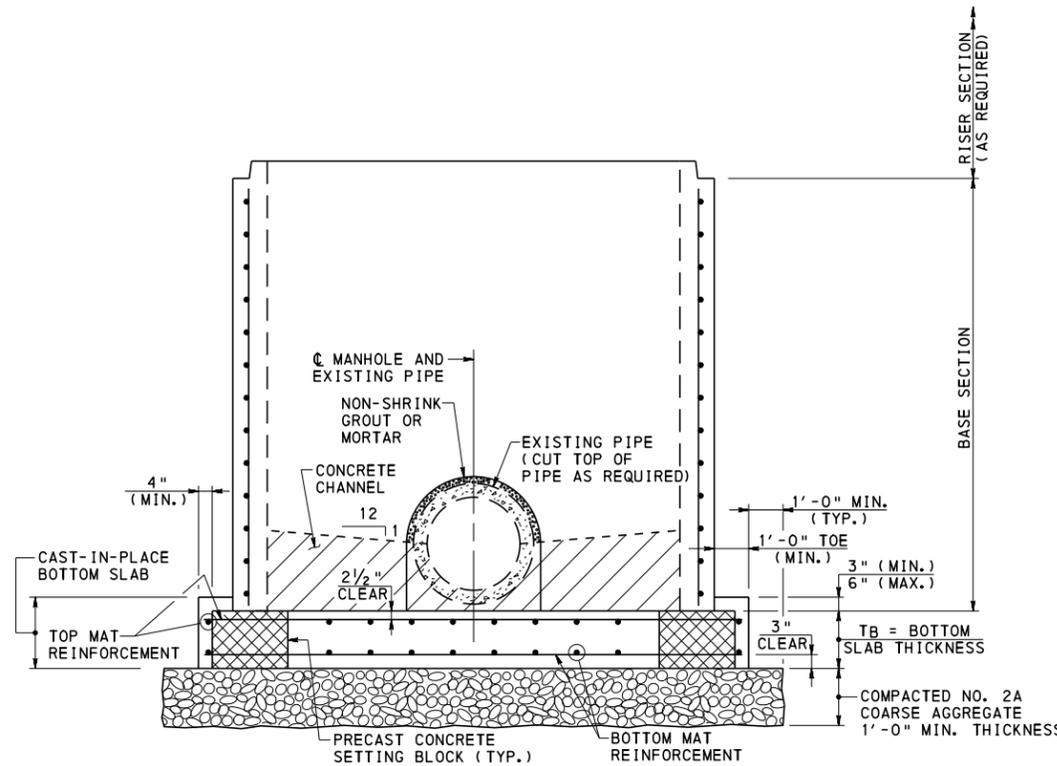
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR DOGHOUSE MANHOLE NOTES, SEE SHEET 3.
3. FOR PRECAST MANHOLE DETAILS, SEE SHEETS 24 - 28.
4. ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IS REQUIRED WHEN THE PIPE OPENING IS GREATER THEN 15".
5. ANY REINFORCEMENT BARS IN THE BOTTOM SLAB LESS THAN 8" IN LENGTH, DUE TO LOCATION OF OPENING, ARE NOT REQUIRED.

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STORM WATER MANHOLES  
DOGHOUSE MANHOLES - 1  
(TYPE A)

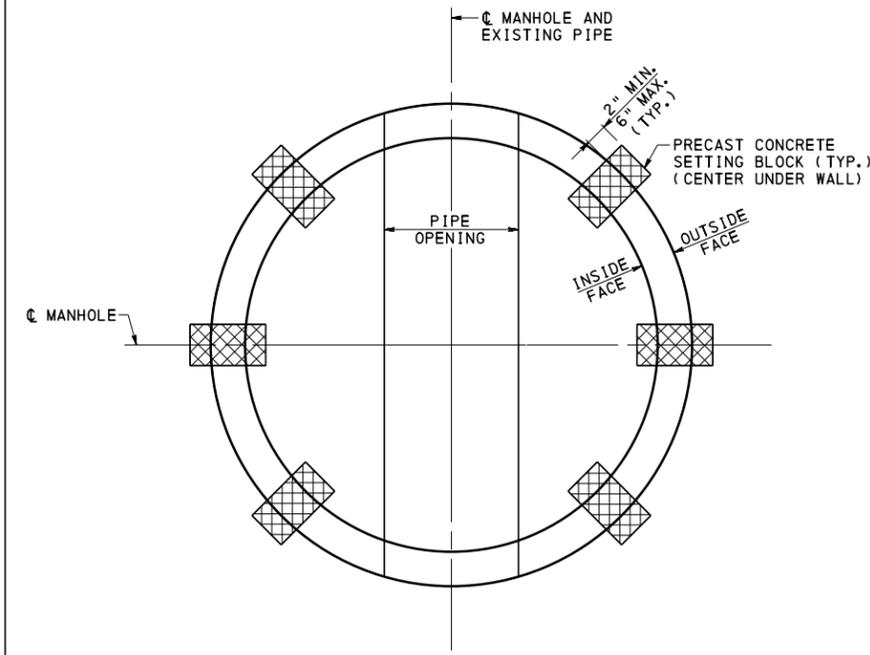


**TYPE B - DOGHOUSE MANHOLE  
(WITHOUT BOTTOM SLAB)**  
(PRECAST BASE SECTION WITHOUT BOTTOM SLAB)

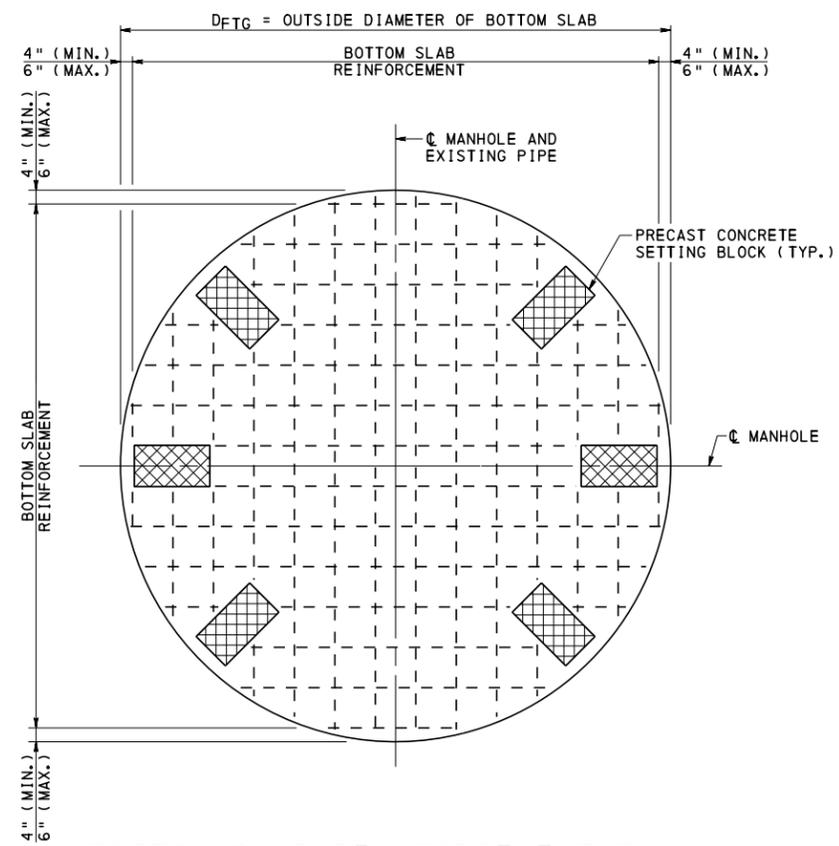


**TYPE B - DOGHOUSE MANHOLE  
CONSTRUCTION DETAIL**

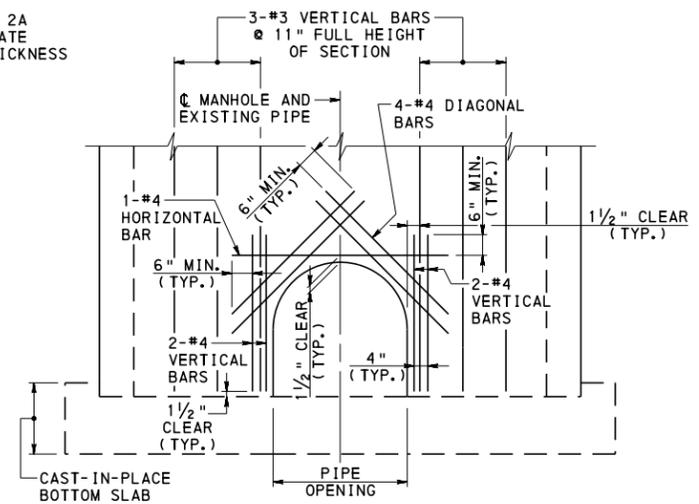
- NOTES:**
1. FOR NOTES, SEE SHEETS 1 - 3.
  2. FOR DOGHOUSE MANHOLE NOTES, SEE SHEET 3.
  3. FOR CAST-IN-PLACE MANHOLE DETAILS, SEE SHEETS 20 - 23.
  4. FOR PRECAST MANHOLE DETAILS, SEE SHEETS 24 - 28.
  5. ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IS REQUIRED WHEN THE PIPE OPENING IS GREATER THEN 15".
  6. ANY REINFORCEMENT BARS IN THE BOTTOM SLAB LESS THAN 8" IN LENGTH, DUE TO LOCATION OF SETTING BLOCKS, ARE NOT REQUIRED.



**SETTING PLAN**



**BOTTOM SLAB REINFORCEMENT PLAN  
(CAST-IN-PLACE)**



**ADDITIONAL REINFORCEMENT  
ADJACENT TO PIPE OPENING**  
(SEE NOTE 5)

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
DOGHOUSE MANHOLES - 2  
(TYPE B)

## GENERAL NOTES:

- DESIGN SPECIFICATIONS:
  - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
  - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
- CONSTRUCTION SPECIFICATIONS:
  - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
- SHOP DRAWINGS FOR INLET TOPS, GRATES, FRAMES, AND GRADE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.
- IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF.
- FOR INLET BOX DETAILS REFER TO RC-46M.

## PLACEMENT NOTES:

- EACH TYPE OF CONCRETE TOP UNIT OR FRAME IS SUITED FOR A PARTICULAR SITUATION AS FOLLOWS:
  - TYPE C CONCRETE TOP UNIT AND TYPE C ALTERNATE CONCRETE TOP UNIT WITH A TYPE C FRAME ARE DESIGNATED FOR INSTALLATION WITH NON-MOUNTABLE CURBS.
  - TYPE M CONCRETE TOP UNIT AND TYPE M FRAMES ARE DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS AND MOUNTABLE CURBS.
  - TYPE S CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS.
  - TYPE D-H CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS WITH A TYPE D-H INLET BOX.
  - TYPE D-H LEVEL CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS WITH A TYPE D-H INLET BOX.
- PLACEMENT OF CONCRETE TOP UNITS:
  - TYPE C AND TYPE C ALTERNATE:
    - DOWEL THE TOP UNIT INTO THE ADJACENT CURB SECTIONS WITH 2-#8 x 1'-0" DOWEL BARS. PLACE 3/4" WIDE PREMOLDED EXPANSION JOINT FILLER BETWEEN THE TOP UNIT AND ADJACENT CURB.
  - TYPE M:
    - PLACE THE TOP UNIT OR FRAME ADJACENT TO THE BACK EDGE OF THE CURB, FLUSH WITH THE PAVEMENT SURFACE, WHEN REQUIRED WITHIN A CONCRETE MOUNTABLE CURB SECTION.
  - TYPE S:
    - THE PLACEMENT OF THE TOP UNIT IS DEPENDENT ON THE GUTTER ELEVATION AND THE RATE OF THE BACK SLOPE.
      - FOR BACK SLOPES GREATER THAN 2:1, LOCATE THE INLET TOP WHERE THE BACK SLOPE LINE INTERSECTS THE BACK, TOP, OUTSIDE CORNER OF THE INLET TOP.
      - FOR BACK SLOPES LESS THAN 2:1, LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE EDGE OF THE INLET GRATE.
  - TYPE D-H:
    - PLACE THE TOP UNIT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
- SET THE PRECAST CONCRETE TOP UNITS ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE. NON-SHRINK GROUT IS ALSO PERMITTED FOR CROSS SLOPE AND LONGITUDINAL GRADE ADJUSTMENTS.
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
  - MINIMUM GROUT DEPTH = 1/2"
  - MAXIMUM GROUT DEPTH = 1"

FOR ALTERNATE GRADE ADJUSTMENT SYSTEMS, WHICH DO NOT REQUIRE NON-SHRINK GROUT, REFER TO NOTE 5 UNDER THE GRADE ADJUSTMENT RING GENERAL NOTES ON SHEET 12.
- BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.

## GENERAL GRATE NOTES:

- THE FOLLOWING TWO DIFFERENT GRATE DEPTHS ARE SPECIFIED ON THIS STANDARD:
  - STRUCTURAL STEEL GRATES = 3 1/2" DEPTH WITH 2 1/2" PERIMETER DEPTH
  - CAST IRON GRATES = 2 1/2" DEPTH (MINIMUM)
- THE SELECTION OF THE TYPE OF GRATE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

## CONCRETE TOP UNIT NOTES:

- SHEETS 2 THRU 6 AND 18 THRU 20 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
- PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
- PROVIDE WELDED INLET ANGLE ASSEMBLIES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
- CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTIONS 605 AND 714, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
- THE SIZE OF THE INLET TOP UNITS IS BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX AS SHOWN ON RC-46M.
- PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS IF A STANDARD INLET BOX IS NOT SPECIFIED. REFER TO RC-46M FOR ADDITIONAL INFORMATION.
- FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
- LIFTING DEVICES (IF REQUIRED):
  - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
  - LIFTING HOLES, WITH A MAXIMUM OUTSIDE DIAMETER EQUAL TO 1 5/8", ARE PERMITTED IN THE SIDEWALLS. LOCATE LIFTING HOLES BASED ON THE CENTER OF GRAVITY OF THE FABRICATED INLET TOP.
  - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION IF THE LIFTING DEVICE IS LOCATED ON THE TOP SURFACE. HOLES IN THE SIDEWALLS ARE NOT REQUIRED TO BE FILLED WITH NON-SHRINK GROUT.
  - PROVIDE LIFTING DEVICES WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.
- PROVIDE THE FOLLOWING CONCRETE CLASS:
  - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH,  $f'_c = 3,000$  PSI]
  - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH,  $f'_c = 4,000$  PSI]
- A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
- PROVIDE GRADE 420 (GRADE 60) DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615M (A615) OR ASTM A706M (A706). DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.
- CLEAR COVER FOR STEEL:
  - PRECAST: 1 1/2"
  - CAST-IN-PLACE: 2"
- PROVIDE STRUCTURAL STEEL (ANGLES AND PLATES) CONFORMING TO AASHTO M270 GRADE 36 [ASTM A709, GRADE 36].
- ANCHORING OF ANGLES AND PLATES: PROVIDE EITHER STUDS OR BENT BAR ANCHORS IN ACCORDANCE WITH THE INDICATED DETAILS.
  - STUDS: PROVIDE STUDS CONFORMING TO AASHTO M169 (ASTM A108). WELD STUDS TO ANGLES OR PLATES.
  - BENT BAR ANCHORS: PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706. WELD BARS TO ANGLES OR PLATES USING A PENNDOT APPROVED WELDING PROCEDURE.
- GALVANIZE PLATES, ANGLES AND STUDS OR BENT BAR ANCHORS (AFTER FABRICATION AND BEFORE INSTALLATION IN FORMS) IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.021(s).
- CHAMFER EXPOSED CONCRETE EDGES 1/2" x 1/2", EXCEPT AS NOTED. (CHAMFERS ARE NOT SHOWN ON THE DETAILS)
- PRECAST TOP UNITS: TAPERS MAY BE PROVIDED ON THE INSIDE AND/OR OUTSIDE VERTICAL FACES OF THE INLET TOPS TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM 2".
- REHABILITATION PROJECTS:
  - PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 18 THRU 20 IF THE AVAILABLE DEPTH IS LESS THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 4.
  - PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 2 THRU 4 IF THE AVAILABLE DEPTH IS GREATER THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 4.
  - CONTRACTOR TO REMOVE THE EXISTING TOP UNIT AND ANY GRADE ADJUSTMENT DEVICES, INCLUDING BRICK AND MORTAR AND GRADE ADJUSTMENT RINGS, DOWN TO THE TOP OF THE EXISTING INLET BOX. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE REQUIRED DEPTH OF THE NEW CONCRETE TOP UNIT BASED ON THE AVAILABLE DEPTH. COST OF THIS WORK IS INCIDENTAL TO THE COST OF THE CONCRETE TOP UNIT.
  - THE DEPTH OF THE CONCRETE TOP UNIT MUST ALWAYS BE MAXIMIZED.
  - FOR A PRECAST CONCRETE TOP UNIT THE CONTRACTOR MUST PROVIDE THE AVAILABLE DEPTH TO THE FABRICATOR FOR FABRICATION IN ACCORDANCE WITH THIS STANDARD.
  - FOR A CAST-IN-PLACE CONCRETE TOP UNIT THE CONTRACTOR IS TO CONSTRUCT THE NEW TOP IN ACCORDANCE WITH THIS STANDARD.

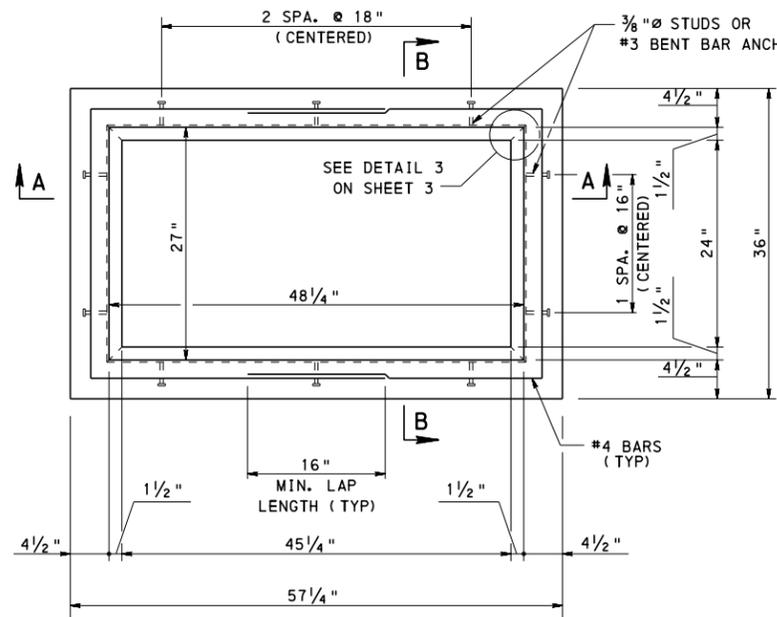
## INDEX OF SHEETS

SHEET NO.	SHEET TITLE
1	GENERAL NOTES
2	CONCRETE TOP UNITS - TYPE M AND TYPE S
3	CONCRETE TOP UNITS - TYPE C
4	CONCRETE TOP UNITS - TYPE C ALTERNATE
5	CONCRETE TOP UNITS - TYPE D-H
6	CONCRETE TOP UNITS - TYPE D-H LEVEL
7	STRUCTURAL STEEL GRATE
8	STRUCTURAL STEEL GRATE - BICYCLE SAFE
9	CAST IRON GRATES - 1
10	CAST IRON GRATES - 2
11	CAST IRON VANE GRATE
12	GRADE ADJUSTMENT RINGS - 1
13	GRADE ADJUSTMENT RINGS - 2
14	TYPE C FRAME
15	TYPE M FRAME
16	TYPE M PLACEMENT AT MEDIAN - 1
17	TYPE M PLACEMENT AT MEDIAN - 2
18	CONCRETE TOP UNITS - TYPE M AND TYPE S FOR REHABILITATION PROJECTS
19	CONCRETE TOP UNITS - TYPE C FOR REHABILITATION PROJECTS
20	CONCRETE TOP UNITS - TYPE C ALTERNATE FOR REHABILITATION PROJECTS

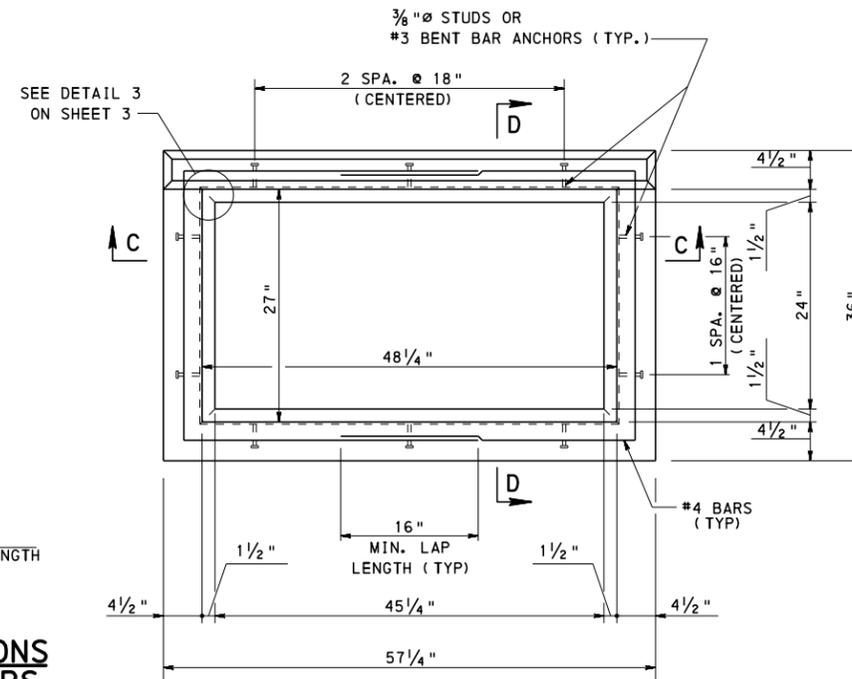
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
GENERAL NOTES

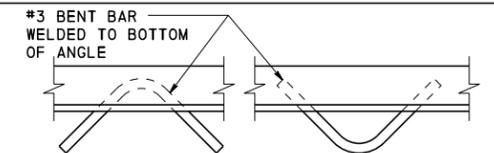
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Benjamin J. ...</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 20 RC-45M
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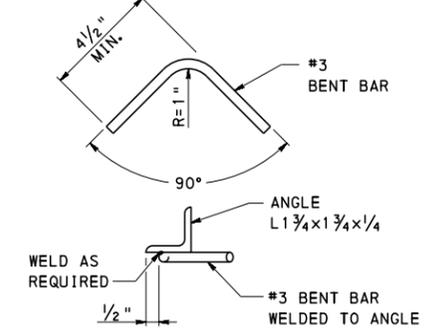
**PLAN VIEW - TYPE M**



**PLAN VIEW - TYPE S**



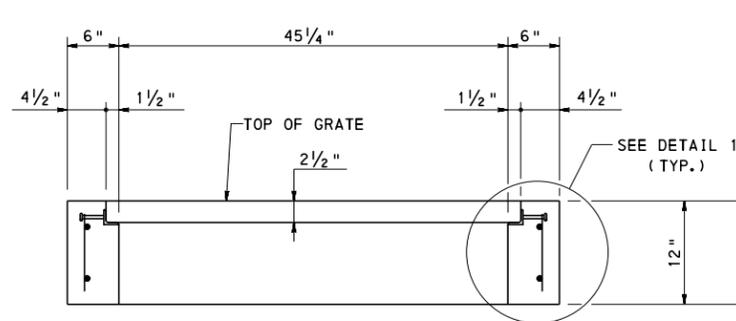
**OPTION 1 PLAN**      **OPTION 2 PLAN**



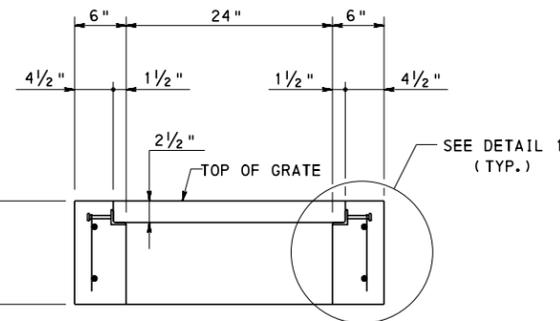
**SECTION**

**#3 BENT BAR ANCHOR DETAIL ATTACHED TO ANGLE**

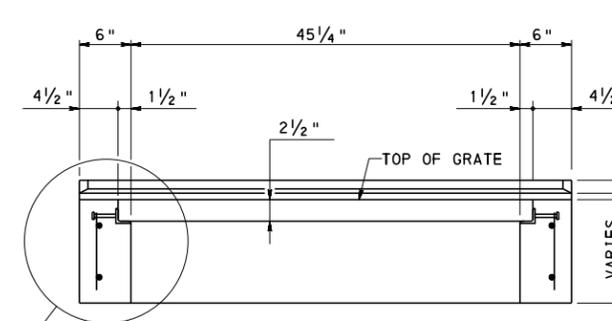
ALTERNATE DETAIL IN PLACE OF PROVIDING  $\frac{3}{8}$ "  $\varnothing$  STUDS



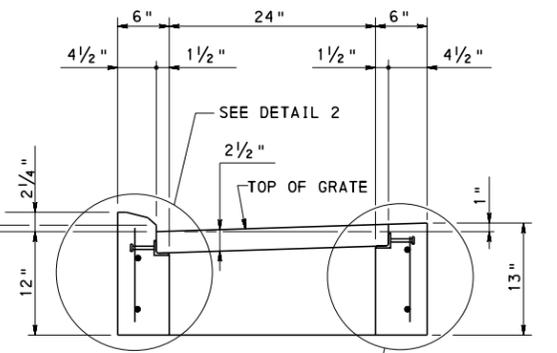
**SECTION A-A**



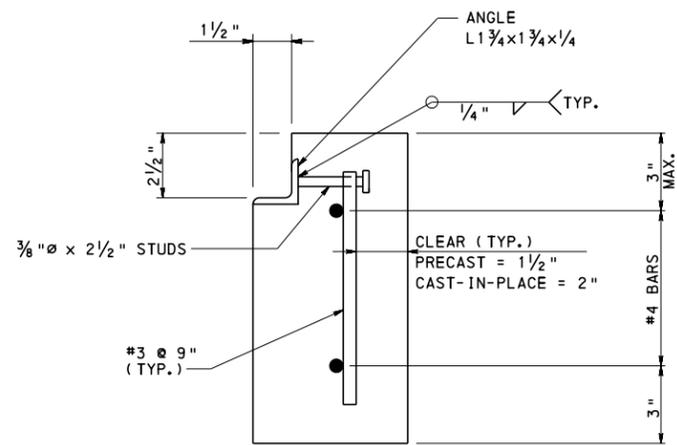
**SECTION B-B**



**SECTION C-C**

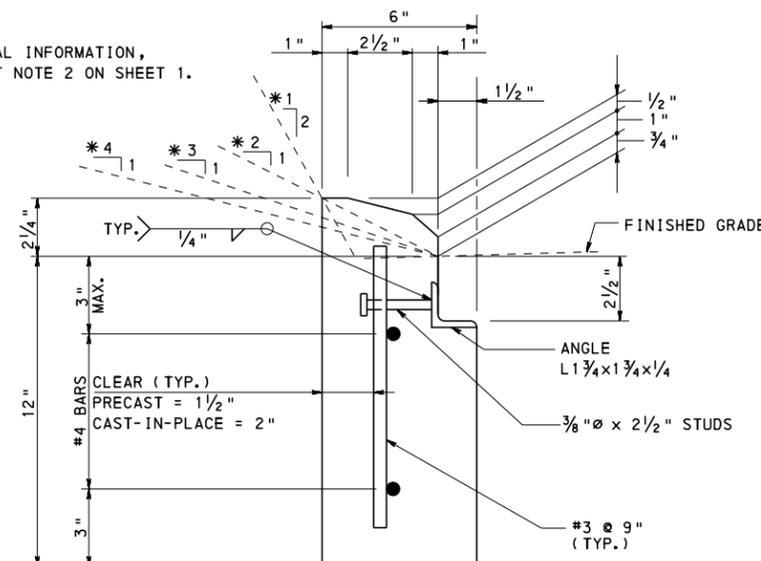


**SECTION D-D**



**DETAIL 1**

\* FOR ADDITIONAL INFORMATION, SEE PLACEMENT NOTE 2 ON SHEET 1.



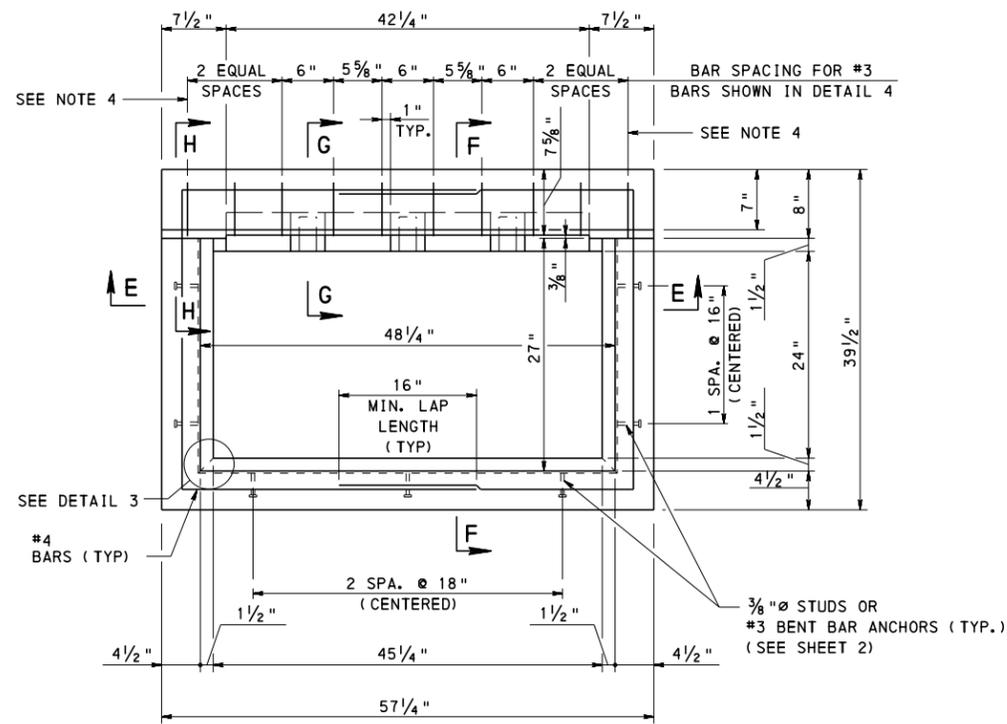
**DETAIL 2**

**NOTES**

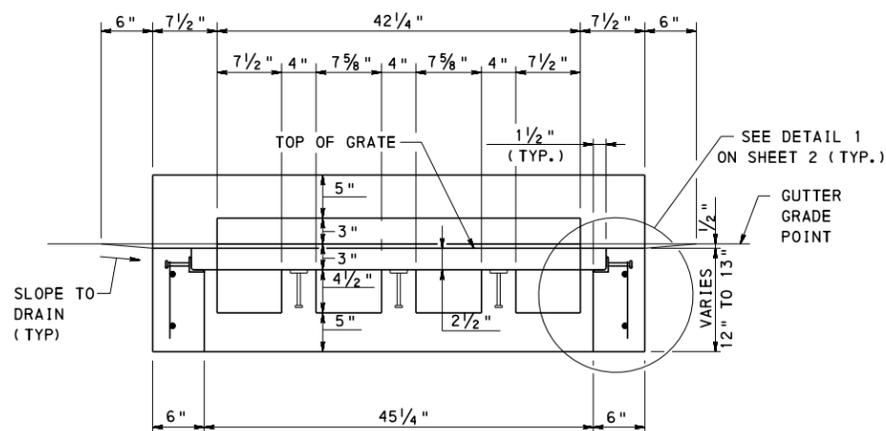
1. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

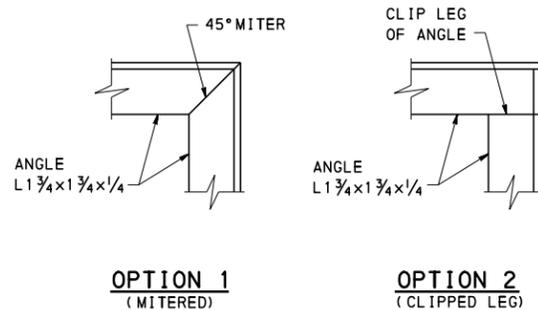
INLET TOPS, GRATES, AND FRAMES  
 CONCRETE TOP UNITS  
 TYPE M AND TYPE S



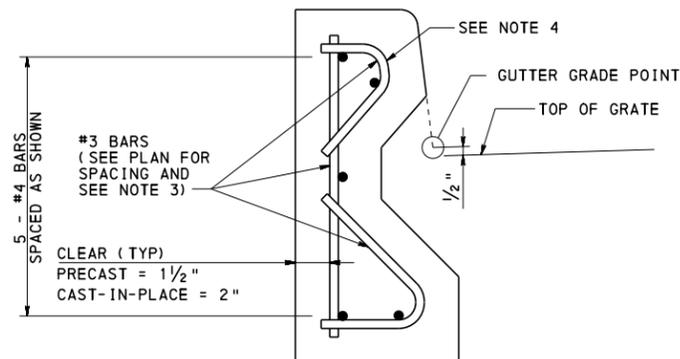
**PLAN VIEW - TYPE C**



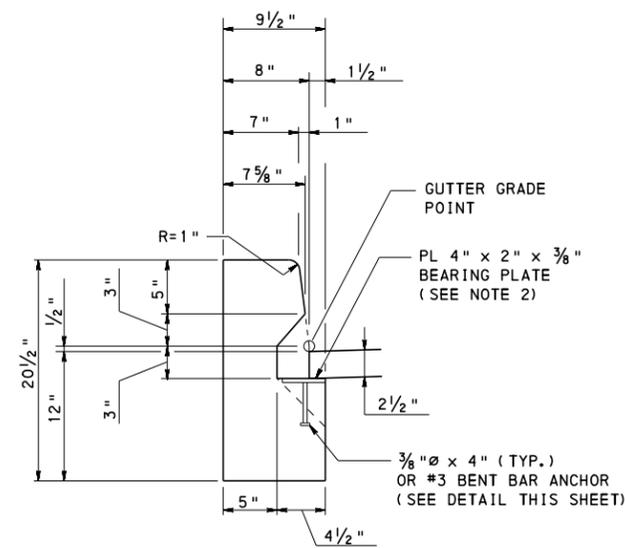
**SECTION E-E**



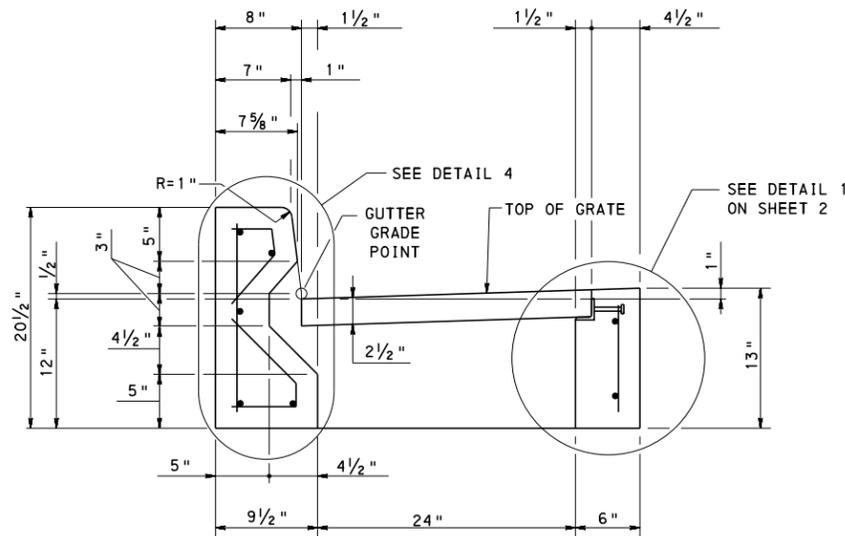
**DETAIL 3**



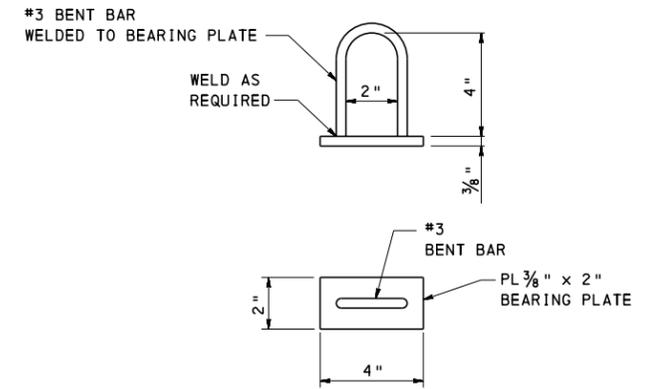
**DETAIL 4**



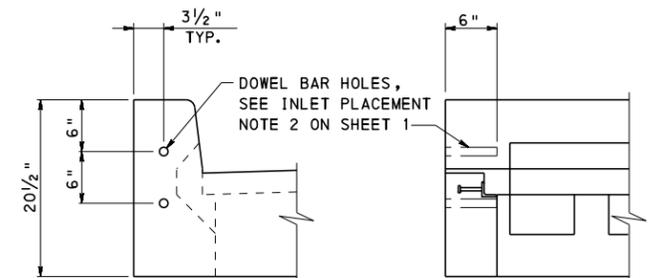
**SECTION G-G**



**SECTION F-F**



**#3 BENT BAR ANCHOR DETAIL ATTACHED TO BEARING PLATE**  
ALTERNATE DETAIL IN PLACE OF PROVIDING 3/8" Ø STUD



**SECTION H-H**

**FRONT ELEVATION**

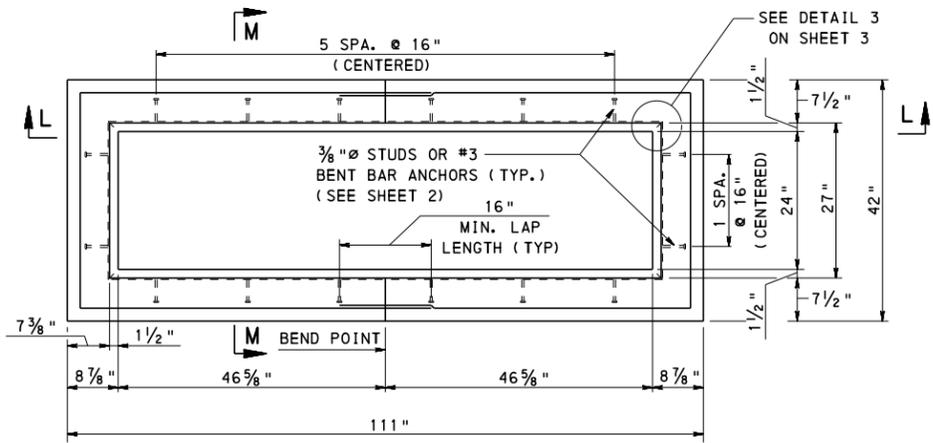
**NOTES**

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. A MAXIMUM OF TWO HOLES ARE PERMITTED IN THE PLATE TO POSITION AND HOLD THE PLATE IN PLACE DURING FABRICATION. HOLES ARE NOT PERMITTED TO BE GREATER THAN 1/4" DIAMETER.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

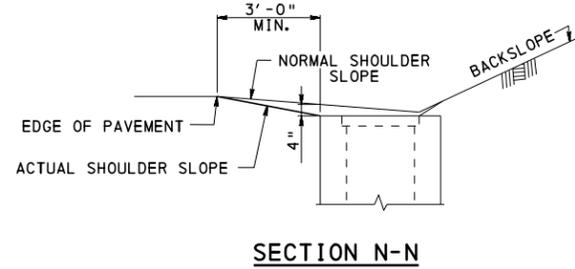
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C

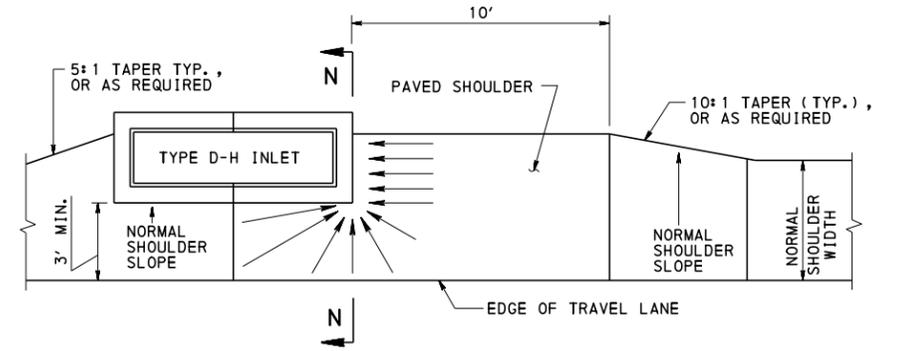




**PLAN VIEW - TYPE D-H**

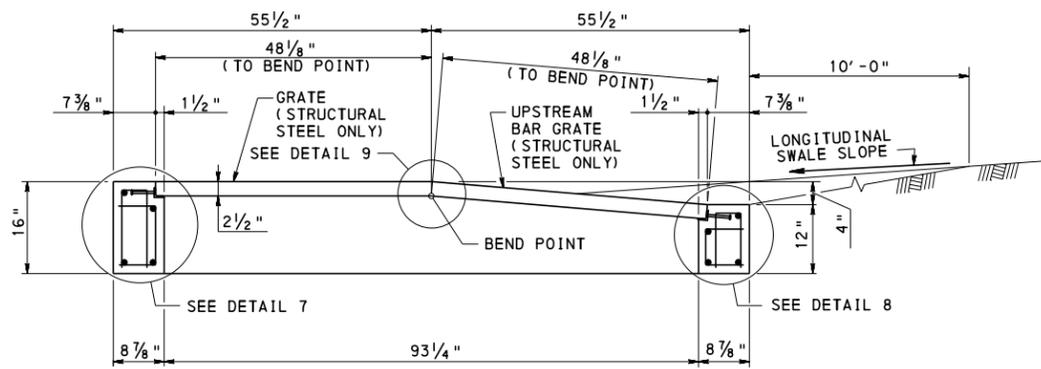


**SECTION N-N**

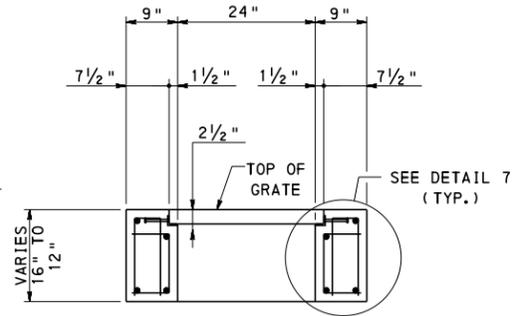


**PLAN VIEW**

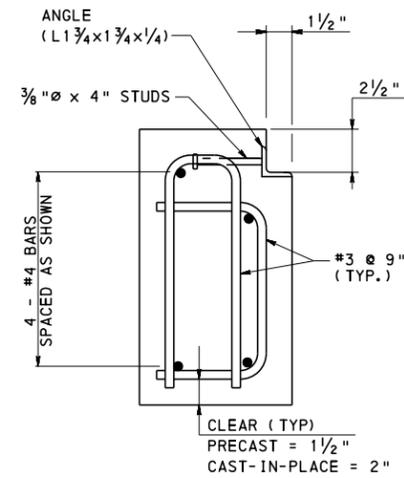
**TYPICAL TYPE D-H INLET LOCATION**



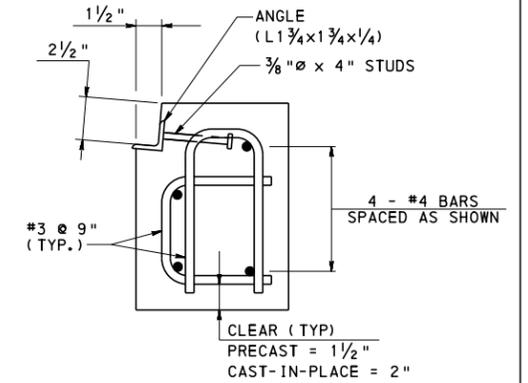
**SECTION L-L**



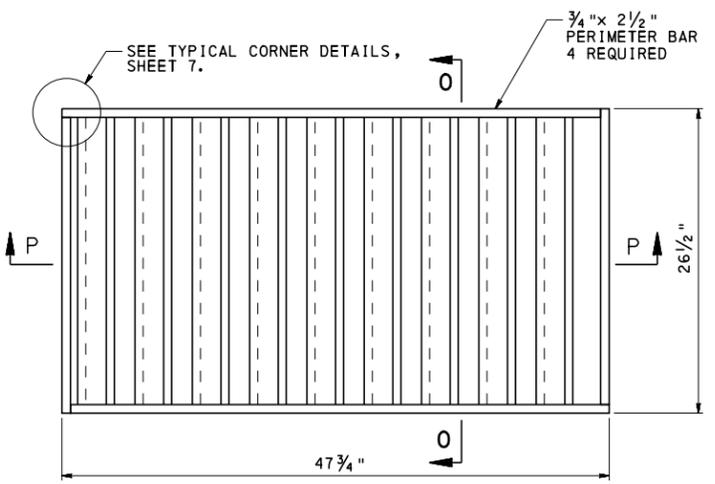
**SECTION M-M**



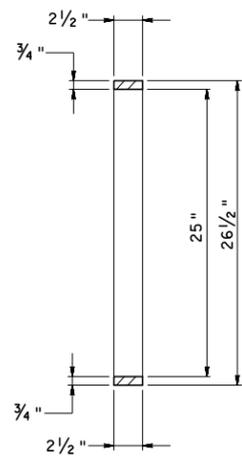
**DETAIL 7**



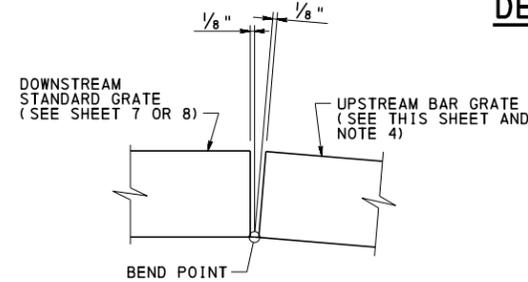
**DETAIL 8**



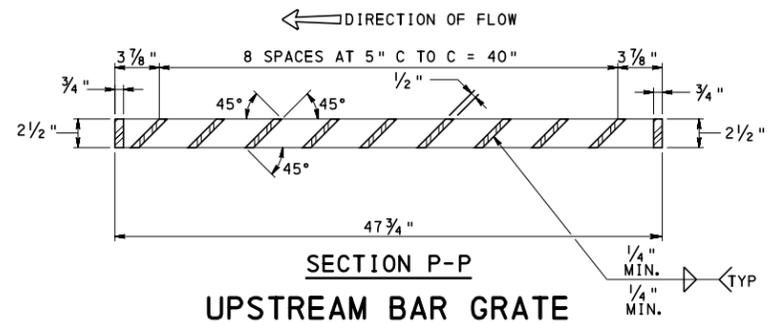
**PLAN VIEW**



**SECTION O-O**



**DETAIL 9**  
TYPE AND LOCATION OF GRATES



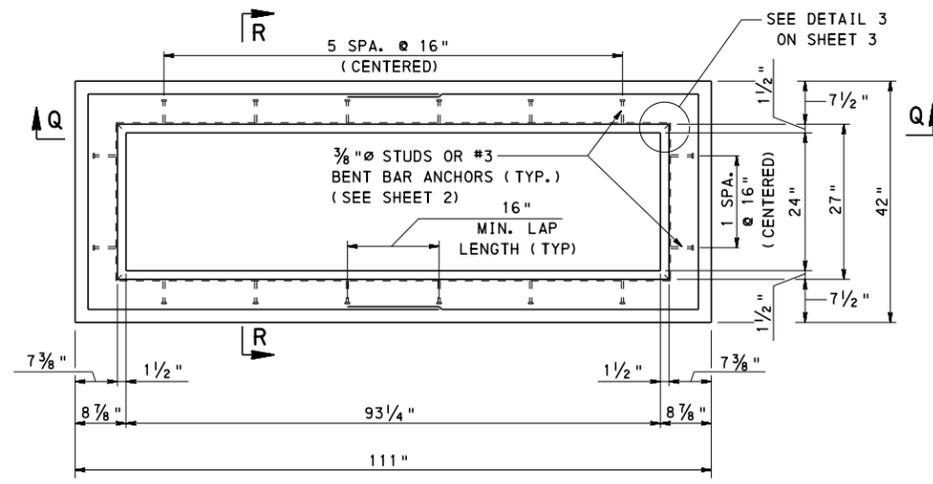
**SECTION P-P**  
**UPSTREAM BAR GRATE**

- NOTES**
- FOR ADDITIONAL NOTES, SEE SHEET 1.
  - FOR STRUCTURAL STEEL GRATE DETAILS AND NOTES, SEE SHEET 7.
  - FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 12.
  - UPSTREAM BAR GRATE IS NOT DESIGNED FOR PHL-93 OR HS-25 LOADING.
  - DO NOT PLACE TYPE D-H INLETS IN A LOCATION WHERE FREQUENT IMPACTS FROM TRAFFIC IS LIKELY.

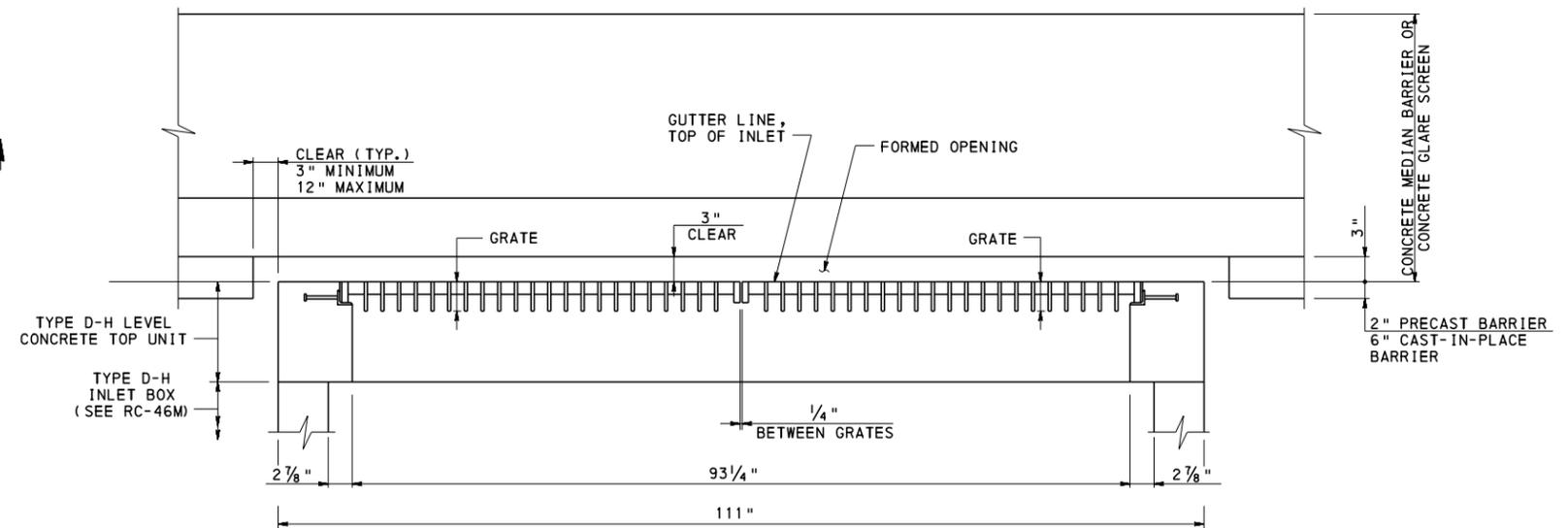
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF PROJECT DELIVERY

**INLET TOPS, GRATES, AND FRAMES**  
**CONCRETE TOP UNITS**  
**TYPE D-H**

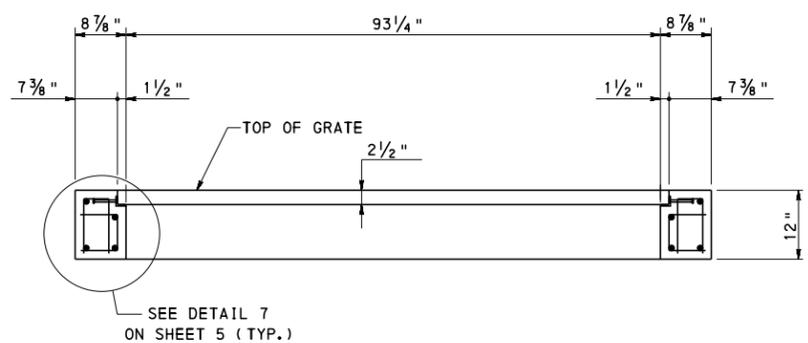
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt J. Johnson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 5 OF 20 <b>RC-45M</b>
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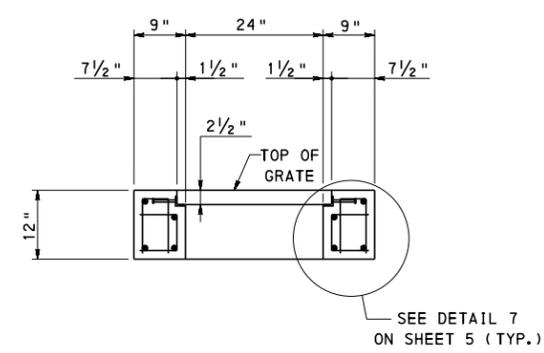
**PLAN VIEW - TYPE D-H LEVEL**



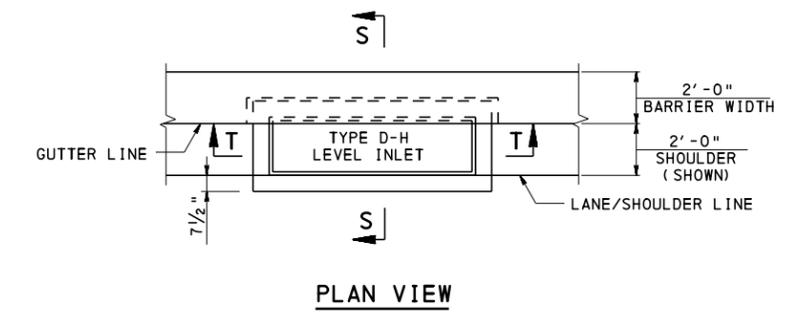
**SECTION T-T**



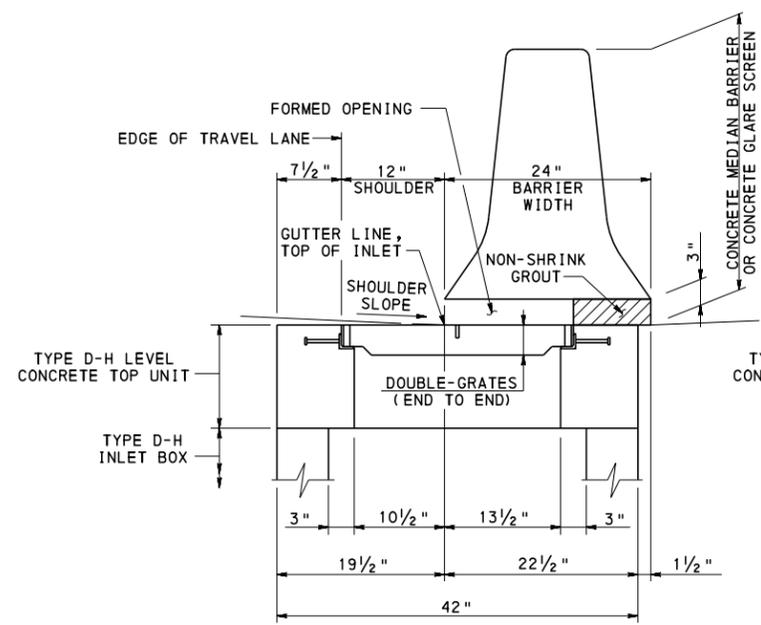
**SECTION Q-Q**



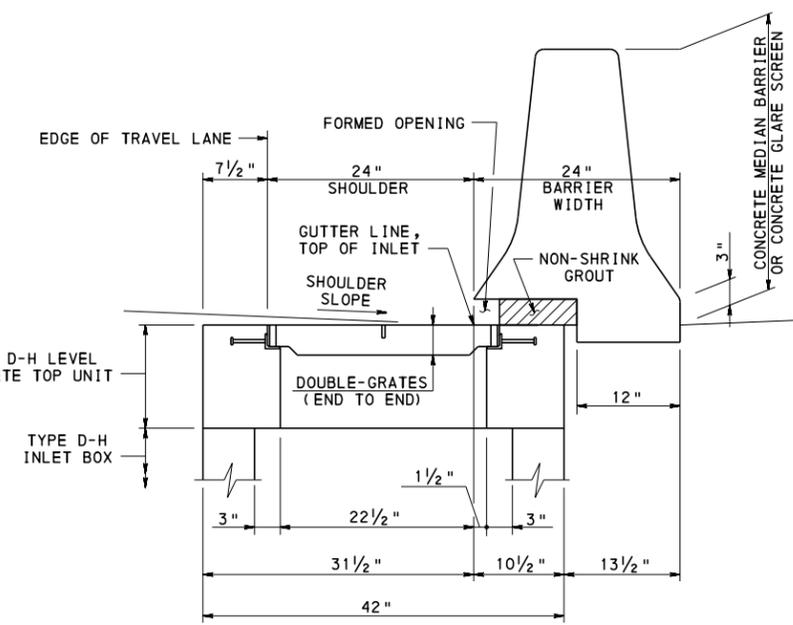
**SECTION R-R**



**TYPICAL TYPE D-H LEVEL INLET LOCATION AT CONCRETE MEDIAN BARRIER**  
(FOR INFORMATION ONLY, REFER TO CONTRACT DRAWINGS FOR ADDITIONAL DETAILS.)



**PLACED ALONG 1'-0" WIDE SHOULDER**



**PLACED ALONG 2'-0" WIDE SHOULDER**

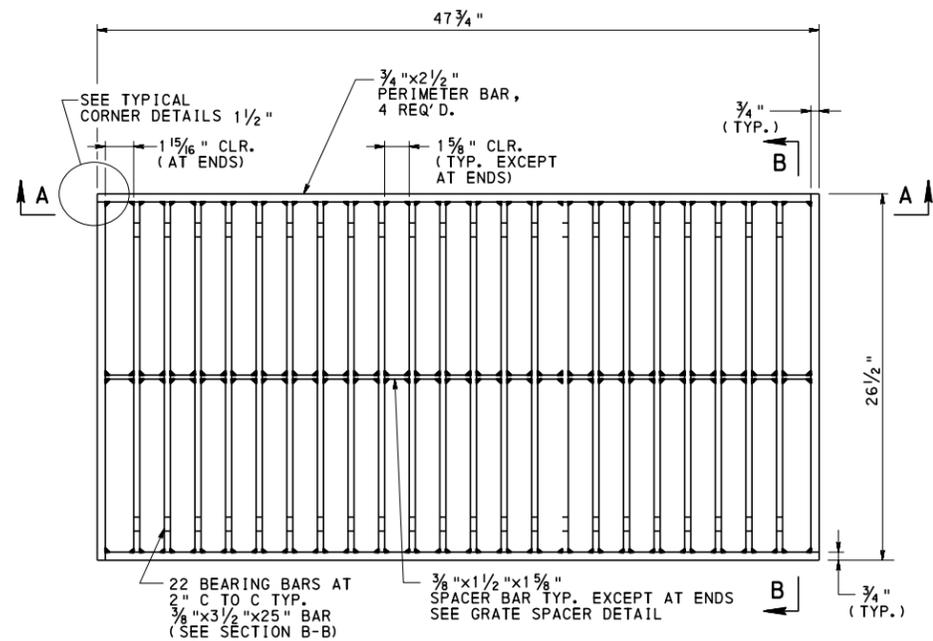
**SECTION S-S**

**NOTES**

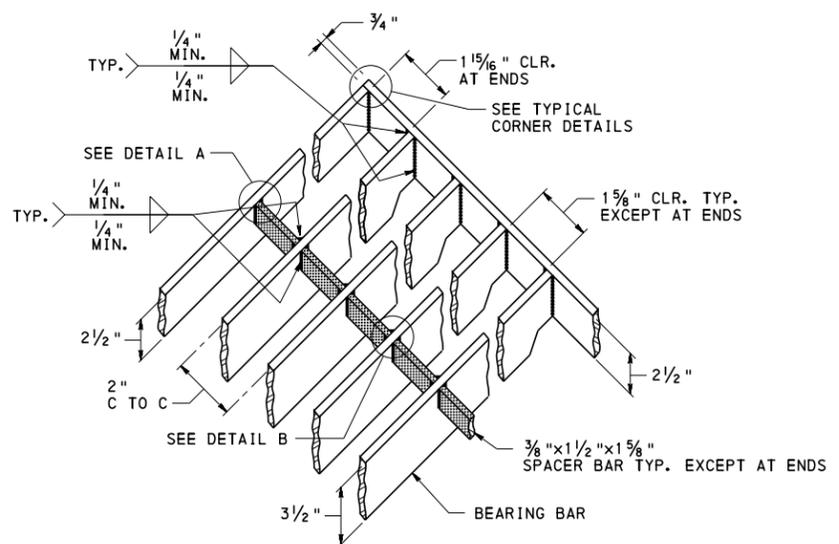
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 12.
3. FOR CONCRETE BARRIER DETAILS, REFER TO RC-57M, RC-59M AND THE CONTRACT DRAWINGS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE D-H LEVEL



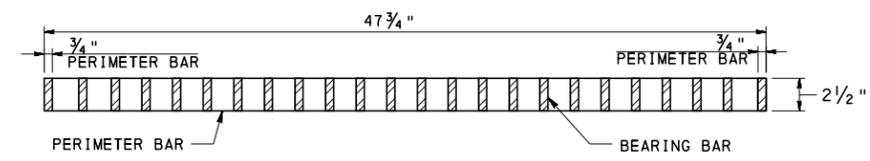
**STRUCTURAL STEEL GRATE**



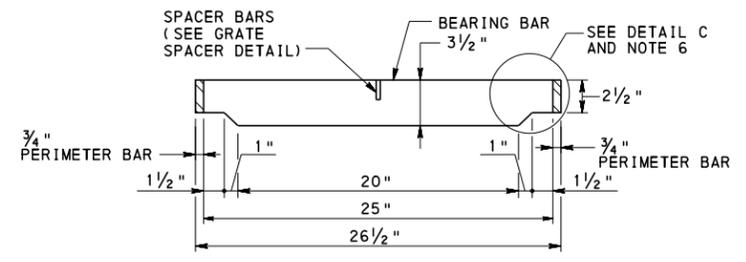
**GRATE SPACER DETAIL**

NOTE: PLACE SPACER BARS AT LONGITUDINAL C OF GRATE.

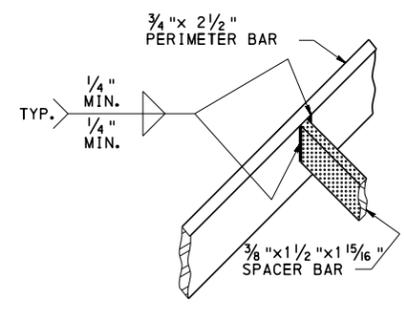
- STRUCTURAL STEEL GRATE NOTES:**
1. SHEETS 7 AND 8 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
  2. PROVIDE STRUCTURAL STEEL GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
  3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
  4. PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270 GRADE 50 [ASTM A709, GRADE 50].
  5. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED.
  6. FABRICATE BEARING BARS FROM 3 1/2" DEEP BARS. FABRICATE BY BURNING, SHEARING OR PUNCHING. PROVIDE EITHER CHAMFERED OR 1/2" RADIUS CORNERS (SEE DETAIL C).
  7. LOCATE SPACER BARS FLUSH WITH THE TOP SURFACE OF THE GRATE.
  8. PROVIDE BICYCLE SAFE GRATES WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE SAFE GRATE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
  9. FABRICATE SLOTS BY BURNING, DRILLING, SHEARING OR PUNCHING. HAVE THE BOTTOM OF ALL BURNED OR DRILLED SLOTS CONFORM TO THE SHAPE OF THE ROD.
  10. COAT GRATES WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE GRATES IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).



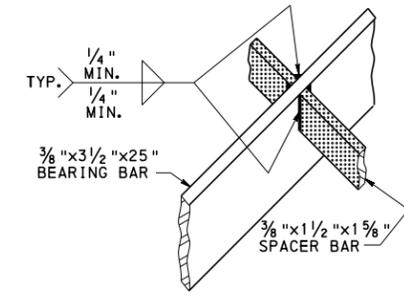
**SECTION A-A**



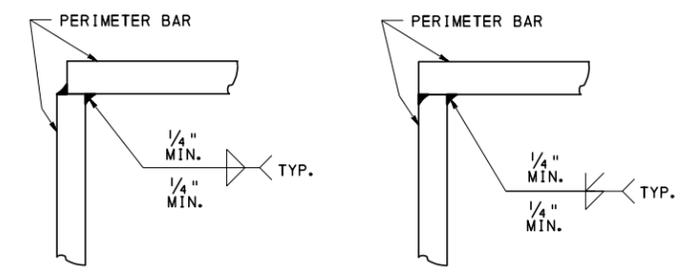
**SECTION B-B**



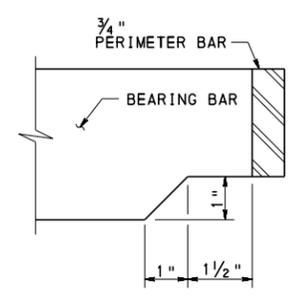
**DETAIL A**



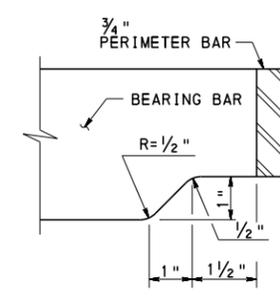
**DETAIL B**



**TYPICAL CORNER DETAILS**



**OPTION 1**



**OPTION 2**

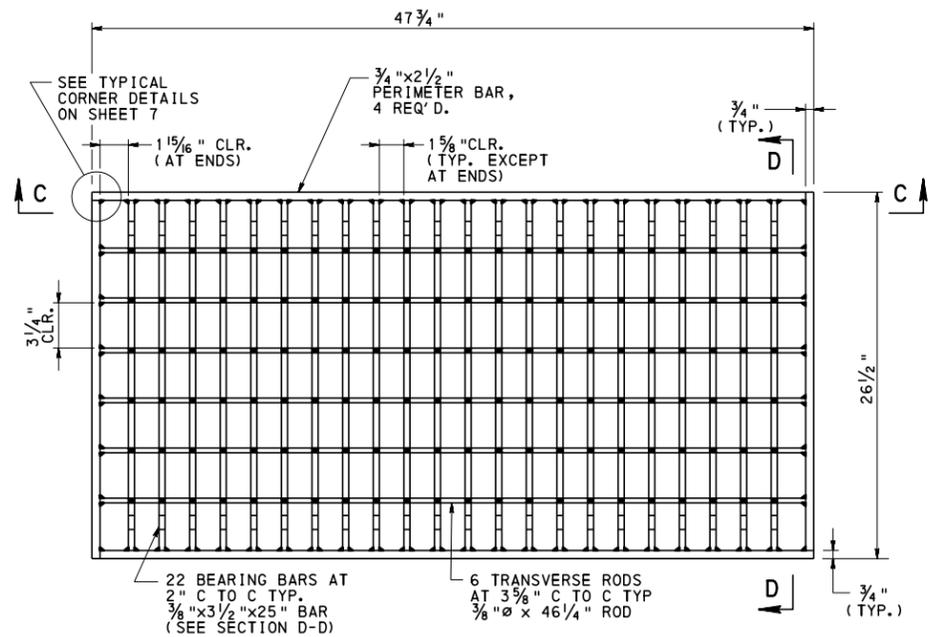
**DETAIL C**

**NOTES**

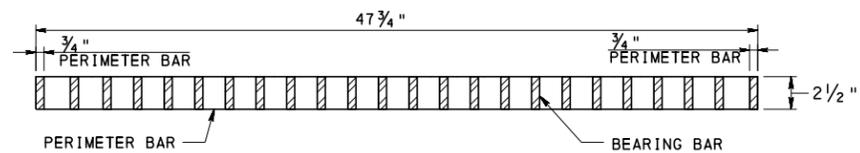
1. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

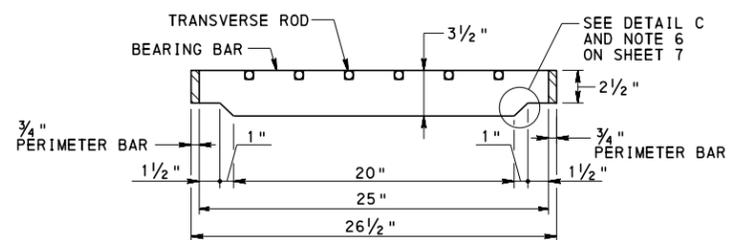
INLET TOPS, GRATES, AND FRAMES  
STRUCTURAL STEEL GRATE



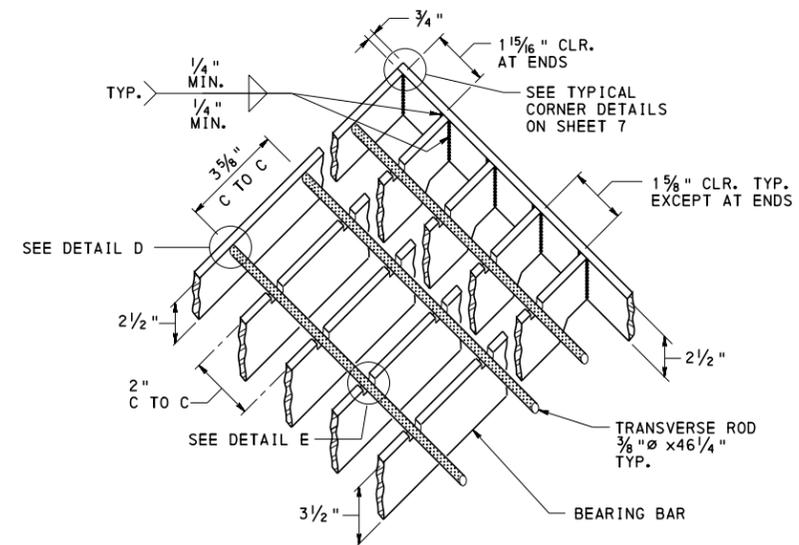
**STRUCTURAL STEEL GRATE  
BICYCLE SAFE**



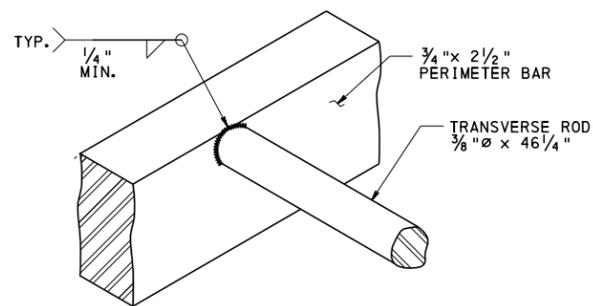
**SECTION C-C**



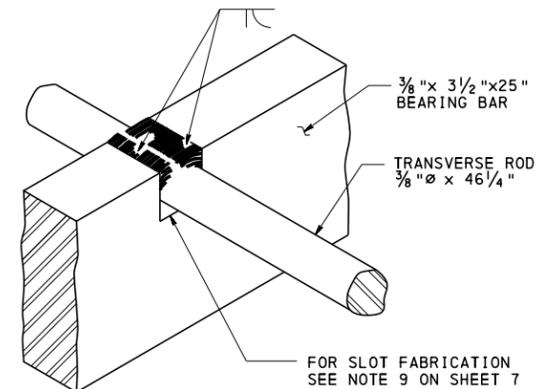
**SECTION D-D**



**BAR AND ROD SPACER DETAIL**



**DETAIL D**



**DETAIL E**

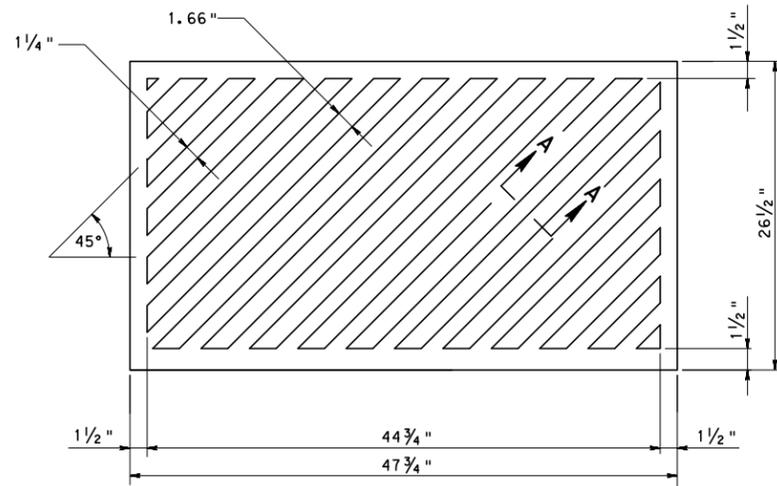
**NOTES**

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE NOTES, SEE SHEET 7.

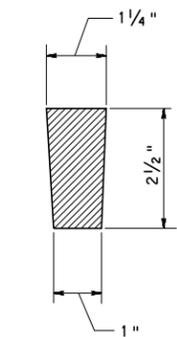
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
STRUCTURAL STEEL GRATE  
BICYCLE SAFE

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Benjamin J. ...</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 8 OF 20 RC-45M
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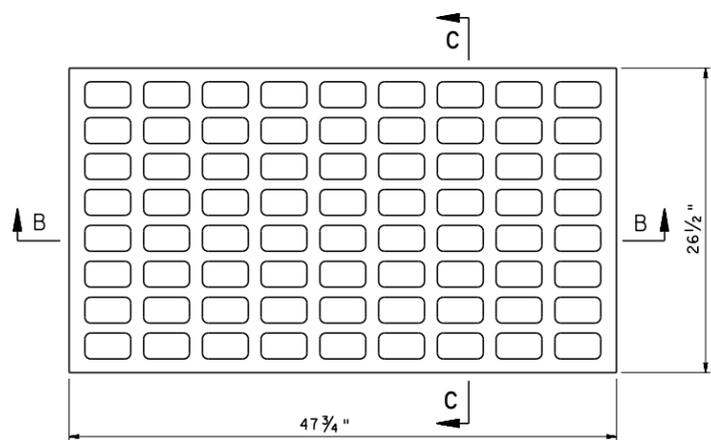


PLAN

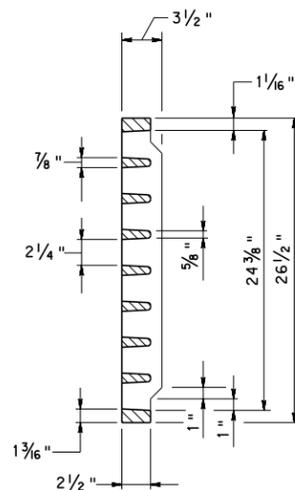


SECTION A-A

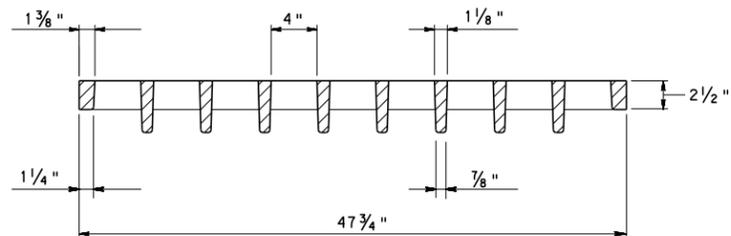
**ONE PIECE CAST IRON GRATE**



PLAN VIEW



SECTION C-C



SECTION B-B

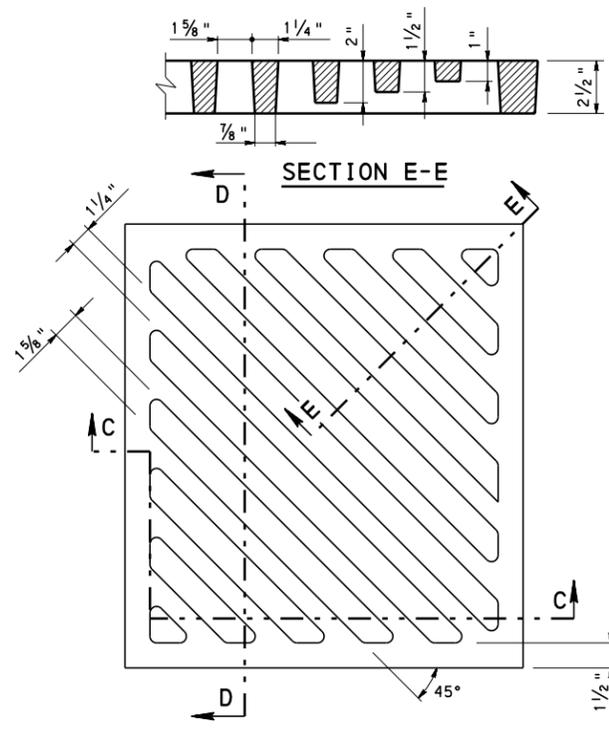
**ONE PIECE CAST IRON GRATE - BICYCLE SAFE**

**CAST IRON GRATE NOTES:**

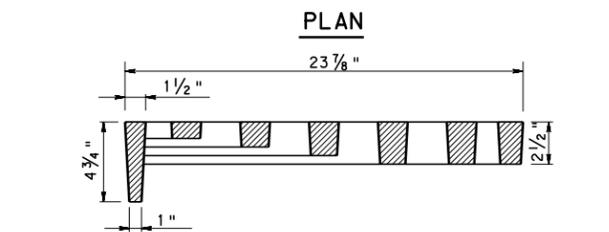
1. SHEETS 9 AND 10 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE CAST IRON GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE GRAY CAST IRON CONFORMING TO AASHTO M105 (ASTM A48), CLASS 35B AND AASHTO M306.
5. PROVIDE BICYCLE SAFE GRATES WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE SAFE GRATE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
6. PROVIDE ADA COMPLIANT GRATES WHERE PEDESTRIAN TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS ADJACENT TO SIDEWALKS. ALTERNATE ADA COMPLIANT GRATE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1 AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
7. CAST IRON GRATES ARE PERMITTED TO BE USED AS AN ALTERNATE TO THE STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND ARE APPROVED FOR PHL-93 OR HS-25 LOADING. CAST IRON GRATES NOT APPROVED FOR PHL-93 OR HS-25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.
8. REFER TO SHEET 10 FOR TWO PIECE CAST IRON GRATES.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

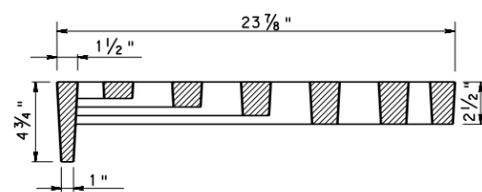
INLET TOPS, GRATES, AND FRAMES  
CAST IRON GRATES - 1



SECTION E-E

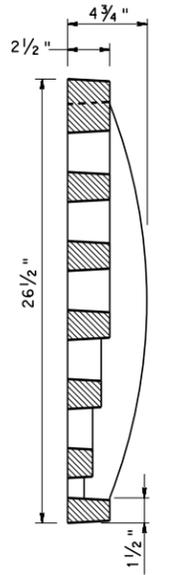


PLAN

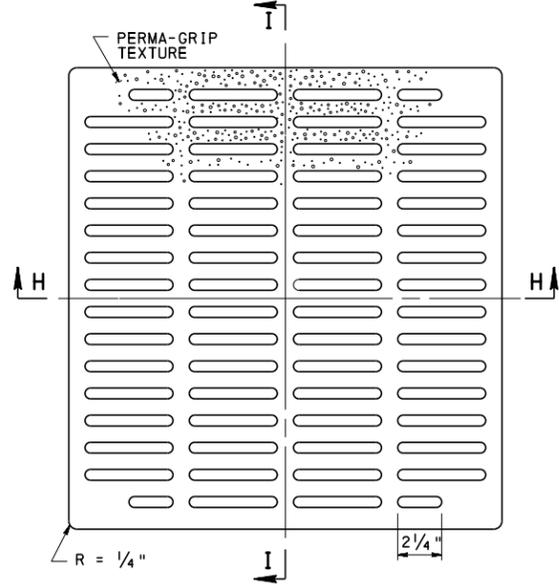


SECTION C-C

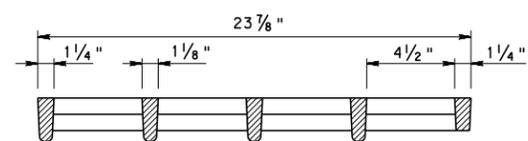
GRATE



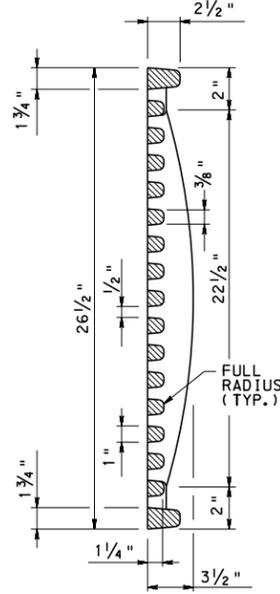
SECTION D-D



PLAN



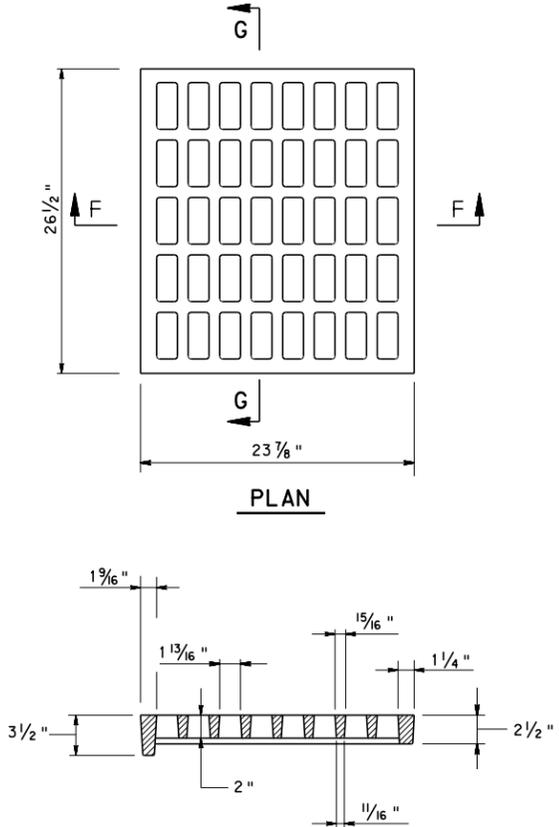
SECTION H-H



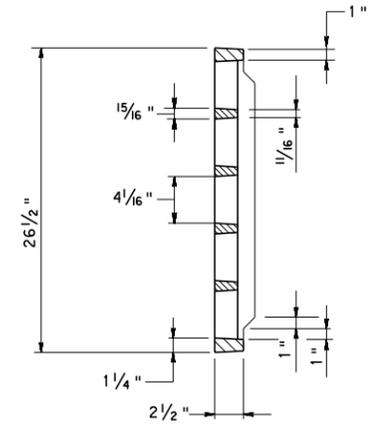
SECTION I-I

ADA COMPLIANT GRATE

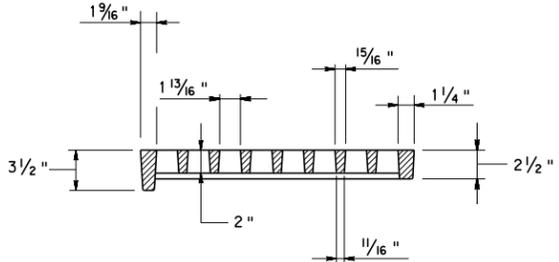
TWO PIECE CAST IRON GRATES



PLAN



SECTION G-G



SECTION F-F

BICYCLE SAFE GRATE

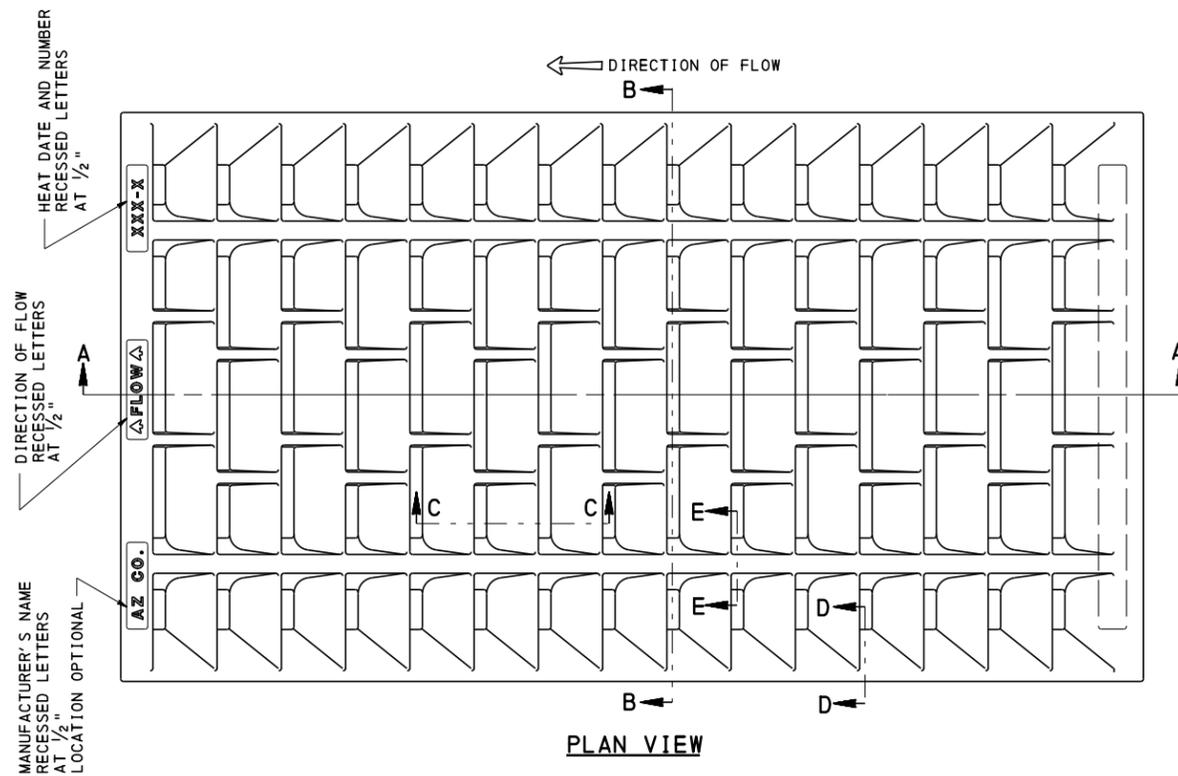
**NOTES**

1. FOR CAST IRON GRATE NOTES, SEE SHEET 9.
2. FOR ONE PIECE CAST IRON GRATE DETAILS, SEE SHEET 9.

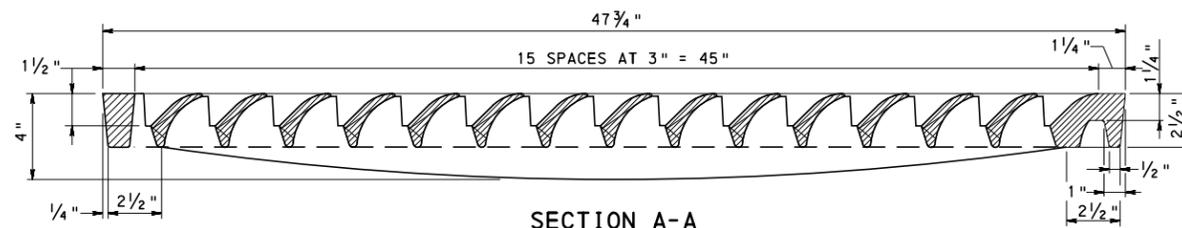
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CAST IRON GRATES - 2

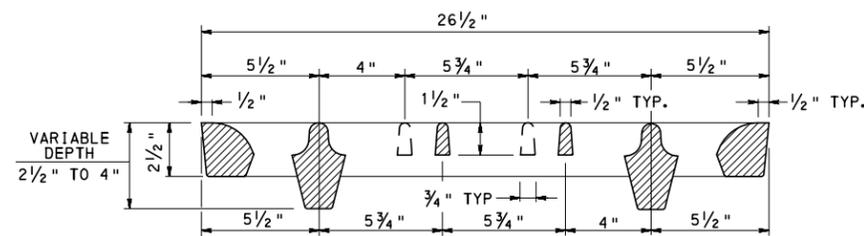
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Bruce J. Wilson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 10 OF 20 RC-45M
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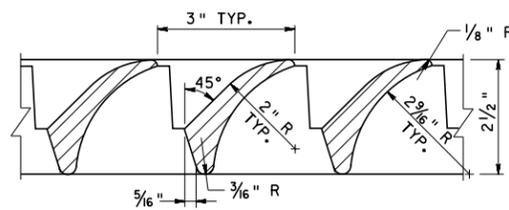
PLAN VIEW



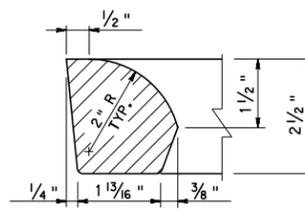
SECTION A-A



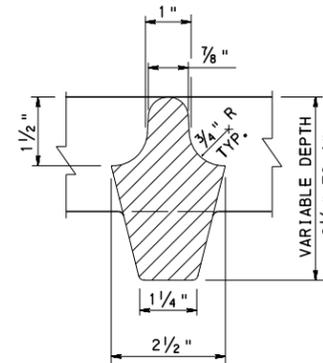
SECTION B-B



SECTION C-C

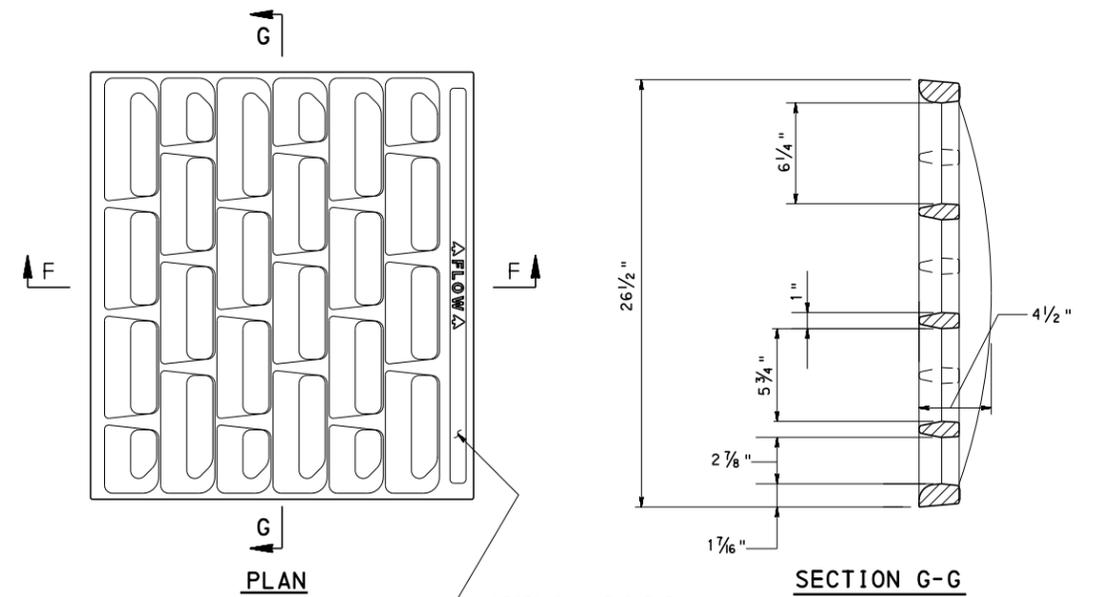


SECTION D-D



SECTION E-E

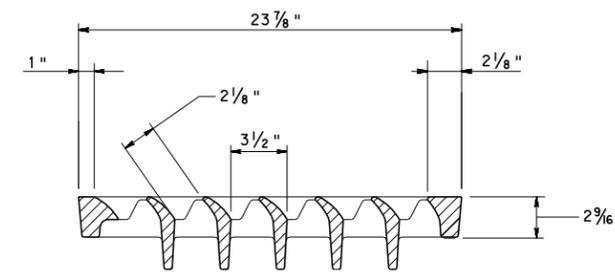
ONE PIECE CAST IRON VANE GRATE



PLAN

SECTION G-G

REFER TO ONE PIECE VANE GRATE FOR ADDITIONAL INFORMATION.



SECTION F-F

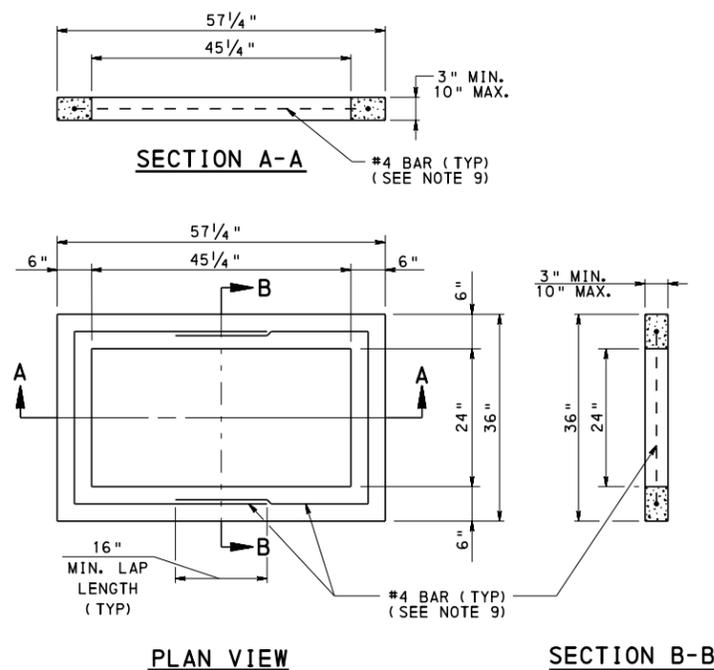
TWO PIECE CAST IRON VANE GRATE

**CAST IRON VANE GRATE NOTES:**

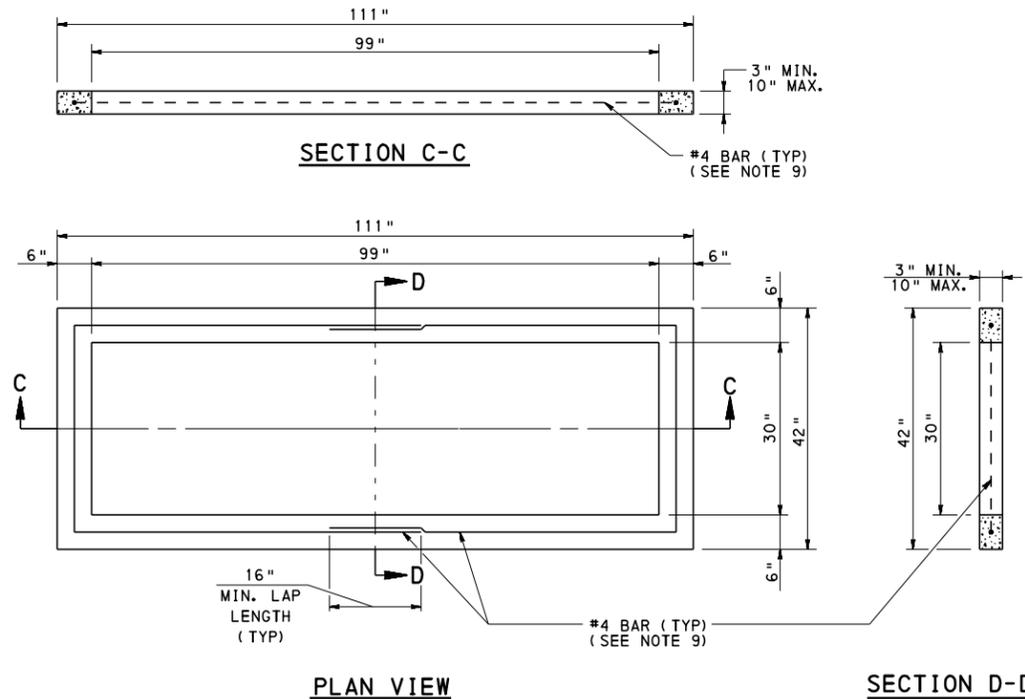
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE CAST IRON VANE GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE EITHER GRAY IRON CASTINGS CONFORMING TO AASHTO M105 (ASTM A48), CLASS 35B AND AASHTO M306, MALLEABLE IRON CASTINGS CONFORMING TO ASTM A47, GRADE 32510, OR DUCTILE IRON CASTINGS CONFORMING TO ASTM A536, GRADE 60-40-18.
5. INSTALL VANE GRATES WITH CURVED VANES FACING THE DIRECTION OF FLOW.
6. PROVIDE RADIUS OF 1/8" TYPICAL FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.
7. CAST IRON VANE GRATES ARE PERMITTED TO BE USED AS AN ALTERNATE TO THE STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND ARE APPROVED FOR PHL-93 OR HS-25 LOADING. CAST IRON VANE GRATES NOT APPROVED FOR PHL-93 OR HS-25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CAST IRON VANE GRATE



**PRECAST CONCRETE  
GRADE ADJUSTMENT RING**  
(FOR TYPE C, C ALTERNATE, M,  
AND S CONCRETE TOP UNITS)



**PRECAST CONCRETE  
GRADE ADJUSTMENT RING**  
(FOR TYPE D-H AND TYPE D-H LEVEL  
CONCRETE TOP UNITS)

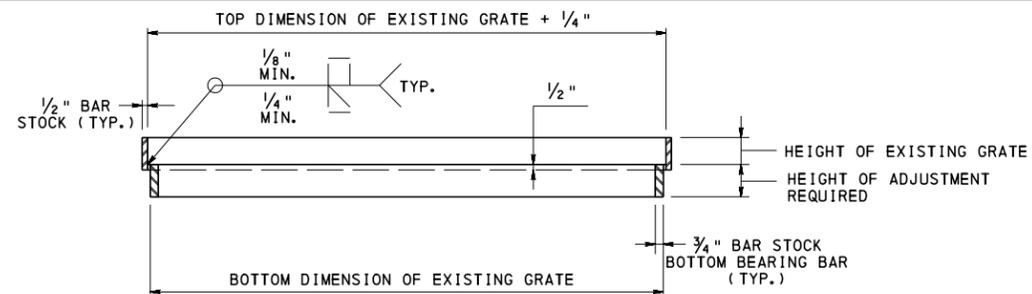
**GRADE ADJUSTMENT RING GENERAL NOTES:**

- SHEETS 12 AND 13 DEPICT THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
- PROVIDE GRADE ADJUSTMENT RINGS/RISERS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE D1.5 AND/OR D1.1 OR D1.3, AS APPROPRIATE AND THE CONTRACT SPECIAL PROVISIONS.
- BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.
- ALTERNATE ADJUSTMENT RINGS:
  - HDPE OR RUBBER GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENTS IF REQUESTED BY THE CONTRACTOR AND ACCEPTED BY PENNDOT PRIOR TO INSTALLATION. PROVIDE HDPE OR RUBBER GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

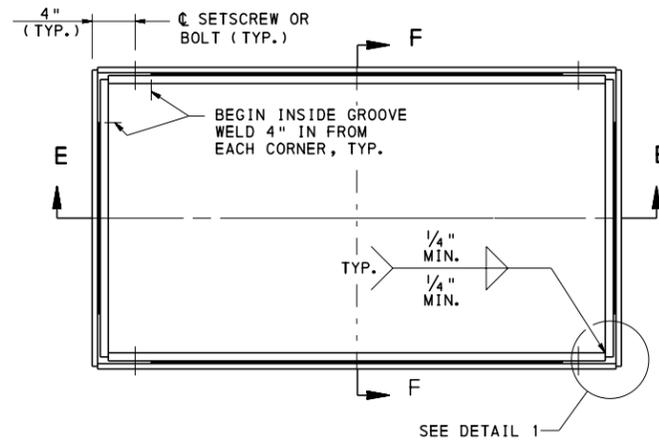
**PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:**

- PRECAST CONCRETE ADJUSTMENT RINGS ARE PERMITTED FOR TYPE C, C ALTERNATE, M, S AND D-H CONCRETE INLET TOPS. DO NOT USE PRECAST CONCRETE ADJUSTMENT RINGS TO RAISE TYPE C FRAMES.
- ONLY ONE GRADE ADJUSTMENT RING IS PERMITTED FOR NEW CONSTRUCTION PROJECTS. GRADE ADJUSTMENT RINGS ARE INCIDENTAL TO THE COST OF THE TOP UNITS OR FRAMES.
- PROVIDE ADJUSTMENT RING WHICH IS FLUSH WITH THE INLET TOP AND DOES NOT ALLOW EXCESSIVE MOVEMENT.
- GRADE ADJUSTMENT RINGS ARE PERMITTED TO BE FABRICATED IN DIFFERENT SHAPES TO FORM A RECTANGLE TO MATCH THE REQUIRED DIMENSIONS. SECTIONS ARE NOT PERMITTED TO BE LESS THAN 1'-6" IN LENGTH.
  - PROVIDE 1/2" CONCRETE COVER FOR REINFORCEMENT AT EACH END.
  - MAXIMUM GAP BETWEEN PIECES = 1/2"
- FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
- PROVIDE CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH =  $f'c = 4,000$  PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.
- A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGNS TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
- PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.
- REINFORCEMENT REQUIREMENTS:
  - DEPTHS LESS THAN OR EQUAL TO 6": PROVIDE ONE #4 BAR PLACED AT CENTER OF THICKNESS.
  - DEPTHS GREATER THAN 6" AND LESS THAN OR EQUAL TO 10": PROVIDE ONE #4 BAR PLACED 1/2" CLEAR FROM THE TOP AND BOTTOM SURFACES FOR A TOTAL OF TWO BARS.
- SET PRECAST CONCRETE GRADE ADJUSTMENT RINGS ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE.
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
  - MAXIMUM GROUT DEPTH = 1/2"
- TAPERED PRECAST CONCRETE ADJUSTMENT RINGS ARE PERMITTED AS LONG AS THE MINIMUM AND MAXIMUM DIMENSIONS REQUIRED ARE BETWEEN 3" AND 10".

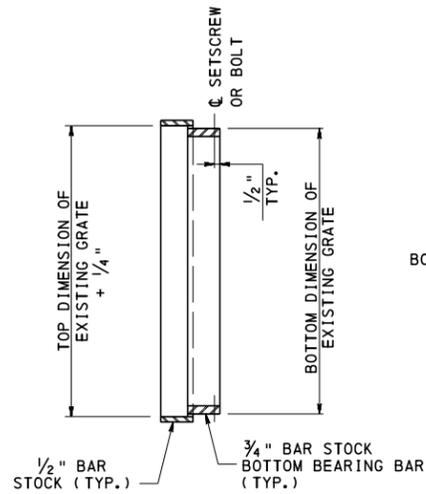
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
INLET TOPS, GRATES, AND FRAMES GRADE ADJUSTMENT RINGS - 1		
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 12 OF 20 RC-45M



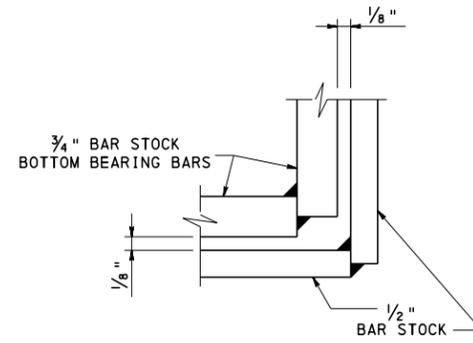
SECTION E-E



PLAN VIEW



SECTION F-F

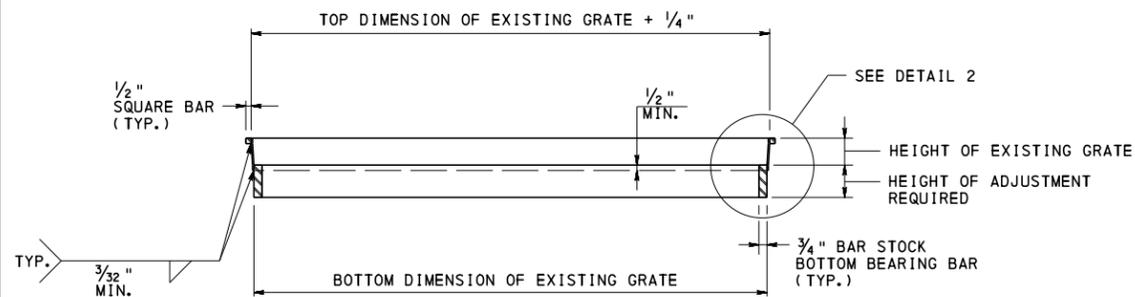


DETAIL 1

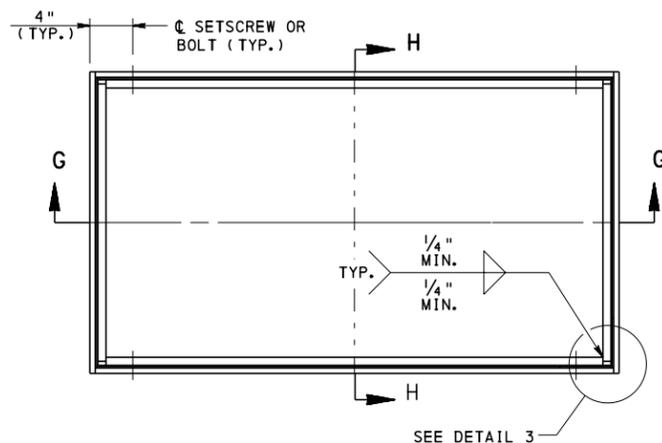
**STRUCTURAL STEEL GRADE ADJUSTMENT RISER NOTES:**

- STRUCTURAL STEEL ADJUSTMENT RISERS ARE PERMITTED FOR TYPE C AND M FRAMES AND TYPE C, C ALTERNATE, M, AND S CONCRETE INLET TOPS.
- ADJUSTMENT RISER TYPES:
  - TYPE 1:
    - MINIMUM HEIGHT ADJUSTMENT = EXISTING GRATE THICKNESS + 1/2"
    - MAXIMUM HEIGHT ADJUSTMENT = 6"
  - TYPE 2:
    - MINIMUM HEIGHT ADJUSTMENT = 1"
    - MAXIMUM HEIGHT ADJUSTMENT = EXISTING GRATE THICKNESS + 1/2"
- PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270, GRADE 36 [ASTM A709, GRADE 36].
- WELD STRUCTURAL STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED. ALL WELDS ARE CONTINUOUS UNLESS NOTED OTHERWISE.
- PROVIDE ADJUSTMENT RISERS WHICH CONFORM TO THE SHAPE OF THE ORIGINAL FRAME AND DOES NOT ALLOW FOR EXCESSIVE MOVEMENT.
- CUSTOM FABRICATE EACH ADJUSTMENT RISER TO FIT THE EXISTING DIMENSIONS OF EACH INLET. CAREFULLY MEASURE LENGTH, WIDTH, AND HEIGHT OF EACH EXISTING INLET FRAME AND GRATE AND PROVIDE THIS INFORMATION TO THE FABRICATOR. CLEARLY MARK EACH ADJUSTMENT RISER FOR PLACEMENT LOCATION. UPON DELIVERY OF ADJUSTMENT RISERS, VERIFY ALL DIMENSIONS AND LOCATIONS BEFORE INSTALLATION BEGINS.
- FABRICATION TOLERANCES:
  - BOTTOM OUTSIDE DIMENSION: +/- 1/8"
  - TOP INSIDE DIMENSION: +/- 1/8"
- CHECK FOR FULL BEARING OF LOWER ADJUSTMENT RISER SECTION ON EXISTING FRAMES DURING INSTALLATION.
- ATTACH THE STEEL ADJUSTMENT RISERS SECURELY TO THE EXISTING FRAME USING SET SCREWS OR BOLTS. PROVIDE TWO SET SCREWS OR BOLTS PER LONG SIDE. PLACE SET SCREWS OR BOLTS 4" FROM CORNER. NO SCREWS OR BOLTS ARE REQUIRED ON THE SHORT SIDE. OMIT SET SCREWS OR BOLTS ALONG GUTTER LINE FOR TYPE C CONCRETE INLET TOP.
- COAT ADJUSTMENT RISERS WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE ADJUSTMENT RISERS IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
- FOR ADDITIONAL NOTES, REFER TO THE GRADE ADJUSTMENT RING GENERAL NOTES ON SHEET 12 AND GENERAL NOTES ON SHEET 1.

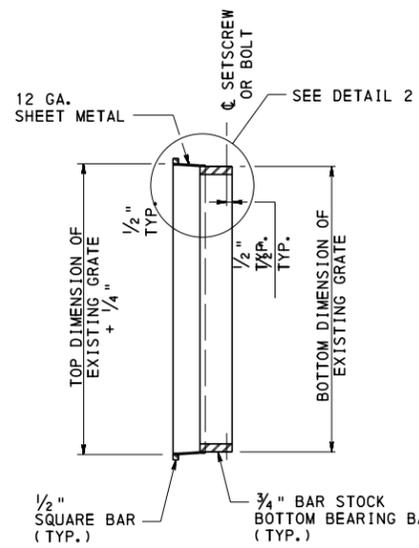
**STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 1**



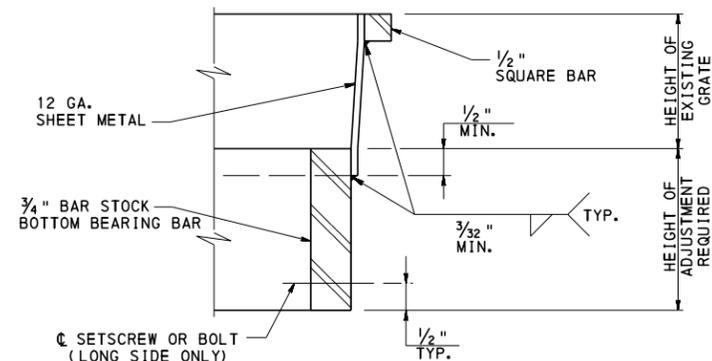
SECTION G-G



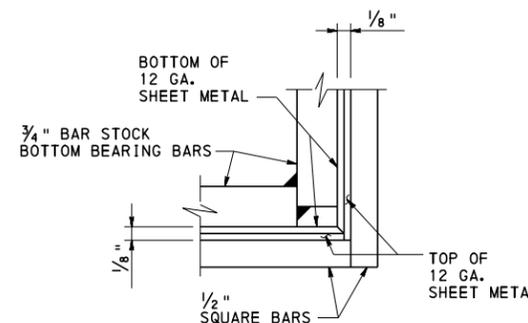
PLAN VIEW



SECTION H-H



DETAIL 2

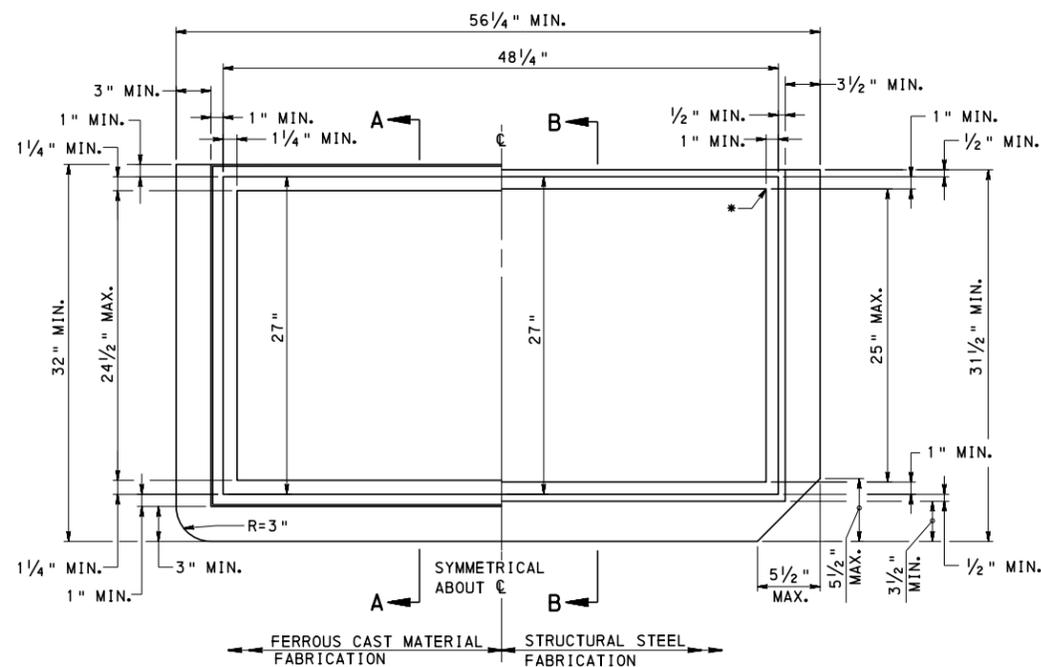


DETAIL 3

**STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 2**

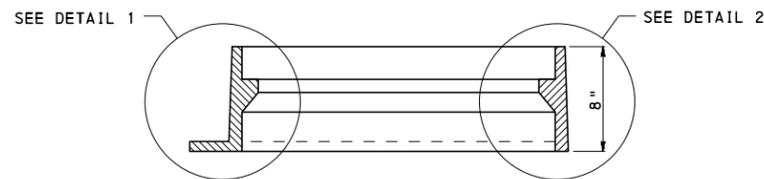
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
GRADE ADJUSTMENT RINGS - 2

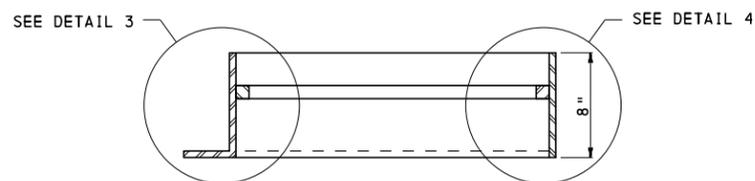


**TYPE C FRAME**  
(USED WITH TYPE C ALTERNATE  
CONCRETE TOP UNIT)

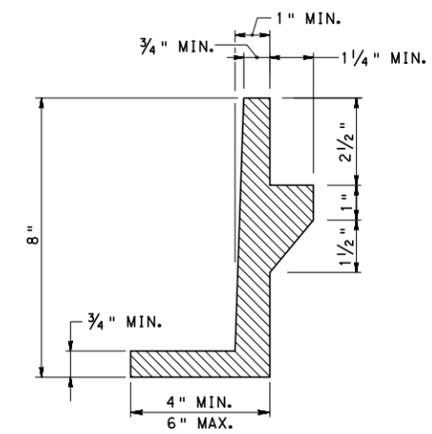
\*CORNER CONFIGURATION DETAILS  
ARE THE FABRICATOR'S  
RESPONSIBILITY AND ARE  
APPROVED BY THE INSPECTOR.



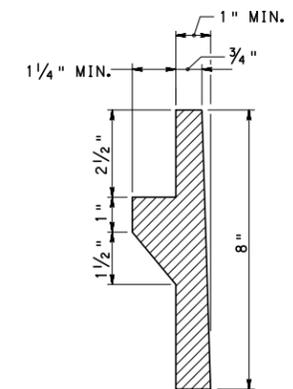
**SECTION A-A**  
(FERROUS CAST MATERIAL)



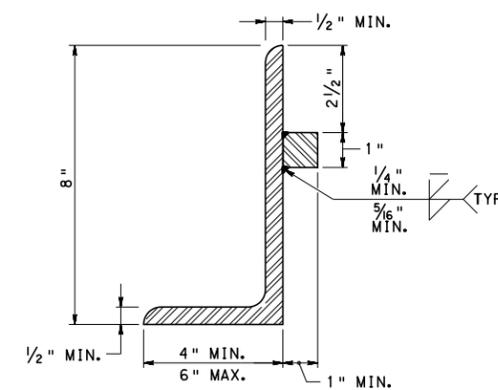
**SECTION B-B**  
(STRUCTURAL STEEL)



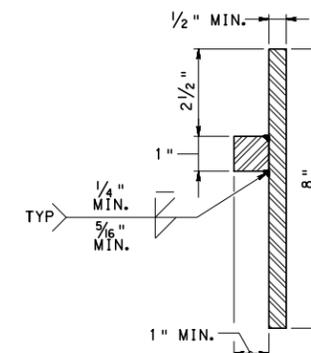
**DETAIL 1**



**DETAIL 2**



**DETAIL 3**



**DETAIL 4**

**NOTES**

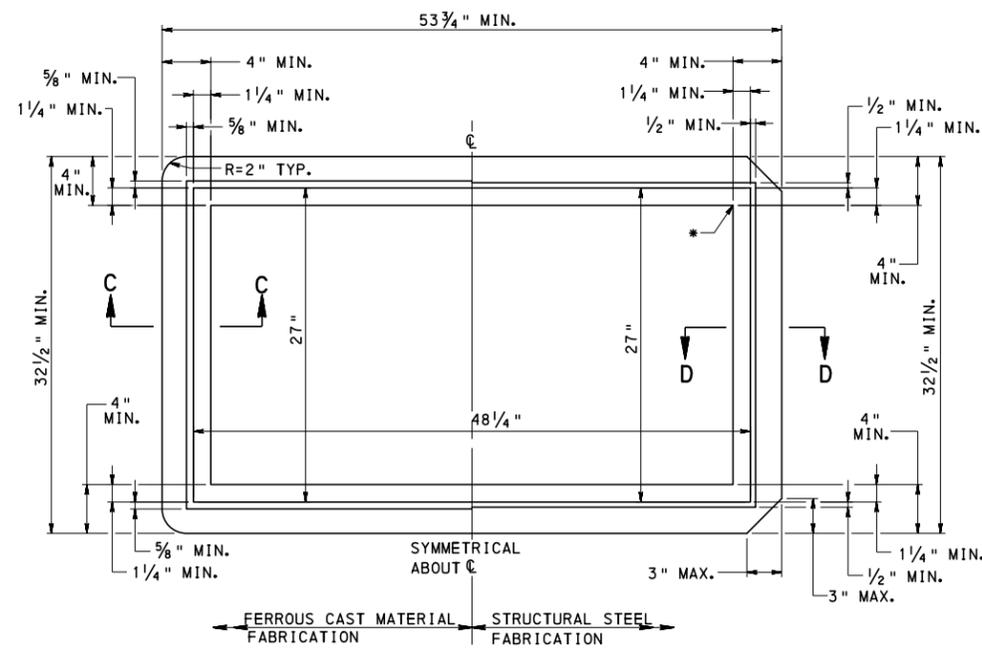
1. FOR INLET FRAME NOTES, SEE SHEET 15.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
TYPE C FRAME

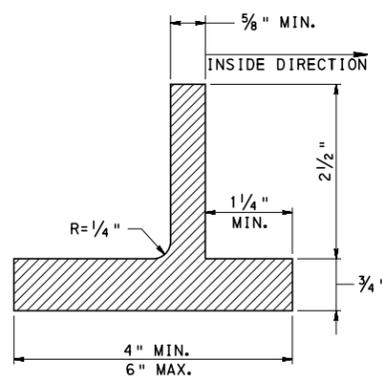
**INLET FRAME NOTES:**

1. SHEETS 14 AND 15 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE EITHER STRUCTURAL STEEL FRAMES OR CAST IRON FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE TYPE C FRAME WITH A TYPE C ALTERNATE CONCRETE TOP UNIT.
5. PROVIDE TYPE M FRAME IN PLACE OF THE TYPE M CONCRETE TOP UNIT.
6. STRUCTURAL STEEL FRAMES:
  - TYPE C FRAMES: PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270, GRADE 50 [ASTM A709, GRADE 50].
  - TYPE M FRAMES: PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270, GRADE 36 [ASTM A709, GRADE 36].
  - WELD STRUCTURAL STEEL FRAMES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED.
  - COAT FRAMES WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE FRAMES IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
7. CAST IRON FRAMES:
  - PROVIDE EITHER GRAY IRON CASTINGS CONFORMING TO AASHTO M105 (ASTM A48), CLASS 35B AND AASHTO M306, MALLEABLE IRON CASTINGS CONFORMING TO ASTM A47, GRADE 32510, OR DUCTILE IRON CASTINGS CONFORMING TO ASTM A536, GRADE 60-40-18.

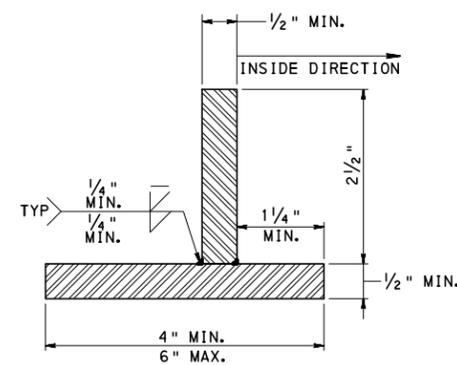


**TYPE M FRAME**

\*CORNER CONFIGURATION DETAILS ARE THE FABRICATOR'S RESPONSIBILITY AND ARE APPROVED BY THE INSPECTOR.



**SECTION C-C**  
(FERROUS CAST MATERIAL)

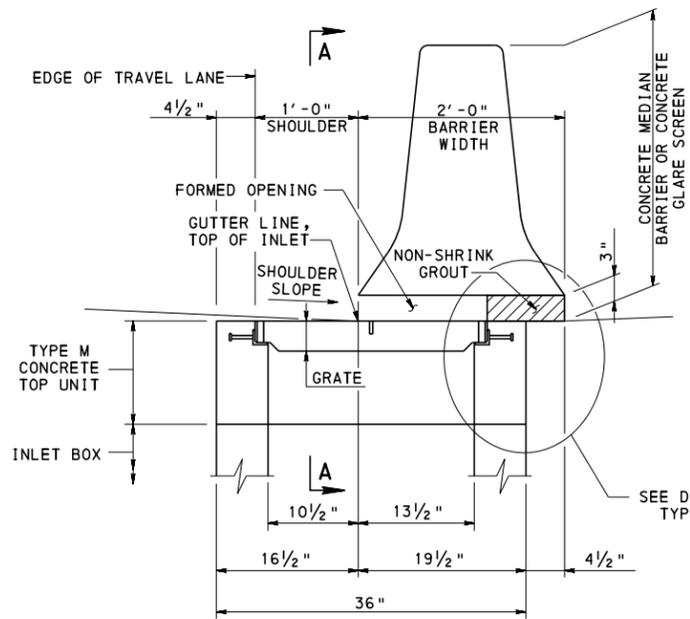


**SECTION D-D**  
(STRUCTURAL STEEL)

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

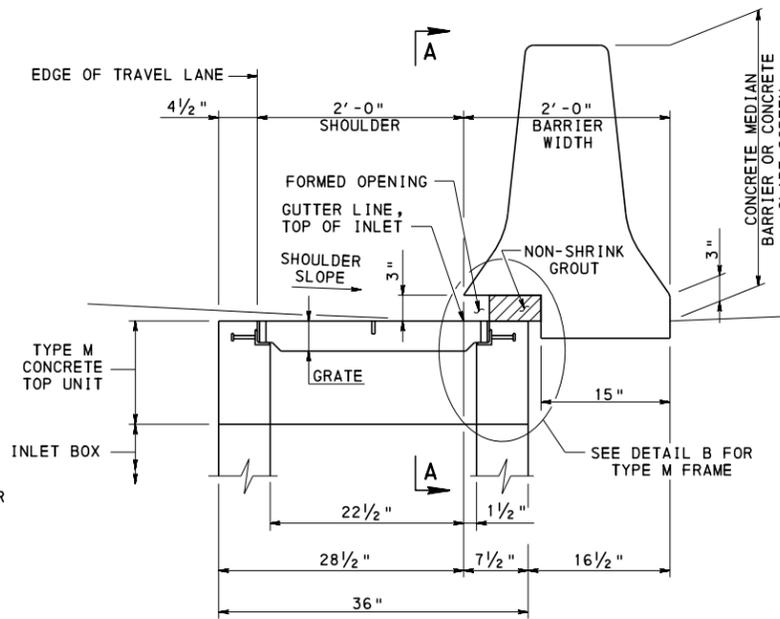
INLET TOPS, GRATES, AND FRAMES  
TYPE M FRAME

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Benjamin J. ...</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 15 OF 20 RC-45M
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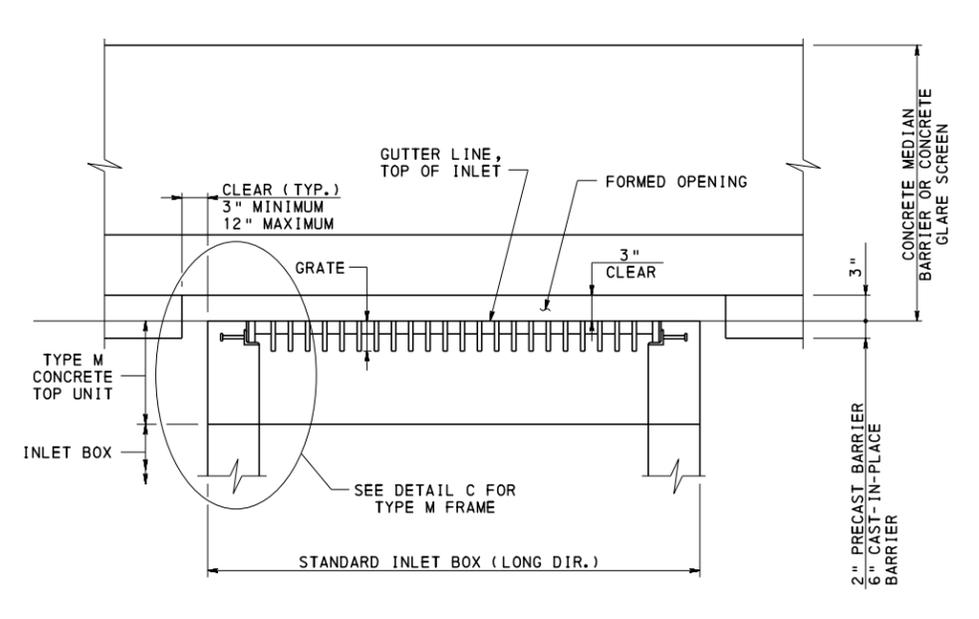
**TYPE M CONCRETE  
TOP UNIT PLACED ALONG  
1'-0" WIDE SHOULDER**

(STANDARD INLET BOX SHOWN / TOP SLAB  
REQUIRED FOR OTHER INLET TYPES)



**TYPE M CONCRETE  
TOP UNIT PLACED ALONG  
2'-0" WIDE SHOULDER**

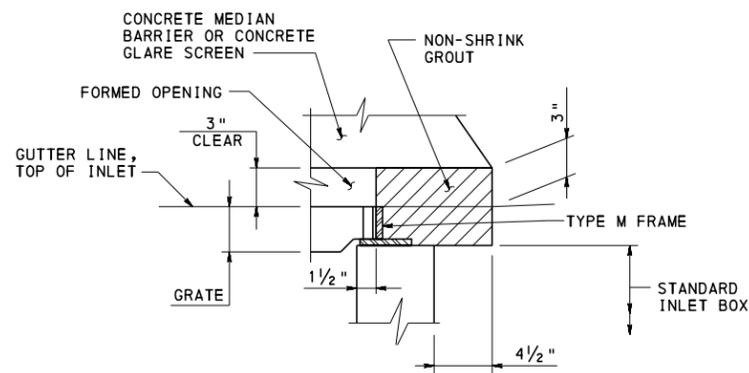
(STANDARD INLET BOX SHOWN / TOP SLAB  
REQUIRED FOR OTHER INLET TYPES)



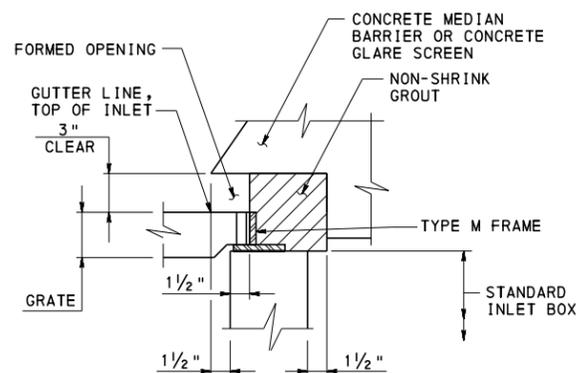
**SECTION A-A**

**INLET PLACEMENT NOTES:**

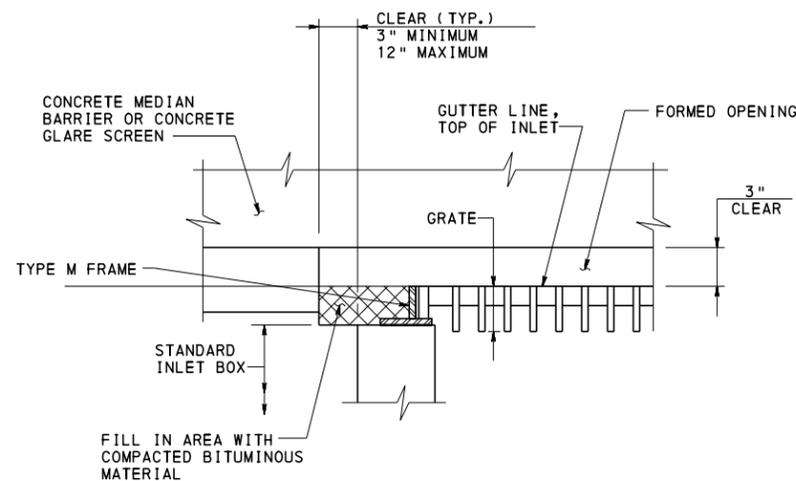
1. DETAILS SHOWN ON SHEETS 16 AND 17 ARE FOR INFORMATION ONLY. FOR ACTUAL PLACEMENT AND BARRIER DETAILS REFER TO THE CONTRACT DRAWINGS.
2. DESIGNER TO DETAIL BARRIER AND INLET PLACEMENT ON THE CONTRACT DRAWINGS.
3. FOR CONCRETE BARRIER DETAILS REFER TO RC-57M, RC-59M, AND THE CONTRACT DRAWINGS.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.



**DETAIL A  
TYPE M FRAME**



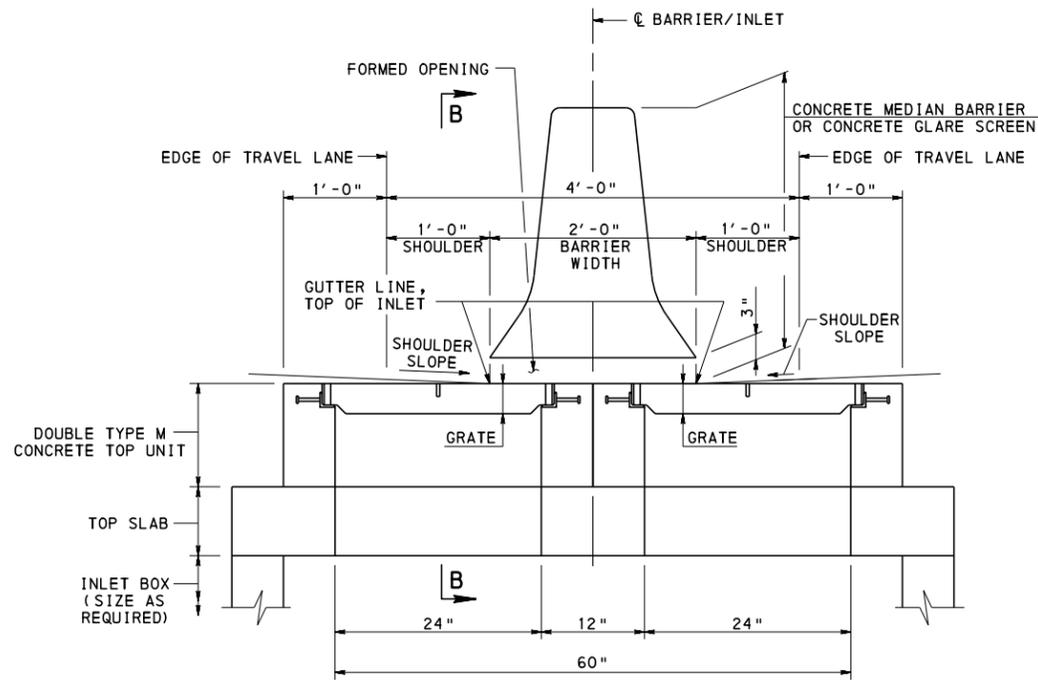
**DETAIL B  
TYPE M FRAME**



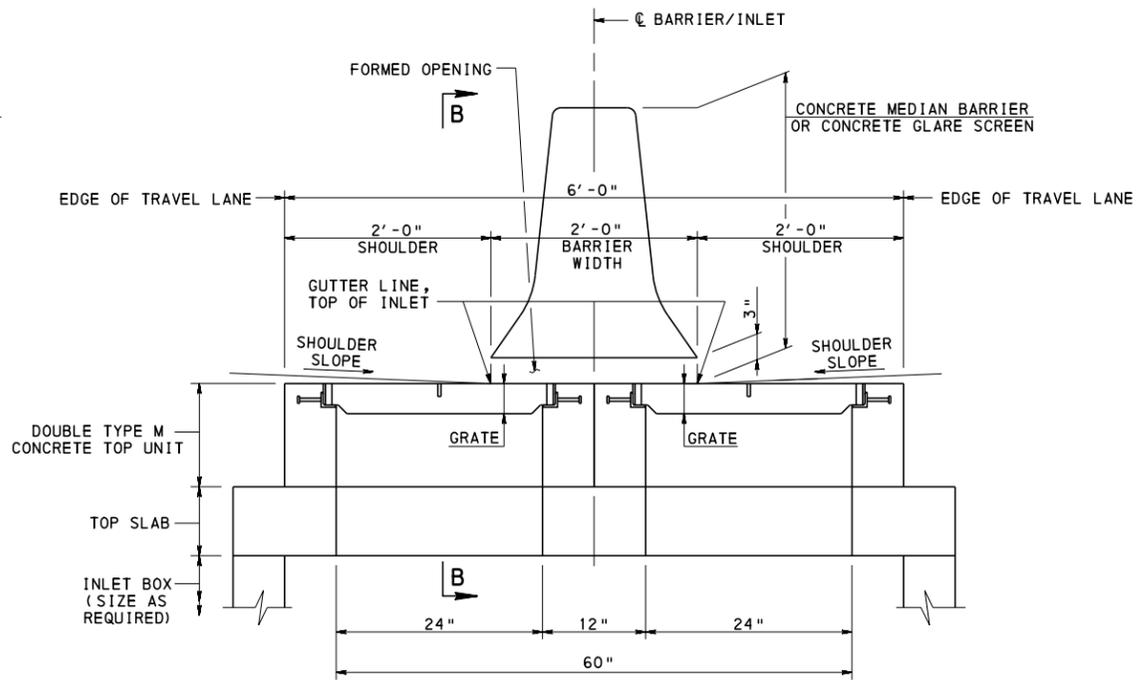
**DETAIL C  
TYPE M FRAME**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

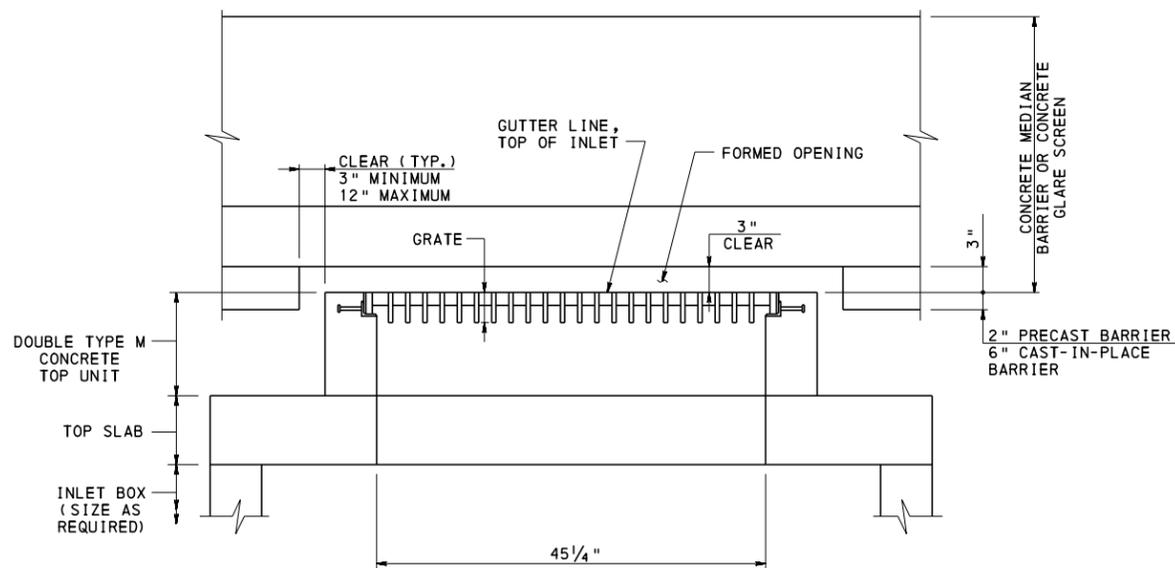
INLET TOPS, GRATES, AND FRAMES  
TYPE M PLACEMENT AT MEDIAN - 1



**INLET BOX WITH TOP SLAB AND  
DOUBLE TYPE M CONCRETE TOP UNIT  
PLACED ALONG 1'-0" WIDE SHOULDERS**



**INLET BOX WITH TOP SLAB AND  
DOUBLE TYPE M CONCRETE TOP UNIT  
PLACED ALONG 2'-0" WIDE SHOULDERS**



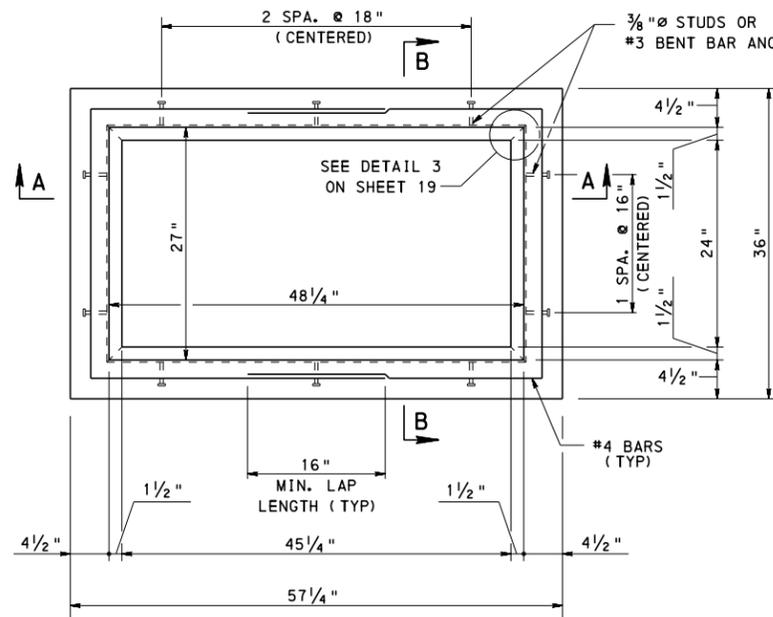
**SECTION B-B**

**NOTES**

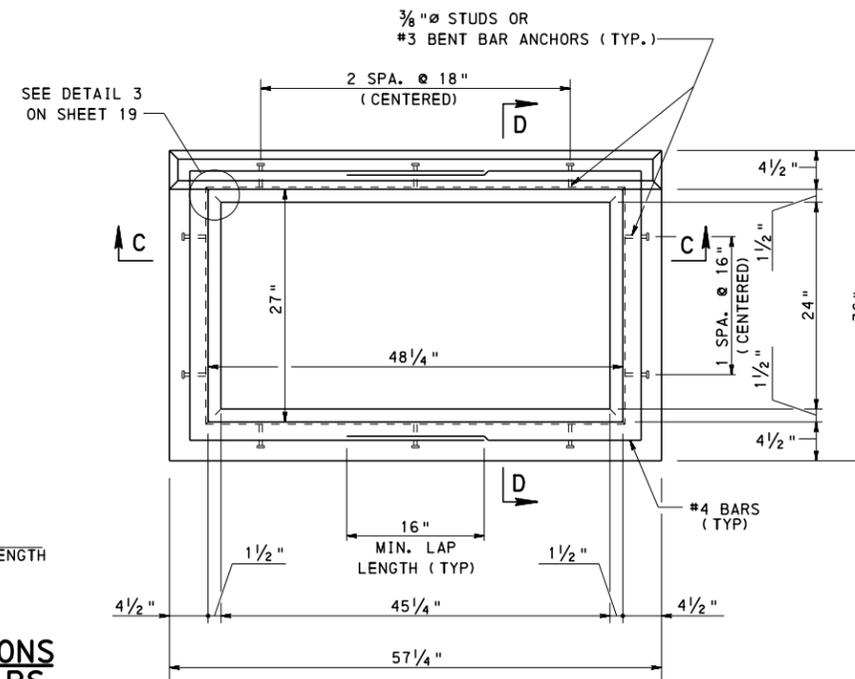
1. FOR INLET PLACEMENT NOTES, SEE SHEET 16.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

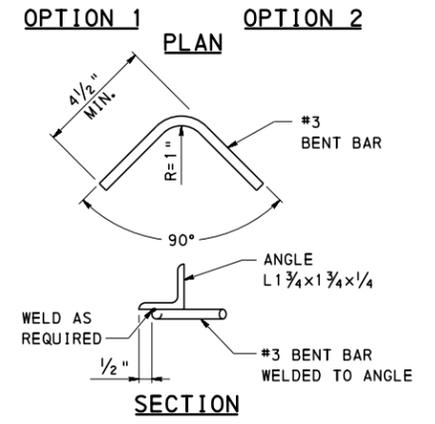
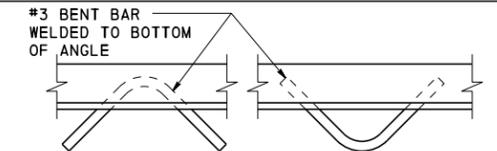
INLET TOPS, GRATES, AND FRAMES  
TYPE M PLACEMENT AT MEDIAN - 2



**PLAN VIEW - TYPE M**



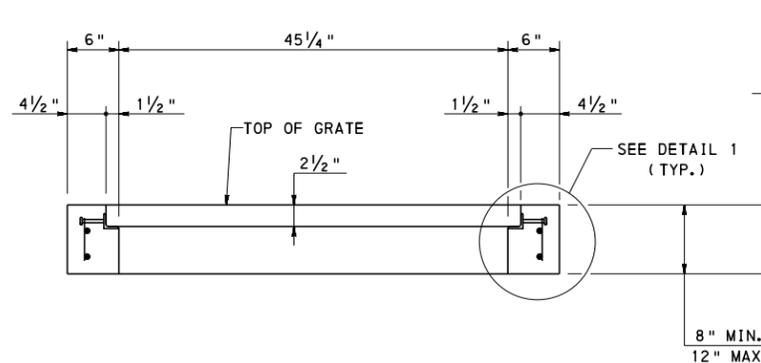
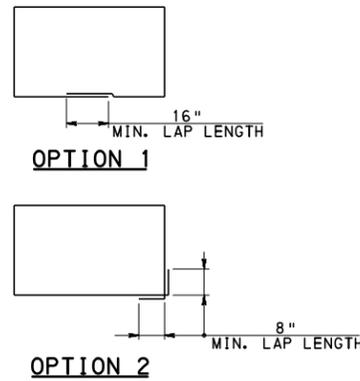
**PLAN VIEW - TYPE S**



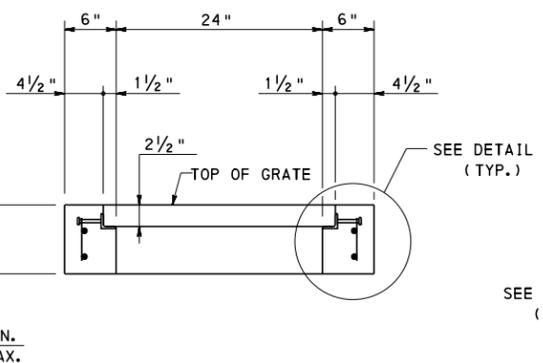
**#3 BENT BAR ANCHOR  
DETAIL ATTACHED  
TO ANGLE**

ALTERNATE DETAIL IN PLACE OF PROVIDING 3/8" Ø STUDS

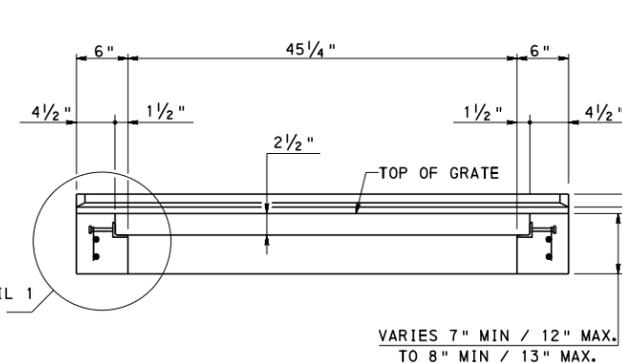
**ALTERNATE ONE BAR OPTIONS  
FOR #4 HORIZONTAL U-BARS**



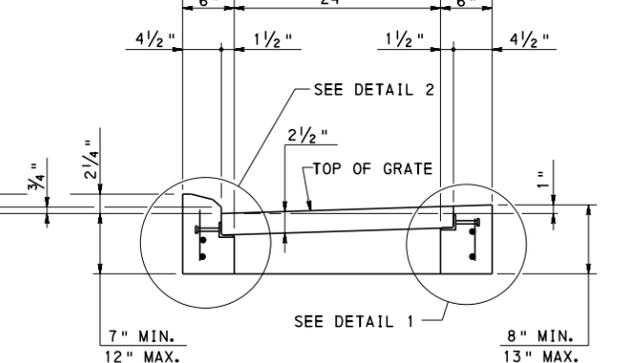
**SECTION A-A**



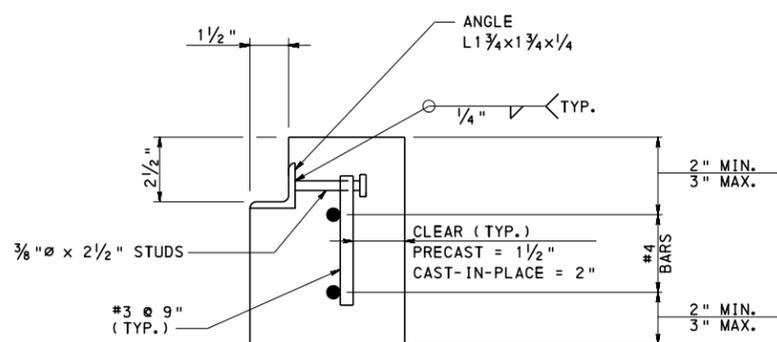
**SECTION B-B**



**SECTION C-C**

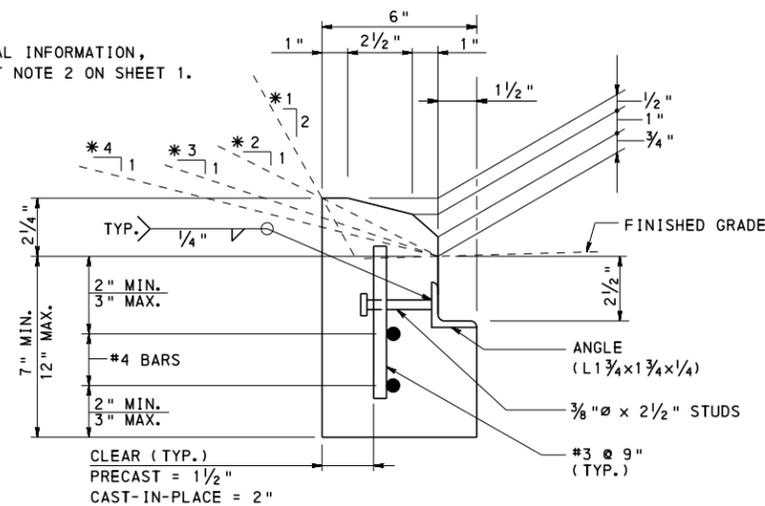


**SECTION D-D**



**DETAIL 1**

\* FOR ADDITIONAL INFORMATION, SEE PLACEMENT NOTE 2 ON SHEET 1.



**DETAIL 2**

**NOTES**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 AND 20.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE M AND TYPE S  
FOR REHABILITATION PROJECTS





## GENERAL NOTES:

- DESIGN SPECIFICATIONS AND REQUIREMENTS:
  - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
  - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
  - INLET BOXES ARE DESIGNED FOR AN ALLOWABLE FOUNDATION PRESSURE EQUAL TO 2.0 TONS/SQ. FT. AT THE SERVICE LIMIT STATE.
- CONSTRUCTION SPECIFICATIONS:
  - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
- SHOP DRAWINGS FOR INLET BOXES, TOP SLABS, AND TRANSITION SLABS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.
- THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
- THE DESIGNER IS RESPONSIBLE FOR DETERMINING THE TYPE OF INLET BOX REQUIRED BASED ON THE REQUIRED PIPE SIZE(S) AND PIPE OPENING(S). REFER TO TABLES A AND B ON SHEET 34 FOR ADDITIONAL INFORMATION. THE DESIGNER IS ALSO RESPONSIBLE TO DETERMINE THE REQUIRED PAY ITEM FOR AN INSTALLATION BASED ON THE OVERALL INSTALLATION HEIGHT.
- THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
- THE SIZE OF THE INLET TOP UNITS, PER RC-45M, ARE BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX.
- MINIMUM PIPE DIAMETERS [INSIDE]:
  - FILL HEIGHT LESS THAN OR EQUAL TO 25': 18" FOR CIRCULAR PIPE (OR EQUIVALENT SIZE PIPE ARCH)
  - FILL HEIGHTS GREATER THAN 25': 24"
- INSIDE INLET BOX DIMENSIONS ARE BASED ON PROVIDING A PIPE OPENING TO ACCOMMODATE A MINIMUM 18" PIPE TO A MAXIMUM 96" PIPE. IF A LARGER PIPE SIZE IS REQUIRED, THE DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.
- INLETS THAT EXCEED THE MAXIMUM HEIGHT INDICATED REQUIRE SPECIAL DESIGN AND DETAILS. DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.
- SHOW ORIENTATION OF INLET BOXES ON THE CONTRACT DRAWINGS.
- THE TOP SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT BOX SECTION.
- PROVIDE 2" DIAMETER WEEPHOLES IN THE WALLS WHEN THE DEPTH BETWEEN THE FINISHED GRADE ELEVATION AND THE TOP OF BOTTOM SLAB ELEVATION IS GREATER THAN 10'-0".
  - VERTICAL PLACEMENT: 5'-0" MAXIMUM SPACING
  - HORIZONTAL PLACEMENT: PLACE WEEPHOLES IN THE SIDE WALLS THAT ARE PERPENDICULAR TO TRAFFIC.
  - LOCATE WEEPHOLES A MINIMUM OF 6" FROM PIPE OPENINGS OR JOINTS.
  - LOCATE WEEPHOLES A MINIMUM OF 1'-0" ABOVE OUTLET PIPE INVERT.
- PROVIDE MANHOLE STEPS WHEN THE DEPTH BETWEEN THE FINISHED GRADE ELEVATION AND THE TOP OF BOTTOM SLAB ELEVATION IS GREATER THAN 5'-0". LOCATE THE TOP STEP 6" MINIMUM BELOW THE TOP OF THE INLET BOX. SHALLOW RECESSES, ON THE INSIDE FACE OF THE INLET, NOT GREATER THAN 3/8" IN DEPTH, FORMED BY MAGNETIC STEP FORMERS ARE ACCEPTABLE AND DO NOT REQUIRE PATCHING. FOR DETAILS, REFER TO RC-39M.
- IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF.
- FOR INLET TOPS, GRATES, GRADE ADJUSTMENT RINGS AND FRAMES, REFER TO RC-45M.

## MATERIAL NOTES:

- PROVIDE THE FOLLOWING CONCRETE CLASS:
  - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH,  $f'_c = 3,000$  PSI]
  - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH,  $f'_c = 4,000$  PSI]
- A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
- REINFORCEMENT STEEL:
  - PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706. DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.
  - PROVIDE MINIMUM LAP AND EMBEDMENT LENGTH FOR REINFORCING BARS OF 30 DIAMETERS OR IN ACCORDANCE WITH THE CURRENT AASHTO SPECIFICATIONS AS MODIFIED BY THE DESIGN MANUAL PART 4, WHICHEVER IS GREATER. (REFER TO TABLE ON SHEET 3)
  - BAR SPACING:
    - MINIMUM SPACING = 4"
    - MAXIMUM SPACING = 1'-0" OR 1.5 MEMBER THICKNESS
  - PERMITTED BAR SIZES:
    - INLET BOXES: #3, #4, #5, #6
    - LARGER BAR SIZES ARE PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
  - MINIMUM AREA OF STEEL REQUIREMENTS FOR REINFORCEMENT BARS:
    - WALLS = 0.15  $in^2/ft$  EACH WAY
    - BOTTOM SLAB:
      - TOP MAT = 0.20  $in^2/ft$  EACH WAY
      - BOTTOM MAT = 0.20  $in^2/ft$  EACH WAY
- WELDED WIRE FABRIC (WWF):
  - PROVIDE GRADE 65 PLAIN WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A185 OR GRADE 70 DEFORMED WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A497.
  - ALL WELDED WIRE FABRIC SHOWN IS SOFT CONVERTED METRIC SIZES.
  - PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER OF TWO GRID SPACINGS OR 12".
  - WIRE SPACING:
    - MINIMUM SPACING = 2"
    - MAXIMUM SPACING = 1'-0" OR 1.5 MEMBER THICKNESS
  - PERMITTED WIRE SIZES:
    - MINIMUM WIRE SIZE = W4 [D4]
    - MAXIMUM WIRE SIZE = W20 [D20]
    - WWF IS NOT PERMITTED IN THE CAST-IN-PLACE INLET BOXES.
    - WWF IS NOT PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
  - MINIMUM AREA OF STEEL REQUIREMENTS FOR WWF:
    - WALLS = 0.12  $in^2/ft$  EACH WAY
    - BOTTOM SLAB:
      - TOP MAT = 0.20  $in^2/ft$  EACH WAY
      - BOTTOM MAT = 0.20  $in^2/ft$  EACH WAY
- NON-SHRINK GROUT:
  - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
- EPOXY BONDING COMPOUND:
  - PROVIDE EPOXY BONDING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 706.1.
- MORTAR:
  - PROVIDE MORTAR IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.7(b).
- CAULKING COMPOUND:
  - PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.8(d).
- GASKETS:
  - PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b).
- MANHOLE STEPS:
  - PROVIDE MANHOLE STEPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(c).
- SUBBASE MATERIAL AND PREPARATION:
  - PROVIDE NO. 2A COARSE AGGREGATE IN ACCORDANCE WITH PUBLICATION 408, SECTION 703.2 AND COMPACT IN ACCORDANCE WITH PUBLICATION 408, SECTION 350.3(e).
  - PLACE AND COMPACT IN 4" MAXIMUM LAYERS.
  - PROVIDE A 1'-0" MINIMUM DEPTH.

## FIELD CONSTRUCTION NOTES:

- CONSTRUCT OR PLACE INLET BOXES LEVEL, UNLESS OTHERWISE INDICATED OR DIRECTED.
- CONSTRUCT OR PLACE INLET BOXES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A COARSE AGGREGATE. PLACE AND COMPACT IN 4" LAYERS TO PROVIDE A 1'-0" MINIMUM DEPTH.
- LOCATE PIPE OR PIPES AS INDICATED OR DIRECTED.
- CONNECT PIPES TO INLET BOXES WITH MORTAR OR WATERTIGHT RUBBER FLEXIBLE CONNECTORS.
- FORM BOTTOM OF INLET, USING CLASS A CEMENT CONCRETE, TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. PROVIDE #4 REINFORCEMENT BARS SPACED AT 12" CENTER TO CENTER MAXIMUM WHEN THE THICKNESS EXCEEDS 3".
- BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE WITH ACCEPTABLE EMBANKMENT MATERIAL.
- THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE INLET BOX PAY ITEM: EXCAVATION, COMPACTED NO. 2A COARSE AGGREGATE, INLET BOX, CLASS A CEMENT CONCRETE TO CHANNEL FLOW, TRANSITION SLAB, TOP SLAB, BACKFILL AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE CONSTRUCTION OF THE INLET BOX.

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34	MISCELLANEOUS DETAILS

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## INLET BOXES GENERAL NOTES - 1

## PIPE LOCATION AND PIPE OPENING NOTES:

1. LOCATE THE TOP OF PIPE AT LEAST 6" BELOW THE ROADWAY SUBGRADE ELEVATION. FOR ADDITIONAL INFORMATION REFER TO RC-30M. (SUBGRADE IS DEFINED AS THE BOTTOM OF THE PAVEMENT STRUCTURE.)
2. PROVIDE A MINIMUM DROP OF AT LEAST 2" BETWEEN THE INLET PIPE INVERT ELEVATION AND THE OUTLET PIPE INVERT ELEVATION, WHENEVER POSSIBLE.
3. PROVIDE PIPE OPENING(S) OF AT LEAST 2" BUT NOT MORE THAN 4" LARGER THAN THE OUTSIDE DIAMETER OF THE SPECIFIED PIPE.
4. LOCATE PIPE OPENINGS, EXCEPT CORNER PENETRATIONS, TO PROVIDE A MINIMUM 4" OF CONCRETE BETWEEN THE TOP OF THE INLET BOX AND THE TOP OF THE PIPE OPENING.
5. WHEN PROJECT CONDITIONS REQUIRE THE PIPE OPENINGS TO BE LOCATED WITHIN 4" FROM THE TOP OR BOTTOM OF A BOX SECTION (NOT APPLICABLE TO CORNER PENETRATIONS), PROVIDE AN ADDITIONAL #3 HORIZONTAL BAR ALONG THE FULL WIDTH OF THE INLET BOX. PROVIDE 12" HOOKS ON BARS AT CORNERS. LOCATE BARS 1/2" CLEAR FROM THE TOP OR BOTTOM OF THE SECTION. CUT BARS IN THE FIELD PRIOR TO INSTALLING PIPE.
6. LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 12" OF CONCRETE BETWEEN THE BOTTOM OF A TRANSITION SLAB AND THE TOP OF THE PIPE OPENING.
7. IF MULTIPLE PIPE OPENINGS ARE REQUIRED IN A SINGLE WALL AND THE PIPE OPENINGS ARE GREATER THAN 12", LOCATE THE PIPE OPENINGS A MINIMUM OF 12" APART.
8. IF REINFORCED CONCRETE PIPE IS USED, THE PIPE OPENING MAY BE FORMED "FLUSH" WITH THE TOP OF THE INLET BOTTOM [BASE] SLAB.
9. LOCATE PIPE OPENINGS PER THE CONTRACT DRAWINGS OR AS DIRECTED.
10. LOCATE PIPE OPENINGS WITHIN THE INLET BOX. DO NOT CUT THE TOP SLAB, TRANSITION SLAB, OR TOP UNIT TO ACCOMMODATE PIPES.
11. PIPE OPENINGS ARE PERMITTED TO BE IN EACH WALL WHEN CORNER PENETRATIONS ARE NOT REQUIRED.
12. CORNER PENETRATIONS:
  - PIPE OPENINGS ARE PERMITTED IN ONE (1) CORNER AND IN THE TWO (2) OTHER WALLS NOT AFFECTED BY THE CORNER PENETRATION.
  - LOCATE CORNER PENETRATION PIPE OPENINGS TO PROVIDE A MINIMUM OF 8" OF CONCRETE BETWEEN THE TOP OF THE INLET BOX AND THE TOP OF THE PIPE OPENING.
  - DESIGNER IS RESPONSIBLE TO SIZE THE INLET BOX TO ACCOMMODATE THE CORNER PIPE AND ANY OTHER PIPES. DESIGNER MUST CONSIDER THE PIPE OUTSIDE DIAMETER AND PIPE OPENINGS WHEN DETERMINING THE REQUIRED INLET BOX SIZE. FOR ADDITIONAL DETAILS, REFER TO SHEET 34.
13. SKEWED PIPES:
  - DESIGNER IS RESPONSIBLE TO SIZE THE INLET BOX TO ACCOMMODATE SKEWED PIPES. DESIGNER MUST CONSIDER THE SKEW ANGLE, PIPE OUTSIDE DIAMETER, AND PIPE OPENING WHEN DETERMINING THE REQUIRED INLET BOX SIZE. FOR ADDITIONAL DETAILS, REFER TO SHEET 34.
14. PIPE OPENINGS ARE PERMITTED TO REMOVE UP TO 1" OF EACH WALL THICKNESS IN THE STANDARD BOX ONLY. THE PIPE OPENINGS, IN ALL OTHER BOXES, ARE NOT PERMITTED TO REDUCE THE WALL THICKNESS.
15. TAPERED PIPE OPENINGS ARE PERMITTED.
  - TAPERED PIPE OPENINGS THAT REDUCE THE WALL THICKNESS ARE ONLY PERMITTED IN THE STANDARD BOX.
  - TAPERED PIPE OPENINGS, IN ALL OTHER BOXES, ARE NOT PERMITTED TO REDUCE THE WALL THICKNESS.
16. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND PIPE OPENINGS AS INDICATED (SEE SHEETS 15 AND 22), OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS LESS THAN 12". ADDITIONAL STEEL IS PERMITTED TO BE ADDED AROUND THE PIPE OPENING TO KEEP THE "HOLE FORM" IN PLACE DURING CONSTRUCTION OR FABRICATION.

## PIPE OPENINGS IN BOTTOM SLAB NOTES:

1. PIPE OPENINGS ARE PERMITTED IN THE BOTTOM SLAB, IF REQUIRED. A MAXIMUM OF ONE OPENING IS PERMITTED.
2. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND THE PIPE OPENING IN ACCORDANCE WITH THE DETAIL SHOWN ON SHEET 34.
3. THE BOTTOM SLAB THICKNESS IS PERMITTED TO BE INCREASED, AS REQUIRED, TO MAINTAIN ALL CLEARANCE REQUIREMENTS.

## CAST-IN-PLACE CONCRETE INLET BOX NOTES:

1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS M, S, C AND C ALTERNATE WHEN A STANDARD INLET BOX IS NOT SPECIFIED. PROVIDE OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS. PROVIDE A TOP SLAB WITH A ROUND OPENING FOR MANHOLE COVER WHEN SPECIFIED ON THE CONTRACT DRAWINGS.
3. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE INLET BOX SIZES, WHEN TWO SEPARATE INLET BOX SIZES ARE USED. (SEE TRANSITION SLAB NOTES.)
4. CLEAR COVER FOR STEEL:
  - WALLS: 2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2 1/2"
    - BOTTOM COVER: 3"
    - SIDE COVER: 2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 2"
5. MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM WALL THICKNESS: 6"
  - MINIMUM BOTTOM SLAB THICKNESS: 9"
6. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE INLET BOX.
7. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE INLET BOXES.
8. WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE 3" MINIMUM BETWEEN THE PIPE OPENING AND TOP OF THE BOTTOM SLAB.
9. KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
10. PROVIDE A KEYED JOINT BETWEEN BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOX.
11. PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
12. PROVIDE KEYED CONSTRUCTION JOINTS BETWEEN CONCRETE POURS.
13. SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0"
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 9'-0"
14. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

## TRANSITION SLAB NOTES

1. USE TRANSITION SLABS TO TRANSITION A LARGER INLET BOX SIZE (LOWER SECTION) TO A SMALLER BOX SIZE (UPPER SECTION).
2. THE DESIGNER IS NOT RESPONSIBLE TO SPECIFY A TRANSITION SLAB. THE DESIGNER IS ONLY RESPONSIBLE FOR DETERMINING THE MAXIMUM INLET BOX SIZE REQUIRED WITHIN AN INLET ASSEMBLY BASED ON THE OVERALL INSTALLATION HEIGHT.
3. THE CONTRACTOR/FABRICATOR IS RESPONSIBLE TO DETERMINE WHEN A TRANSITION SLAB WILL BE USED BASED ON THE REQUIREMENTS OF THIS STANDARD AND THE CONTRACT DRAWINGS.
4. ONLY ONE TRANSITION SLAB IS PERMITTED WITHIN AN INLET ASSEMBLY.
5. THE TRANSITION SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT UPPER OR LOWER BOX SECTIONS.
6. TRANSITION SLAB IS NOT PERMITTED ON A TYPE D-H INLET.

## PRECAST CONCRETE INLET BOX NOTES:

1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
2. PROVIDE PRECAST CONCRETE INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS M, S, C AND C ALTERNATE WHEN A STANDARD INLET BOX IS NOT SPECIFIED. PROVIDE OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS. PROVIDE A TOP SLAB WITH A ROUND OPENING FOR MANHOLE COVER WHEN SPECIFIED ON THE CONTRACT DRAWINGS.
4. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE INLET BOX SIZES, WHEN TWO SEPARATE INLET BOX SIZES ARE USED. (SEE TRANSITION SLAB NOTES.)
5. CLEAR COVER FOR STEEL:
  - WALLS: 1 1/2"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1 1/2"
    - SIDE COVER: 1 1/2"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1 1/2"
6. MINIMUM SLAB AND WALL THICKNESS:
  - MINIMUM TOP SLAB THICKNESS: 8"
  - MINIMUM WALL THICKNESS: 6"
  - MINIMUM BOTTOM SLAB THICKNESS: 7"
7. THICKNESS OF WALL IS PERMITTED TO VARY FROM SECTION TO SECTION. INSIDE FACE OF WALLS MUST ALIGN BETWEEN SECTIONS.
8. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
9. LIFTING DEVICES:
  - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
  - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION.
  - PROVIDE LIFTING DEVICES WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.
10. TAPERS MAY BE PROVIDED ON THE INSIDE AND/OR OUTSIDE VERTICAL FACES OF THE INLET BOXES TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY 1/4" / FOOT PER SIDE TO A MAXIMUM OF 1" PER SIDE.
11. KEYED JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT SEGMENT. PLACE MORTAR OR CAULKING COMPOUND BETWEEN JOINTS IN ACCORDANCE WITH THIS STANDARD.
12. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOX.
13. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.
14. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN PRECAST SECTIONS.
15. SEGMENT HEIGHTS:
  - MINIMUM HEIGHT:
    - RISER SECTIONS = 1'-0"
    - BASE SECTIONS = 2'-0"
  - MAXIMUM HEIGHT = 8'-0"

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## INLET BOXES GENERAL NOTES - 2

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _2 OF 34 RC-46M
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### DESIGN TABLE GENERAL NOTES:

- SEPARATE DESIGN TABLES ARE PROVIDED FOR CAST-IN-PLACE CONCRETE AND PRECAST CONCRETE INLET BOXES.
- SEPARATE DESIGN TABLES ARE PROVIDED USING REINFORCEMENT BARS AND WELDED WIRE FABRIC FOR THE PRECAST CONCRETE INLET BOXES.
- THE RISER (UPPER) AND BASE (BOTTOM) BOX SECTIONS WERE DESIGNED AS SQUARE BOXES, EXCEPT FOR THE STANDARD AND TYPE D-H BOXES.
- ALWAYS TRY TO MAXIMIZE THE HEIGHT OF THE RISER AND BASE SECTIONS.
- ALWAYS TRY TO PROVIDE THE MINIMUM NUMBER OF SECTIONS BY USING THE MAXIMUM POSSIBLE SECTION HEIGHTS.

### CUSTOMIZED RECTANGULAR BOX NOTES:

- CUSTOMIZED RECTANGULAR INLET BOXES MAY BE USED PROVIDED THE DESIGN REQUIREMENTS ARE BASED ON THE LARGER INSIDE DIMENSION OF THE INLET BOX LENGTH OR WIDTH.
- THE CONTRACTOR/FABRICATOR WILL BE RESPONSIBLE TO DETERMINE THE MINIMUM INSIDE BOX DIMENSIONS BASED ON THE REQUIRED PIPE SIZE, PIPE WALL THICKNESS, PIPE OPENING, PIPE SKEW AND ANY REQUIRED CLEARANCES. AT A MINIMUM, TRY AND ROUND DIMENSIONS UP TO THE NEXT 3".
- AFTER THE CONTRACTOR/FABRICATOR DETERMINES THE MINIMUM INSIDE BOX DIMENSIONS THEY THEN MUST DETERMINE WHICH BOX TYPE (DESIGN TABLE) WILL BE USED TO DETERMINE THE DESIGN REQUIREMENTS OF THE INLET BOX.
  - EXAMPLE 1:
    - MINIMUM REQUIRED INSIDE BOX DIMENSIONS:
      - L<sub>I</sub> = 77" 6'-5"
      - W<sub>I</sub> = 24" 2'-0"
    - FABRICATED INSIDE BOX DIMENSIONS:
      - L<sub>I</sub> = 78" 6'-6"
      - W<sub>I</sub> = 24" 2'-0"
    - DESIGN REQUIREMENTS WOULD THAN BE BASED ON A TYPE 7 [7'-0" x 7'-0"] INLET BOX
  - EXAMPLE 2:
    - MINIMUM REQUIRED INSIDE BOX DIMENSIONS:
      - L<sub>I</sub> = 64" 5'-4"
      - W<sub>I</sub> = 36" 3'-0"
    - FABRICATED INSIDE BOX DIMENSIONS:
      - L<sub>I</sub> = 66" 5'-6"
      - W<sub>I</sub> = 39" 3'-3"
    - DESIGN REQUIREMENTS WOULD THAN BE BASED ON A TYPE 6 [6'-0" x 6'-0"] INLET BOX

### CAST-IN-PLACE CONCRETE INLET BOX DESIGN TABLE NOTES:

- RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 9'-0" MAXIMUM HEIGHT.
- AVOID USING RISER SECTIONS WHEN THE HEIGHT OF THE INLET BOX IS LESS THAN 9'-0".
- WHEN RISER SECTIONS ARE REQUIRED, ALWAYS MAXIMIZE THE HEIGHT OF THE BASE SECTION.
- THE WALL THICKNESS FOR THE RISER SECTION MUST ALWAYS MATCH THE WALL THICKNESS REQUIRED FOR THE BASE SECTION, UNLESS A TRANSITION SLAB IS USED.
- WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE CONCRETE INLET BOXES.
- HOW TO DETERMINE THE RISER AND BASE BOX DESIGN REQUIREMENTS:
  - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
  - GO TO THE APPROPRIATE TABLE AND SELECT THE DESIGN INFORMATION FOR BOTH THE RISER AND BASE SECTIONS BASED ON THE ROUNDED HEIGHT.
  - IF MULTIPLE RISER SECTIONS ARE REQUIRED, USE THE RISER DESIGN REQUIREMENTS SHOWN FOR ALL RISER SECTIONS. DO NOT USE THE DESIGN REQUIREMENTS FOR A LESSER HEIGHT.
- HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS WHEN USING A TRANSITION SLAB:
  - DETERMINE THE TOP OF TRANSITION SLAB ELEVATION AND CALCULATE THE HEIGHT, H (FINISHED GRADE ELEVATION - TOP OF TRANSITION SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
  - GO TO THE APPROPRIATE TABLE AND SELECT THE DESIGN INFORMATION FOR THE RISER SECTION BASED ON THE REQUIRED HEIGHT.

### PRECAST CONCRETE INLET BOX DESIGN TABLE NOTES:

- RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 8'-0" MAXIMUM HEIGHT.
- WELDED WIRE FABRIC SIZE AND SPACING SHOWN IN THE DESIGN TABLES IS ONLY SUGGESTED. FABRICATOR IS PERMITTED TO USE ANY WIRE SIZE AND SPACING THAT MEETS THE STEEL AREA REQUIREMENTS, CLEARANCE REQUIREMENTS, CLEARANCE REQUIREMENTS BETWEEN TWO REINFORCEMENT MATS AND THE REQUIREMENTS SHOWN IN MATERIAL NOTE 4 ON SHEET 1.
- THE WALL THICKNESS FOR THE RISER SECTIONS DOES NOT NEED TO MATCH THE WALL THICKNESS FOR THE BASE SECTION, ALTHOUGH THE INSIDE FACES MUST ALIGN.
- HOW TO DETERMINE THE BASE DESIGN REQUIREMENTS:
  - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
  - GO TO THE APPROPRIATE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT.
- HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS:
  - DETERMINE THE JOINT ELEVATION AND CALCULATE THE JOINT DEPTH, JD (FINISHED GRADE ELEVATION - JOINT ELEVATION), AND ROUND THE DEPTH UP TO THE NEXT HIGHER DEPTH INCREMENT SHOWN IN THE TABLE.
  - GO TO THE APPROPRIATE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED DEPTH.
  - IF MULTIPLE RISER SECTIONS ARE REQUIRED, SELECT ADDITIONAL RISER SECTIONS DESIGN REQUIREMENTS BASED ON THE JOINT ELEVATION.
- HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS WHEN USING A TRANSITION SLAB:
  - DETERMINE THE TOP OF TRANSITION SLAB ELEVATION AND CALCULATE THE JOINT DEPTH, JD (FINISHED GRADE ELEVATION - TOP OF TRANSITION SLAB ELEVATION), AND ROUND THE DEPTH UP TO THE NEXT HIGHER DEPTH INCREMENT SHOWN IN THE TABLE.
  - GO TO THE APPROPRIATE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED DEPTH.
  - IF MULTIPLE RISER SECTIONS ARE REQUIRED, SELECT ADDITIONAL RISER SECTIONS DESIGN REQUIREMENTS BASED ON THE JOINT ELEVATION.
- FABRICATOR IS PERMITTED TO FABRICATE PRECAST CONCRETE INLET BOXES USING A COMBINATION OF REINFORCEMENT BARS AND WELDED WIRE FABRIC (WWF) IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
  - THE MEMBER THICKNESS AND THE REQUIRED AREA OF STEEL MUST MEET THE REQUIREMENTS OF THE REINFORCEMENT BAR DESIGN TABLES SHOWN ON SHEETS 26-28.
  - BAR SIZE AND BAR SPACING MUST MEET THE REQUIREMENTS SHOWN IN MATERIAL NOTE 3 ON SHEET 1.
  - WIRE SIZE AND WIRE SPACING MUST MEET THE REQUIREMENTS SHOWN IN MATERIAL NOTE 4 ON SHEET 1.
  - CLEARANCE REQUIREMENTS AND CLEARANCE REQUIREMENTS BETWEEN TWO REINFORCEMENT MATS MUST BE MET.
  - FOR DETAILS, SEE SHEET 25.
- PROVIDE MARKINGS ON EACH SECTION TO CLEARLY IDENTIFY THE MAXIMUM ALLOWABLE DEPTH.

REINFORCEMENT BAR AREAS	
BAR SIZE AND SPACING	STEEL AREA (IN. <sup>2</sup> /FT.)
#3 @ 4"	0.33
#3 @ 6"	0.22
#3 @ 9"	0.15
#4 @ 4"	0.60
#4 @ 6"	0.40
#4 @ 9"	0.27
#4 @ 12"	0.20
#5 @ 4"	0.93
#5 @ 6"	0.62
#5 @ 9"	0.41
#5 @ 12"	0.31
#6 @ 4"	1.32
#6 @ 6"	0.88
#6 @ 9"	0.59
#6 @ 12"	0.44

WELDED WIRE FABRIC WIRE SIZES PLAIN [DEFORMED]	
W4 [D4]	
W5 [D5]	
W6 [D6]	
W7 [D7]	
W8 [D8]	
W9 [D9]	
W10 [D10]	
W12 [D12]	
W14 [D14]	
W16 [D16]	
W20 [D20]	

W = PLAIN WIRES  
D = DEFORMED WIRES

### REINFORCEMENT BAR SPLICE LENGTHS

BAR SIZE	CAST-IN-PLACE CONCRETE (CLASS A) f'c = 3000 psi	PRECAST CONCRETE (CLASS AA, MODIFIED) f'c = 4000 psi
#3	1'-4"	1'-4"
#4	1'-9"	1'-9"
#5	2'-2"	2'-2"
#6	2'-9"	2'-7"
#7	3'-9"	3'-3"
#8	4'-11"	4'-3"
#9	6'-3"	5'-5"
#10	7'-11"	6'-10"
#11	9'-9"	8'-5"

### NOTES:

- SPLICE LENGTHS BASED ON UNCOATED DEFORMED BARS.
- SPLICE LENGTHS BASED ON CLASS C SPLICE.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
GENERAL NOTES - 3

RECOMMENDED SEPT. 15, 2016

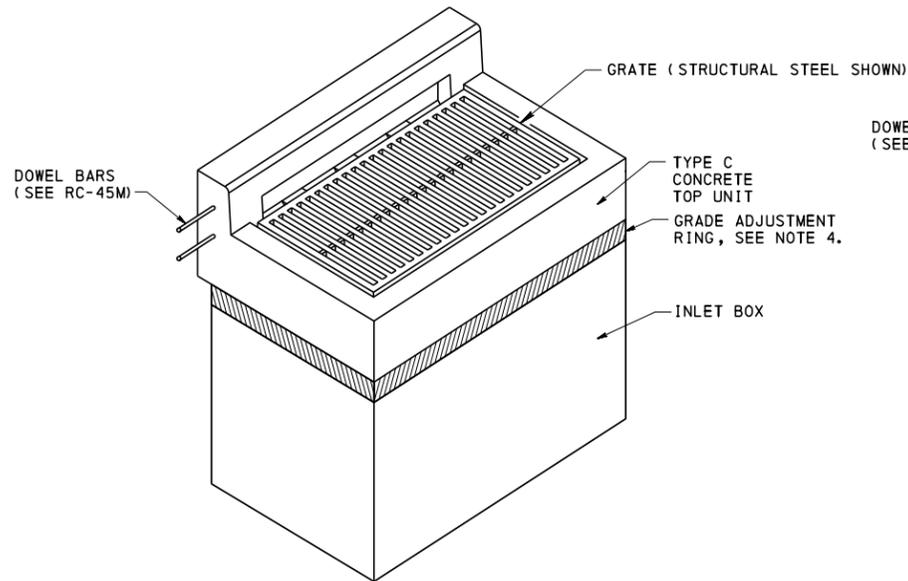
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016

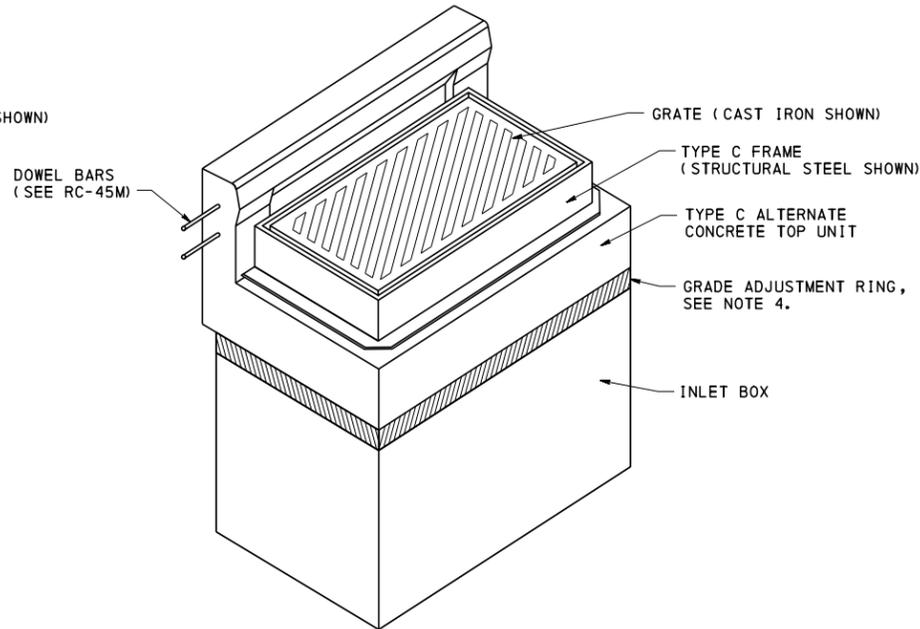
*Brian J. Lyons*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 34

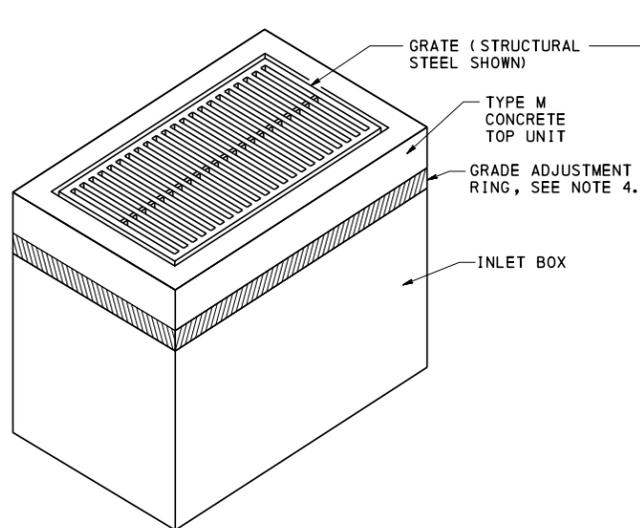
RC-46M



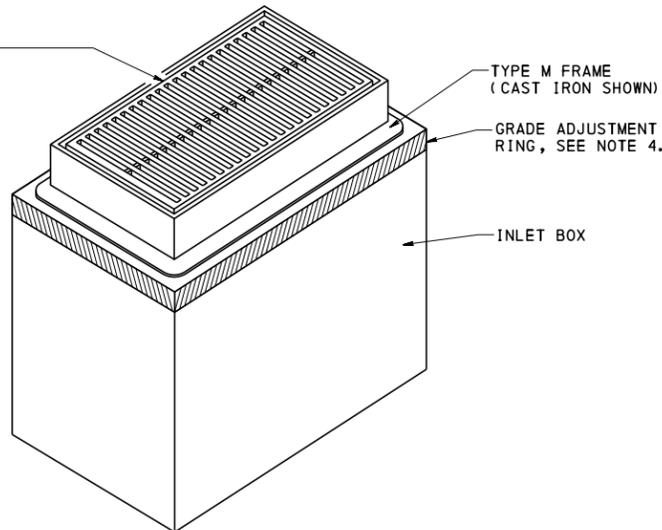
**CONCRETE TOP UNIT - TYPE C**



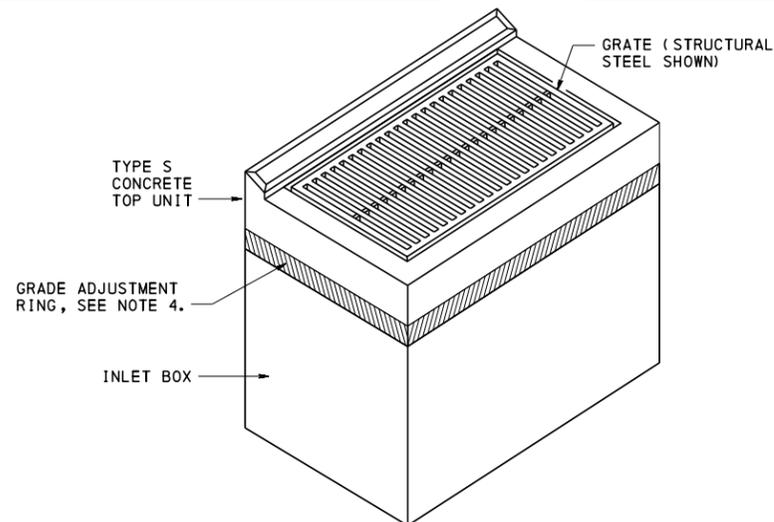
**CONCRETE TOP UNIT - TYPE C ALTERNATE WITH TYPE C FRAME**



**CONCRETE TOP UNIT - TYPE M**



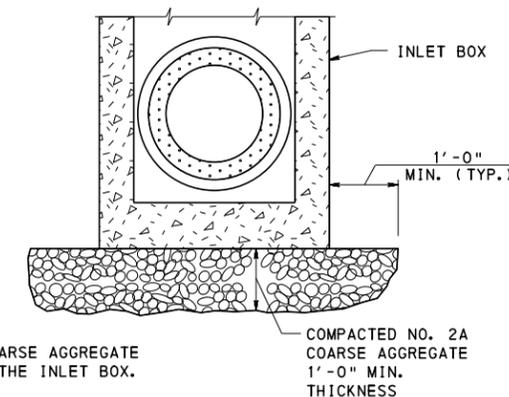
**INLET BOX WITH TYPE M FRAME**



**CONCRETE TOP UNIT - TYPE S**

**NOTES:**

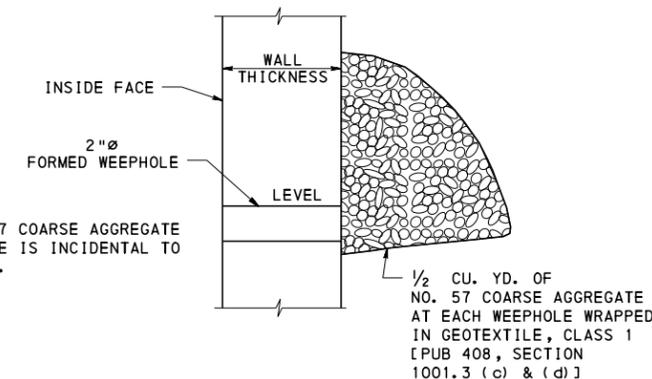
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. STANDARD INLET BOXES SHOWN, PROVIDE TOP SLABS FOR OTHER INLET BOX TYPES.
3. SEE RC-45M FOR DETAILS FOR THE CONCRETE TOP UNITS, FRAMES, AND GRATES.
4. PROVIDE GRADE ADJUSTMENT RINGS WHEN REQUIRED. SEE RC-45M FOR DETAILS.



**NOTE:**  
COST OF NO. 2A COARSE AGGREGATE IS INCIDENTAL TO THE INLET BOX.

**INLET BOX SUBBASE PREPARATION DETAIL**

(SEE FIELD CONSTRUCTION NOTES ON SHEET 1)



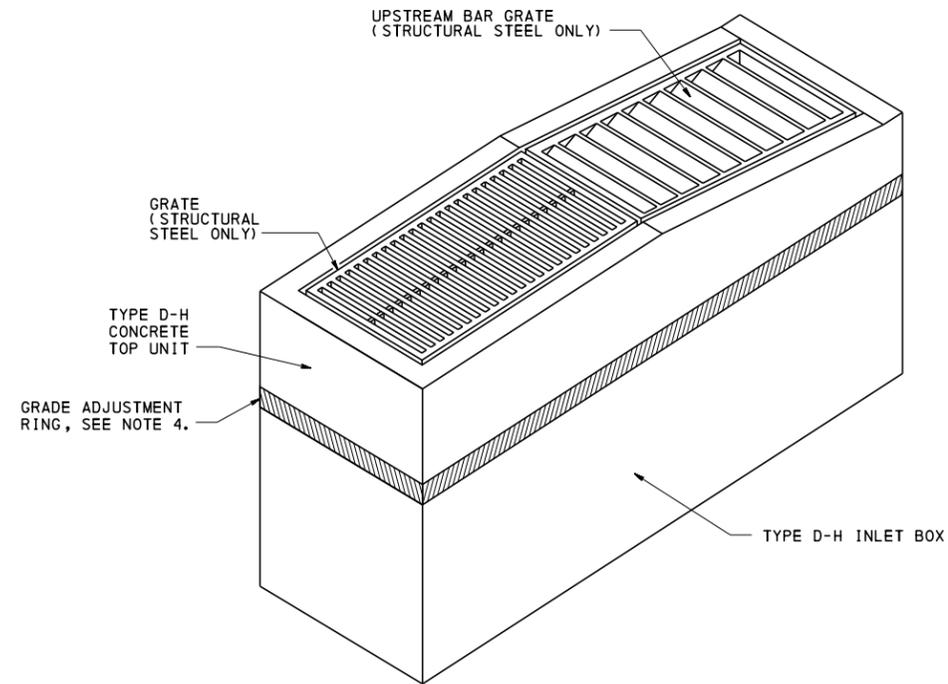
**NOTE:**  
COST OF NO. 57 COARSE AGGREGATE AND GEOTEXTILE IS INCIDENTAL TO THE INLET BOX.

**WEEPHOLE DETAIL**

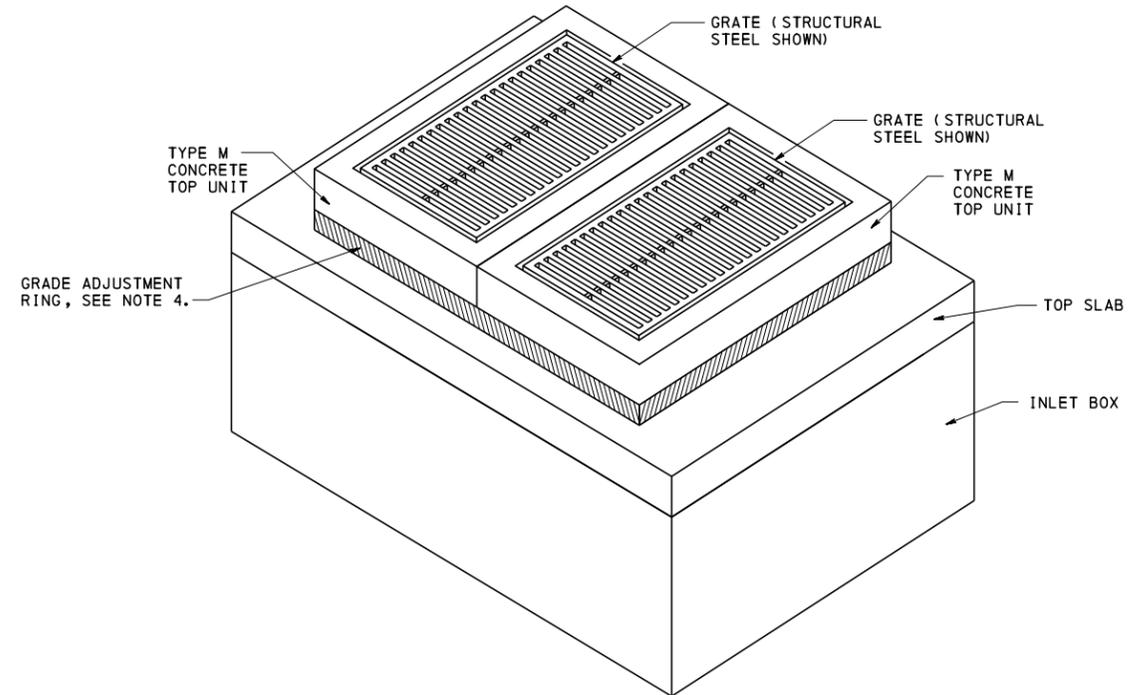
(SEE GENERAL NOTE 15 ON SHEET 1)

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

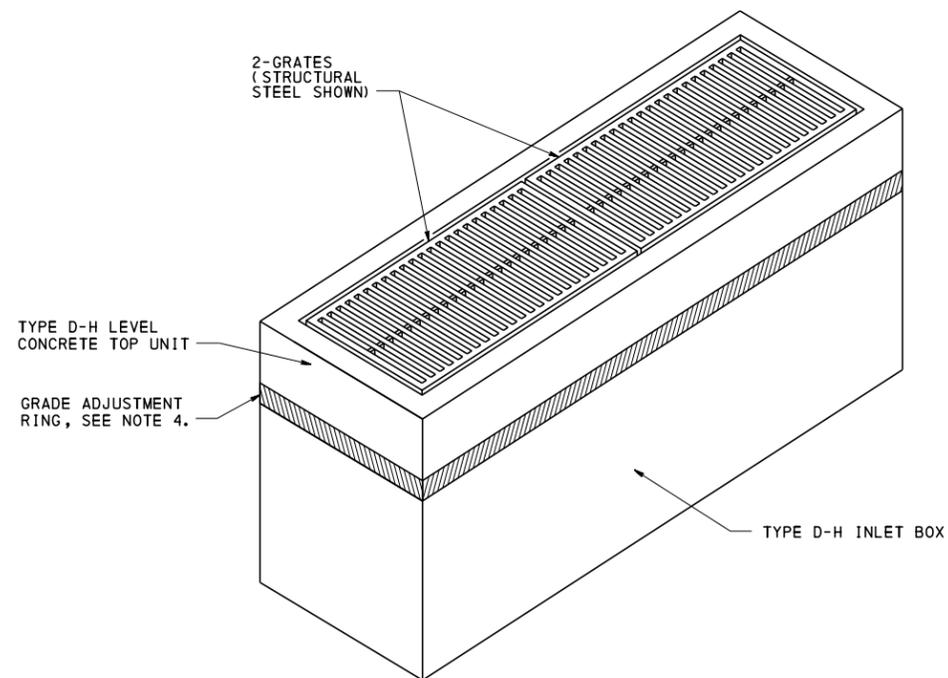
INLET BOXES  
INLET ASSEMBLIES - 1



**CONCRETE TOP UNIT - TYPE D-H**



**CONCRETE TOP UNIT - DOUBLE TYPE M**



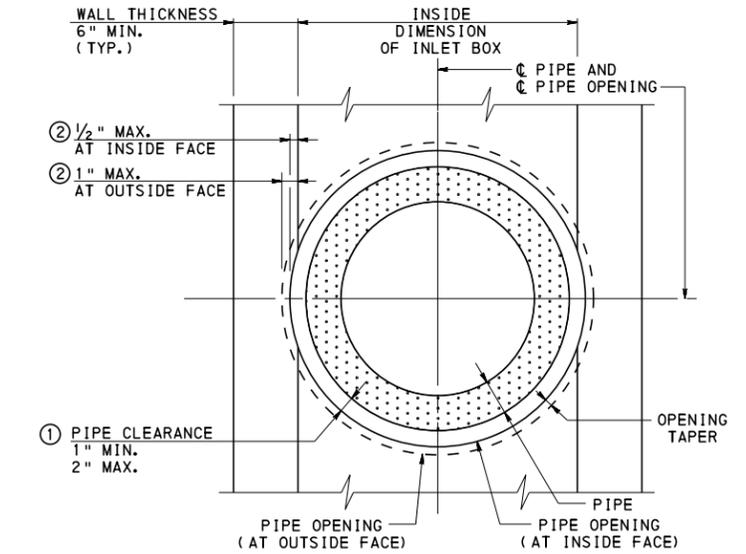
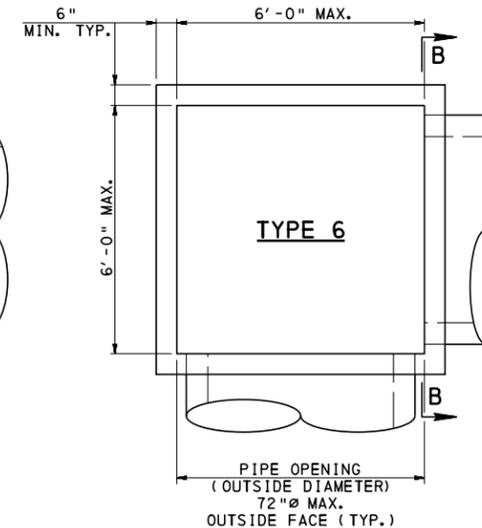
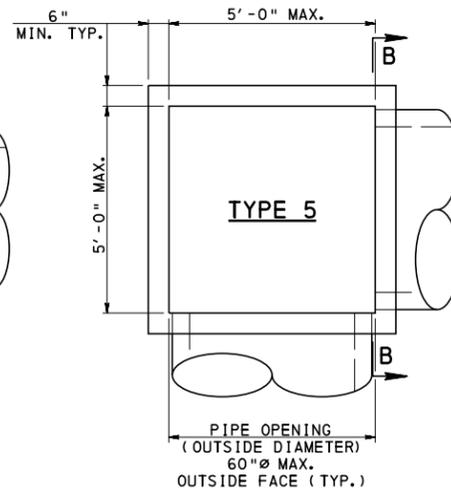
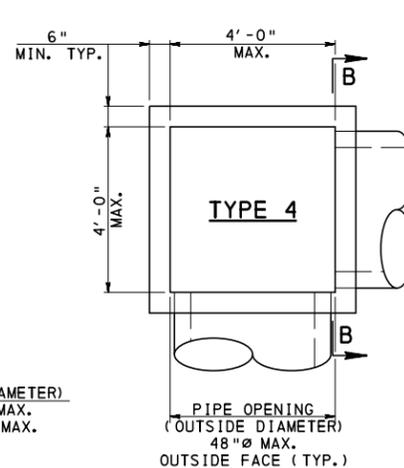
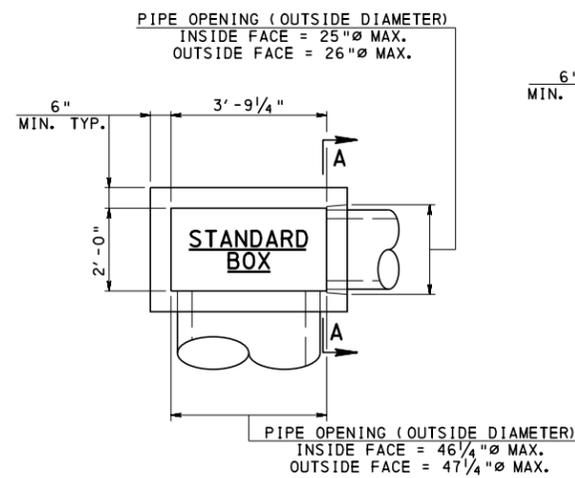
**CONCRETE TOP UNIT - TYPE D-H LEVEL**

**NOTES:**

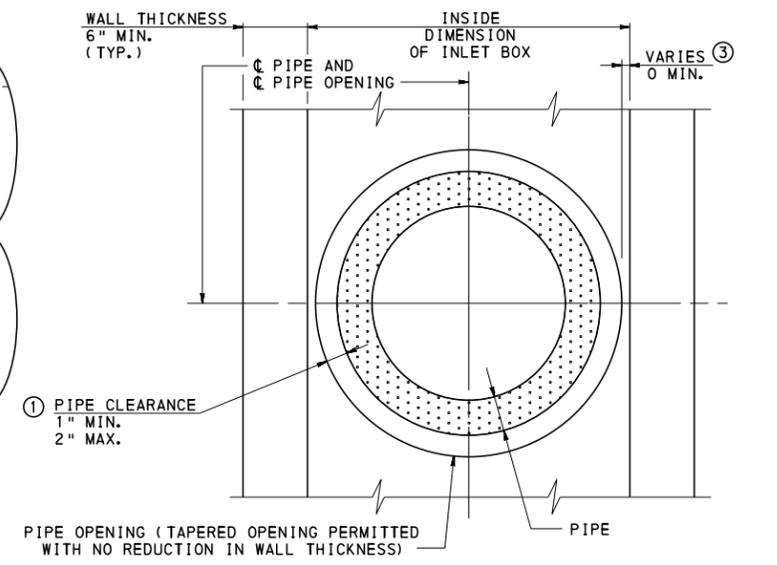
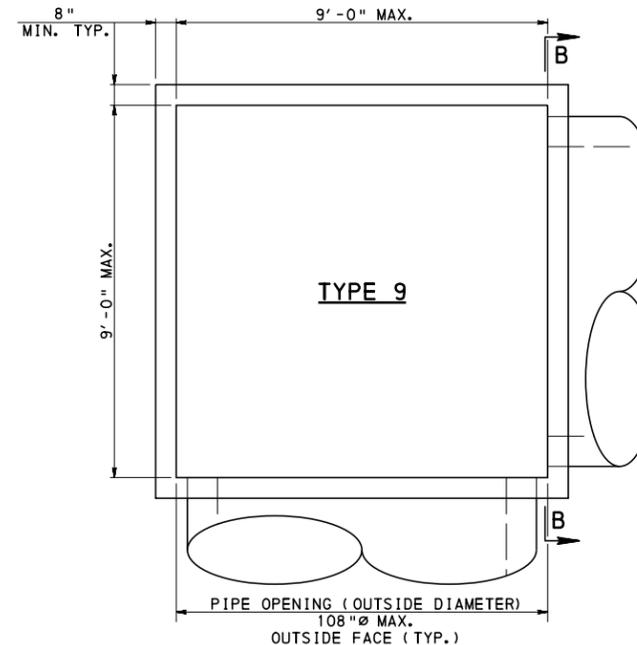
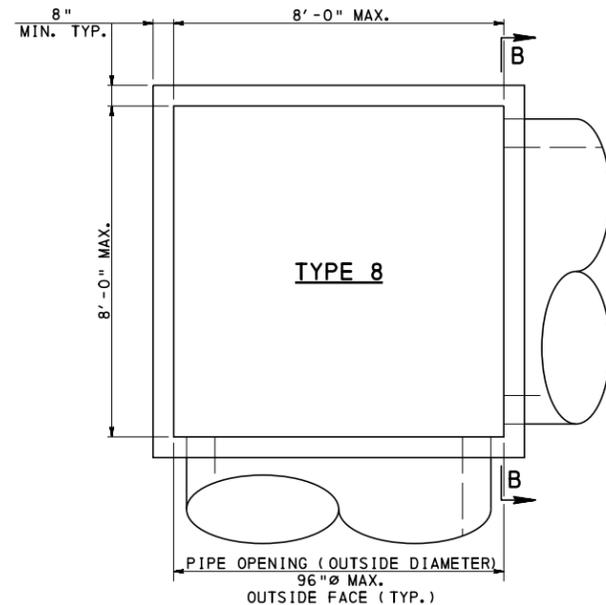
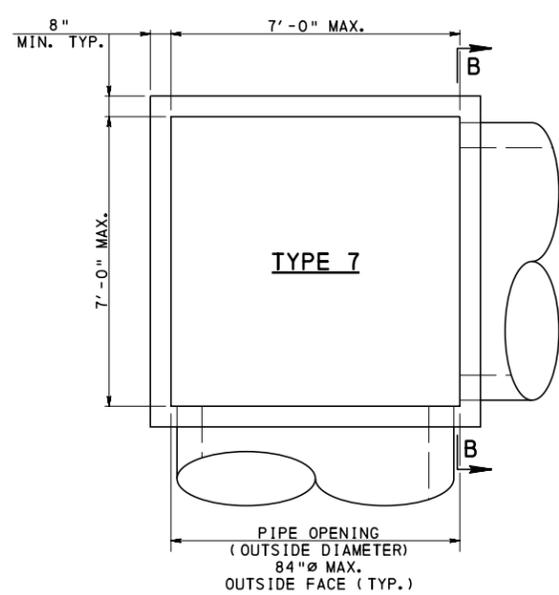
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. TOP SLAB NOT PERMITTED ON TYPE D-H INLET BOX.
3. SEE RC-45M FOR DETAILS FOR THE CONCRETE TOP UNITS, FRAMES, AND GRATES.
4. PROVIDE GRADE ADJUSTMENT RINGS WHEN REQUIRED. SEE RC-45M FOR DETAILS.

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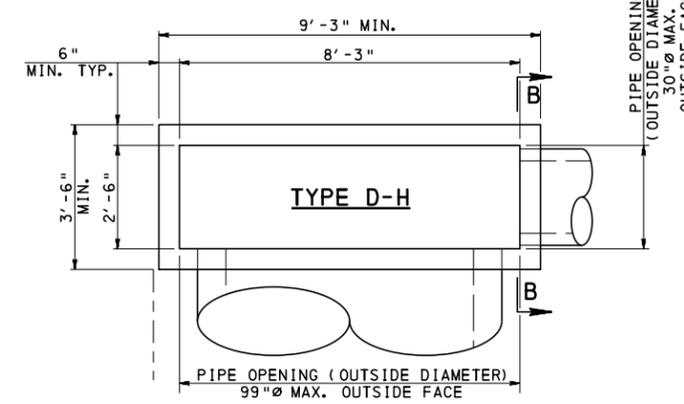
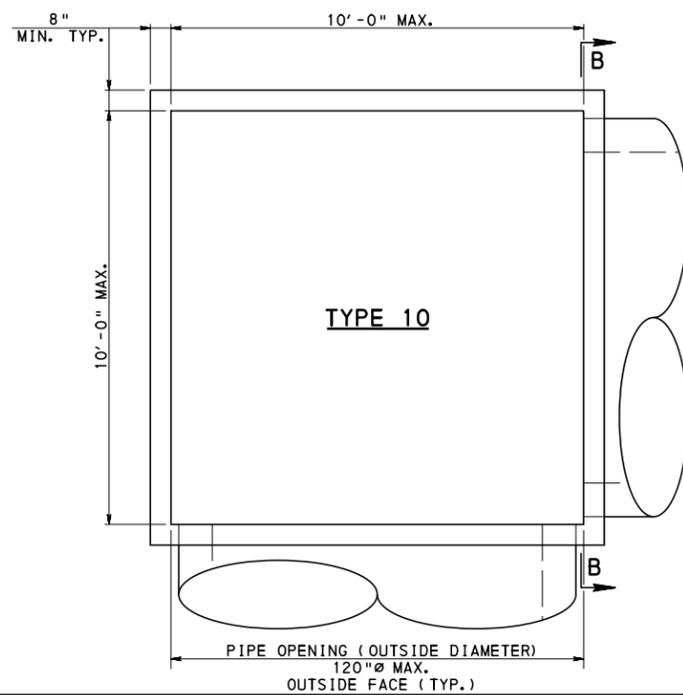
INLET BOXES  
INLET ASSEMBLIES - 2



**SECTION A-A**  
(STANDARD INLET BOX ONLY)



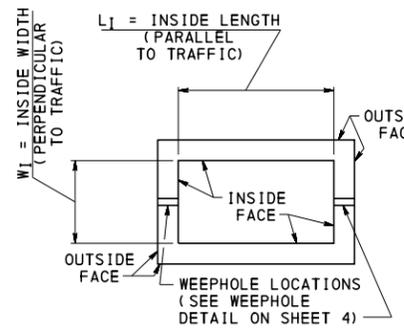
**SECTION B-B**  
(TYPICAL ALL TYPES EXCEPT STANDARD)



**PLAN - INLET BOXES**

**NOTES**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.



**INLET BOX SCHEMATIC**

**LEGEND**

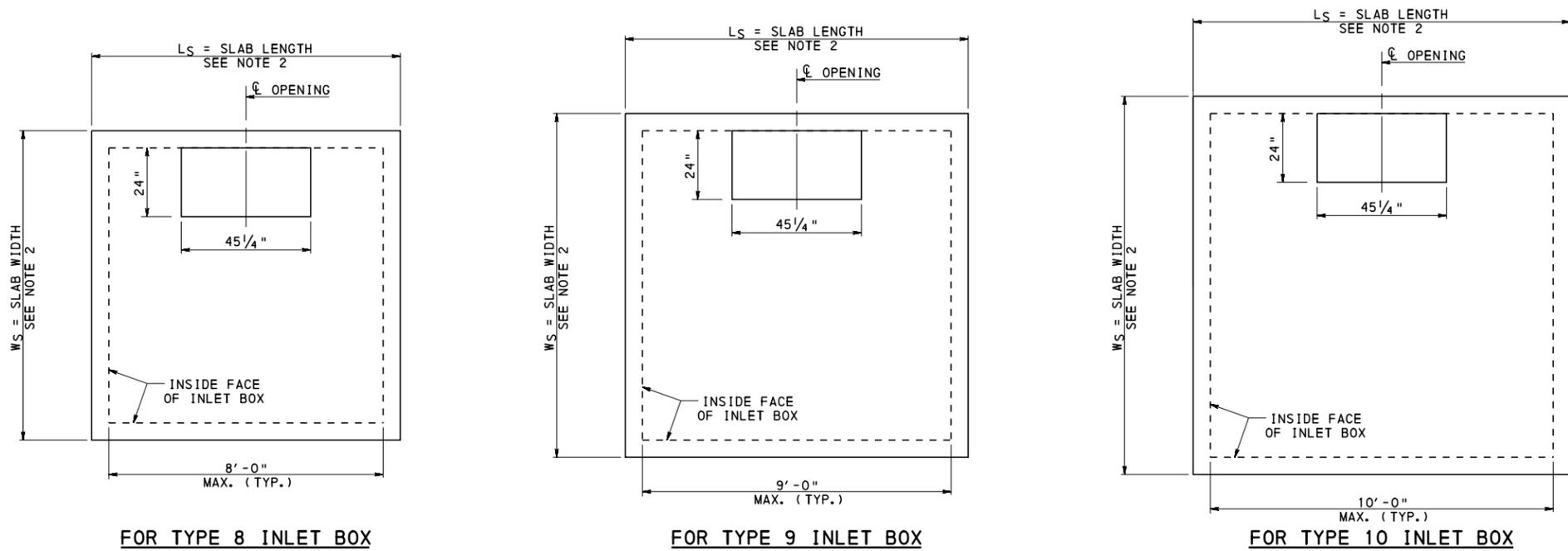
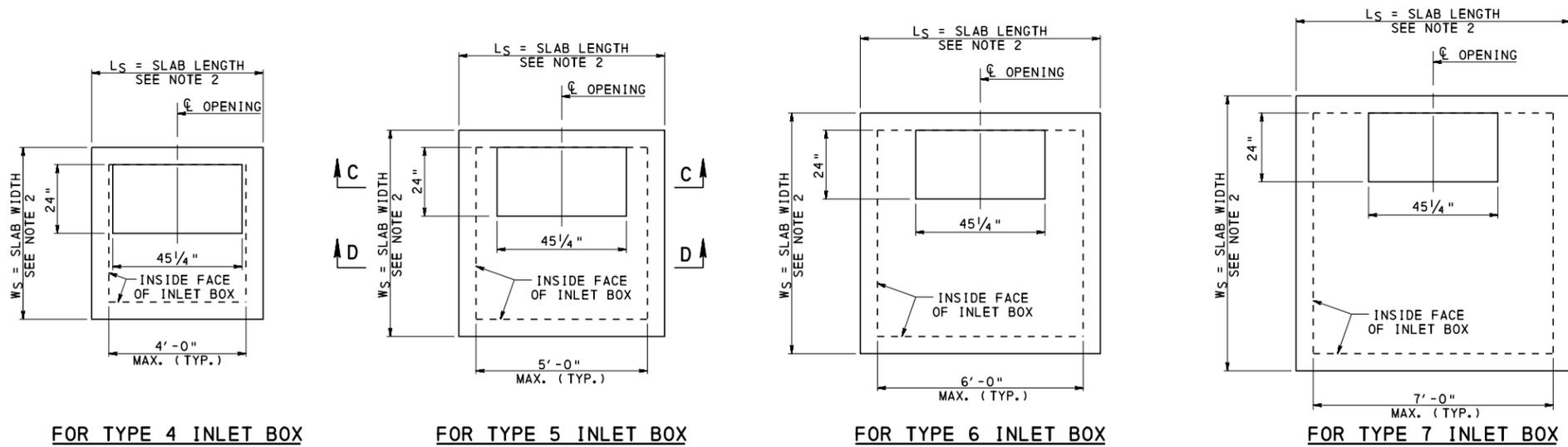
- OUTSIDE FACE - OUTSIDE FACE OF INLET BOX WALL
- INSIDE FACE - INSIDE FACE OF INLET BOX WALL

**LEGEND**

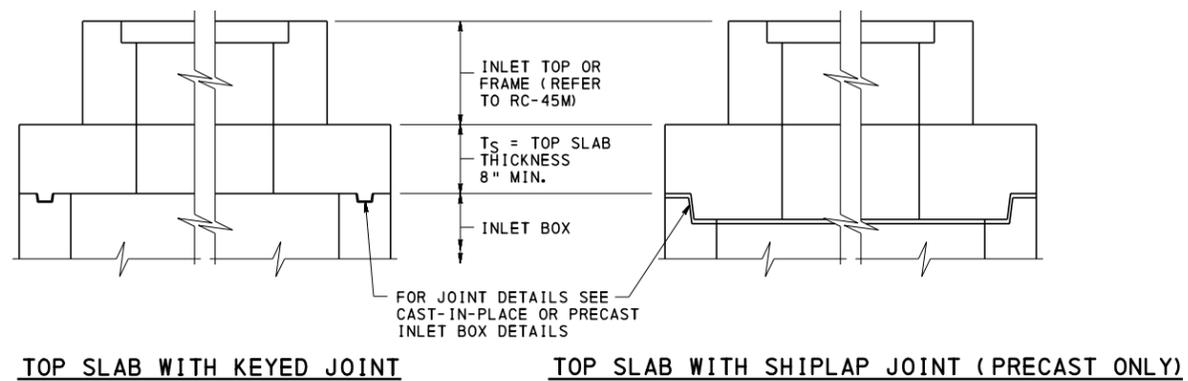
- OUTSIDE DIAMETER OF PIPE TO PIPE OPENING
- REDUCTION IN WALL THICKNESS DIMENSION
- INSIDE FACE OF BOX WALL TO OUTSIDE DIAMETER OF PIPE OPENING

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**INLET BOXES**  
**INLET BOX TYPES**



**PLAN - TOP SLABS**  
(WITH STANDARD OPENING)



**SECTION C-C**  
(TYPICAL)

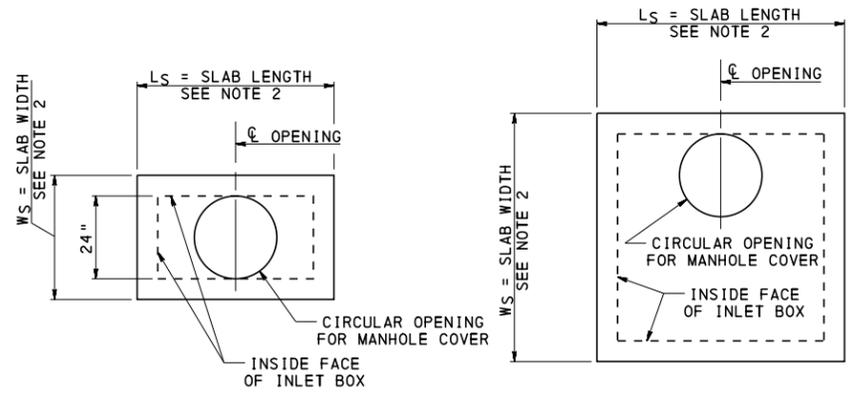
NOTE: GRADE ADJUSTMENT RINGS NOT SHOWN

**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
4. FOR SECTION D-D AND REINFORCEMENT REQUIREMENTS, SEE SHEET 8.
5. FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEETS 9 & 10.

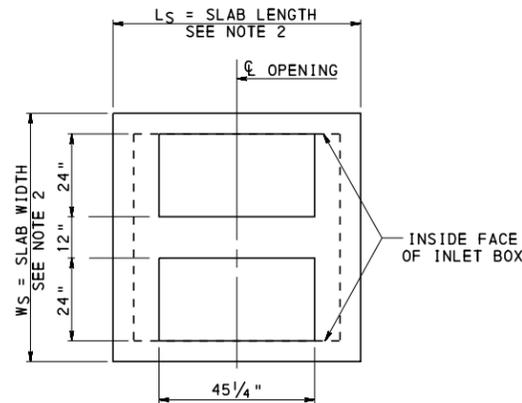
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TOP SLABS - 1

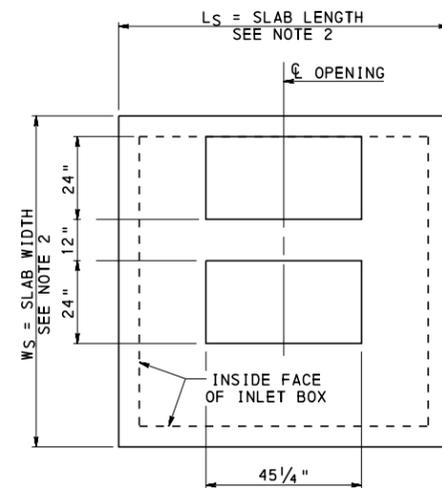


**STANDARD INLET BOX**

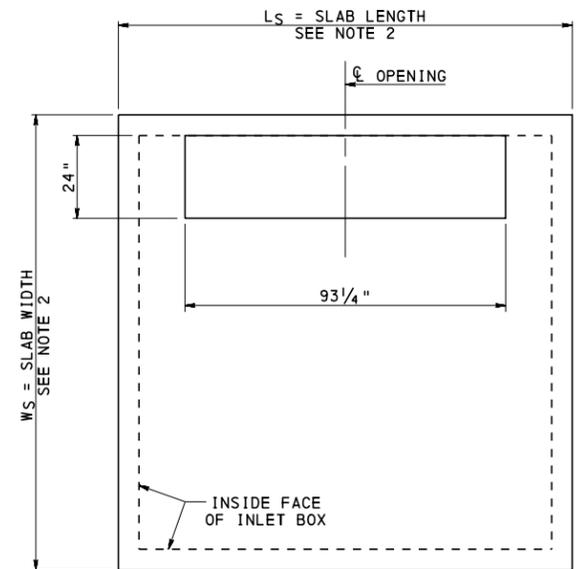
**OTHER INLET BOXES**



**TYPE 5 INLET BOX**



**OTHER INLET BOXES  
(TYPE 6, 7, 8, 9 AND 10)**



**PLAN - TOP SLAB  
FOR TYPE D-H  
CONCRETE TOP UNITS**  
FOR TYPES 8, 9 OR 10  
INLET BOXES ONLY

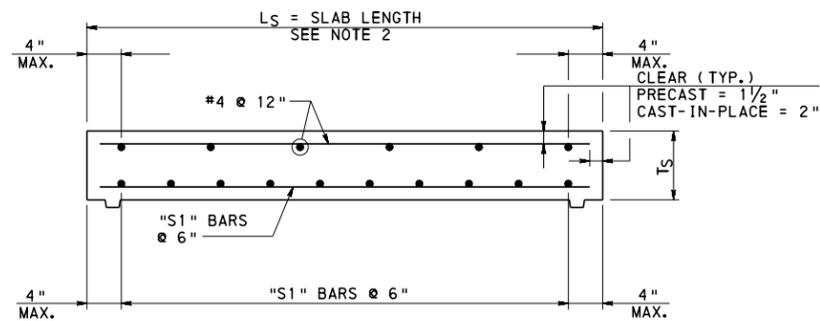
**PLAN - TOP SLAB WITH  
OPTIONAL ROUND OPENING  
FOR MANHOLE COVER**

**CIRCULAR OPENINGS:**

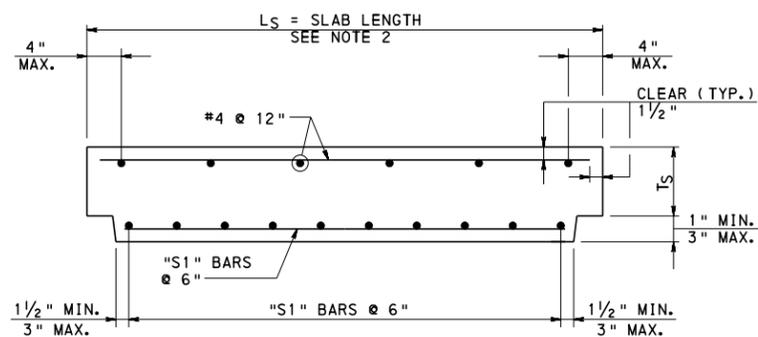
- THE FOLLOWING CIRCULAR OPENINGS ARE PERMITTED:  
24"Ø  
27"Ø  
30"Ø
- FOR A STANDARD BOX, ONLY A 24"Ø OPENING IS PERMITTED.

**PLAN - TOP SLAB  
FOR DOUBLE TYPE M  
CONCRETE TOP UNIT**

NOT APPLICABLE FOR STANDARD OR TYPE 4 INLET BOXES



**TOP SLAB WITH KEYED JOINT**



**TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)**

**SECTION D-D**  
(ADDITIONAL REINFORCEMENT NOT SHOWN)

**TOP SLAB  
CAST-IN-PLACE CONCRETE**

INLET BOX TYPE	T <sub>s</sub> (IN.)	S1 (BAR SIZE)
STANDARD	8	#6
TYPE 4	12	#7
TYPE 5	14	#8
TYPE 6	14	#8
TYPE 7	14	#9
TYPE 8	14	#9
TYPE 9	14	#9
TYPE 10	14	#9

**TOP SLAB  
PRECAST CONCRETE**

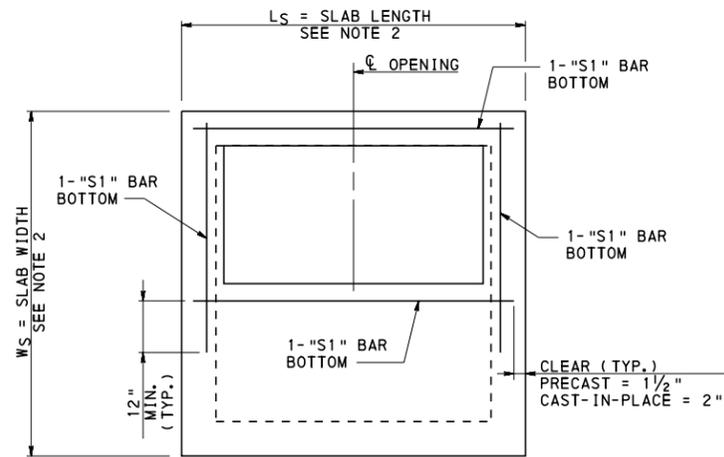
INLET BOX TYPE	T <sub>s</sub> (IN.)	S1 (BAR SIZE)
STANDARD	8	#6
TYPE 4	10	#8
TYPE 5	12	#9
TYPE 6	12	#9
TYPE 7	14	#9
TYPE 8	14	#9
TYPE 9	14	#9
TYPE 10	14	#9

**NOTES:**

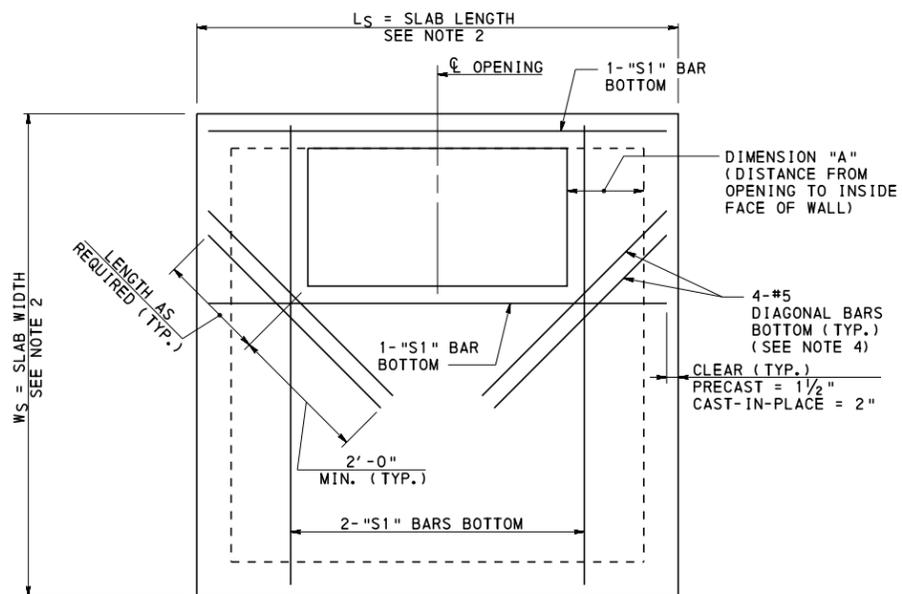
- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
- SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
- FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEETS 9 & 10.
- FOR JOINT DETAILS, SEE SHEETS 13 OR 20.
- ANY REINFORCEMENT BARS LESS THAN 6" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.

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**INLET BOXES  
TOP SLABS - 2**

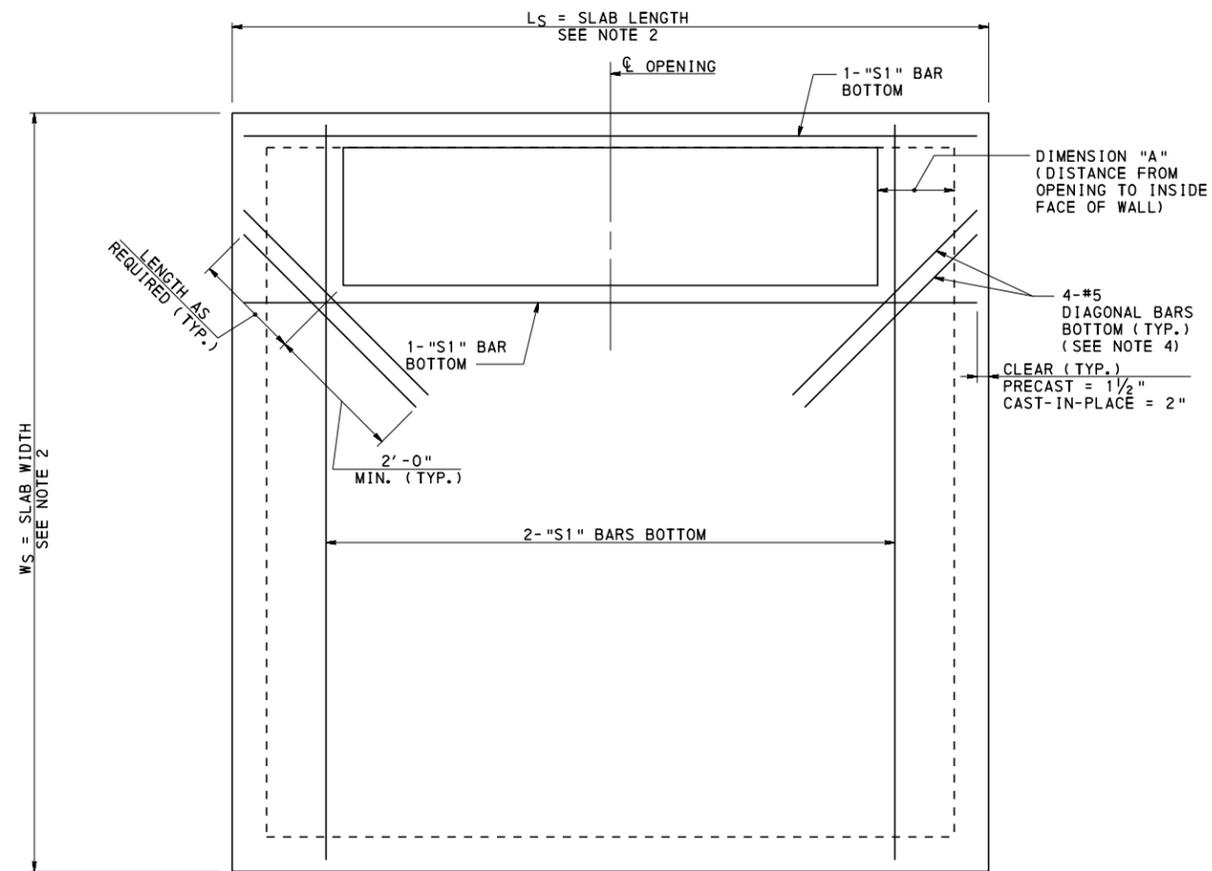


**FOR TYPE 4 AND 5 INLET BOXES**



**FOR TYPE 6, 7, 8, 9 AND 10 INLET BOXES**

**ADDITIONAL REINFORCING AT RECTANGULAR OPENINGS IN TOP SLAB**  
(FOR ADDITIONAL INFORMATION SEE SHEET 8)



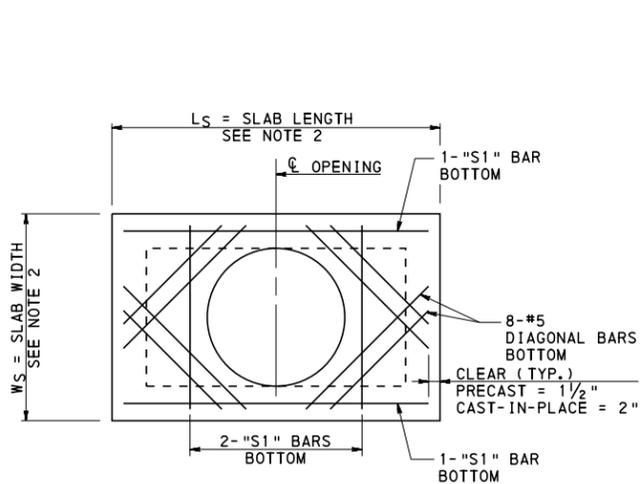
**ADDITIONAL REINFORCING AT RECTANGULAR OPENING IN TOP SLAB FOR TYPE D-H CONCRETE TOP UNITS**  
(FOR ADDITIONAL INFORMATION SEE SHEET 8)

**NOTES:**

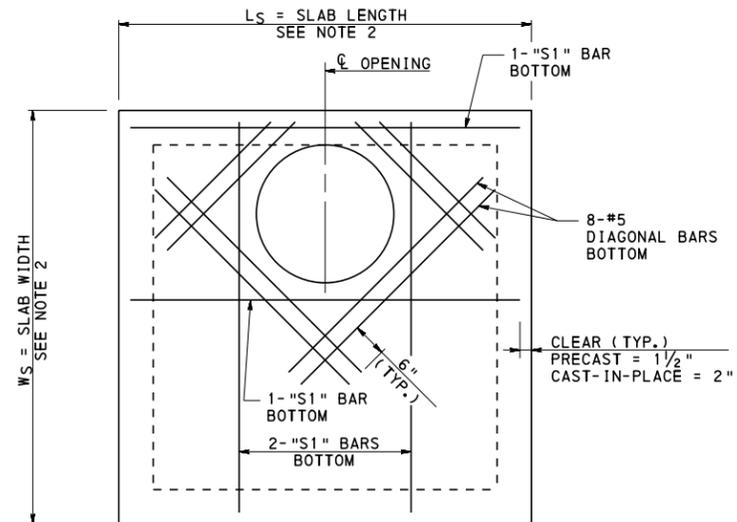
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. FOR REINFORCEMENT REQUIREMENTS, SEE SHEET 8.
4. DIAGONAL BARS NOT REQUIRED WHEN DIMENSION "A" IS LESS THAN 6".

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INLET BOXES  
TOP SLABS - 3



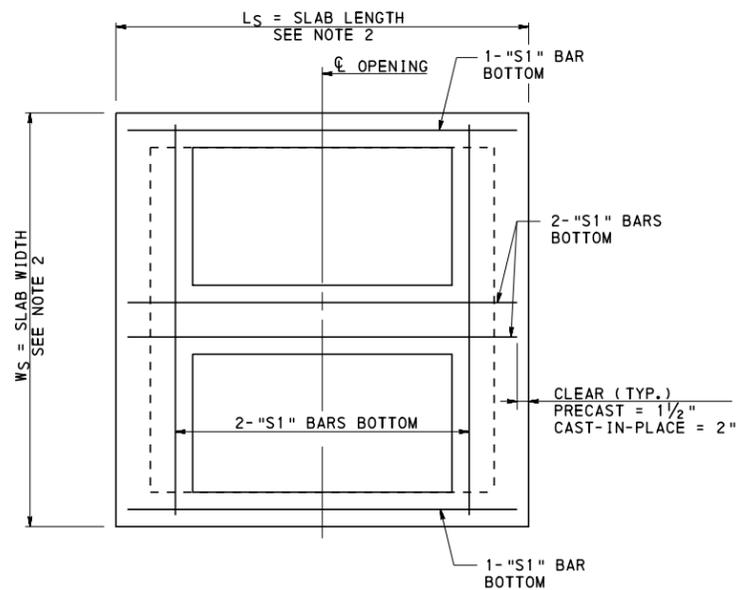
FOR STANDARD INLET BOX



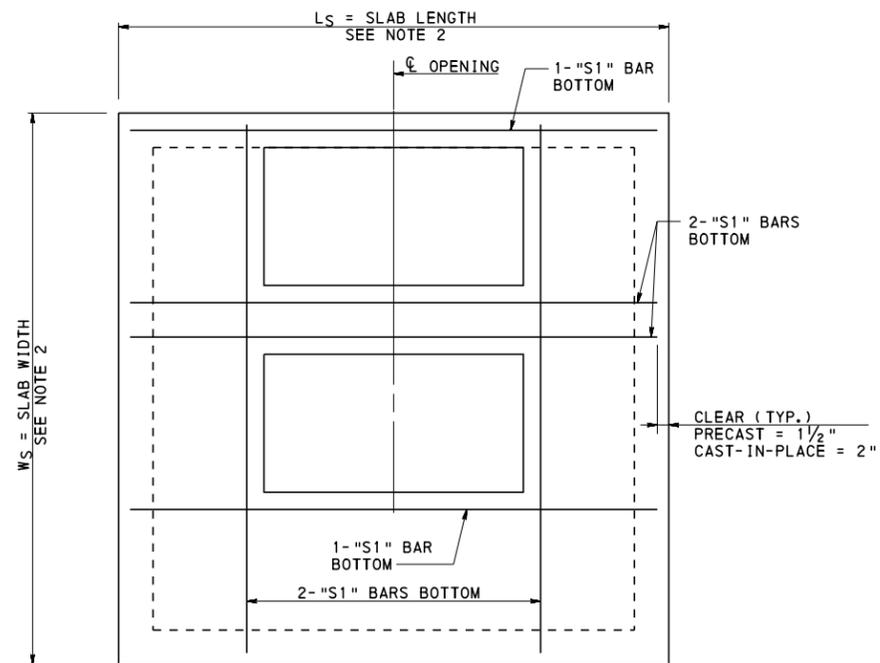
FOR OTHER INLET BOXES

**ADDITIONAL REINFORCING AT ROUND OPENING IN TOP SLAB**

(FOR ADDITIONAL INFORMATION SEE SHEET 8)



FOR TYPE 5 INLET BOX



FOR OTHER INLET BOXES  
(TYPE 6, 7, 8, 9 AND 10)

**NOTES:**

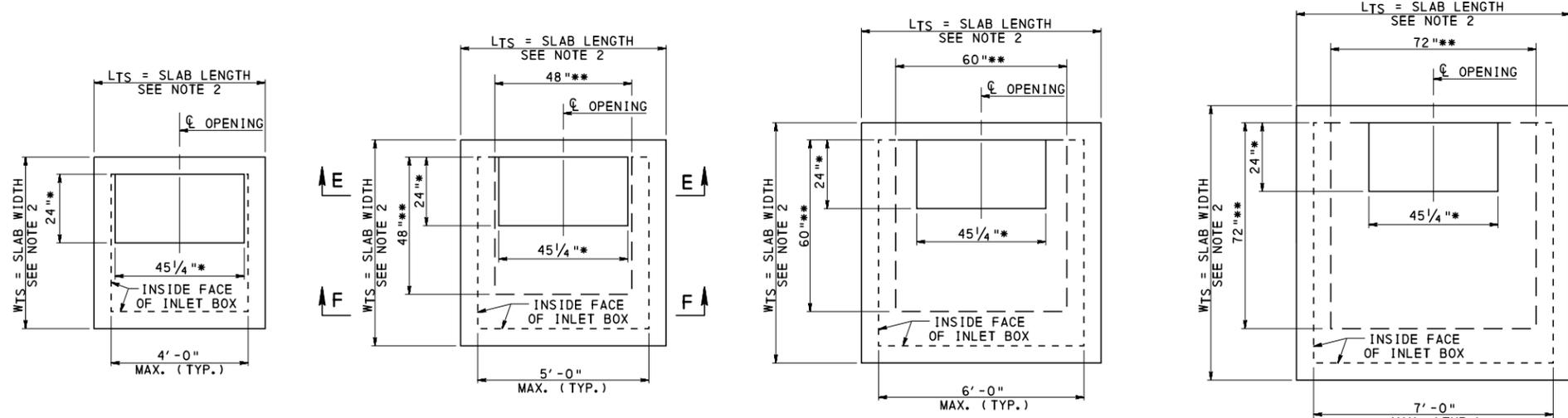
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. FOR REINFORCEMENT REQUIREMENTS, SEE SHEET 8.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TOP SLABS - 4

**ADDITIONAL REINFORCING AT RECTANGULAR OPENINGS IN TOP SLAB FOR DOUBLE TYPE M CONCRETE TOP UNIT**

(FOR ADDITIONAL INFORMATION SEE SHEET 8)

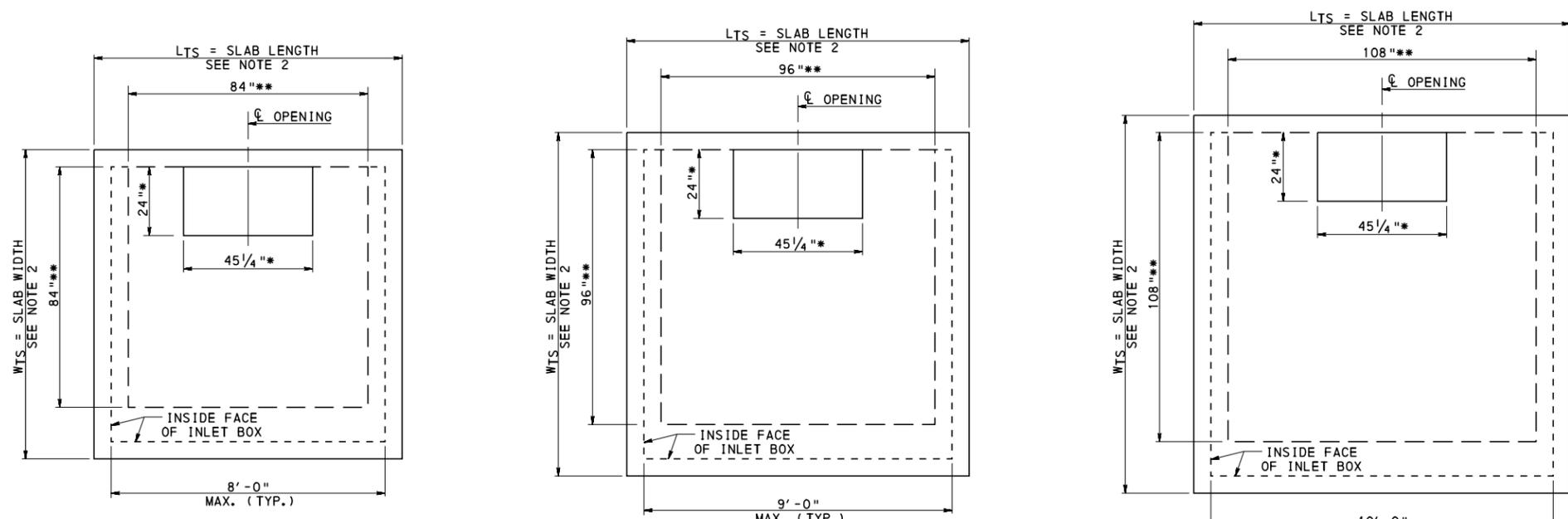


FOR TYPE 4 INLET BOX

FOR TYPE 5 INLET BOX

FOR TYPE 6 INLET BOX

FOR TYPE 7 INLET BOX



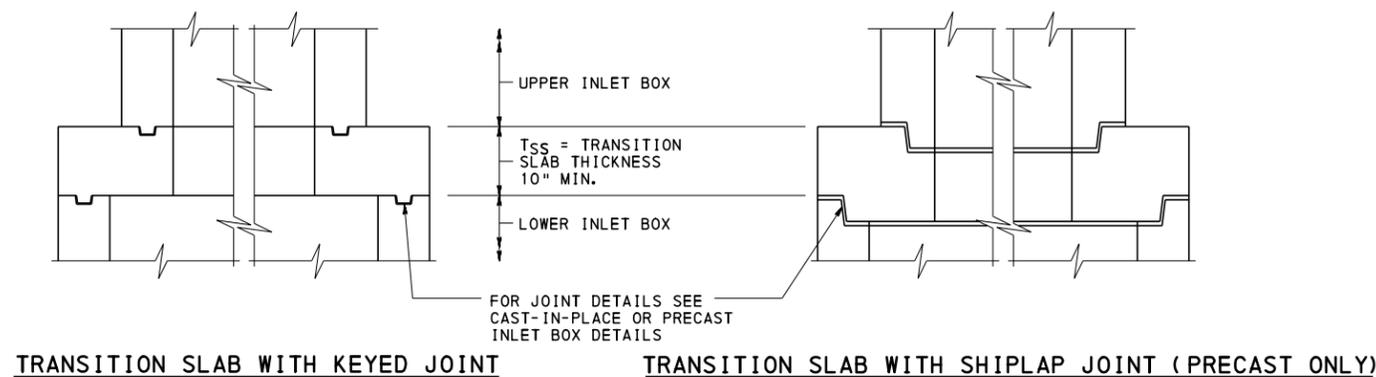
FOR TYPE 8 INLET BOX

FOR TYPE 9 INLET BOX

FOR TYPE 10 INLET BOX

\* MIN. OPENING - SIZED FOR STANDARD INLET BOX  
 \*\* MAX. OPENING - SIZED FOR NEXT SMALLER INLET BOX

**PLAN - TRANSITION SLABS**



TRANSITION SLAB WITH KEYED JOINT

TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

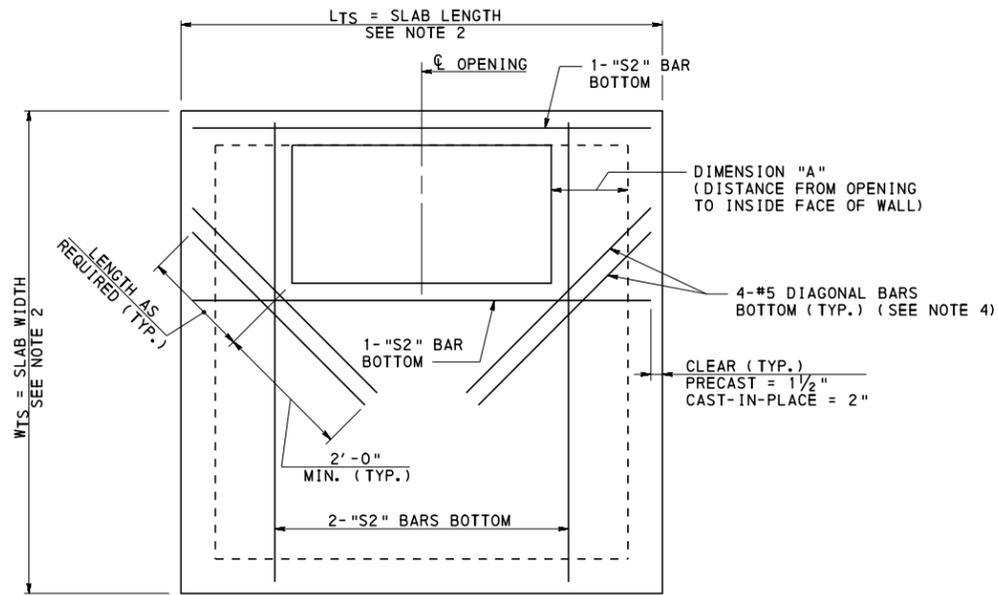
**SECTION E-E  
(TYPICAL)**

**NOTES:**

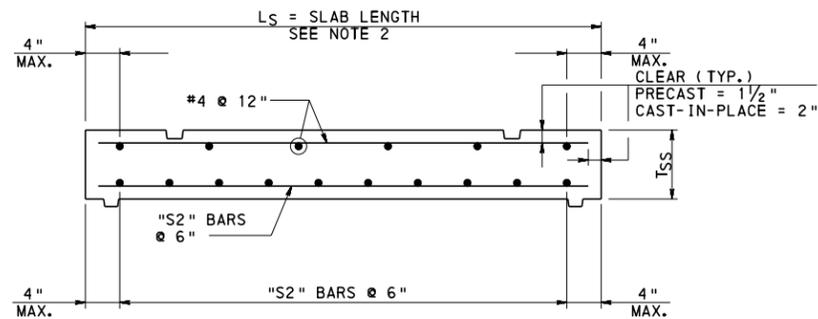
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TRANSITION SLAB TO MATCH SIZE OF LOWER INLET BOX.
3. SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
4. FOR SECTION F-F AND REINFORCEMENT REQUIREMENTS, SEE SHEET 12.
5. FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEET 12.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
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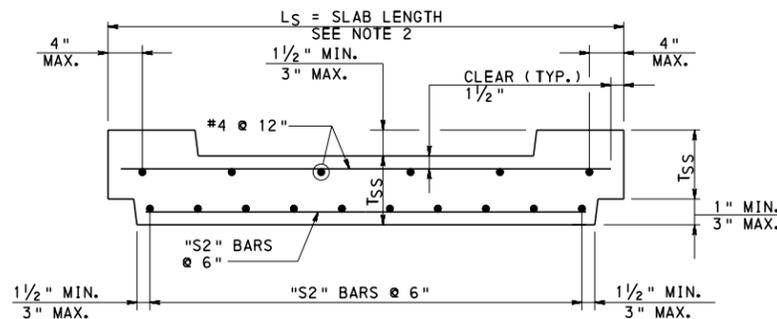
INLET BOXES  
 TRANSITION SLABS - 1



**ADDITIONAL REINFORCING AT OPENINGS IN TRANSITION SLAB**



**TRANSITION SLAB WITH KEYED JOINT**



**TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)**

**SECTION F-F**  
(ADDITIONAL REINFORCEMENT NOT SHOWN)

TRANSITION SLAB CAST-IN-PLACE CONCRETE			
BOTTOM BOX TYPE	T <sub>SS</sub> (IN.)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 4	12	#6	25.0
TYPE 5	12	#8	24.0
TYPE 6	15	#8	23.0
TYPE 7	18	#10	22.0
TYPE 8	21	#10	21.0
TYPE 9	21	#11	20.0
TYPE 10	24	#11	19.0

TRANSITION SLAB PRECAST CONCRETE			
BOTTOM BOX TYPE	T <sub>SS</sub> (IN.)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 4	10	#7	25.0
TYPE 5	12	#8	24.0
TYPE 6	14	#9	23.0
TYPE 7	16	#11	22.0
TYPE 8	18	#11	21.0
TYPE 9	22	#11	20.0
TYPE 10	24	#11	19.0

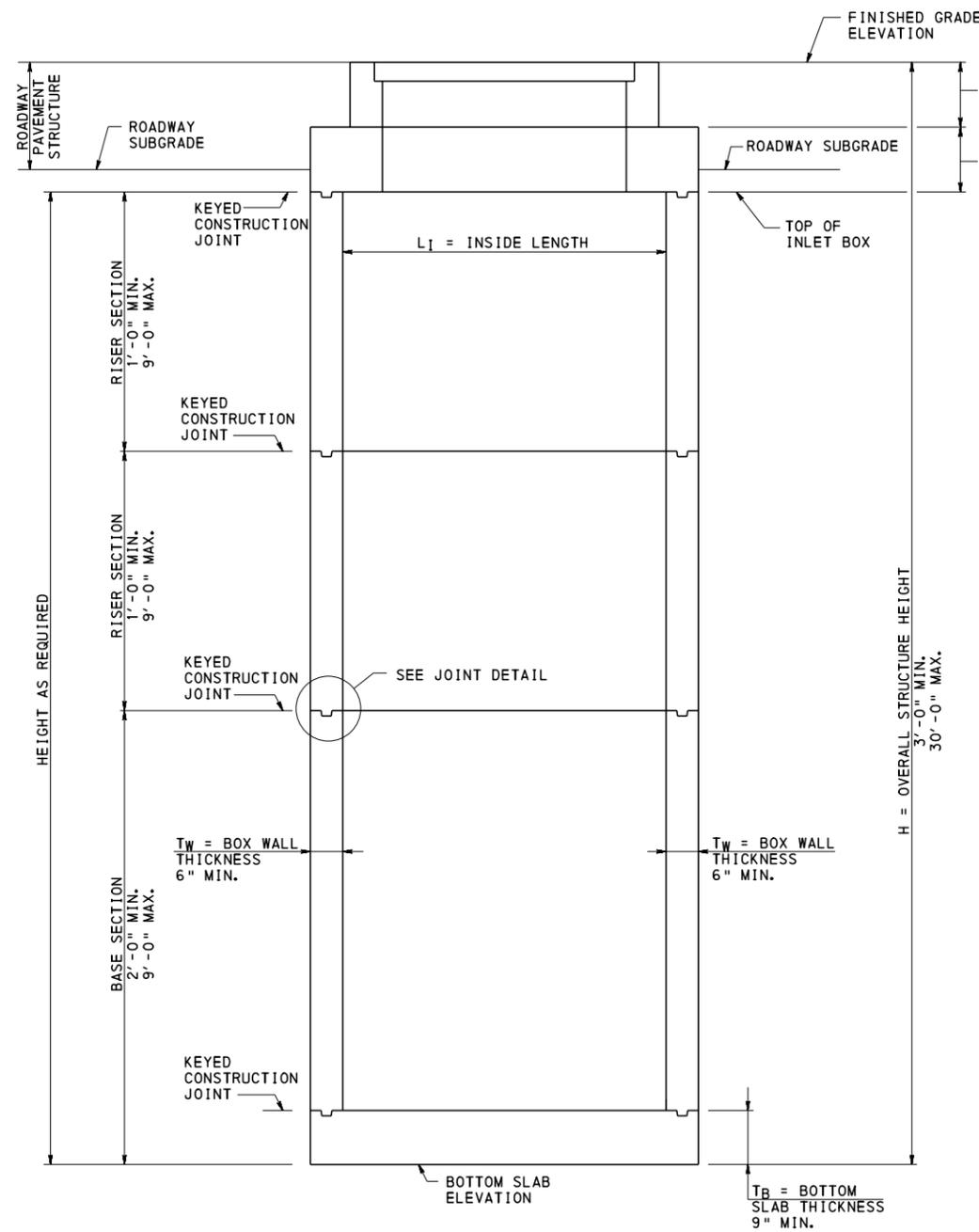
\* MAXIMUM INSTALLATION DEPTH = FINISHED GRADE ELEVATION - BOTTOM OF TRANSITION SLAB ELEVATION.

**NOTES:**

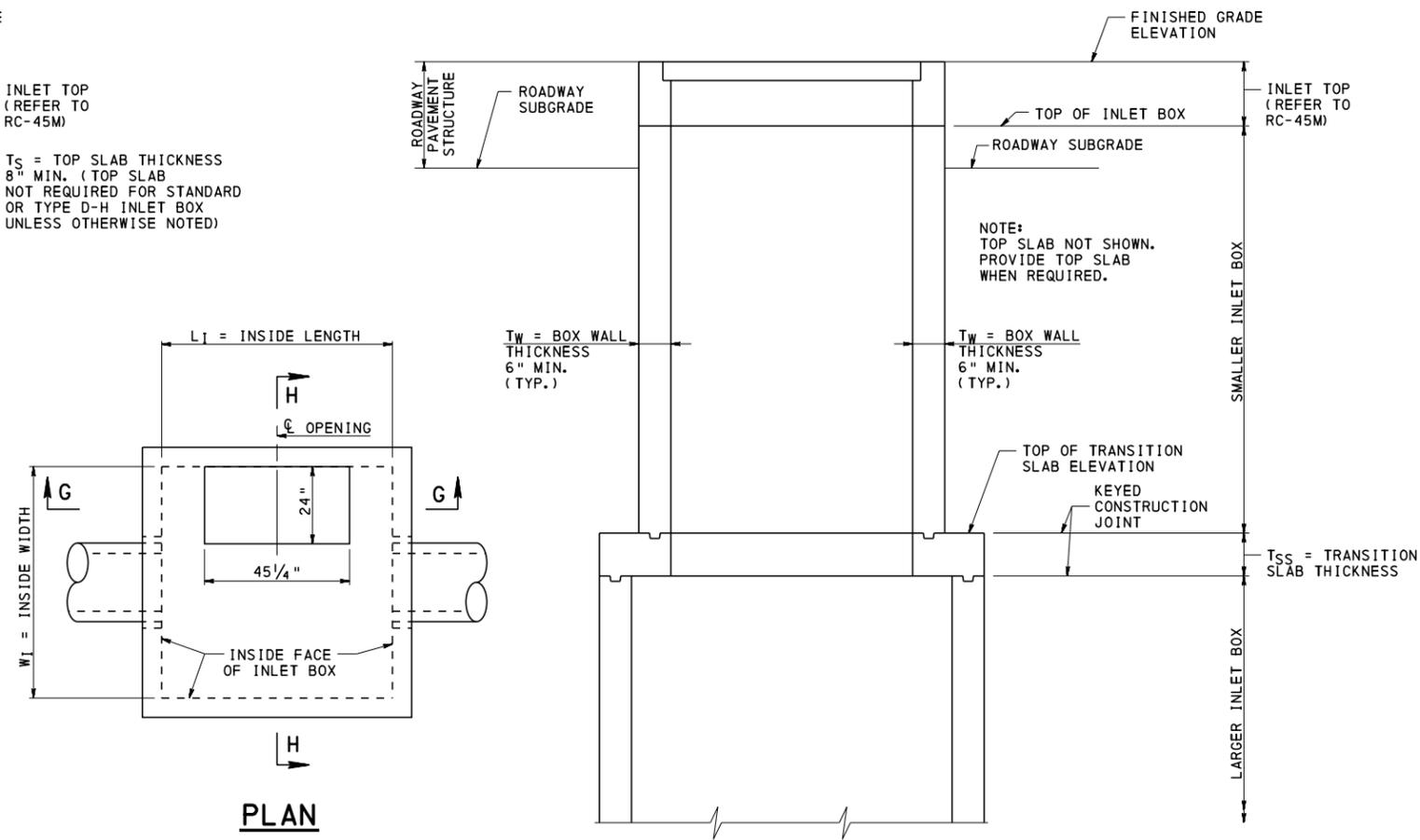
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TRANSITION SLAB TO MATCH SIZE OF LOWER INLET BOX.
3. ANY REINFORCEMENT BARS LESS THAN 6" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
4. DIAGONAL BARS NOT REQUIRED WHEN DIMENSION "A" IS LESS THAN 6".

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INLET BOXES  
TRANSITION SLABS - 2

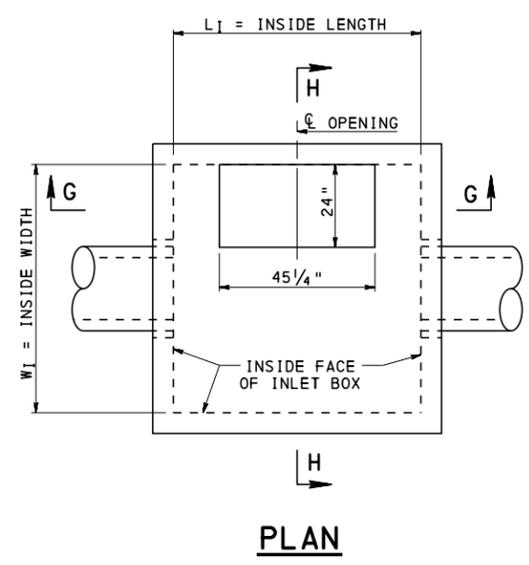


**SECTION G-G**  
SAME SIZE INLET BOX FULL HEIGHT  
WITH TOP SLAB AND INLET TOP

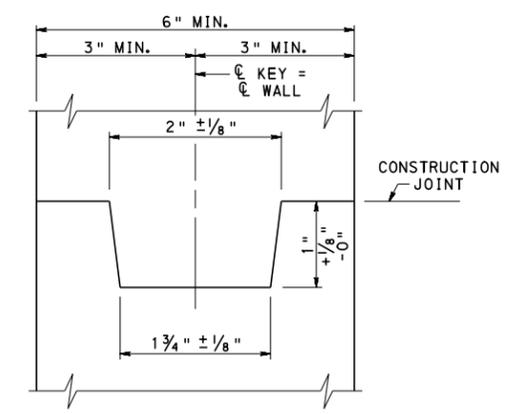


**SECTION G-G**

LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP



**PLAN**



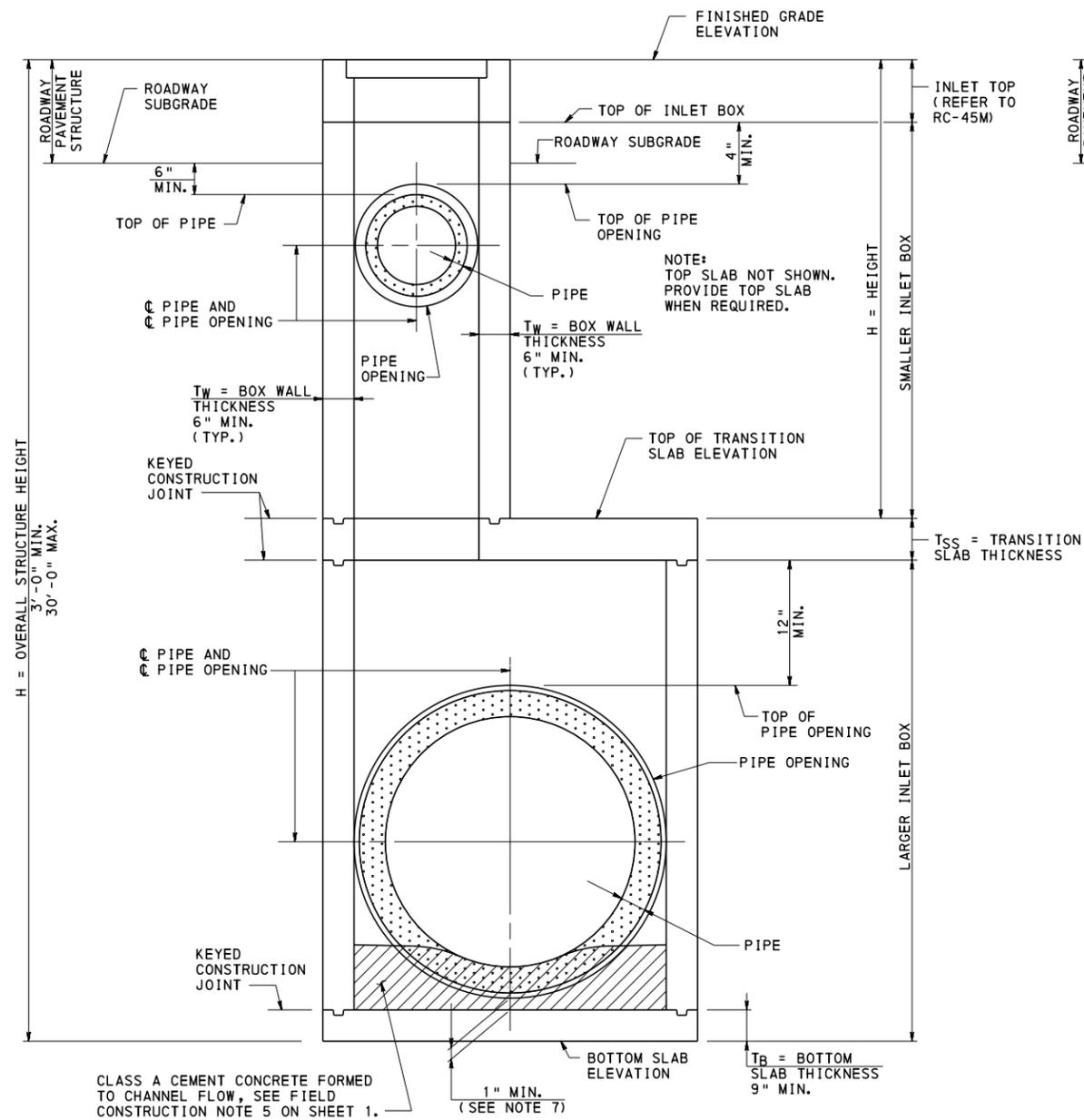
**JOINT DETAIL (CAST-IN-PLACE)**  
(KEYED CONSTRUCTION JOINT)

**NOTES:**

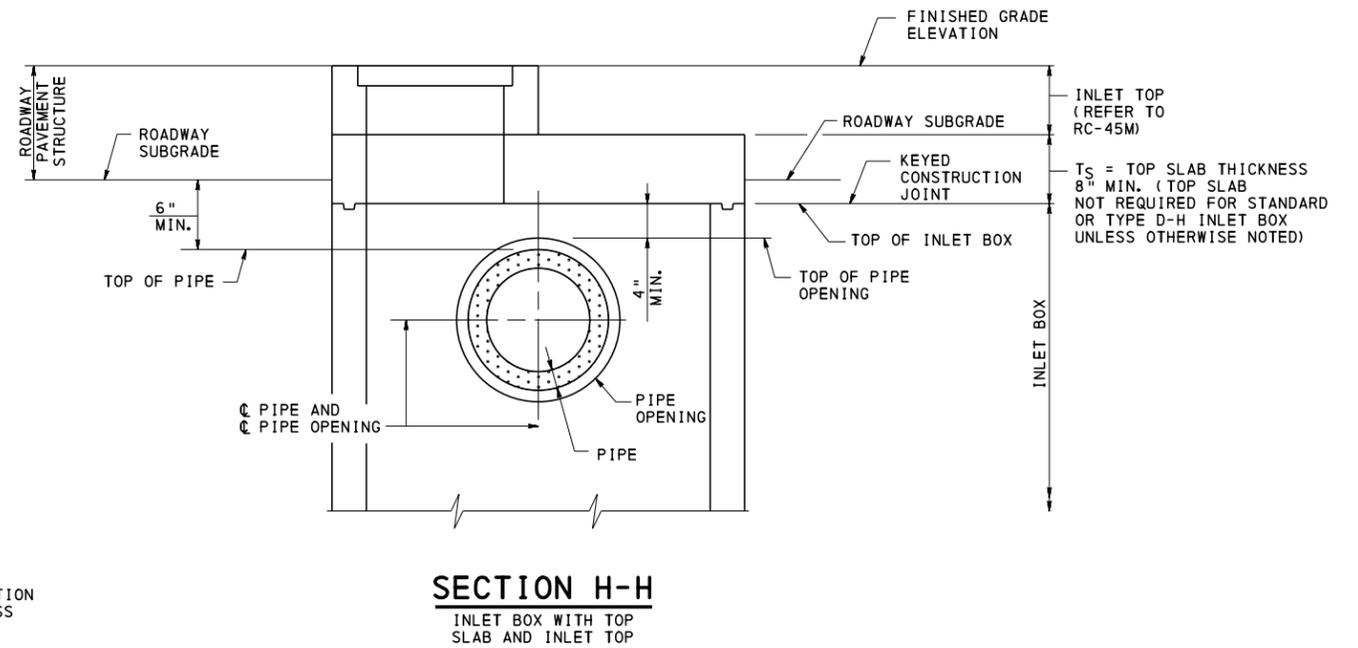
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR SECTION H-H, SEE SHEET 14.
6. FOR REINFORCEMENT DETAILS, SEE SHEETS 15 & 16.
7. FOR DESIGN TABLES, SEE SHEETS 17 - 19.

COMMONWEALTH OF PENNSYLVANIA  
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INLET BOXES  
CAST-IN-PLACE INLET BOXES - 1



**SECTION H-H**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP



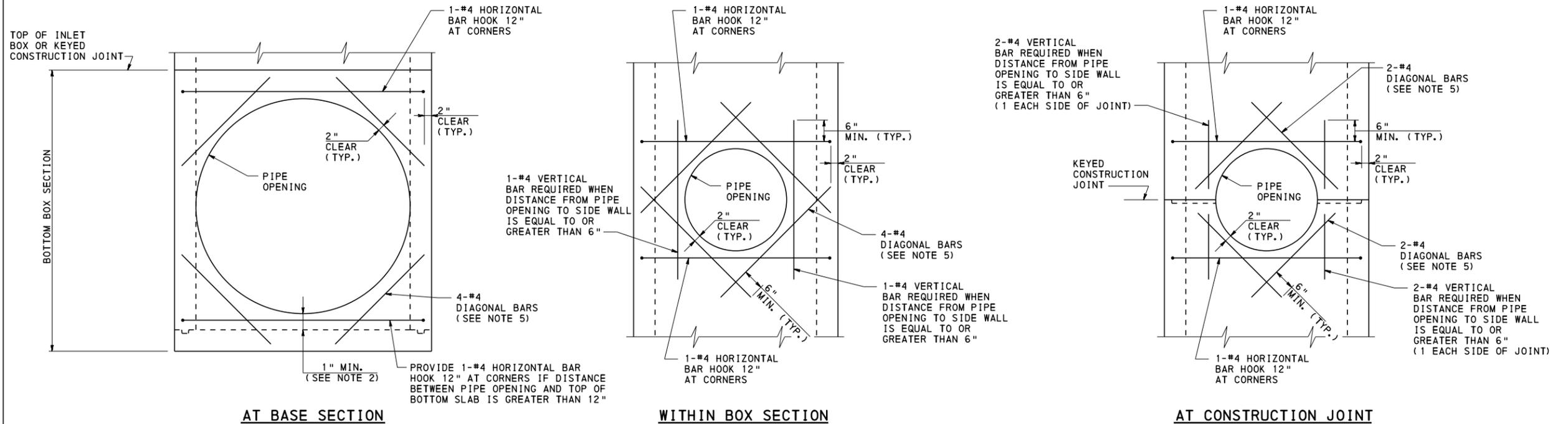
**SECTION H-H**  
INLET BOX WITH TOP  
SLAB AND INLET TOP

**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR REINFORCEMENT DETAILS, SEE SHEETS 15 & 16.
6. FOR DESIGN TABLES, SEE SHEETS 17 - 19.
7. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.

COMMONWEALTH OF PENNSYLVANIA  
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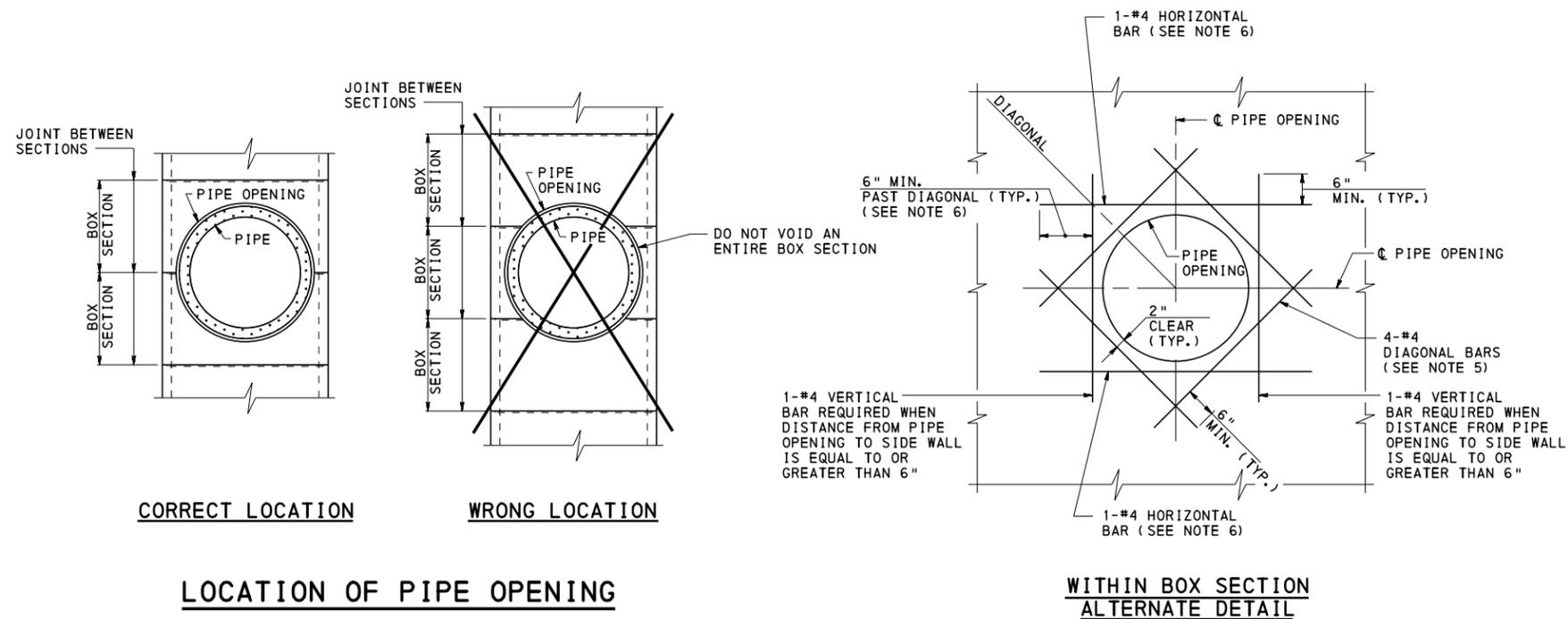
INLET BOXES  
CAST-IN-PLACE INLET BOXES - 2



DETAIL SHOWN WHEN THE DISTANCE FROM PIPE OPENING TO SIDE WALL IS LESS THAN 6". PROVIDE A VERTICAL BAR WHEN THE DISTANCE FROM THE PIPE OPENING TO SIDE WALL IS EQUAL TO OR GREATER THAN 6".

**ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL**

PIPE OPENING LOCATION AND SIZE AS REQUIRED

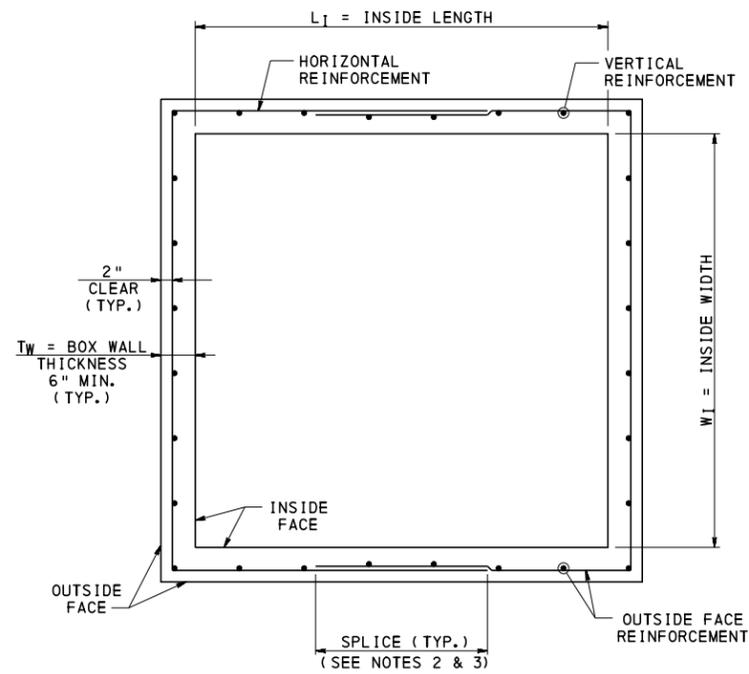


**NOTES:**

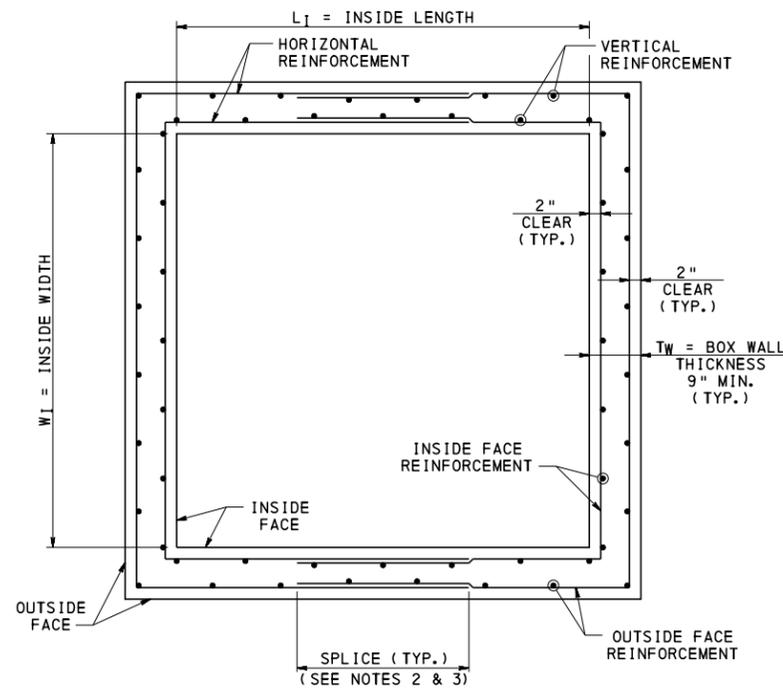
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. TIE ADDITIONAL REINFORCEMENT TO THE OUTSIDE FACE REINFORCEMENT.
4. FOR REINFORCEMENT DETAILS, SEE SHEET 16.
5. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS GREATER THAN 3'-0".
6. PROVIDE 12" HOOK WHEN HORIZONTAL BAR EXTENDS INTO SIDE WALL.

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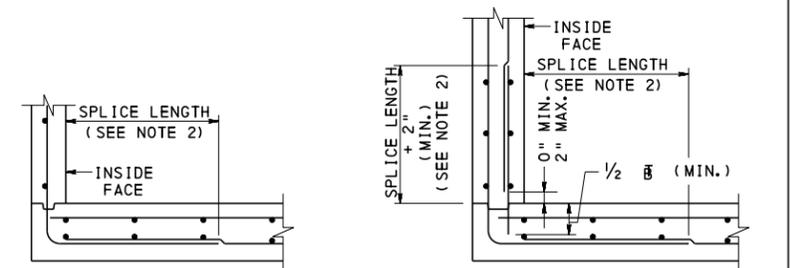
INLET BOXES  
 CAST-IN-PLACE INLET BOXES - 3



**HORIZONTAL SECTION WITH OUTSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)



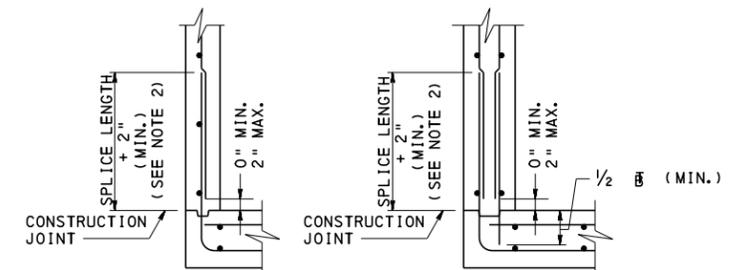
**HORIZONTAL SECTION WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)



**WITH OUTSIDE FACE REINFORCEMENT**

**WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

**SPLICE IN BOTTOM SLAB**

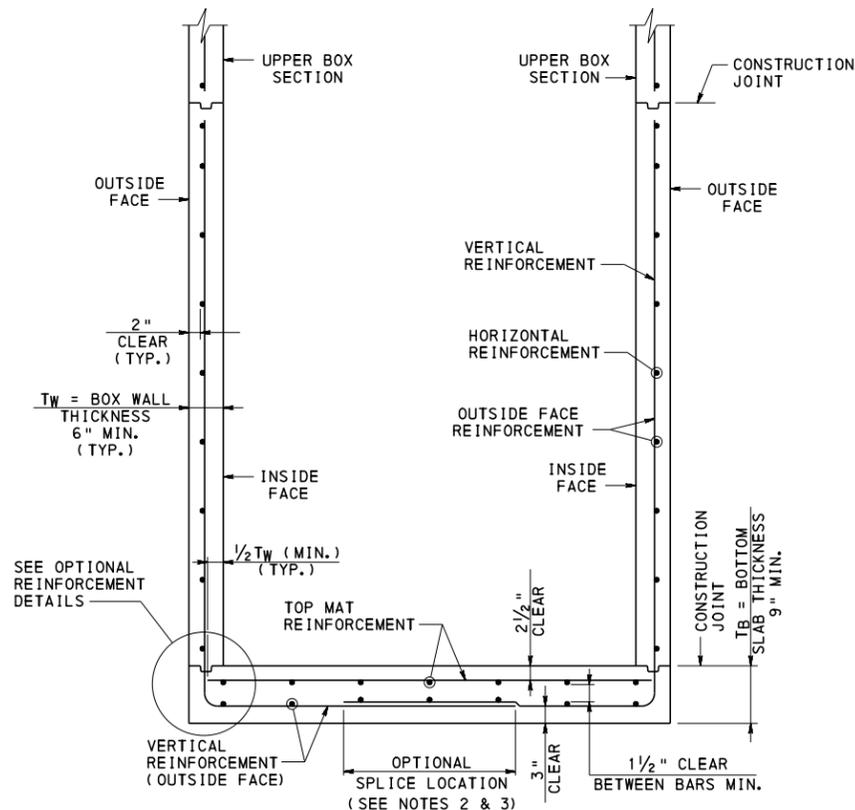


**WITH OUTSIDE FACE REINFORCEMENT**

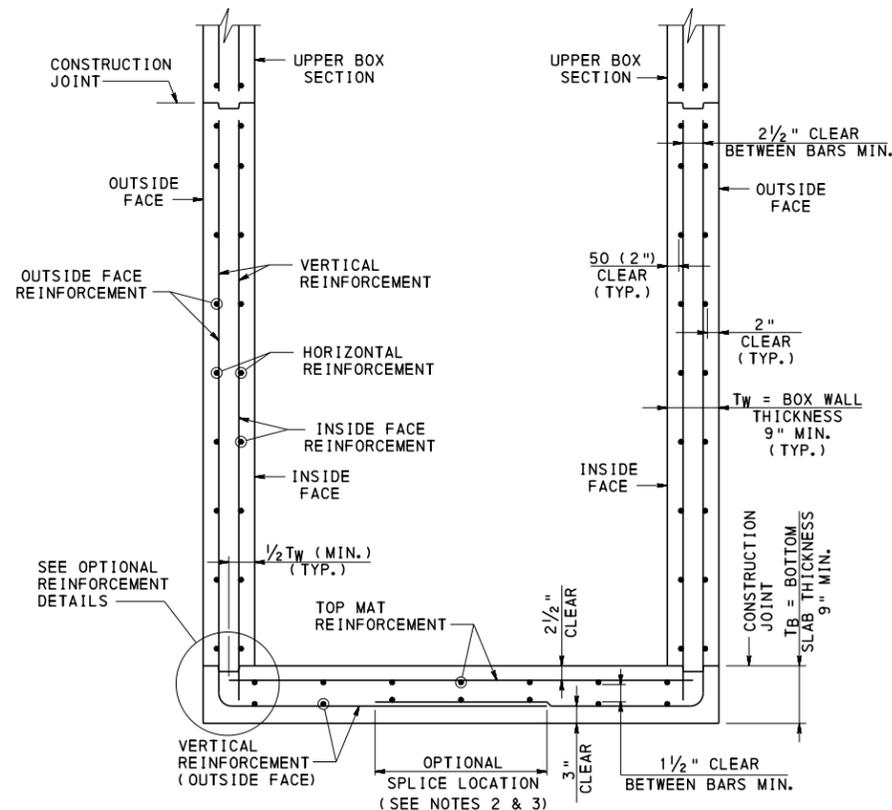
**WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

**SPLICE IN WALLS**

**OPTIONAL REINFORCEMENT DETAILS**



**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE REINFORCEMENT**



**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

**TYPICAL SECTIONS CAST-IN-PLACE INLET BOXES WITH REINFORCEMENT BARS**

**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATION TO BE DETERMINED BY CONTRACTOR.
4. FOR DESIGN TABLES, SEE SHEETS 17 - 19.

COMMONWEALTH OF PENNSYLVANIA  
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INLET BOXES  
CAST-IN-PLACE INLET BOXES - 4  
(REINFORCEMENT BAR DETAILS)

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - STANDARD**

H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	RISER SECTIONS								BASE SECTIONS												
			T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
9.0	45 1/4	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	9	#3	6	---	---	---	---	#4	12
14.0	45 1/4	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	6	#3	6	---	---	---	---	#4	12
17.0	45 1/4	24	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
21.0	45 1/4	24	9	#4	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
25.0	45 1/4	24	9	#4	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
28.0	45 1/4	24	9	#5	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
30.0	45 1/4	24	9	#5	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#4	12	#3	9	#4	12

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 4**

H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	RISER SECTIONS								BASE SECTIONS												
			T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
6.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#3	9	#3	6	---	---	---	---	#4	12
10.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#3	6	#3	6	---	---	---	---	#4	12
14.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
18.0	48	48	9	#4	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
22.0	48	48	9	#4	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
24.0	48	48	9	#5	12	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
27.0	48	48	9	#4	6	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
30.0	48	48	9	#3	9	#3	9	#3	9	#3	9	9	9	#3	4	#3	6	#3	4	#3	9	#4	12

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 5**

H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	RISER SECTIONS								BASE SECTIONS												
			T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
8.0	60	60	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
11.0	60	60	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
14.0	60	60	9	#3	6	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
16.0	60	60	9	#4	9	#3	9	---	---	---	---	9	9	#4	12	#3	6	#3	9	#3	9	#4	12
19.0	60	60	9	#3	4	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
21.0	60	60	9	#3	9	#3	9	#3	9	#3	9	9	9	#3	4	#3	6	#3	4	#3	9	#4	12
25.0	60	60	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	9	#4	4	#3	9	#4	12
28.0	60	60	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	9	#4	4	#3	9	#4	12
30.0	60	60	9	#3	4	#3	9	#3	4	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 13 - 16.

COMMONWEALTH OF PENNSYLVANIA  
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INLET BOXES  
CAST-IN-PLACE INLET BOXES  
DESIGN TABLES - 1  
(REINFORCEMENT BARS)

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 6**

H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
9.0	72	72	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#4	6	#3	9	#3	9	#4	12
11.0	72	72	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#4	6	#3	9	#3	9	#4	12
13.0	72	72	9	#4	9	#3	9	---	---	---	---	9	10	#4	12	#4	6	#4	12	#3	9	#4	12
15.0	72	72	9	#3	9	#3	9	#3	9	#3	9	9	10	#3	4	#4	6	#3	4	#3	9	#4	12
19.0	72	72	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
23.0	72	72	9	#4	12	#3	9	#4	12	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
25.0	72	72	9	#3	4	#3	9	#3	4	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
28.0	72	72	12	#4	12	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
30.0	72	72	12	#4	12	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 7**

H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
10.0	84	84	9	#3	9	#3	9	---	---	---	---	9	9	#3	4	#3	4	#3	4	#3	9	#4	12
11.0	84	84	9	#3	9	#3	9	---	---	---	---	9	9	#3	4	#4	4	#3	4	#3	9	#4	12
13.0	84	84	9	#4	6	#3	9	---	---	---	---	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
16.0	84	84	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
19.0	84	84	9	#4	12	#3	9	#4	12	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
21.0	84	84	9	#3	4	#3	9	#3	4	#3	9	9	11	#5	4	#4	4	#5	4	#3	9	#4	12
23.0	84	84	12	#3	6	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
25.0	84	84	12	#3	6	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
27.0	84	84	12	#4	4	#3	9	#3	6	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
30.0	84	84	12	#4	4	#3	9	#4	4	#4	12	12	13	#5	4	#4	4	#5	4	#4	12	#4	12

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 8**

H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
11.0	96	96	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
13.0	96	96	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
16.0	96	96	9	#4	12	#3	9	#4	12	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
18.0	96	96	9	#3	4	#3	9	#3	4	#3	9	9	11	#5	4	#4	4	#5	4	#3	9	#4	12
20.0	96	96	12	#4	12	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
22.0	96	96	12	#3	6	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
26.0	96	96	12	#4	4	#3	9	#4	4	#4	12	12	12	#5	4	#4	4	#5	4	#4	12	#4	12
29.0	96	96	15	#4	9	#3	9	#4	9	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#3	6
30.0	96	96	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#3	6

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 13 - 16.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
CAST-IN-PLACE INLET BOXES  
DESIGN TABLES - 2  
(REINFORCEMENT BARS)

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 9**

H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
11.0	108	108	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
13.0	108	108	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
15.0	108	108	9	#3	4	#3	9	#3	4	#3	9	9	10	#5	4	#4	4	#5	4	#3	9	#4	12
17.0	108	108	9	#4	4	#3	9	#4	4	#3	9	9	10	#5	4	#4	4	#5	4	#3	9	#4	12
20.0	108	108	12	#4	9	#3	9	#4	9	#4	12	12	10	#5	4	#4	4	#5	4	#4	12	#4	12
23.0	108	108	12	#4	4	#3	9	#4	4	#4	12	12	11	#5	4	#4	4	#5	4	#4	12	#4	12
25.0	108	108	15	#4	9	#3	9	#4	9	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
27.0	108	108	15	#4	4	#3	9	#4	4	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	108	108	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#4	9

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 10**

H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
13.0	120	120	9	#4	6	#3	9	#4	6	#3	9	9	9	#5	4	#4	4	#5	4	#3	9	#4	12
15.0	120	120	9	#4	4	#3	9	#4	4	#3	9	9	10	#5	4	#5	4	#5	4	#3	9	#4	12
18.0	120	120	12	#4	9	#3	9	#4	9	#4	12	12	10	#5	4	#4	4	#5	4	#4	12	#4	12
20.0	120	120	12	#4	4	#3	9	#4	4	#4	12	12	11	#5	4	#4	4	#5	4	#4	12	#4	12
23.0	120	120	15	#4	9	#3	9	#4	9	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
25.0	120	120	15	#4	4	#3	9	#4	4	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
27.0	120	120	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	120	120	18	#4	4	#3	9	#4	4	#4	6	18	14	#5	4	#5	4	#5	4	#4	6	#4	9

**CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - D-H**

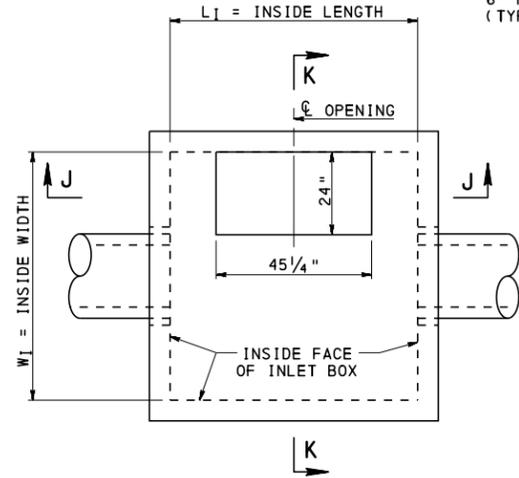
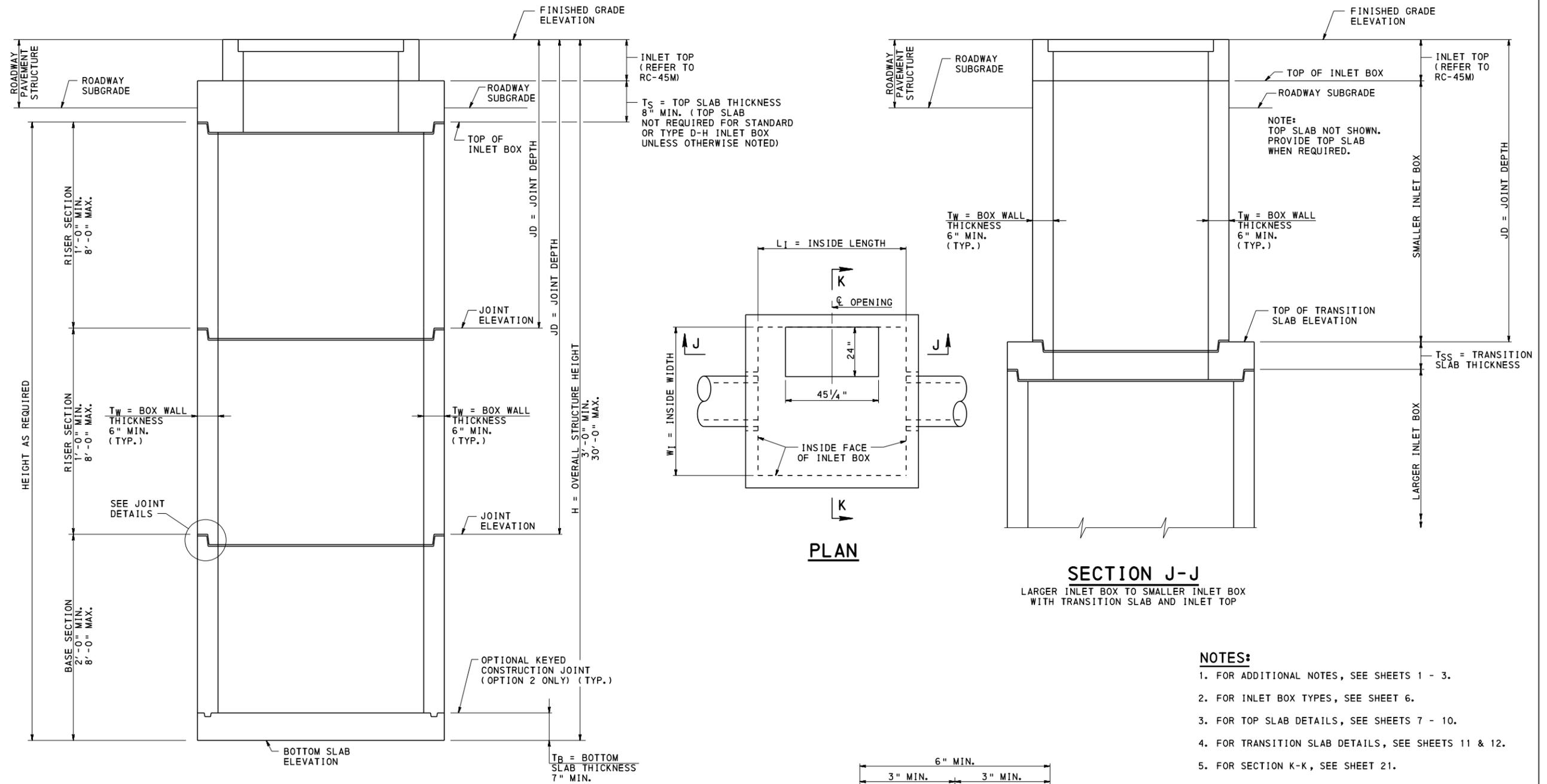
H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS								BASE SECTIONS												
			TW (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT		INSIDE FACE REINFORCEMENT		TOP MAT REINFORCEMENT									
				HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL			HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	BAR SIZE	SPACING (IN.)								
7.0	99	30	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
9.0	99	30	9	#3	9	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
12.0	99	30	9	#5	12	#3	9	---	---	---	---	9	9	#4	6	#3	6	#4	6	#3	9	#4	12
14.0	99	30	9	#4	6	#3	9	---	---	---	---	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
17.0	99	30	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
19.0	99	30	12	#4	12	#3	9	#4	12	#4	12	12	9	#4	4	#4	9	#4	4	#4	12	#4	12
24.0	99	30	12	#4	12	#3	9	#4	12	#4	12	12	9	#4	4	#4	4	#4	4	#4	12	#4	12
26.0	99	30	12	#3	6	#3	9	#3	6	#4	12	12	9	#4	4	#4	4	#4	4	#4	12	#4	12
28.0	99	30	15	#4	9	#3	9	#4	9	#4	9	15	9	#4	4	#4	6	#4	4	#4	9	#4	12
30.0	99	30	15	#4	9	#3	9	#4	9	#4	9	15	9	#4	4	#4	4	#4	4	#4	9	#4	12

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 13 - 16.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
CAST-IN-PLACE INLET BOXES  
DESIGN TABLES - 3  
(REINFORCEMENT BARS)

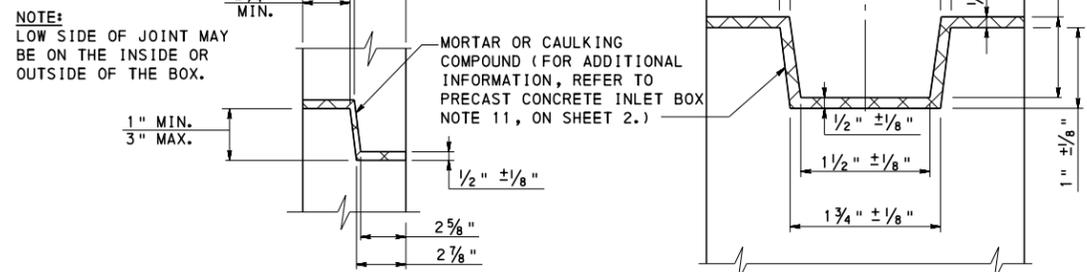


**PLAN**

**SECTION J-J**  
SAME SIZE INLET BOX FULL HEIGHT  
WITH TOP SLAB AND INLET TOP

**SECTION J-J**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP

- NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  2. FOR INLET BOX TYPES, SEE SHEET 6.
  3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
  4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
  5. FOR SECTION K-K, SEE SHEET 21.
  6. FOR REINFORCEMENT DETAILS, SEE SHEETS 22 - 25.
  7. FOR DESIGN TABLES, SEE SHEETS 26 - 33.

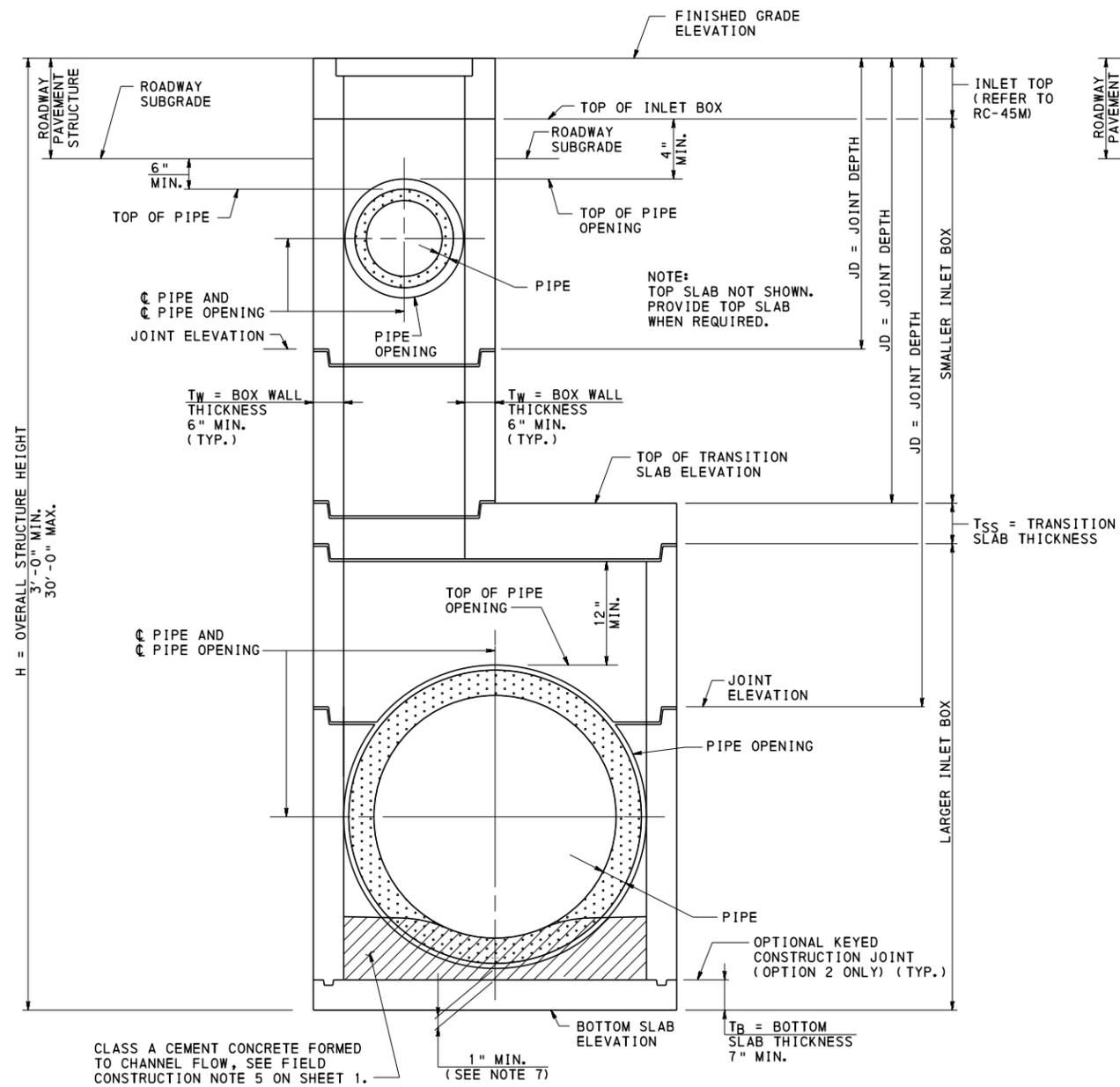


**OPTION 1 (SHIPLAP JOINT)**  
**OPTION 2 (KEYED JOINT)**  
**JOINT DETAILS (PRECAST)**

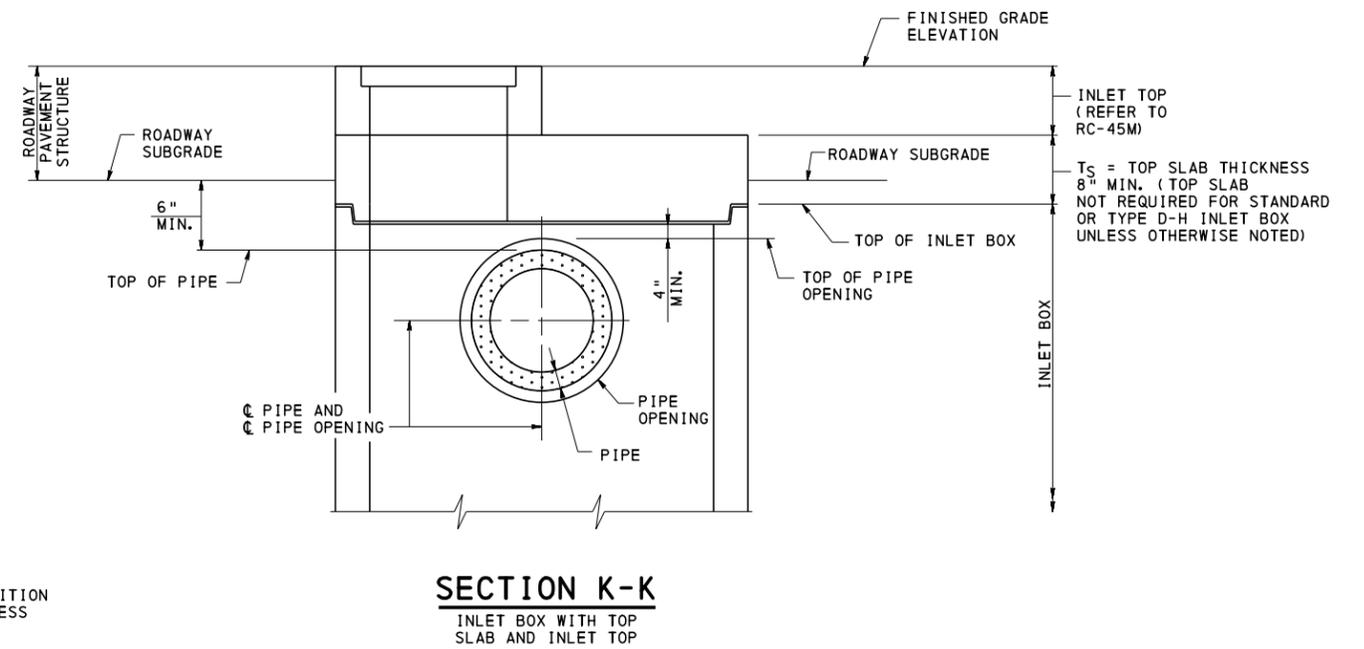
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF PROJECT DELIVERY

**INLET BOXES**  
**PRECAST INLET BOXES - 1**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Johnson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 20 OF 34 <b>RC-46M</b>
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**SECTION K-K**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP



**SECTION K-K**  
INLET BOX WITH TOP  
SLAB AND INLET TOP

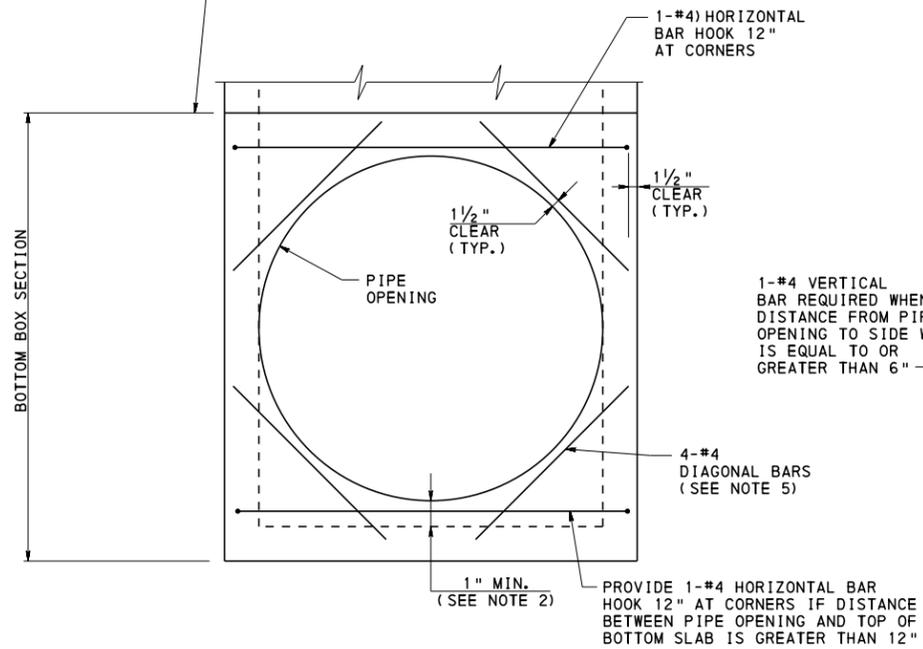
**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR REINFORCEMENT DETAILS, SEE SHEETS 22 - 25.
6. FOR DESIGN TABLES, SEE SHEETS 26 - 33.
7. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

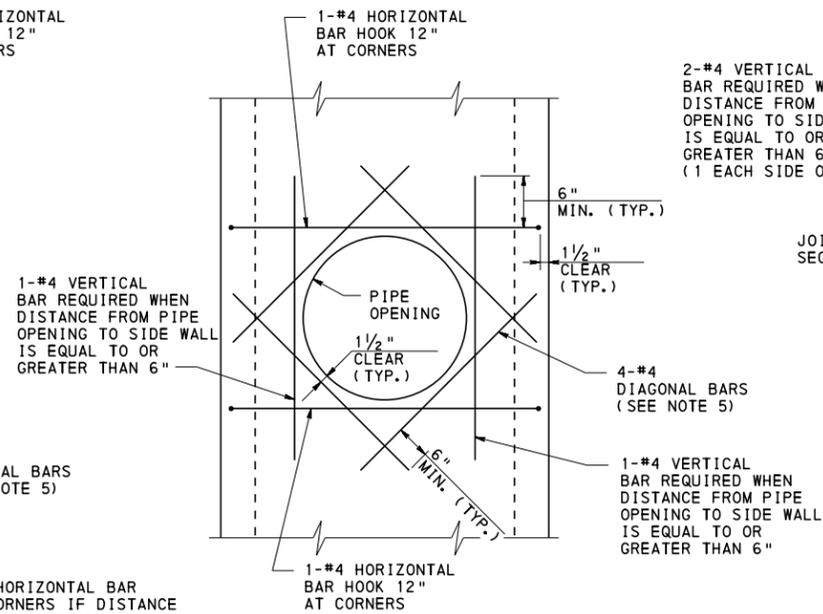
INLET BOXES  
PRECAST INLET BOXES - 2

TOP OF INLET BOX OR JOINT BETWEEN SEGMENTS

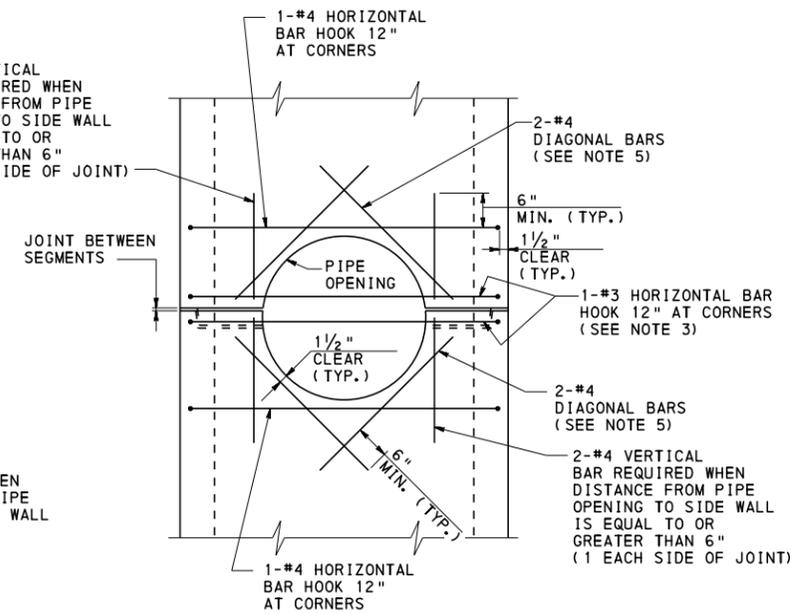


**AT BASE SECTION**

DETAIL SHOWN WHEN THE DISTANCE FROM PIPE OPENING TO SIDE WALL IS LESS THAN 6". PROVIDE A VERTICAL BAR WHEN THE DISTANCE FROM THE PIPE OPENING TO SIDE WALL IS EQUAL TO OR GREATER THAN 6".



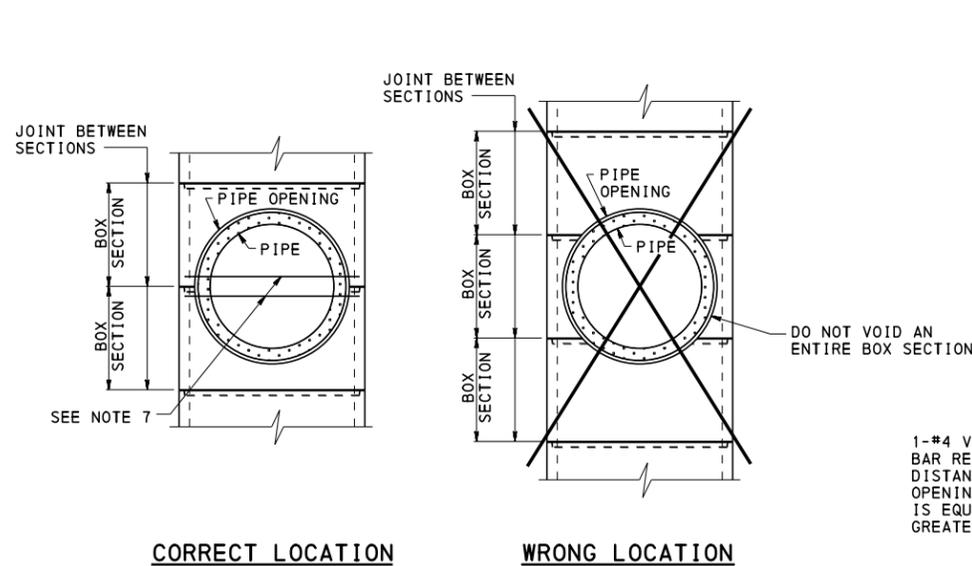
**WITHIN BOX SECTION**



**BETWEEN BOX SECTIONS**

**ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL**

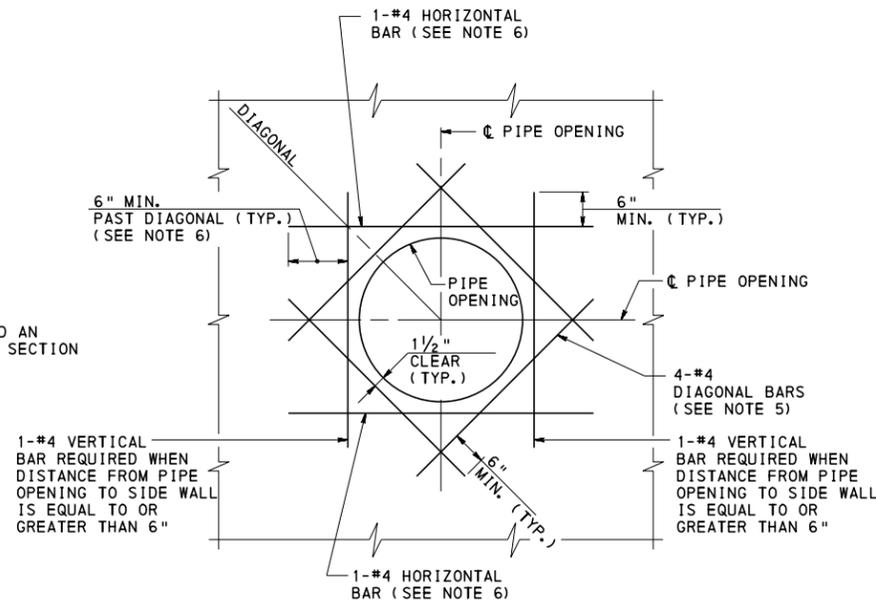
PIPE OPENING LOCATION AND SIZE AS REQUIRED



**CORRECT LOCATION**

**WRONG LOCATION**

**LOCATION OF PIPE OPENING**



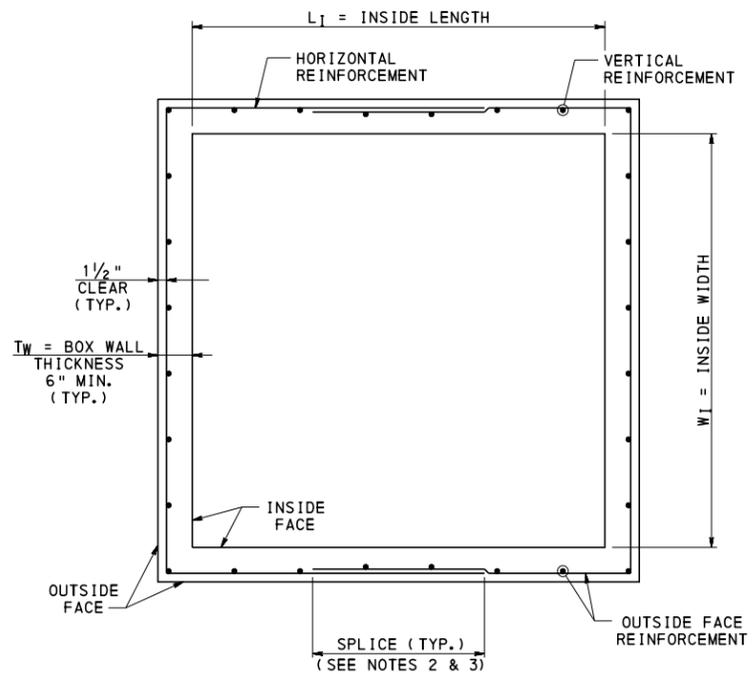
**WITHIN BOX SECTION ALTERNATE DETAIL**

**NOTES:**

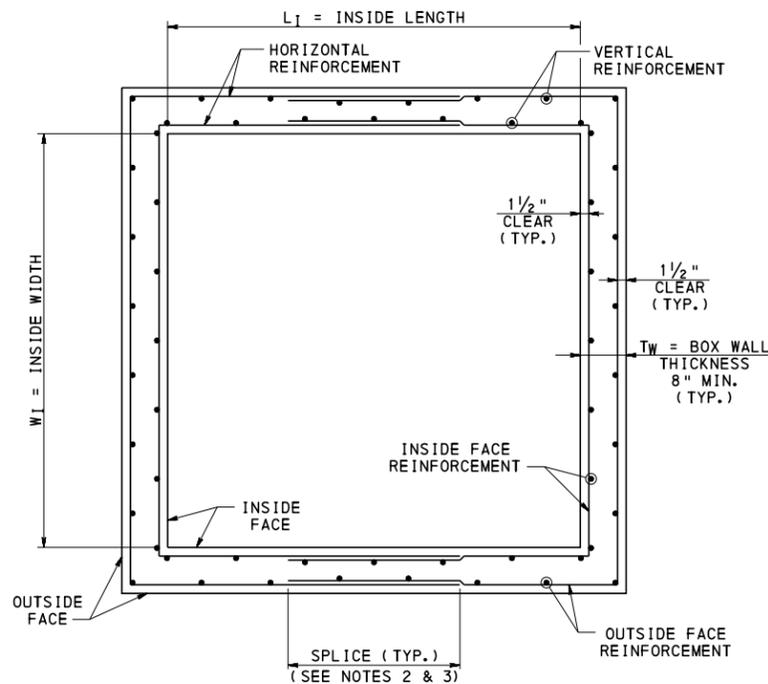
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. TIE ADDITIONAL REINFORCEMENT TO THE OUTSIDE FACE REINFORCEMENT.
4. FOR REINFORCEMENT DETAILS, SEE SHEETS 23 - 25.
5. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS GREATER THAN 3'-0".
6. PROVIDE 12" HOOK WHEN HORIZONTAL BAR EXTENDS INTO SIDE WALL.
7. PROVIDE #3 BARS TO SUPPORT THE PIPE OPENING DURING FABRICATION. LOCATE BARS 1/2" CLEAR FROM TOP OR BOTTOM OF THE SECTION. CUT BARS IN FIELD PRIOR TO INSTALLING PIPE.

COMMONWEALTH OF PENNSYLVANIA  
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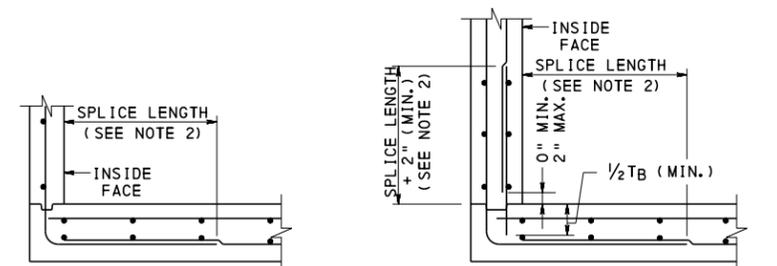
INLET BOXES  
PRECAST INLET BOXES - 3



**HORIZONTAL SECTION WITH OUTSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)

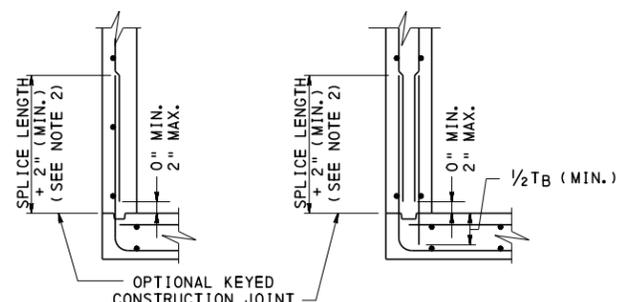


**HORIZONTAL SECTION WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)



**WITH OUTSIDE FACE REINFORCEMENT**      **WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

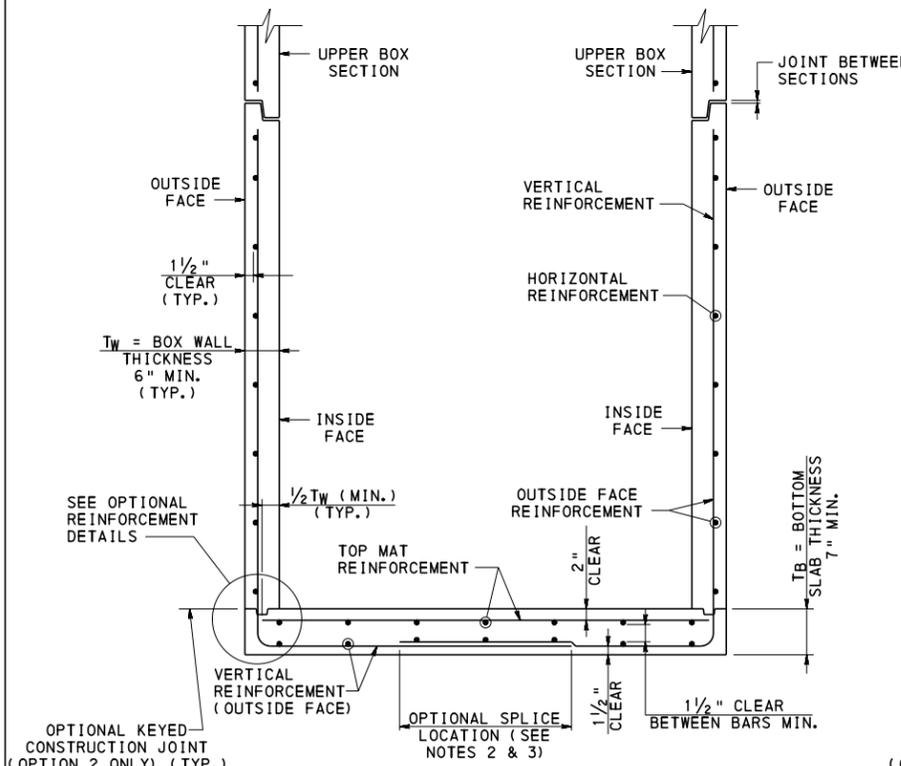
**SPLICE IN BOTTOM SLAB**



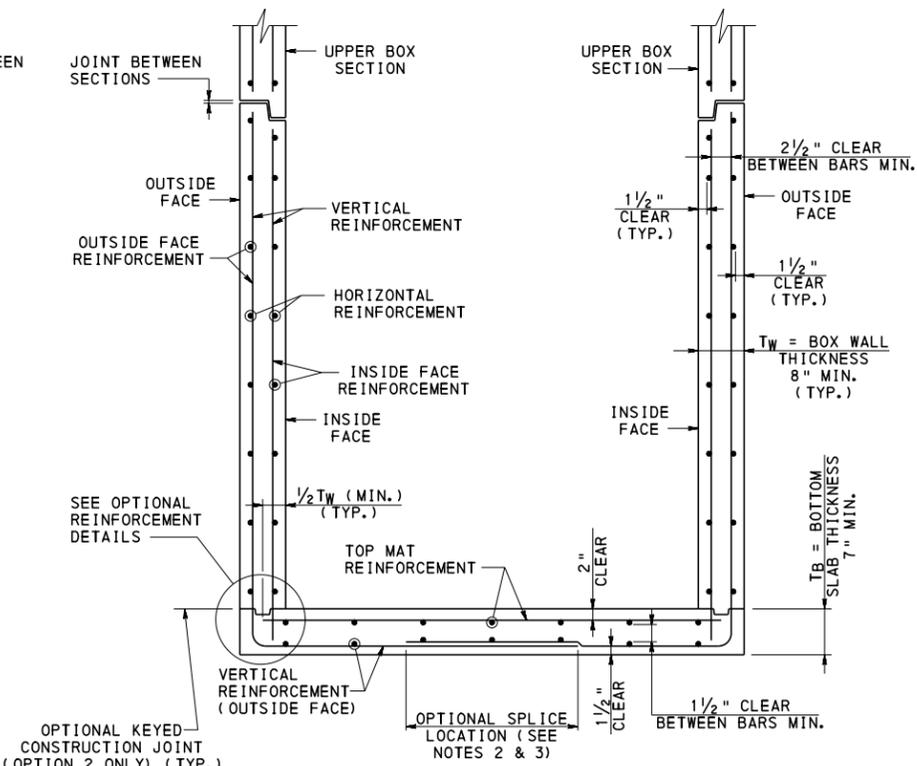
**WITH OUTSIDE FACE REINFORCEMENT**      **WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

**SPLICE IN WALLS**

**OPTIONAL REINFORCEMENT DETAILS**



**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE REINFORCEMENT**



**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

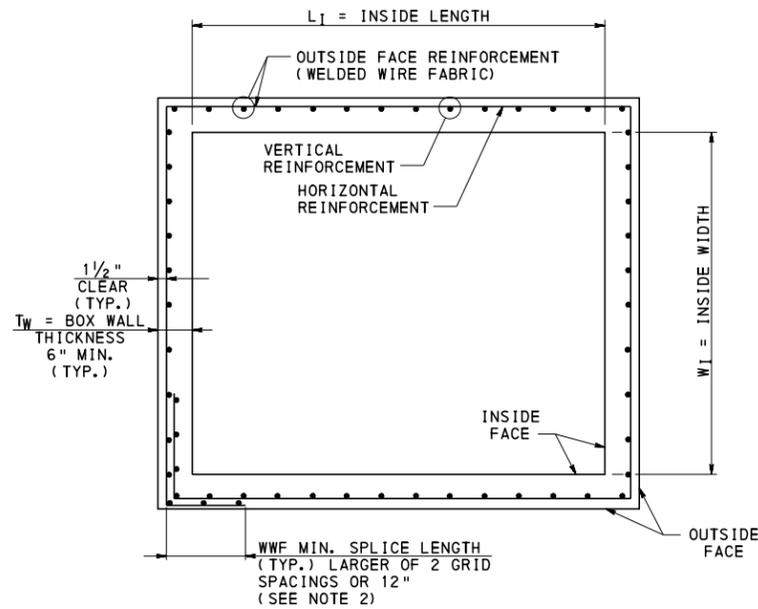
**TYPICAL SECTIONS PRECAST INLET BOXES WITH REINFORCEMENT BARS**

**NOTES:**

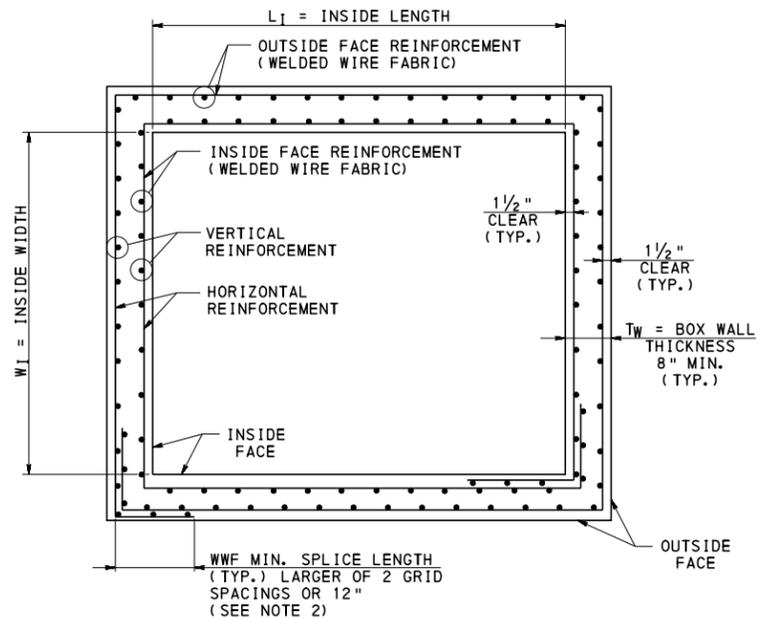
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
4. FOR REINFORCEMENT BAR DESIGN TABLES, SEE SHEETS 26 - 28.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

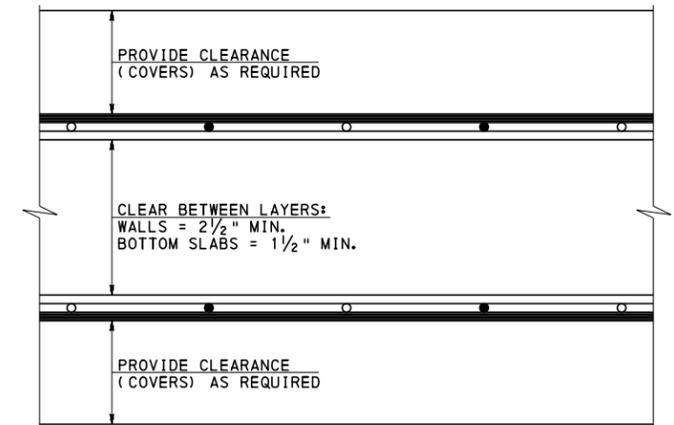
**INLET BOXES  
PRECAST INLET BOXES - 4  
(REINFORCEMENT BAR DETAILS)**



**HORIZONTAL SECTION WITH OUTSIDE FACE WELDED WIRE FABRIC**  
(RISER SECTIONS AND BASE SECTIONS)



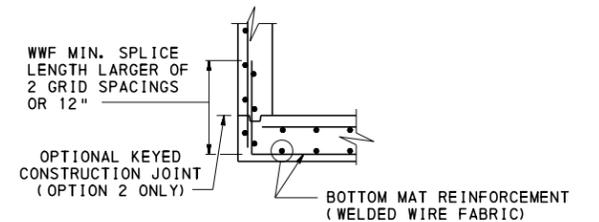
**HORIZONTAL SECTION WITH OUTSIDE FACE AND INSIDE WELDED WIRE FABRIC**  
(RISER SECTIONS AND BASE SECTIONS)



**NESTED WWF DETAIL**

**NESTED WWF NOTES:**

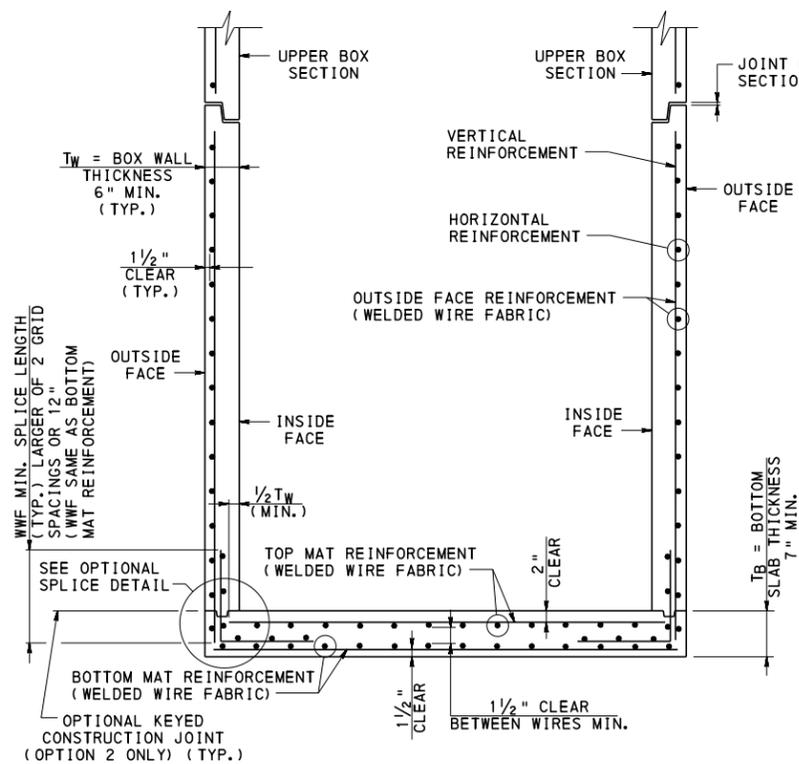
- FABRICATOR IS PERMITTED TO FABRICATE THE PRECAST CONCRETE INLET BOXES USING NESTED WWF IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
  - THE MEMBER THICKNESS AND THE REQUIRED AREA OF STEEL MUST MEET THE REQUIREMENTS OF THE WELDED WIRE FABRIC DESIGN TABLES SHOWN ON SHEETS 29 - 33.
  - THE CLEAR DISTANCE BETWEEN PARALLEL WIRES IS NOT PERMITTED TO BE LESS THAN 1 1/2".
  - ALL OTHER COVER AND CLEARANCE REQUIREMENTS ARE MET.
- A MAXIMUM OF TWO LAYERS OF WWF IS PERMITTED TO BE NESTED PER MAT.



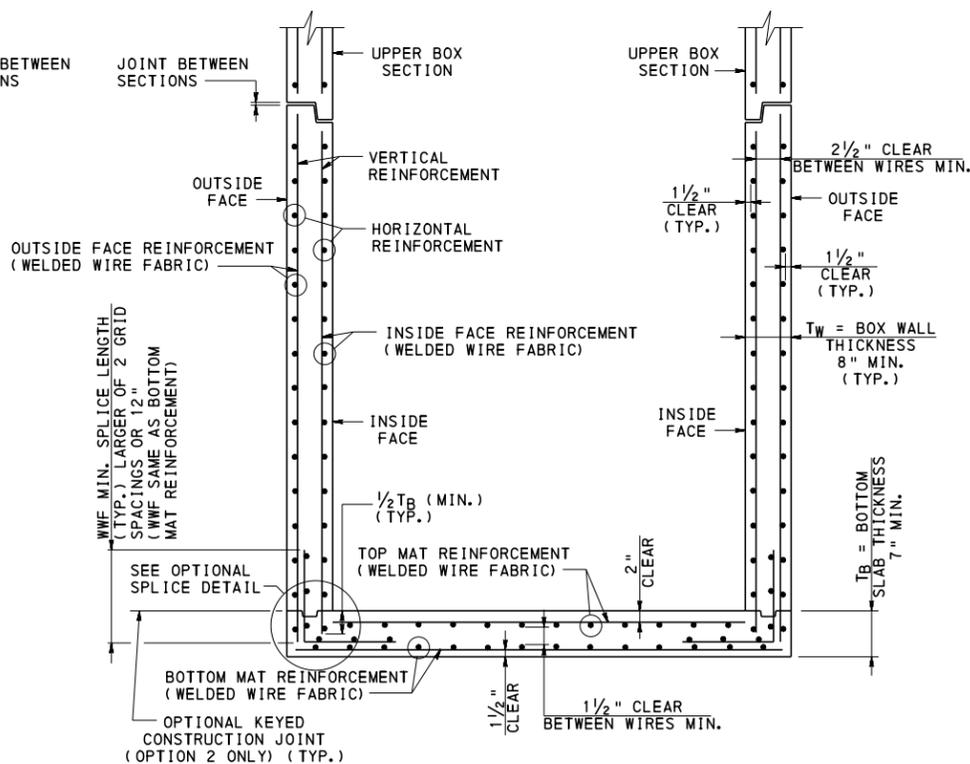
**OPTIONAL SPLICE DETAIL**

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
- FOR WWF DESIGN TABLES, SEE SHEETS 29 - 33.



**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE WELDED WIRE FABRIC**

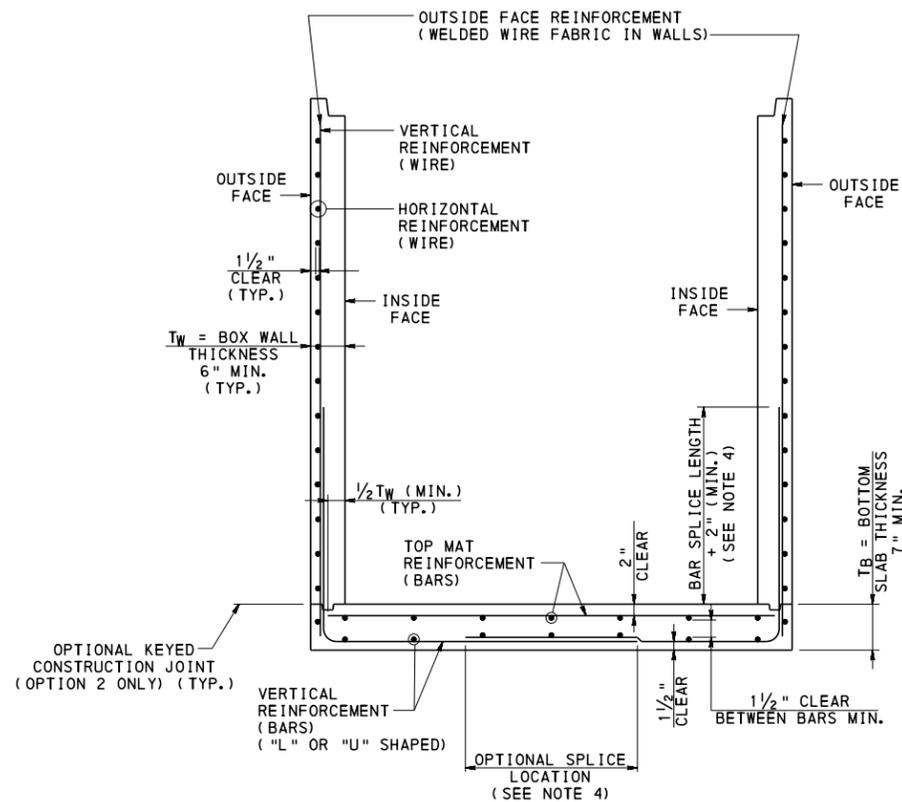


**VERTICAL SECTION OF BASE SECTION WITH OUTSIDE FACE AND INSIDE FACE WELDED WIRE FABRIC**

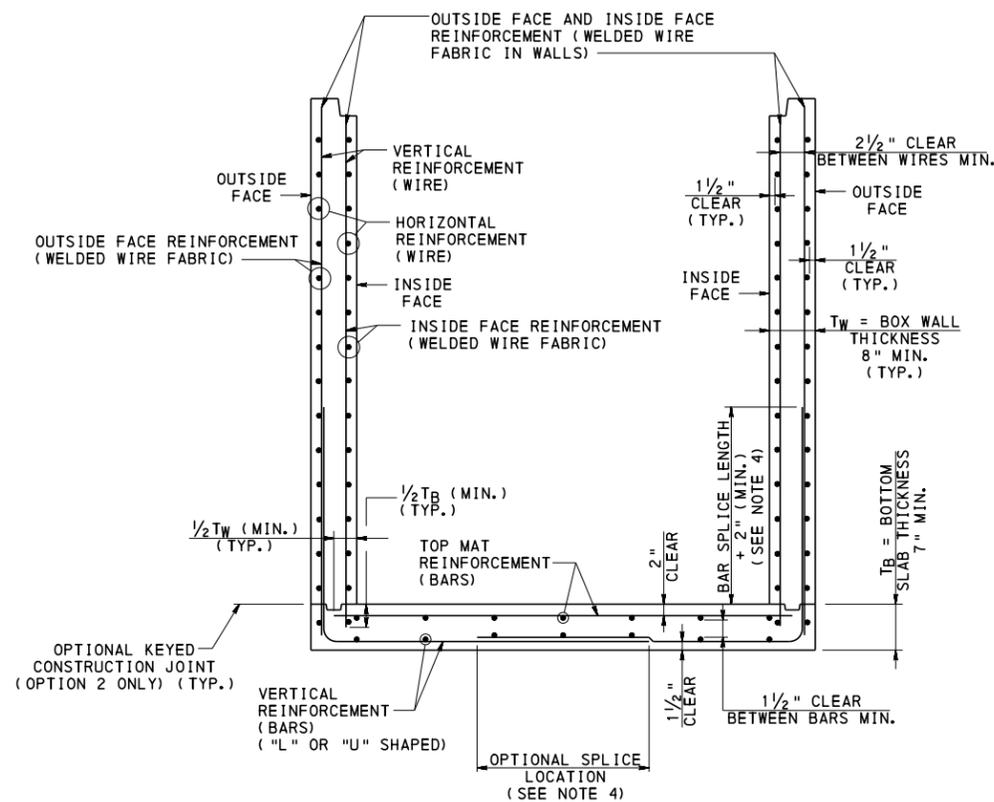
**TYPICAL SECTIONS PRECAST INLET BOXES WITH WELDED WIRE FABRIC**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**INLET BOXES PRECAST INLET BOXES - 5 (WELDED WIRE FABRIC DETAILS)**



**VERTICAL SECTION OF BASE SECTION  
WITH OUTSIDE FACE REINFORCEMENT**



**VERTICAL SECTION OF BASE SECTION  
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT**

**TYPICAL SECTIONS  
PRECAST INLET BOXES  
WITH REINFORCEMENT BARS IN BOTTOM SLAB  
AND WELDED WIRE FABRIC IN WALLS**

**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR ADDITIONAL INFORMATION, REFER TO NOTE 7 UNDER THE PRECAST CONCRETE INLET BOX DESIGN TABLE NOTES ON SHEET 3.
3. FOR ADDITIONAL DETAILS, SEE SHEETS 20 - 24.
4. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
PRECAST INLET BOXES - 6  
(COMBINATION DETAILS)

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - STANDARD**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.) SPACING (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0	45 1/4	24	6	#3	9	#3	9	---	---	---	---
11.0	45 1/4	24	6	#3	6	#3	9	---	---	---	---
14.0	45 1/4	24	6	#4	9	#3	9	---	---	---	---
16.0	45 1/4	24	6	#3	4	#3	9	---	---	---	---
20.0	45 1/4	24	6	#4	6	#3	9	---	---	---	---
28.0	45 1/4	24	8	#4	12	#3	9	#4	12	#3	9

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - STANDARD**

BASE SECTIONS															
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
7.0	45 1/4	24	6	7	#3	9	#3	6	---	---	---	---	#3	6	
11.0	45 1/4	24	6	7	#3	6	#3	6	---	---	---	---	#3	6	
13.0	45 1/4	24	6	7	#4	9	#3	6	---	---	---	---	#3	6	
16.0	45 1/4	24	6	7	#3	4	#3	6	---	---	---	---	#3	6	
19.0	45 1/4	24	6	7	#4	6	#3	6	---	---	---	---	#3	6	
30.0	45 1/4	24	8	7	#4	12	#3	6	#4	12	#4	12	#3	6	

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 4**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
4.0	48	48	6	#3	9	#3	9	---	---	---	---
8.0	48	48	6	#3	6	#3	9	---	---	---	---
11.0	48	48	6	#4	9	#3	9	---	---	---	---
12.0	48	48	6	#3	4	#3	9	---	---	---	---
15.0	48	48	6	#4	6	#3	9	---	---	---	---
26.0	48	48	8	#4	12	#3	9	#4	12	#3	9
28.0	48	48	8	#3	4	#3	9	#3	4	#3	9

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 4**

BASE SECTIONS															
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
8.0	48	48	6	7	#3	6	#3	6	---	---	---	---	#3	6	
10.0	48	48	6	7	#4	9	#3	6	---	---	---	---	#3	6	
12.0	48	48	6	7	#3	4	#3	6	---	---	---	---	#3	6	
15.0	48	48	6	7	#4	6	#3	6	---	---	---	---	#3	6	
16.0	48	48	6	7	#5	9	#3	6	---	---	---	---	#3	6	
25.0	48	48	8	7	#4	12	#3	6	#4	12	#3	9	#3	6	
26.0	48	48	8	7	#3	4	#3	6	#4	12	#3	9	#3	6	
29.0	48	48	8	7	#3	4	#3	6	#4	6	#3	9	#3	6	
30.0	48	48	8	8	#3	4	#3	6	#4	6	#3	9	#3	6	

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 5**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
5.0	60	60	6	#4	9	#3	9	---	---	---	---
7.0	60	60	6	#3	4	#3	9	---	---	---	---
10.0	60	60	6	#4	6	#3	9	---	---	---	---
17.0	60	60	8	#4	12	#3	9	#4	12	#3	9
24.0	60	60	8	#3	4	#3	9	#3	4	#3	9
28.0	60	60	8	#4	4	#3	9	#4	4	#3	9

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 5**

BASE SECTIONS															
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
7.0	60	60	6	7	#3	4	#3	6	---	---	---	---	#3	6	
10.0	60	60	6	7	#4	6	#3	6	---	---	---	---	#3	6	
17.0	60	60	8	7	#4	12	#3	6	#4	12	#3	9	#3	6	
19.0	60	60	8	7	#3	4	#3	6	#3	4	#3	9	#3	6	
22.0	60	60	8	8	#3	4	#3	6	#3	4	#3	9	#3	6	
24.0	60	60	8	8	#3	4	#3	4	#3	4	#3	9	#3	6	
26.0	60	60	8	8	#4	4	#3	4	#4	4	#3	9	#3	6	
30.0	60	60	8	8	#4	4	#4	4	#4	4	#3	9	#3	6	

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 23.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 1  
(REINFORCEMENT BARS)**

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 6**

RISER SECTIONS

JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
6.0	72	72	6	#4	6	#3	9	---	---	---	---
13.0	72	72	8	#4	12	#3	9	#4	12	#3	9
17.0	72	72	8	#3	4	#3	9	#3	4	#3	9
26.0	72	72	8	#4	4	#3	9	#4	4	#3	9
28.0	72	72	10	#4	4	#3	9	#4	4	#4	12

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 6**

BASE SECTIONS

H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
10.0	72	72	8	8	#4	12	#3	4	#4	12	#3	9	#3	6
12.0	72	72	8	8	#4	12	#4	4	#4	12	#3	9	#3	6
17.0	72	72	8	9	#3	4	#4	4	#3	4	#3	9	#3	6
20.0	72	72	8	9	#4	4	#4	4	#4	4	#3	9	#3	6
26.0	72	72	8	10	#4	4	#4	4	#4	4	#3	9	#3	6
30.0	72	72	10	10	#4	4	#4	4	#4	4	#4	12	#4	9

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 7**

RISER SECTIONS

JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
9.0	84	84	8	#4	12	#3	9	#4	12	#3	9
13.0	84	84	8	#3	4	#3	9	#3	4	#3	9
22.0	84	84	8	#4	4	#3	9	#4	4	#3	9
28.0	84	84	10	#4	4	#4	12	#4	4	#4	12

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 7**

BASE SECTIONS

H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
9.0	84	84	8	8	#3	4	#4	4	#4	12	#4	12	#3	6
11.0	84	84	8	8	#3	4	#4	4	#4	6	#4	12	#3	6
13.0	84	84	8	9	#3	4	#4	4	#4	6	#4	12	#3	6
18.0	84	84	8	9	#4	4	#4	4	#4	4	#4	12	#3	6
22.0	84	84	8	10	#4	4	#4	4	#4	4	#4	12	#3	6
24.0	84	84	10	10	#4	4	#4	4	#4	4	#4	12	#4	9
26.0	84	84	10	10	#4	4	#5	4	#4	4	#4	12	#3	4
29.0	84	84	10	11	#5	4	#5	4	#4	4	#4	12	#3	4
30.0	84	84	12	11	#5	6	#5	4	#4	4	#4	9	#3	4

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 8**

RISER SECTIONS

JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
10.0	96	96	8	#4	6	#3	9	#4	6	#3	9
18.0	96	96	8	#4	4	#3	9	#4	4	#3	9
23.0	96	96	10	#4	4	#3	9	#4	4	#4	12
25.0	96	96	10	#5	4	#3	9	#5	4	#4	12
27.0	96	96	12	#4	4	#3	9	#4	4	#4	9
28.0	96	96	12	#5	4	#3	9	#5	4	#4	9

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 8**

BASE SECTIONS

H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)		
11.0	96	96	8	8	#4	4	#4	4	#4	4	#4	12	#3	6
17.0	96	96	8	9	#4	4	#4	4	#4	4	#4	12	#3	6
19.0	96	96	8	10	#5	4	#4	4	#5	4	#4	12	#3	6
22.0	96	96	10	10	#5	4	#5	4	#5	4	#4	12	#3	4
24.0	96	96	10	10	#5	4	#4	4	#5	4	#4	12	#3	6
28.0	96	96	12	11	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	96	96	12	12	#5	4	#5	4	#5	4	#4	9	#4	4

**NOTES:**

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 20 - 23.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 2  
(REINFORCEMENT BARS)

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - 9											
RISER SECTIONS											
JOINT DEPTH (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14.0	108	108	8	#4	4	#3	9	#4	4	#3	9
16.0	108	108	8	#5	4	#3	9	#5	4	#3	9
18.0	108	108	10	#4	4	#3	9	#4	4	#4	12
23.0	108	108	10	#5	4	#3	9	#5	4	#4	12
28.0	108	108	12	#5	4	#3	9	#5	4	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - 9															
BASE SECTIONS															
H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
14.0	108	108	8	8	#4	4	#4	4	#4	4	#4	12	#3	6	
18.0	108	108	10	9	#5	4	#5	4	#5	4	#4	12	#3	4	
21.0	108	108	10	9	#5	4	#5	4	#5	4	#4	12	#4	9	
24.0	108	108	12	10	#5	4	#5	4	#5	4	#4	9	#4	9	
26.0	108	108	12	10	#5	4	#5	4	#5	4	#4	9	#4	4	
28.0	108	108	12	11	#5	4	#5	4	#5	4	#4	9	#4	4	
30.0	108	108	14	11	#5	4	#5	4	#5	4	#4	6	#4	4	

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - 10											
RISER SECTIONS											
JOINT DEPTH (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
12.0	120	120	8	#4	4	#3	9	#4	4	#3	9
15.0	120	120	8	#5	4	#3	9	#5	4	#4	12
20.0	120	120	10	#5	4	#3	9	#5	4	#4	12
26.0	120	120	12	#5	4	#3	9	#5	4	#4	9
28.0	120	120	14	#5	4	#3	9	#5	4	#3	4

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - 10															
BASE SECTIONS															
H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
13.0	120	120	8	8	#5	4	#4	4	#5	4	#4	12	#4	9	
15.0	120	120	8	8	#5	4	#5	4	#5	4	#4	12	#4	9	
18.0	120	120	10	9	#5	4	#4	4	#5	4	#4	12	#3	6	
20.0	120	120	10	9	#5	4	#5	4	#5	4	#4	12	#4	9	
24.0	120	120	12	10	#5	4	#5	4	#5	4	#4	9	#4	4	
28.0	120	120	14	11	#5	4	#5	4	#5	4	#4	6	#4	4	
30.0	120	120	14	12	#5	4	#5	4	#5	4	#4	6	#4	4	

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - D-H											
RISER SECTIONS											
JOINT DEPTH (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
3.0	99	30	6	#4	6	#3	9	---	---	---	---
9.0	99	30	8	#4	12	#3	9	#4	12	#3	9
13.0	99	30	8	#3	4	#3	9	#3	4	#3	9
19.0	99	30	8	#4	4	#3	9	#4	4	#3	9
26.0	99	30	10	#4	4	#3	9	#4	4	#4	12
28.0	99	30	12	#4	4	#3	9	#4	4	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - D-H															
BASE SECTIONS															
H (FT.)	L <sub>I</sub> (IN.)	W <sub>I</sub> (IN.)	T <sub>W</sub> (IN.)	T <sub>B</sub> (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL		BAR SIZE	SPACING (IN.)	
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			
4.0	99	30	6	7	#5	9	#3	6	---	---	---	---	#3	6	
9.0	99	30	8	7	#4	12	#3	6	#4	12	#3	9	#3	6	
12.0	99	30	8	7	#3	4	#3	4	#3	4	#3	9	#3	6	
19.0	99	30	8	7	#4	4	#4	4	#4	4	#3	9	#3	6	
25.0	99	30	10	7	#4	4	#4	4	#4	4	#4	12	#3	6	
30.0	99	30	12	7	#4	4	#4	4	#4	4	#4	9	#3	6	

- NOTES:**
- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  - FOR INLET BOX TYPES, SEE SHEET 6.
  - FOR DETAILS, SEE SHEETS 20 - 23.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**INLET BOXES**

**PRECAST INLET BOXES  
DESIGN TABLES - 3  
(REINFORCEMENT BARS)**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Ben J. Lyons</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 28 OF 34 <b>RC-46M</b>
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**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - STANDARD**

**BASE SECTIONS**

H (FT.)	L <sub>1</sub> (IN.)	W <sub>1</sub> (IN.)	T <sub>w</sub> (IN.)	T <sub>b</sub> (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL				
4.0	45 1/4	24	6	7	WWF 4x4-W4xW4	0.12	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
7.0	45 1/4	24	6	7	WWF 3x4-W4xW4	0.16	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
9.0	45 1/4	24	6	7	WWF 3x4-W5xW4	0.20	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
11.0	45 1/4	24	6	7	WWF 3x4-W6xW4	0.24	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
13.0	45 1/4	24	6	7	WWF 3x4-W7xW4	0.28	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
15.0	45 1/4	24	6	7	WWF 3x4-W8xW4	0.32	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
17.0	45 1/4	24	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
19.0	45 1/4	24	6	7	WWF 6x6-W20xW10	0.40	0.20	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	45 1/4	24	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - STANDARD**

**RISER SECTIONS**

JOINT DEPTH (FT.)	L <sub>1</sub> (IN.)	W <sub>1</sub> (IN.)	T <sub>w</sub> (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
5.0	45 1/4	24	6	WWF 4x4-W4xW4	0.12	0.12	---	---	---
8.0	45 1/4	24	6	WWF 3x4-W4xW4	0.16	0.12	---	---	---
10.0	45 1/4	24	6	WWF 3x4-W5xW4	0.20	0.12	---	---	---
13.0	45 1/4	24	6	WWF 3x4-W7xW4	0.28	0.12	---	---	---
15.0	45 1/4	24	6	WWF 3x4-W8xW4	0.32	0.12	---	---	---
17.0	45 1/4	24	6	WWF 3x4-W9xW4	0.36	0.12	---	---	---
19.0	45 1/4	24	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
28.0	45 1/4	24	8	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD  
A = SPACING OF HORIZONTAL WIRES (SH), IN.  
B = SPACING OF VERTICAL WIRES (SV), IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 22 AND 24.

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 4**

**BASE SECTIONS**

H (FT.)	L <sub>1</sub> (IN.)	W <sub>1</sub> (IN.)	T <sub>w</sub> (IN.)	T <sub>b</sub> (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL				
6.0	48	48	6	7	WWF 3x4-W4xW4	0.20	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
8.0	48	48	6	7	WWF 3x4-W6xW4	0.24	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
10.0	48	48	6	7	WWF 3x4-W7xW4	0.28	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
13.0	48	48	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
24.0	48	48	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
26.0	48	48	8	7	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	48	48	8	8	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 4**

**RISER SECTIONS**

JOINT DEPTH (FT.)	L <sub>1</sub> (IN.)	W <sub>1</sub> (IN.)	T <sub>w</sub> (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
4.0	48	48	6	WWF 3x4-W4xW4	0.16	0.12	---	---	---
6.0	48	48	6	WWF 3x4-W5xW4	0.20	0.12	---	---	---
9.0	48	48	6	WWF 3x4-W6xW4	0.24	0.12	---	---	---
12.0	48	48	6	WWF 3x4-W8xW4	0.32	0.12	---	---	---
14.0	48	48	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
24.0	48	48	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
26.0	48	48	8	WWF 3x3-W5xW4	0.20	0.12	WWF 3x3-W5xW4	0.20	0.16
28.0	48	48	8	WWF 3x4-W7xW4	0.28	0.12	WWF 3x3-W7xW4	0.28	0.16

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 1  
(WELDED WIRE FABRIC)

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 5**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
8.0	60	60	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20		
16.0	60	60	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20		
18.0	60	60	8	7	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24		
21.0	60	60	8	7	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24		
23.0	60	60	8	8	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24		
25.0	60	60	8	8	WWF 3x3-W9xW5	0.36	0.20	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24		
27.0	60	60	8	8	WWF 3x3-W10xW7	0.40	0.28	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28		
29.0	60	60	8	8	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28		
30.0	60	60	8	8	WWF 3x3-W12xW8	0.48	0.32	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28		

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 5**

RISER SECTIONS									
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
6.0	60	60	6	WWF 4x4-W10xW4	0.30	0.12	---	---	---
8.0	60	60	6	WWF 4x4-W12xW4	0.36	0.12	---	---	---
16.0	60	60	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
18.0	60	60	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W5xW4	0.20	0.16
24.0	60	60	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
28.0	60	60	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD  
A = SPACING OF HORIZONTAL WIRES (SH), IN.  
B = SPACING OF VERTICAL WIRES (SV), IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 22 AND 24.

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 6**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
10.0	72	72	8	8	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28		
12.0	72	72	8	8	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32		
15.0	72	72	8	9	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32		
17.0	72	72	8	9	WWF 3x3-W8xW5	0.32	0.20	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W9xW9	0.36		
19.0	72	72	8	9	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W9xW9	0.36		
21.0	72	72	8	10	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
25.0	72	72	8	10	WWF 3x3-W12xW9	0.48	0.36	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
27.0	72	72	10	10	WWF 3x3-W12xW6	0.48	0.24	WWF 3x3-W12xW6	0.48	0.24	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48		
29.0	72	72	10	10	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W12xW6	0.48	0.24	WWF 6x6-W12xW12	0.24	WWF 4x4-W20xW20	0.60		
30.0	72	72	10	10	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW6	0.48	0.24	WWF 6x6-W12xW12	0.24	WWF 4x4-W20xW20	0.60		

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 6**

RISER SECTIONS									
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
11.0	72	72	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
13.0	72	72	8	WWF 3x4-W5xW4	0.20	0.12	WWF 3x3-W5xW4	0.20	0.16
17.0	72	72	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
21.0	72	72	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
25.0	72	72	8	WWF 3x6-W12xW6	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
28.0	72	72	10	WWF 3x12-W12xW12	0.48	0.12	WWF 3x3-W12xW5	0.48	0.20

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY**

**INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 2  
(WELDED WIRE FABRIC)**

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 7**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
10.0	84	84	8	8	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32		
12.0	84	84	8	9	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
14.0	84	84	8	9	WWF 3x3-W10xW6	0.40	0.24	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
16.0	84	84	8	9	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
18.0	84	84	8	9	WWF 3x3-W12xW10	0.48	0.40	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
21.0	84	84	8	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW8	0.60	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W12xW12	0.48		
24.0	84	84	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60		
26.0	84	84	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60		
28.0	84	84	10	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60		
30.0	84	84	12	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x4-W20xW8	0.60	0.24	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60		

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 7**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)			
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		
8.0	84	84	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16		
10.0	84	84	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W5xW4	0.20	0.16		
13.0	84	84	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16		
16.0	84	84	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16		
19.0	84	84	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16		
22.0	84	84	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16		
24.0	84	84	10	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW10	0.48	0.20		
28.0	84	84	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20		

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD  
A = SPACING OF HORIZONTAL WIRES (SH), IN.  
B = SPACING OF VERTICAL WIRES (SV), IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 22 AND 24.

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 8**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
11.0	96	96	8	8	WWF 3x3-W10xW5	0.40	0.20	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
13.0	96	96	8	9	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
15.0	96	96	8	9	WWF 3x3-W12xW10	0.48	0.40	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40		
17.0	96	96	8	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW8	0.60	0.16	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48		
19.0	96	96	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48		
22.0	96	96	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56		
24.0	96	96	12	10	WWF 4x3-W20xW10	0.60	0.40	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
27.0	96	96	12	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W6xW6	0.24	WWF 4x4-W20xW20	0.60		
30.0	96	96	14	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W6xW6	0.24	WWF 4x4-W20xW20	0.60		

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 8**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)			
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		
10.0	96	96	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16		
13.0	96	96	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16		
15.0	96	96	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16		
18.0	96	96	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20		
23.0	96	96	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20		
27.0	96	96	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW12	0.60	0.24		
28.0	96	96	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32		

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 3  
(WELDED WIRE FABRIC)

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 9**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
12.0	108	108	8	8	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW5	0.48	0.20	WWF 3x3-W5xW5	0.20	WWF 3x3-W12xW12	0.48		
14.0	108	108	8	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48		
16.0	108	108	10	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W14xW14	0.56		
18.0	108	108	10	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56		
20.0	108	108	12	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56		
22.0	108	108	12	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56		
24.0	108	108	14	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
29.0	108	108	16	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
30.0	108	108	18	12	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD  
A = SPACING OF HORIZONTAL WIRES (SH), IN.  
B = SPACING OF VERTICAL WIRES (SV), IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 9**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)			
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		
10.0	108	108	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16		
12.0	108	108	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16		
14.0	108	108	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16		
18.0	108	108	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20		
22.0	108	108	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x4-W20xW8	0.60	0.24		
26.0	108	108	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32		
28.0	108	108	16	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40		

**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 22 AND 24.

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 10**

BASE SECTIONS																
H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION		
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL						
13.0	120	120	10	8	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
15.0	120	120	10	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
17.0	120	120	12	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
19.0	120	120	14	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
22.0	120	120	16	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
24.0	120	120	18	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
26.0	120	120	20	13	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
29.0	120	120	20	14	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		
30.0	120	120	22	14	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60		

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - 10**

RISER SECTIONS											
JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)			
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		
12.0	120	120	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16		
15.0	120	120	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20		
18.0	120	120	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW12	0.60	0.24		
21.0	120	120	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32		
24.0	120	120	16	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40		
27.0	120	120	18	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40		
28.0	120	120	20	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW12	0.60	0.48		

COMMONWEALTH OF PENNSYLVANIA  
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INLET BOXES  
PRECAST INLET BOXES  
DESIGN TABLES - 4  
(WELDED WIRE FABRIC)

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - D-H**

**BASE SECTIONS**

H (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.) EACH DIRECTION
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL				
8.0	99	30	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
10.0	99	30	8	7	WWF 3x3-W7xW5	0.28	0.20	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
12.0	99	30	8	7	WWF 3x3-W8xW7	0.32	0.28	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
14.0	99	30	8	7	WWF 3x3-W9xW9	0.36	0.36	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
16.0	99	30	8	7	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
18.0	99	30	8	7	WWF 3x3-W12xW12	0.48	0.48	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
24.0	99	30	10	7	WWF 4x4-W20xW20	0.60	0.60	WWF 3x3-W12xW5	0.48	0.20	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
27.0	99	30	12	7	WWF 4x4-W20xW20	0.60	0.60	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	99	30	12	8	WWF 4x4-W20xW20	0.60	0.60	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

**PRECAST CONCRETE INLET BOX SUMMARY TABLE  
BOX TYPE - D-H**

**RISER SECTIONS**

JOINT DEPTH (FT.)	L1 (IN.)	W1 (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN. <sup>2</sup> /FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
3.0	99	30	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
8.0	99	30	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
10.0	99	30	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W6xW4	0.24	0.16
13.0	99	30	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
15.0	99	30	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
18.0	99	30	8	WWF 3x6-W12xW6	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
24.0	99	30	10	WWF 4x12-W20xW12	0.60	0.12	WWF 3x3-W12xW5	0.48	0.20
26.0	99	30	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
28.0	99	30	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x4-W20xW8	0.60	0.24

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD  
A = SPACING OF HORIZONTAL WIRES (SH), IN.  
B = SPACING OF VERTICAL WIRES (SV), IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

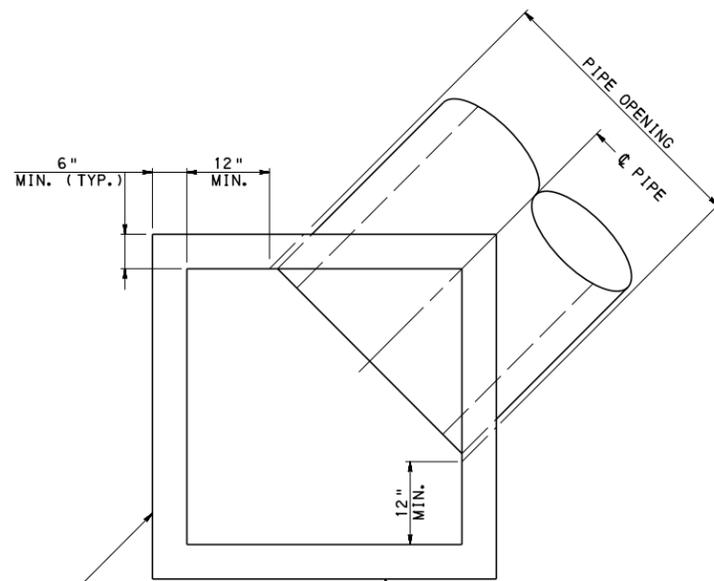
**NOTES:**

- FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
- FOR INLET BOX TYPES, SEE SHEET 6.
- FOR DETAILS, SEE SHEETS 20 - 22 AND 24.

COMMONWEALTH OF PENNSYLVANIA  
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**INLET BOXES**

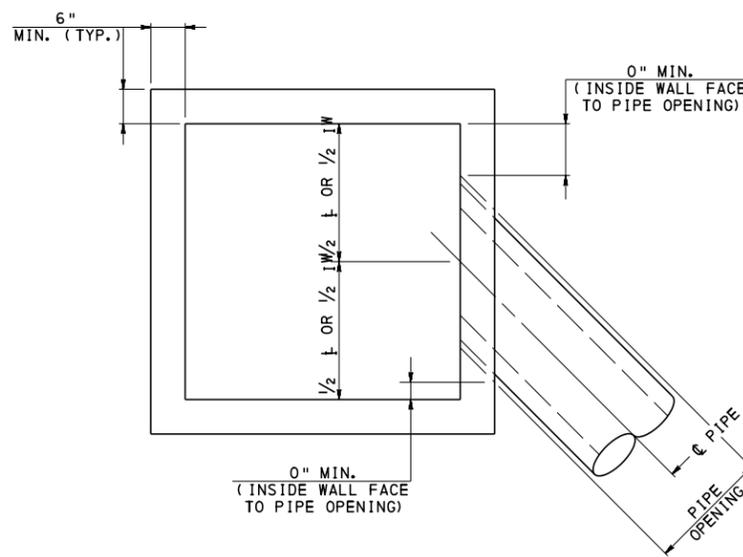
**PRECAST INLET BOXES  
DESIGN TABLES - 5  
(WELDED WIRE FABRIC)**



PIPE OPENINGS ARE PERMITTED IN THESE WALLS IN ADDITION TO THE CORNER PENETRATION

**DETAIL FOR CORNER PIPE**

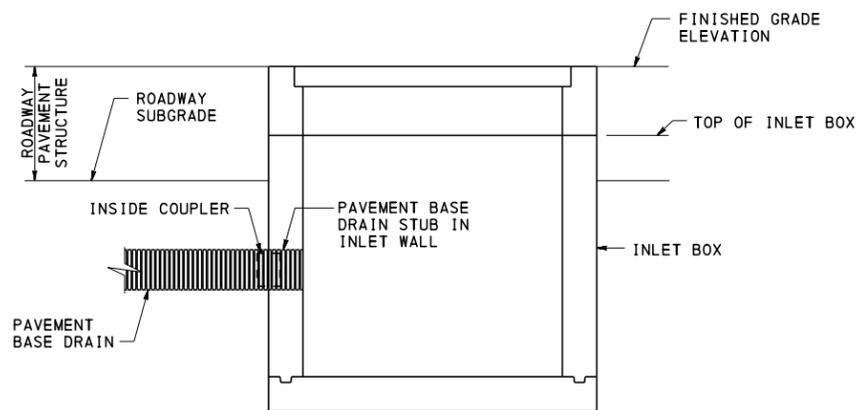
(SEE PIPE LOCATION AND PIPE OPENING NOTES ON SHEET 2)



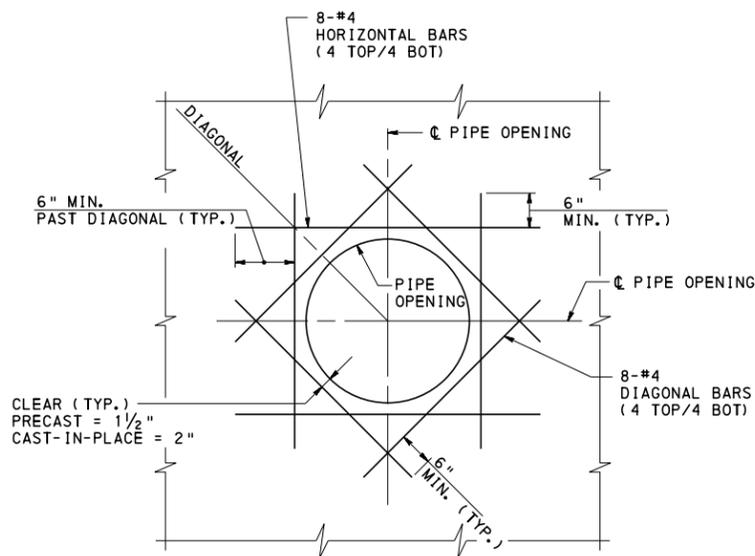
**DETAIL FOR SKEWED PIPE**

(SEE PIPE LOCATION AND PIPE OPENING NOTES ON SHEET 2)

TABLE A BOX TYPE BASED ON REINFORCED CONCRETE PIPE SIZES				
INLET TYPE	MAXIMUM INSIDE WIDTH (IN.)	MAXIMUM INSIDE LENGTH (IN.)	MAXIMUM PERMITTED PIPE DIAMETER ALONG WIDTH (IN.)	MAXIMUM PERMITTED PIPE DIAMETER ALONG LENGTH (IN.)
STANDARD	24	45 1/4	18	36
4	48	48	36	36
5	60	60	42	42
6	72	72	54	54
7	84	84	66	66
8	96	96	72	72
9	108	108	84	84
10	120	120	96	96
D-H	30	99	18	72



**OPTIONAL CONNECTION DETAIL FOR PAVEMENT BASE DRAIN**



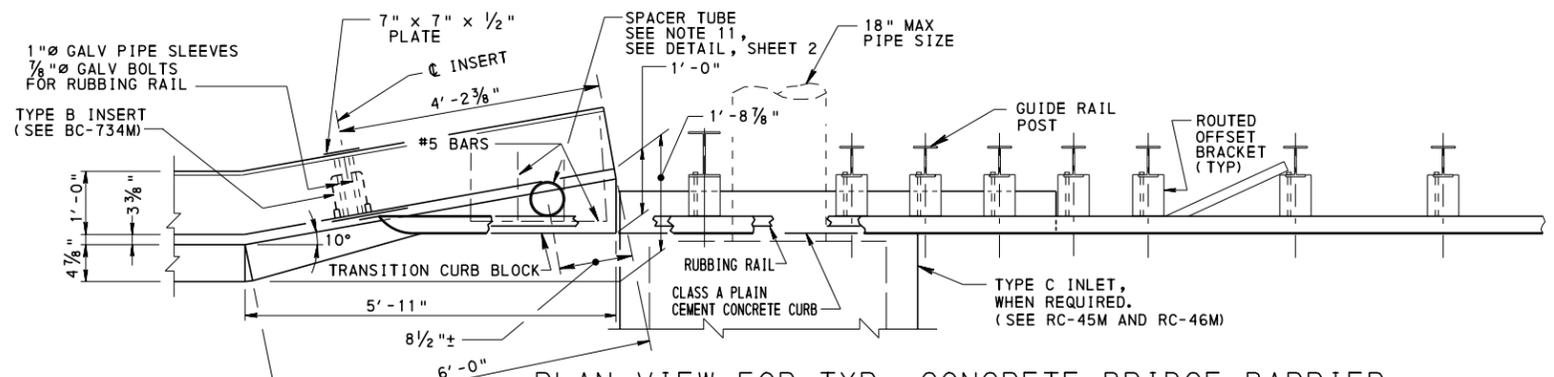
**ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENING IN BOTTOM SLAB**

**NOTES:**

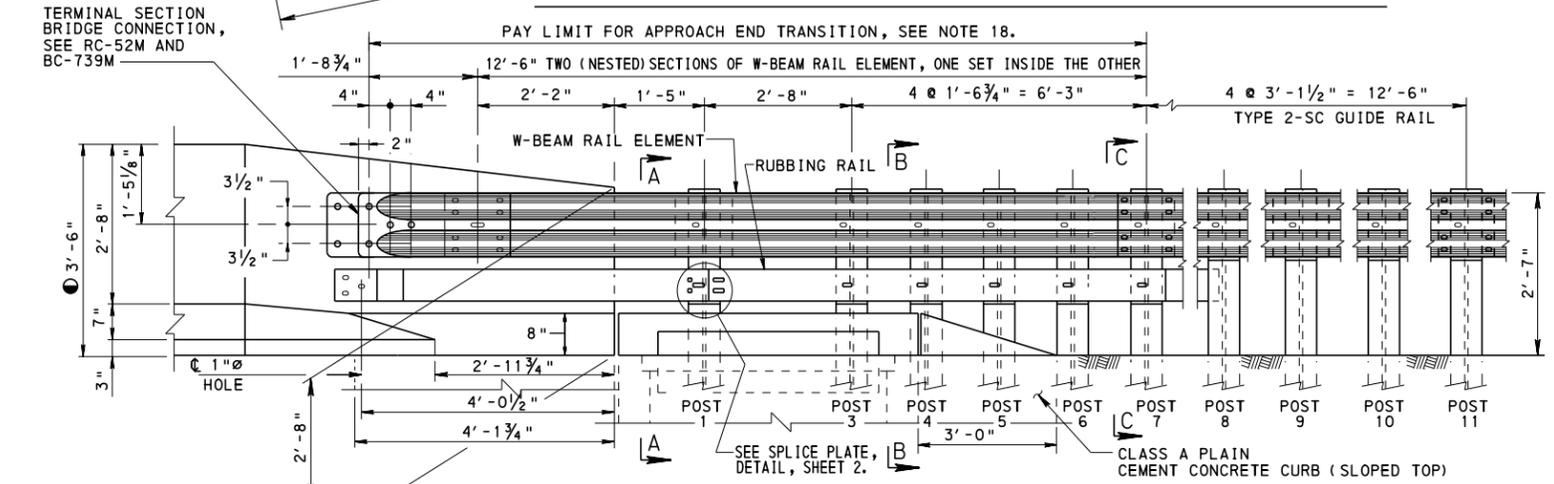
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.

COMMONWEALTH OF PENNSYLVANIA  
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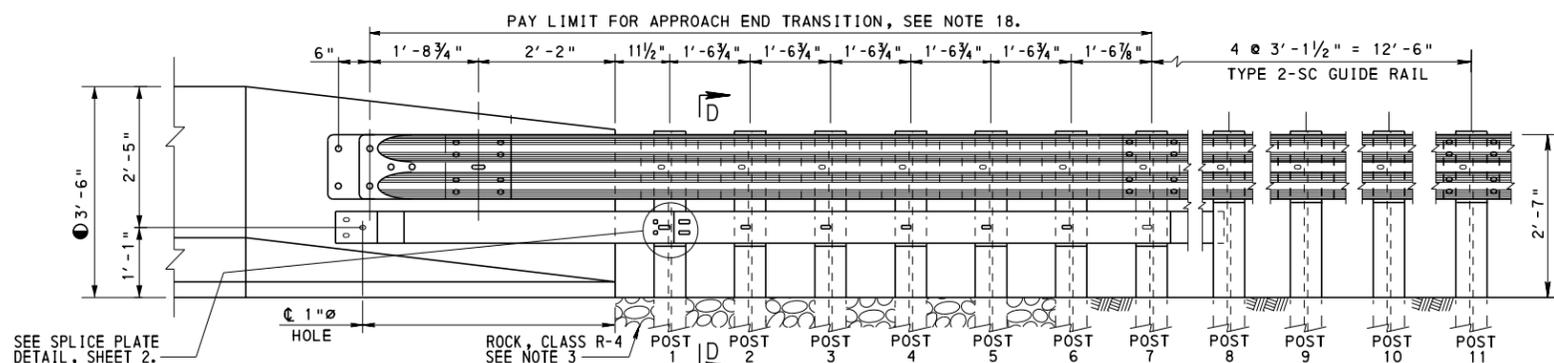
**INLET BOXES  
MISCELLANEOUS DETAILS**



PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER



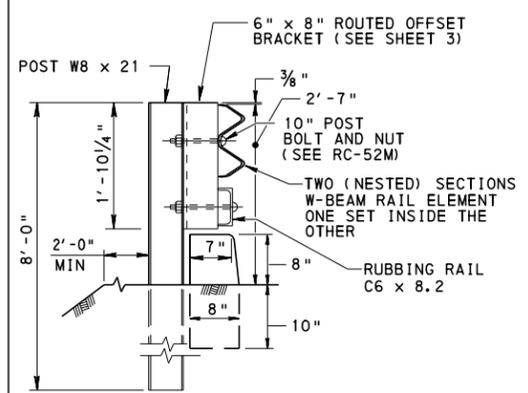
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER



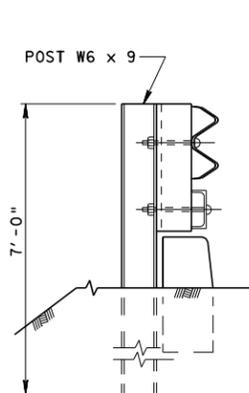
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER

(WITHOUT INLET PLACEMENT)

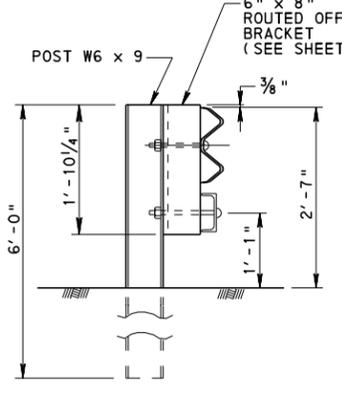
NOTE:  
TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.



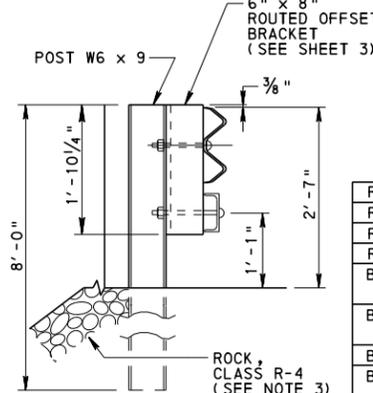
SECTION A-A



SECTION B-B  
(SECTION B-B IS TYPICAL TO SECTION A-A EXCEPT AS SHOWN OTHERWISE)



SECTION C-C



SECTION D-D

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
2. ALL REINFORCEMENT STEEL BARS SHOWN ARE TO MEET THE REQUIREMENTS OF ASTM A615, A996 OR A706.
3. PLACE ROCK, CLASS R-4 WITH A NOMINAL THICKNESS OF 18" TO PROTECT EMBANKMENT MATERIAL FROM EROSION BEHIND GUIDE RAIL POSTS WITHOUT INLET PLACEMENT.
4. W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS.
5. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
6. REINFORCED CONCRETE BARRIER AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
7. WHEN CONNECTING TO TYPE 2-S GUIDE RAIL (2'-3 3/4") OR TYPE 2-W GUIDE RAIL (2'-8"), TRANSITION UP OR DOWN 1" PER 25'-0".
8. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
9. POSTS WITH RUBBING RAIL ATTACHMENT REQUIRE AN ADDITIONAL HOLE.
10. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH BRIDGE BARRIER. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER.
11. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 6" ID x 12". CONNECT TO THE W-BEAM RAIL ELEMENTS USING SPLICE BOLT.
12. GALVANIZE ALL HARDWARE, W-BEAM RAIL ELEMENTS, THRIE-BEAM RAIL ELEMENTS, RUBBING RAIL, W-BEAM TO THRIE-BEAM TRANSITION SECTION, TERMINAL SECTION BRIDGE CONNECTIONS, ANGLES, PLATES, BOLTS AND ANY OTHER FABRICATED STEEL COMPONENTS.
13. REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
14. SEE BC-739M AND RC-52M FOR DETAILS AND HARDWARE NOT SHOWN.
15. PROVIDE 2" CLEARANCE ON ALL REINFORCEMENT EXCEPT AS NOTED.
16. PROVIDE APPROACH END GUIDE RAIL TREATMENT AT BOTH THE APPROACH AND TRAILING ENDS OF STRUCTURE BARRIERS ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC. ON FOUR-LANE DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF BARRIERS UNLESS WARRANTED BY OTHER OBSTRUCTIONS.
17. PROVIDE STEEL POST SIZE AND LENGTH AS SHOWN IN TABLES A, B, C, AND D AS APPROPRIATE.
18. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES TWO 12'-6" SECTIONS OF EITHER W-BEAM OR THRIE-BEAM RAIL ELEMENTS, W-BEAM TO THRIE-BEAM TRANSITION SECTION FABRICATED STEEL ITEMS, TERMINAL SECTION BRIDGE CONNECTION, RUBBING RAIL, RUBBING RAIL CONNECTIONS, BOLTS, POSTS, OFFSET BRACKETS, STEEL SPACER TUBE AND ASSOCIATED HARDWARE. END TRANSITIONS ARE ROADWAY ITEMS.
19. FOR THE PA BRIDGE BARRIER TRANSITION CONNECTION, CONNECTION PLATES SHALL MEET THE REQUIREMENTS OF ASTM A709 GRADE 36 KSI STEEL. BOLTS, NUTS, AND WASHERS SHALL MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(c).
20. REFER TO SHEET 3 FOR PHOTOS OF: GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); AND TYPICAL STEEL SPACER TUBE INSTALLATION.
21. AN INSTALLATION HEIGHT TOLERANCE OF PLUS 1" TO MINUS 1" FOR THE W-BEAM OR THRIE-BEAM GUIDE RAIL SECTIONS IS PERMITTED.

POST	LENGTH	SIZE
1 THRU 3	8'-0"	W8x21
4 THRU 6	7'-0"	W6x9
7 THRU 11	6'-0"	W6x9

LEGEND

SEE BC-739M, SHEET 1 FOR BRIDGE BARRIER HEIGHT.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL CONCRETE BRIDGE BARRIER

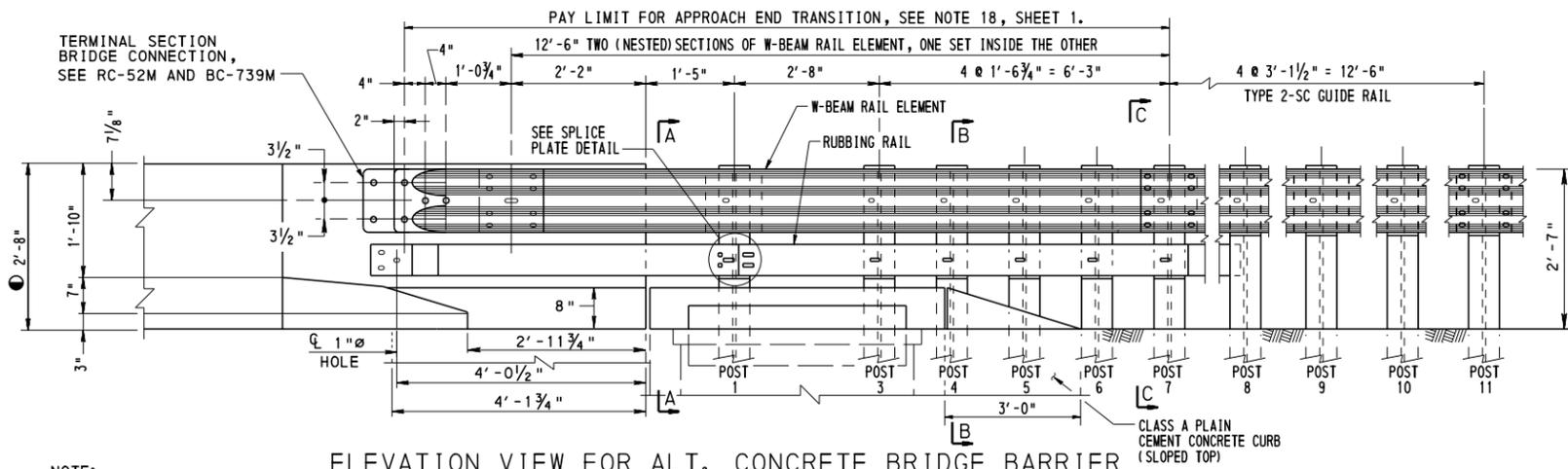
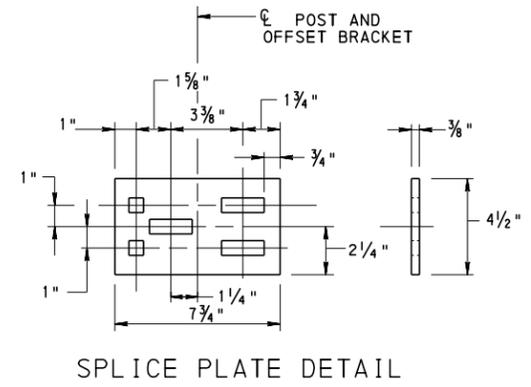
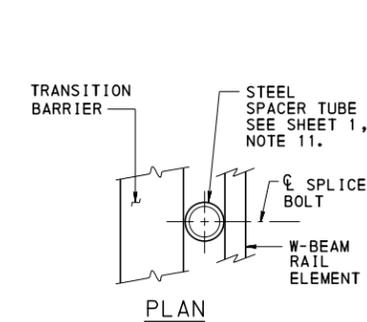
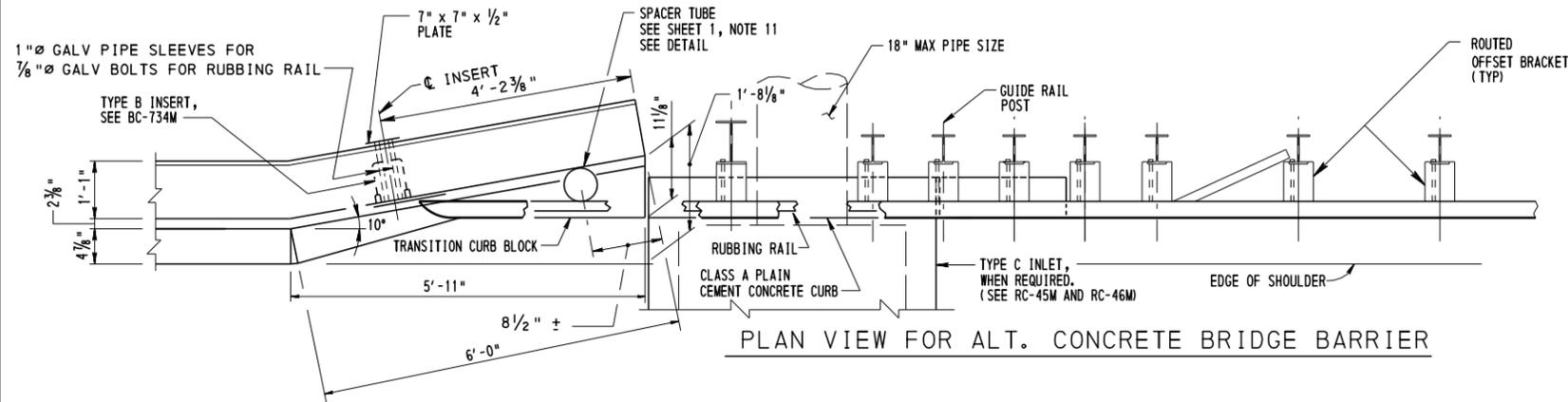
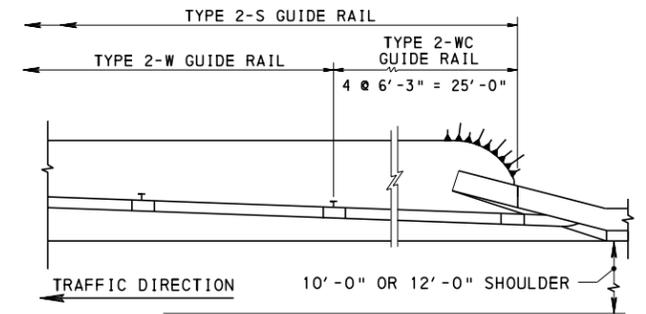
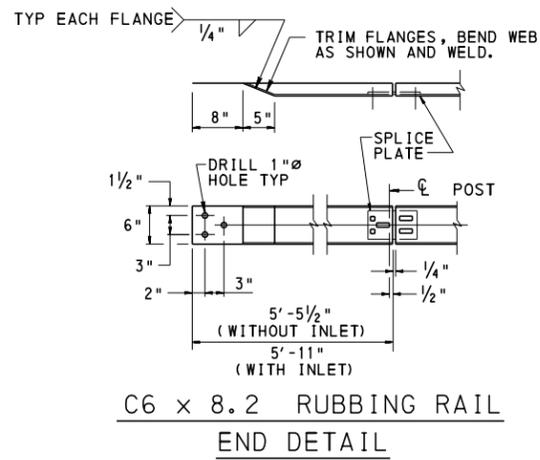
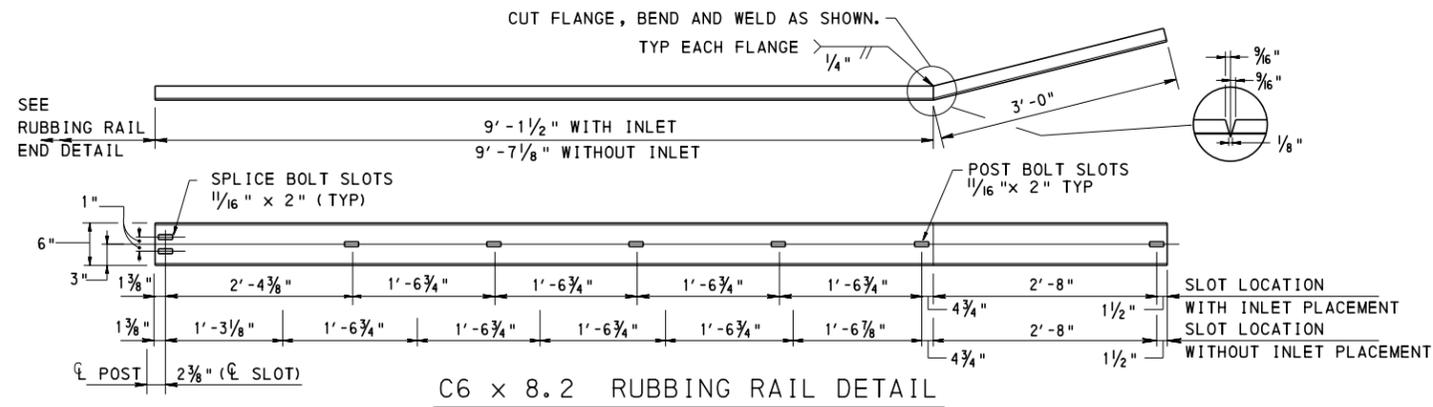
RC-45M	INLET TOPS, GRATES, AND FRAMES
RC-46M	INLET BOXES
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
RC-59M	CONCRETE GLARE SCREEN
BC-703M	THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-712M	THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	TYPE F-BRIDGE BARRIER TO GUIDE RAIL TRANSITION

RECOMMENDED SEPT. 15, 2016  
Melissa J. Betub  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
Burt J. Degan  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 16  
RC-50M

RC-45M	INLET TOPS, GRATES, AND FRAMES
RC-46M	INLET BOXES
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
RC-59M	CONCRETE GLARE SCREEN
BC-703M	THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-712M	THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	TYPE F-BRIDGE BARRIER TO GUIDE RAIL TRANSITION

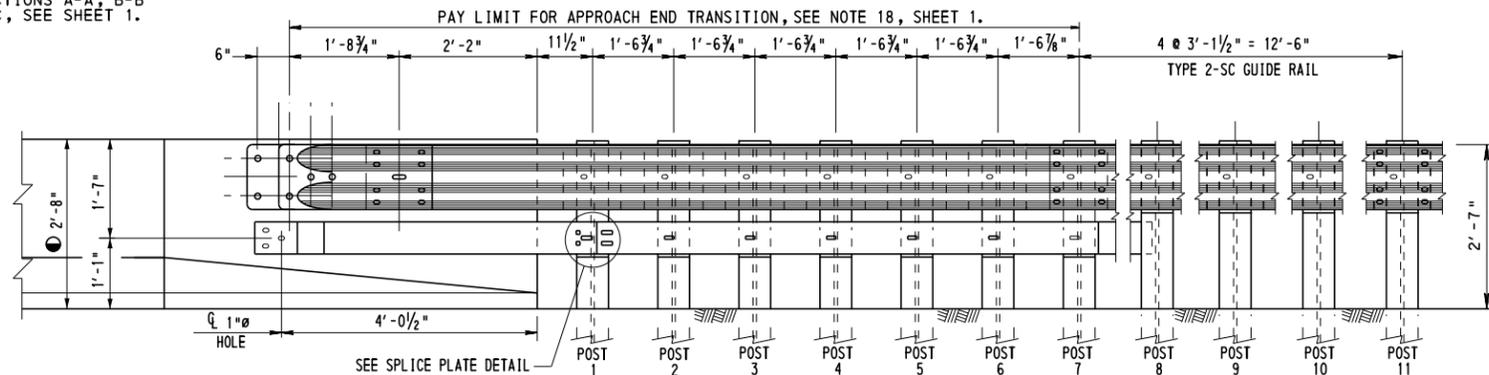


SECTION  
STEEL SPACER TUBE DETAIL

NOTES

1. THE GUIDE RAIL TRANSITION DETAILS ON THIS SHEET ARE ALSO TO BE USED FOR TRANSITIONS TO THE PA HT BRIDGE BARRIERS.
2. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, SHEET 1.
3. FOR ADDITIONAL NOTES AND LEGEND, SEE SHEET 1.
4. FOR PHOTO OF TYPICAL STEEL SPACER TUBE INSTALLATION, SEE SHEET 3.

NOTE:  
FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 1.



NOTE:  
TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.

ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER (WITHOUT INLET PLACEMENT)

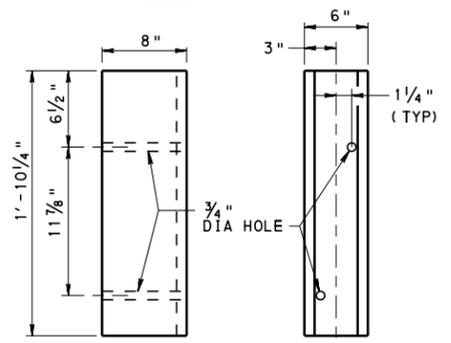
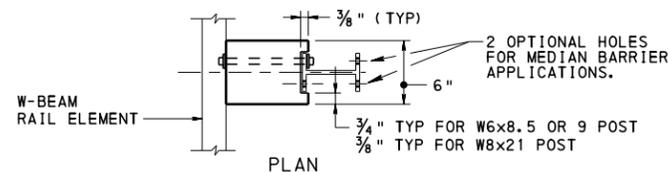
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
ALTERNATE CONCRETE BRIDGE BARRIER

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce E. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 16  
RC-50M



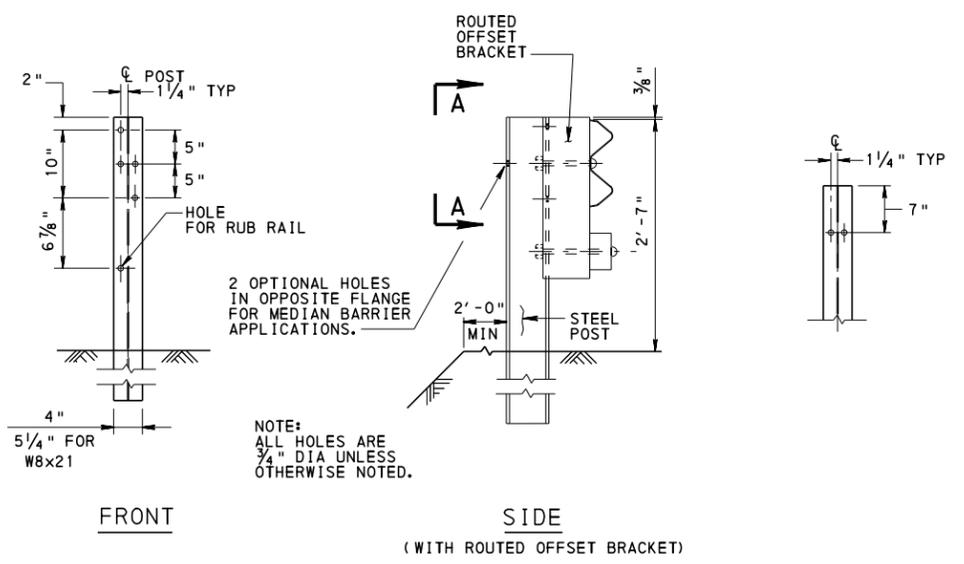
**ROUTED OFFSET BRACKET**  
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER  
TRANSITION POSTS 1 THRU 7, SEE SHEETS 1 AND 2.



**GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION**  
(WITHOUT INLET PLACEMENT)  
FOR DETAILS, SEE SHEET 1



**TYPICAL STEEL SPACER TUBE INSTALLATION**  
FOR DETAILS, SEE SHEETS 1 AND 2



**W6 x 8.5 or 9 POST DETAILS**  
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER  
TRANSITION POSTS 4 THRU 7.  
NOTE: W8x21 POSTS 1 THRU 3  
SIMILAR, SEE DETAILS ON  
SHEETS 1 AND 2.

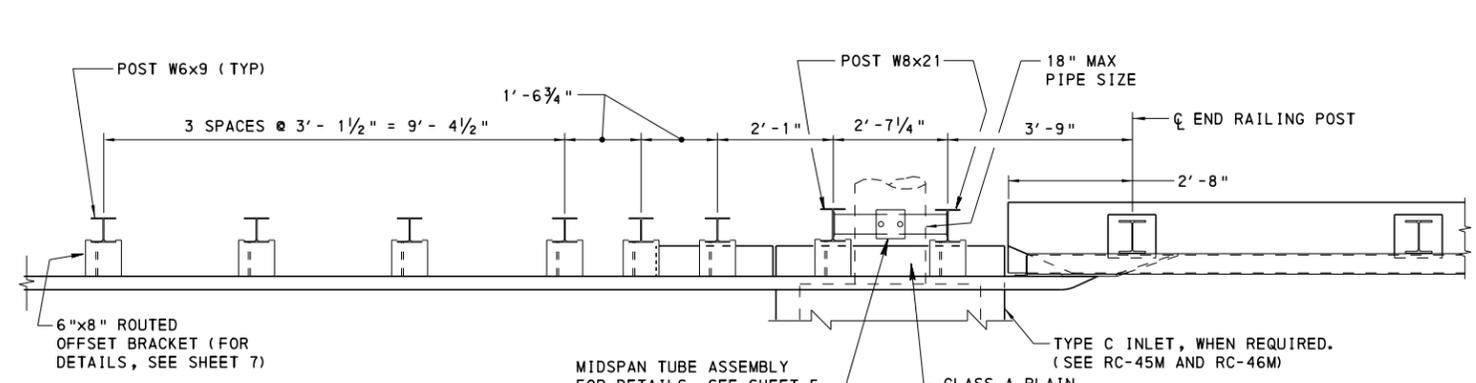


**ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION**  
(WITHOUT INLET PLACEMENT)  
FOR DETAILS, SEE SHEET 1

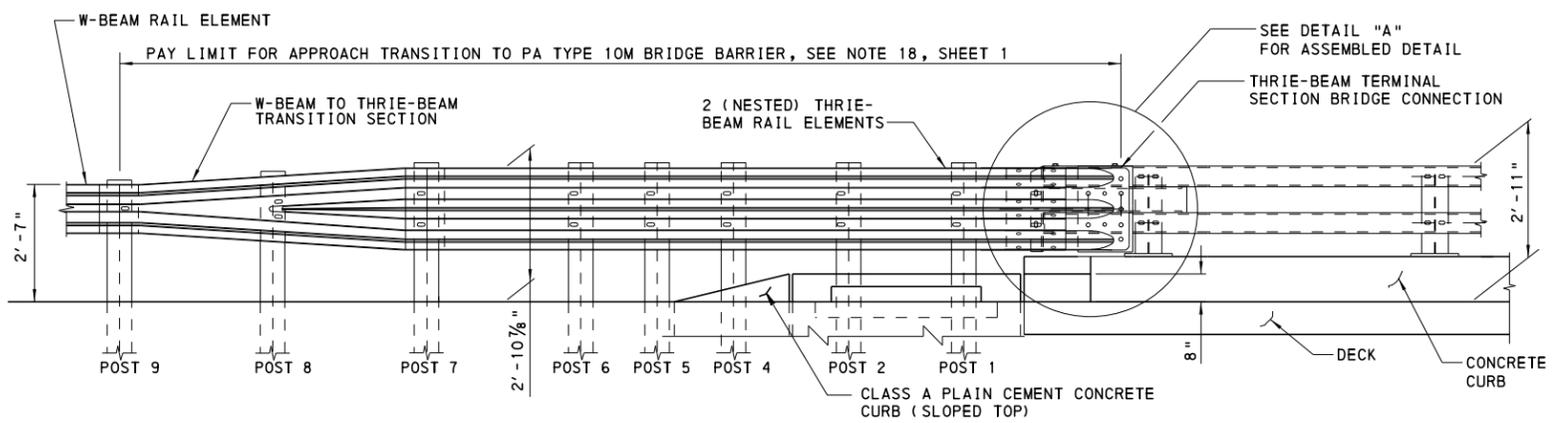
**NOTES**

1. FOR APPROACH TRANSITION POST HEIGHTS, SEE SHEETS 1 AND 2.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, ON SHEET 1.

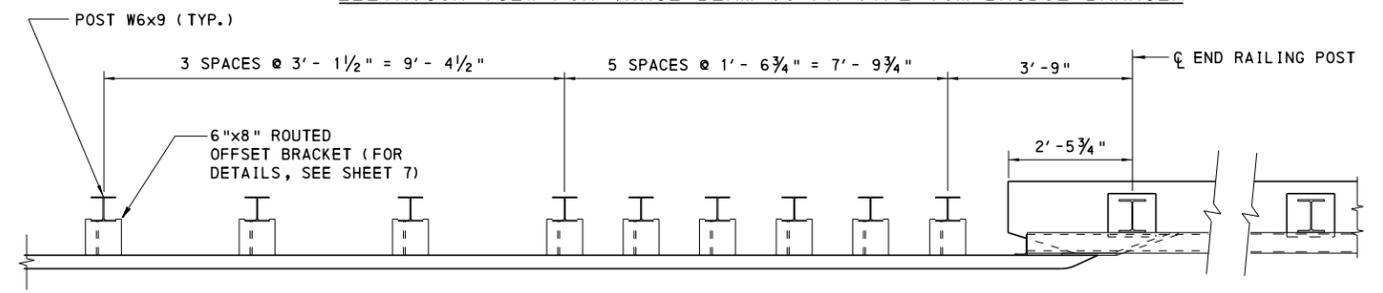
<p><b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF PROJECT DELIVERY</p>		
<p><b>GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS</b></p> <p><b>TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS</b></p>		
<p>RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION</p>	<p>RECOMMENDED SEPT. 15, 2016 <i>Burt E. Johnson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY</p>	<p>SHT 3 OF 16 <b>RC-50M</b></p>



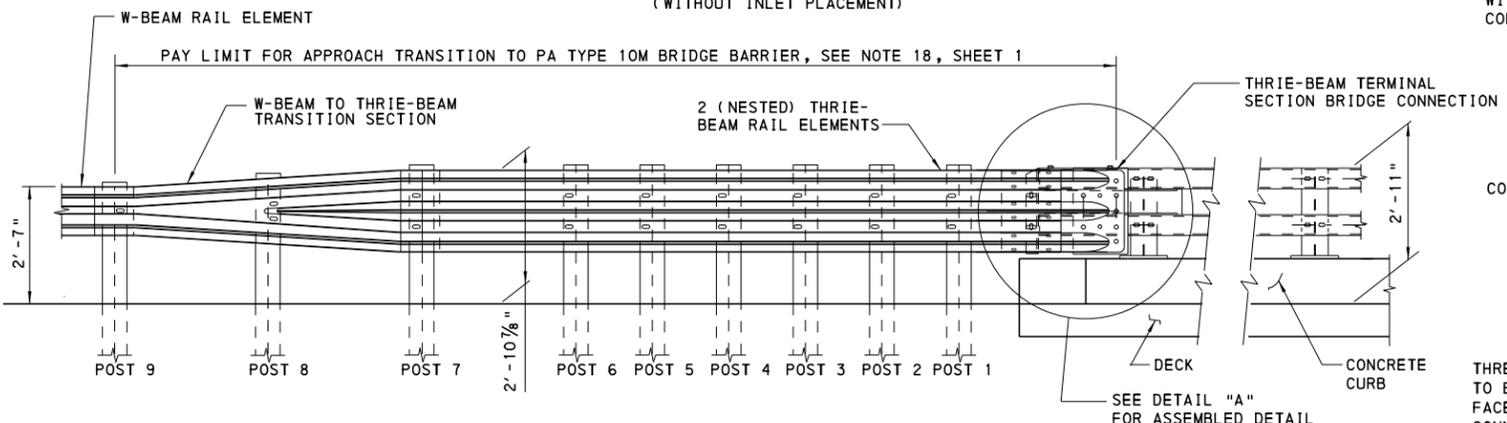
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



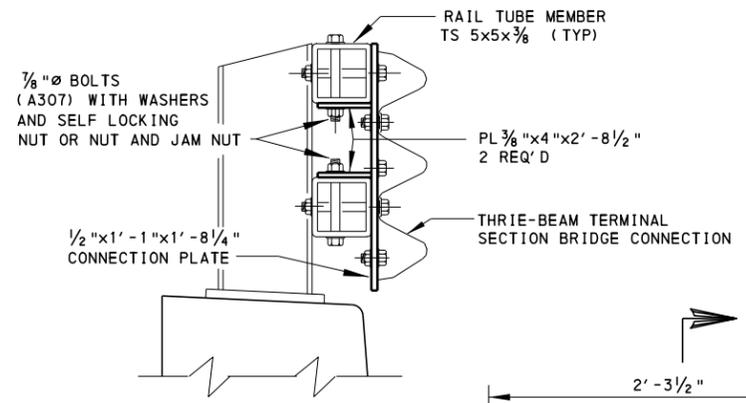
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



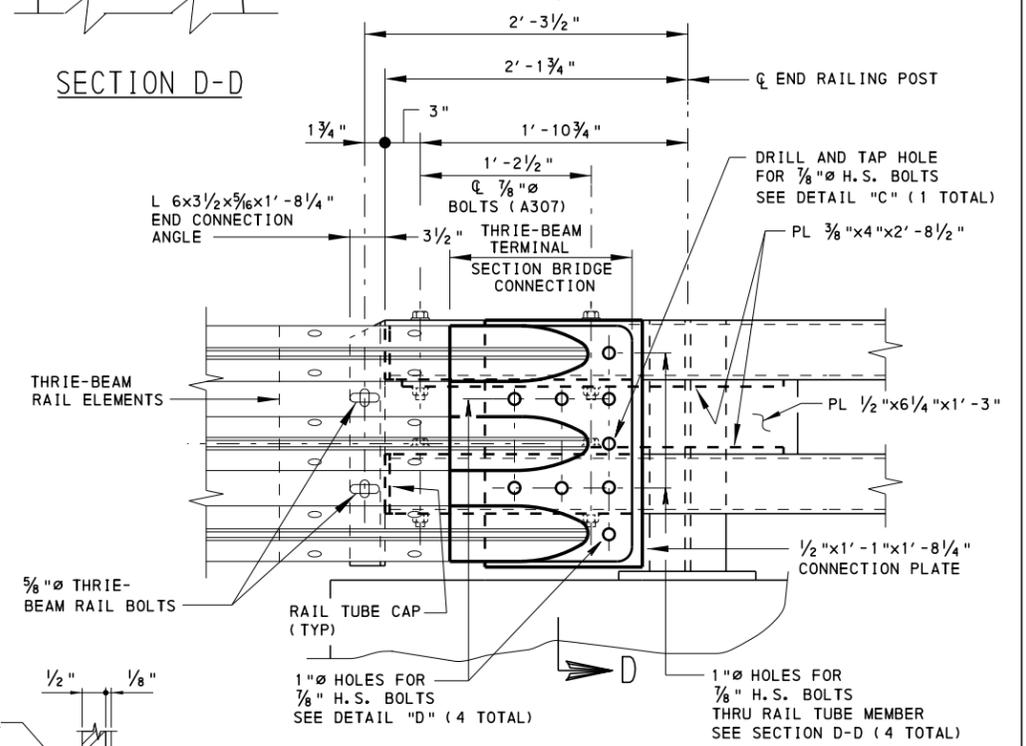
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER (WITHOUT INLET PLACEMENT)



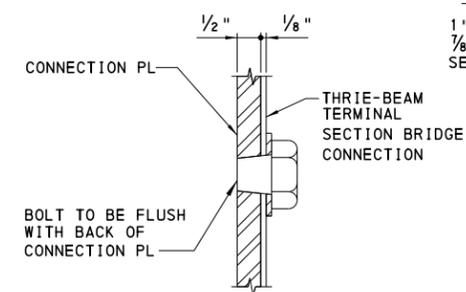
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER (WITHOUT INLET PLACEMENT)



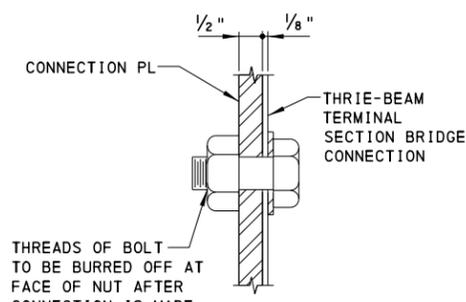
SECTION D-D



DETAIL A (FOR UNASSEMBLED DETAILS, SEE SHEET 6)



DETAIL "C"



DETAIL "D"

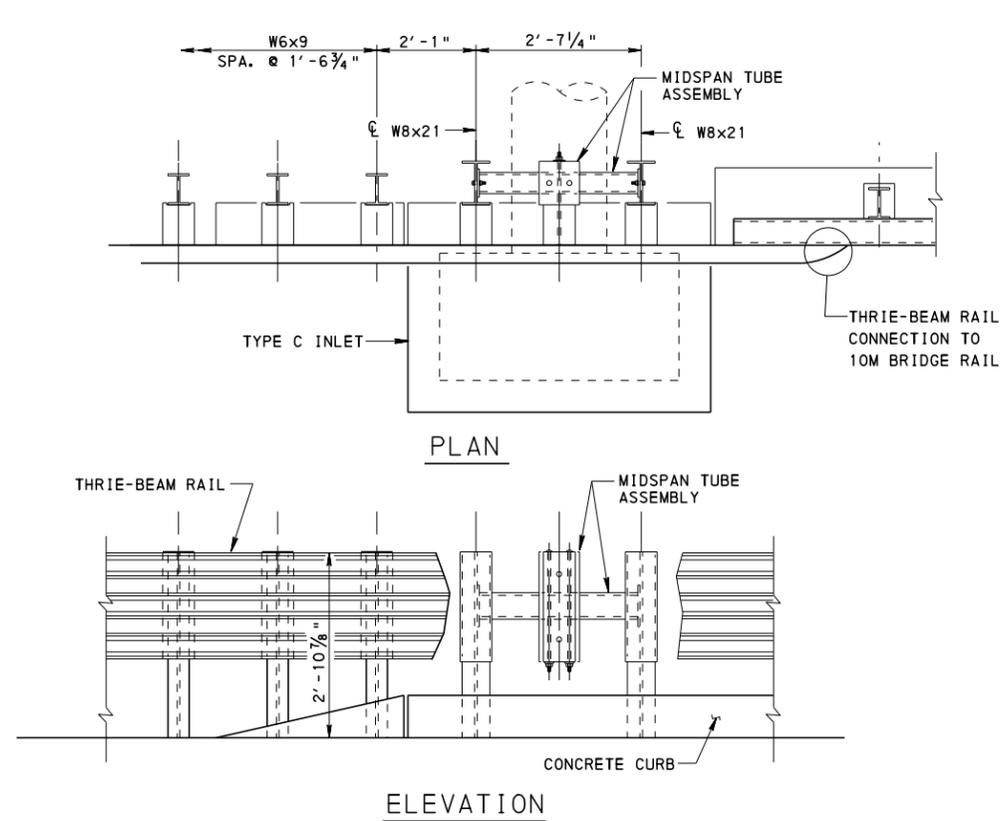
- NOTES
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
  2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.
  3. FOR LOCATION WITH INLET PLACEMENT, POST 3 IS OMITTED.
  4. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

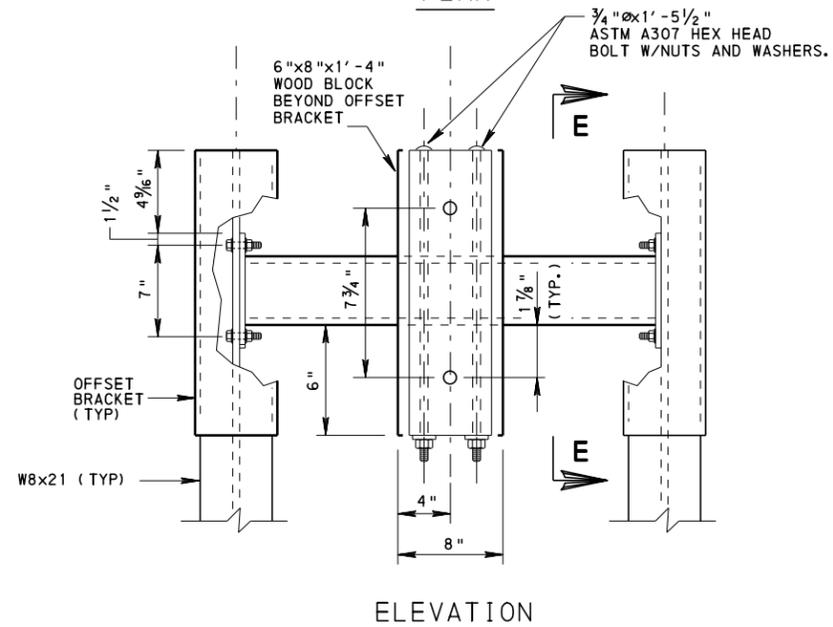
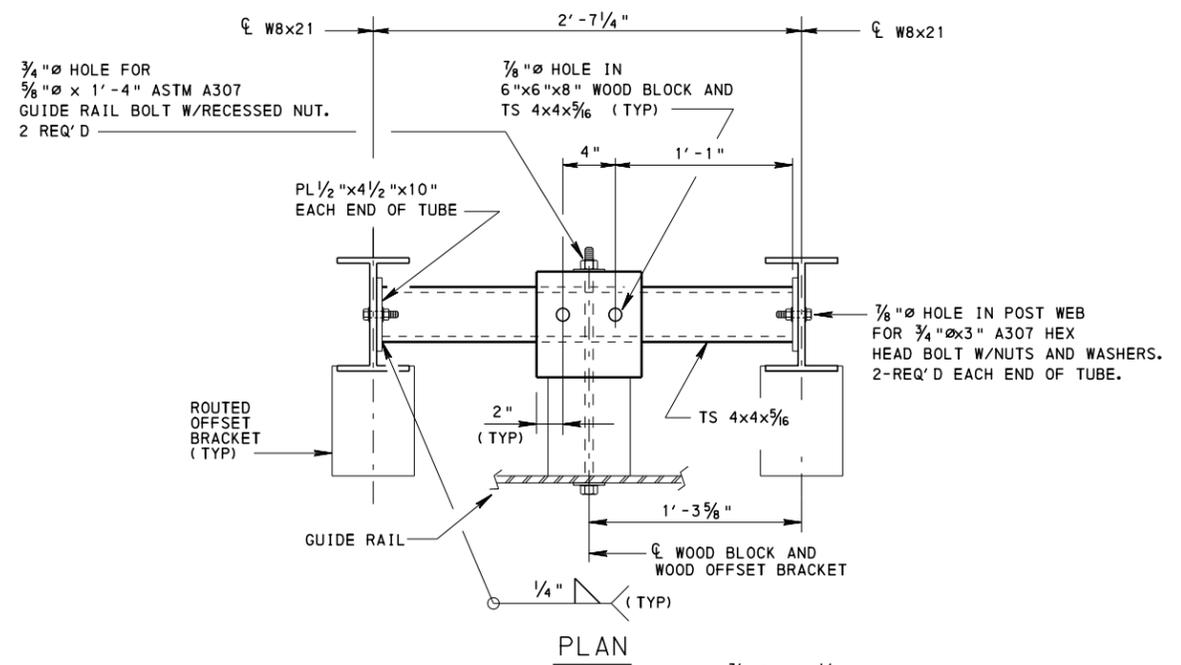
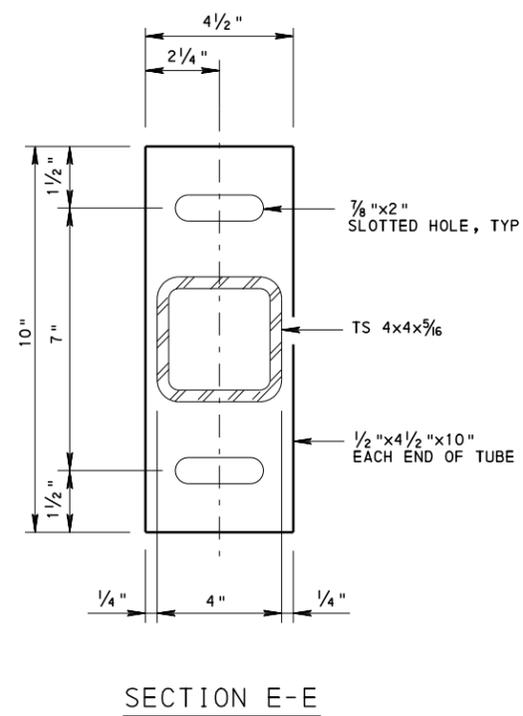
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER

BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION	RECOMMENDED SEPT. 15, 2016	RECOMMENDED SEPT. 15, 2016	SHT 4 OF 16
BC-709M	PA TYPE 10M BRIDGE BARRIER	<i>Melissa J. Betak</i>	<i>Brian J. Lyons</i>	RC-50M
REFERENCE DRAWINGS		CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	



**THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION DETAILS**



**MIDSPAN TUBE ASSEMBLY DETAILS**

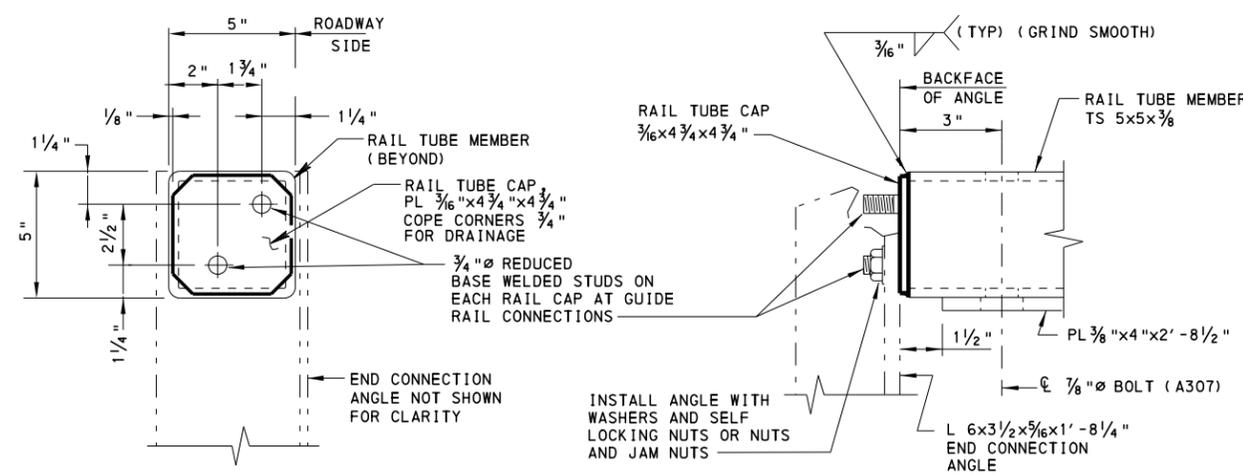
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER  
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Dwyer*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

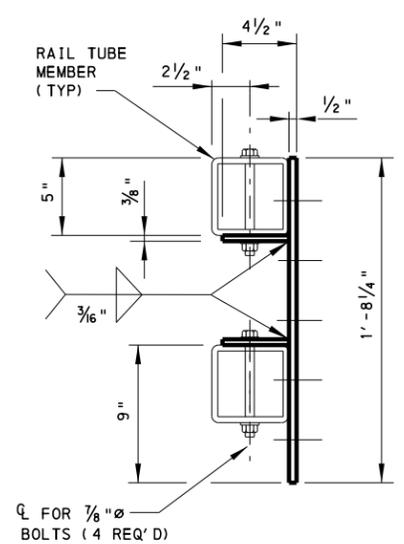
SHT 5 OF 16  
RC-50M



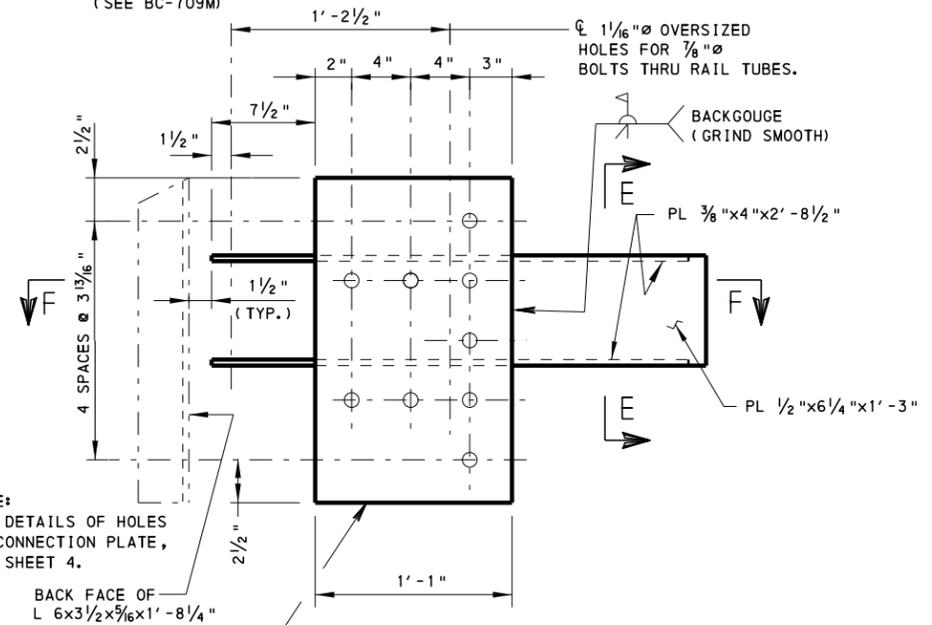
END VIEW

ELEVATION VIEW  
TOP RAIL TUBE MEMBER SHOWN, BOTH TUBES (TYP)

RAIL TUBE CAP DETAIL  
(SEE BC-709M)

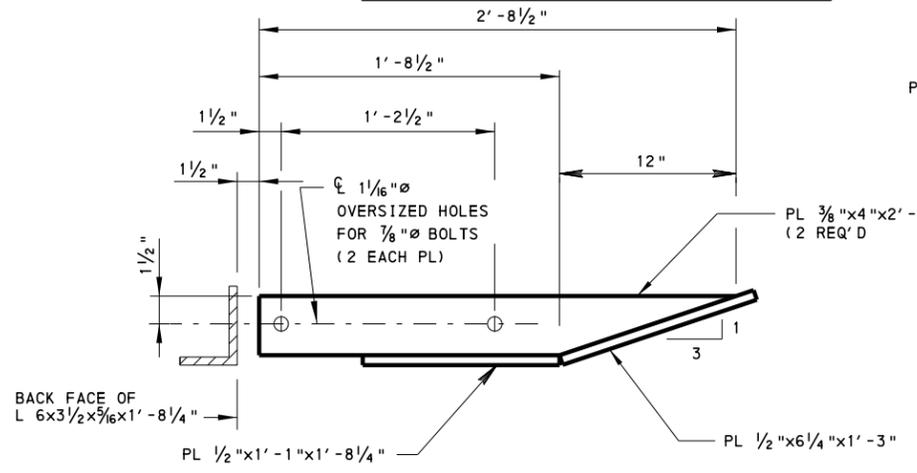


END VIEW

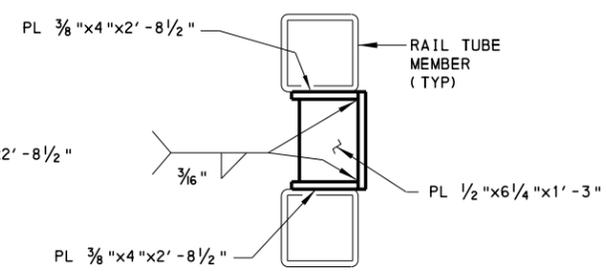


ELEVATION VIEW  
(RAIL TUBES NOT SHOWN FOR CLARITY)

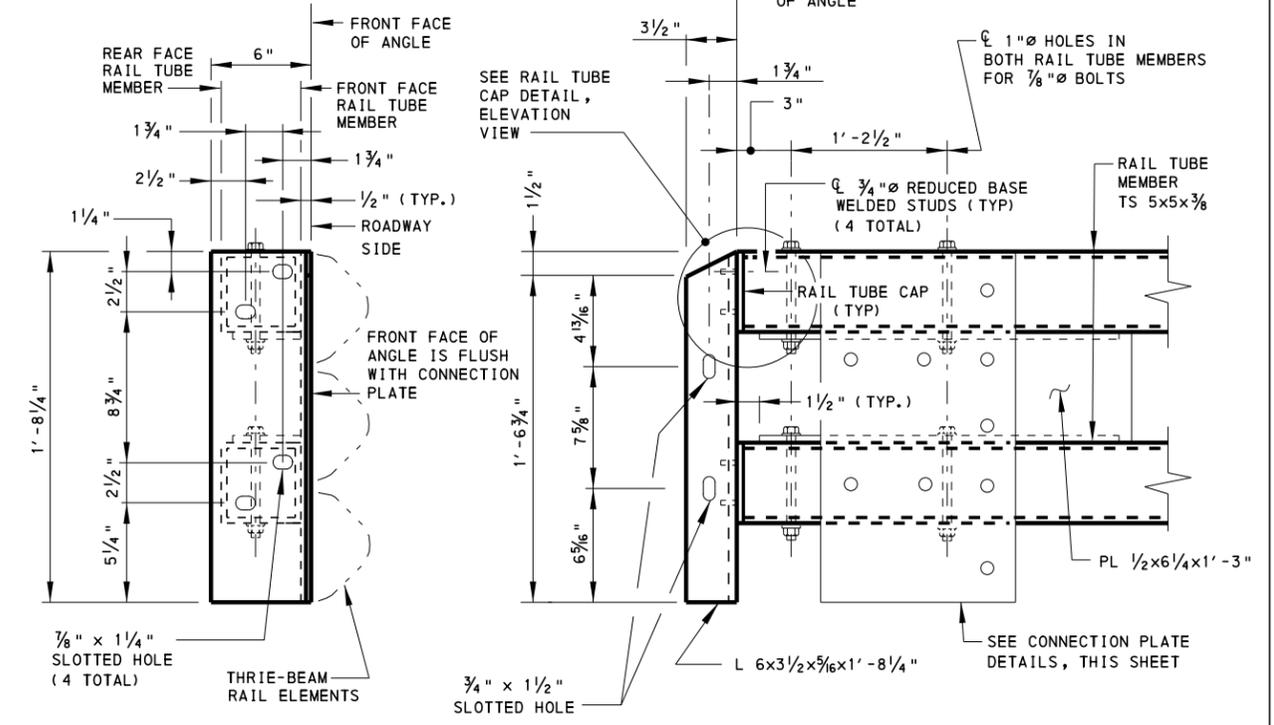
CONNECTION PLATE ASSEMBLY DETAILS



SECTION F-F  
(RAIL TUBES NOT SHOWN FOR CLARITY)



SECTION E-E



END VIEW

ELEVATION VIEW

END CONNECTION ANGLE DETAILS

THRIE-BEAM RAIL ELEMENTS NOT SHOWN FOR CLARITY.

NOTES

1. USE THIS SHEET WITH SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 4.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO PA TYPE 10M  
BRIDGE BARRIER  
CONNECTION PLATE DETAILS

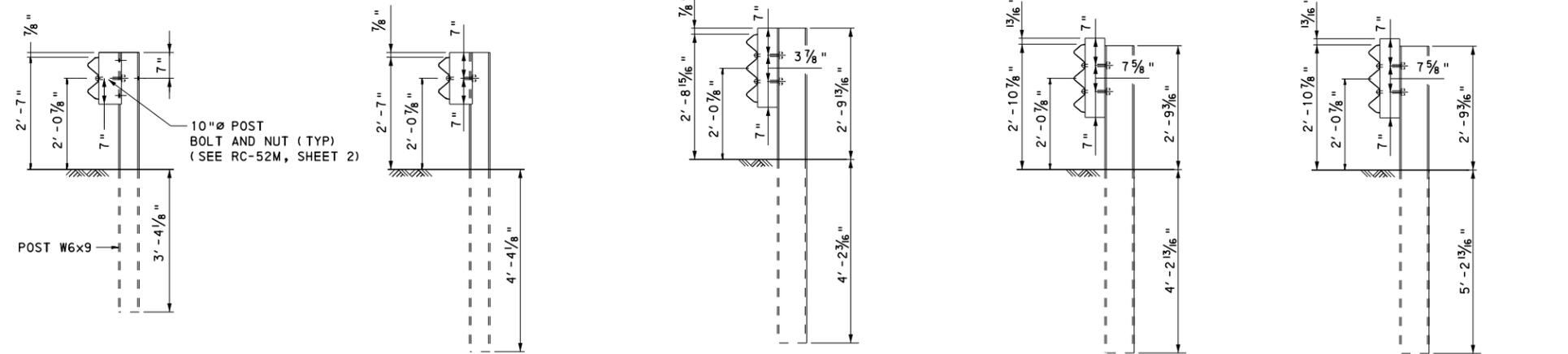
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
REFERENCE DRAWINGS	

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Dyer*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 6 OF 16  
RC-50M

TABLE B		
WITHOUT INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 9	7'-0"	W6x9
BEYOND 9	6'-0"	W6x9
WITH INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 2	8'-0"	W8x21
4 THRU 9	7'-0"	W6x9
BEYOND 9	6'-0"	W6x9



**BEYOND POST 9**  
(AT W-BEAM RAIL ELEMENT)

- SEE NOTE 7, SHEET 1.
- FOR POST DETAILS SEE RC-52M, SHEET 1.

W6x9 STEEL POST 7'-0" LONG  
w/6"x8"x1'-2" ROUTED OFFSET BRACKET

**POST 9**

W6x9 STEEL POST 7'-0" LONG  
w/6"x8"x1'-5 5/8" ROUTED OFFSET BRACKET

**POST 8**

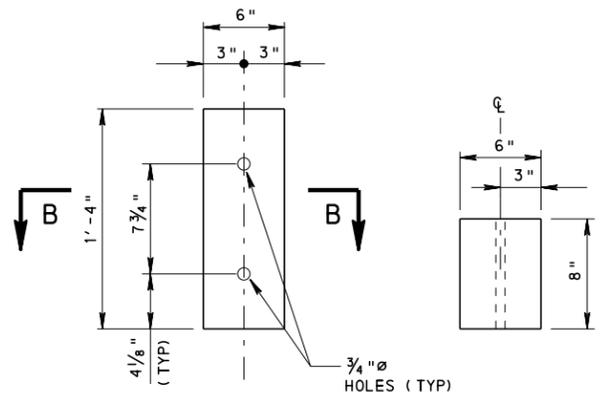
W6x9 STEEL POST 7'-0" LONG  
w/ROUTED OFFSET BRACKET (SEE DETAIL)

**POSTS 1 THRU 7**  
(WITHOUT INLET PLACEMENT)

**POSTS 4 THRU 7 \***  
(WITH INLET PLACEMENT)

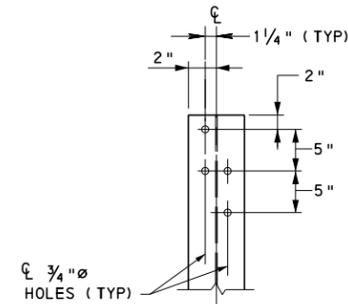
W8x21 STEEL POSTS 8'-0" LONG  
w/ROUTED OFFSET BRACKET (SEE DETAIL)

**POSTS 1 AND 2**  
(WITH INLET PLACEMENT)

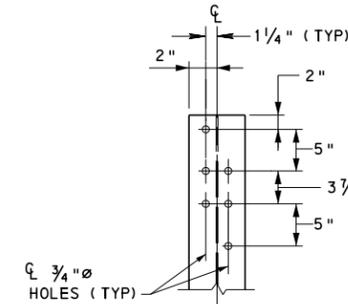


**ELEVATION SECTION B-B**

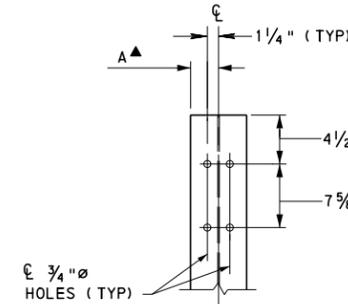
**MIDSPAN TUBE  
WOOD OFFSET BRACKET**



**POST 9**



**POST 8**



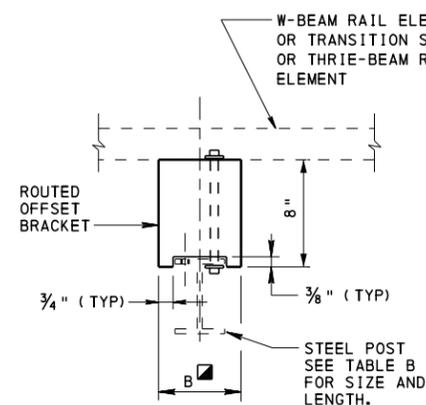
**POSTS 1 THRU 7 \***

\* AT LOCATIONS WITH INLET PLACEMENT  
POST 3 IS OMITTED AND POSTS 1 AND 2  
ARE W8x21 (SEE TABLE B).

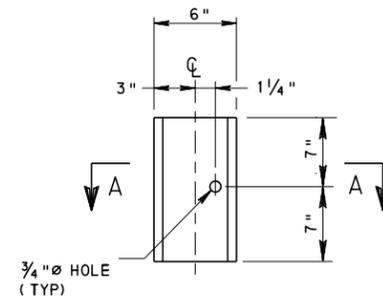
▲ A= 2" FOR W6x9  
A= 2 5/8" FOR W8x21

■ B= 6" FOR W6x9  
B= 7 1/4" FOR W8x21

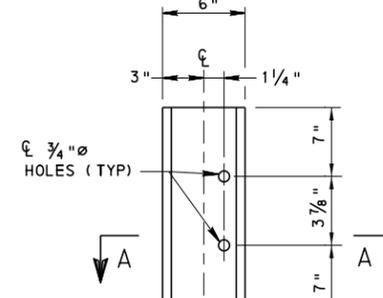
**POST DETAILS**



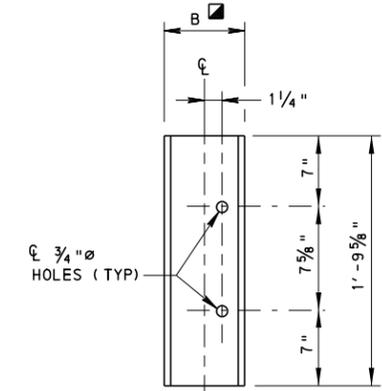
**SECTION A-A**



**POST 9**



**POST 8**



**POSTS 1 THRU 7 \***

**ROUTED OFFSET BRACKET DETAILS**

**NOTES**

1. FOR LOCATION OF POSTS, SEE SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

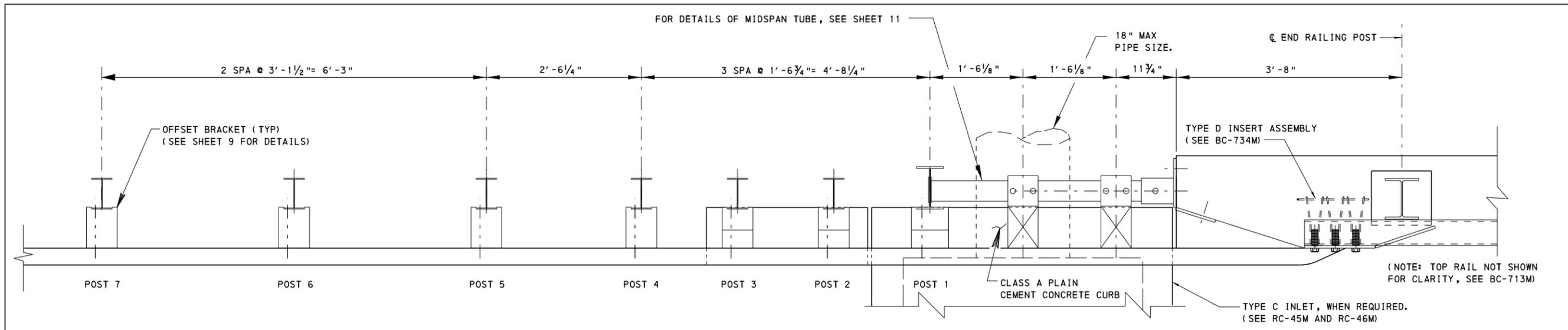
**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY**

**GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO PA TYPE 10M  
BRIDGE BARRIER  
POST AND OFFSET BRACKET DETAILS**

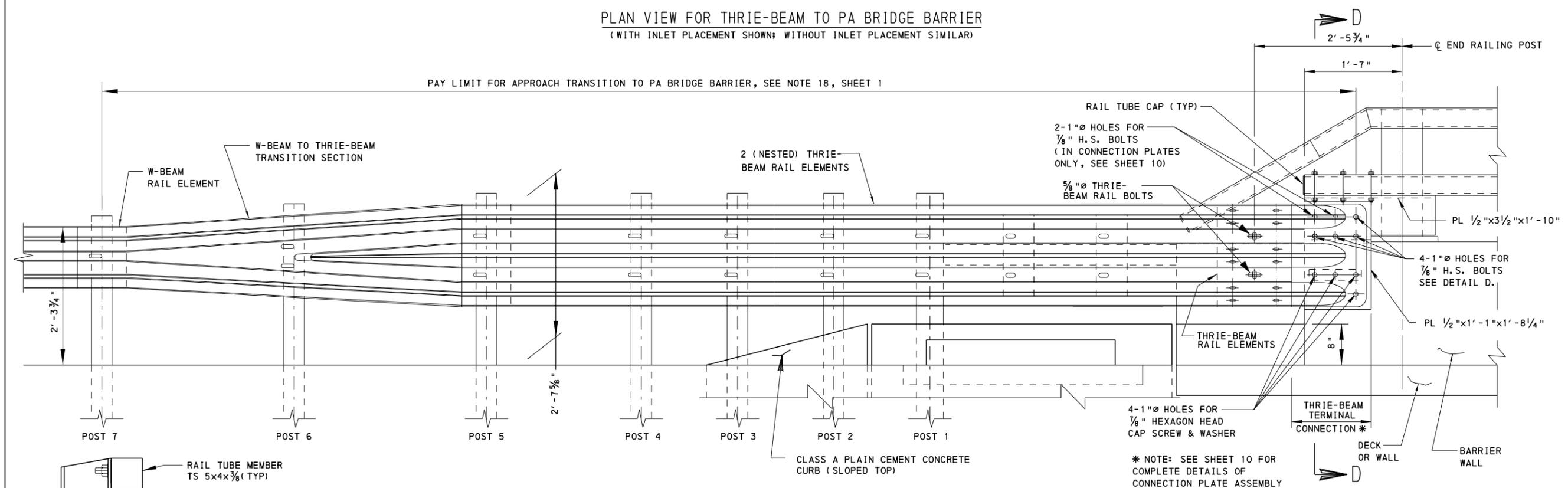
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce E. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

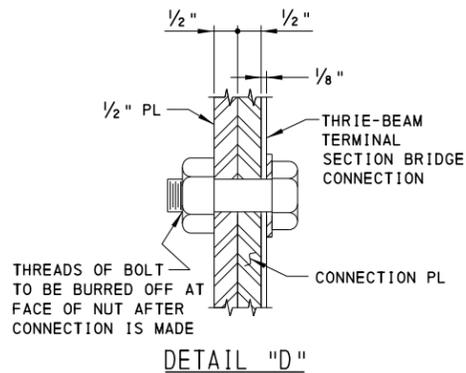
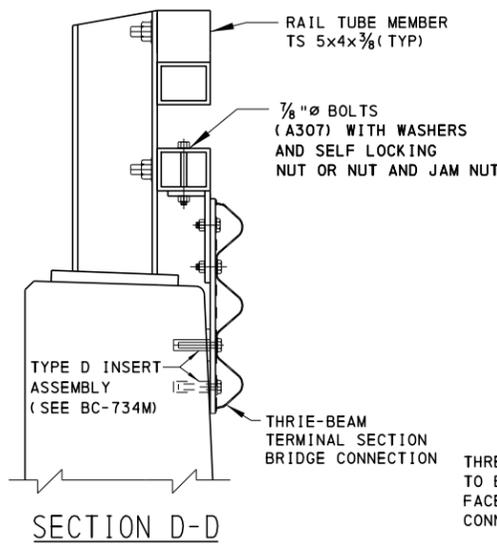
SHT 7 OF 16  
**RC-50M**



PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER  
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER  
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



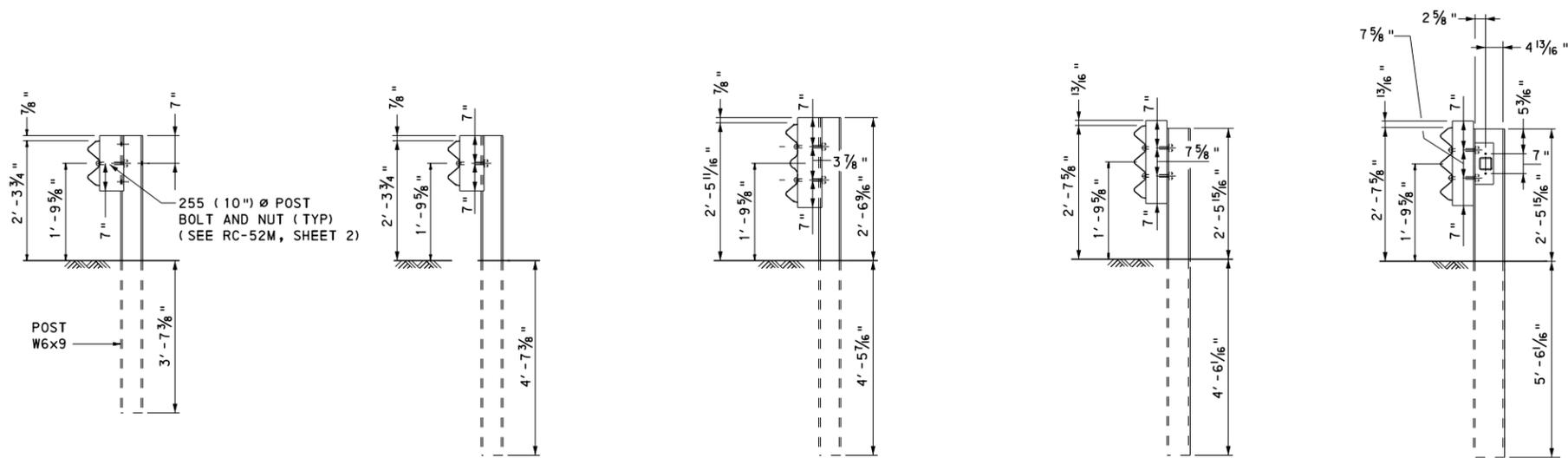
NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
3. FOR ADDITIONAL PA BRIDGE BARRIER NOTES, SEE SHEET 1.
4. SEE BC-712M AND BC-713M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
THRIE-BEAM TO PA BRIDGE BARRIER

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt J. Iwan</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 8 OF 16 RC-50M
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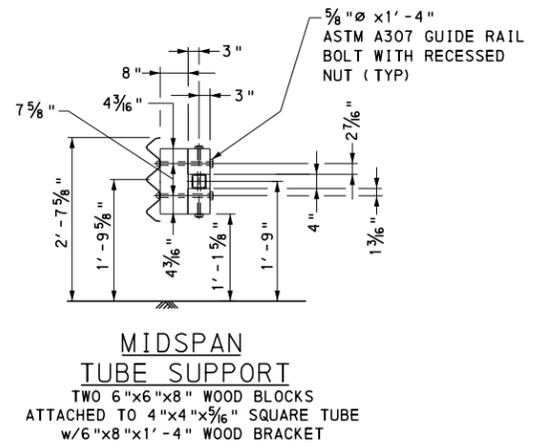
**BEYOND POST 7**  
(AT W-BEAM RAIL ELEMENT)  
SEE NOTE 7, SHEET 1.  
FOR POST DETAILS SEE  
RC-52M, SHEET 1.

W6x9 STEEL POST 7'-0" LONG  
w/6"x8"x1'-2" ROUTED OFFSET BRACKET

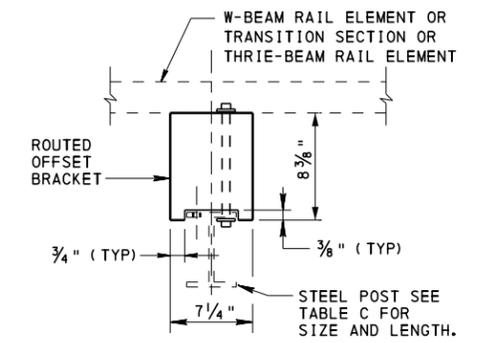
W6x9 STEEL POST 7'-0" LONG  
w/6"x8"x1'-5 1/8" ROUTED OFFSET BRACKET

W6x9 STEEL POST  
7'-0" LONG w/ROUTED OFFSET  
BRACKET (SEE DETAIL)

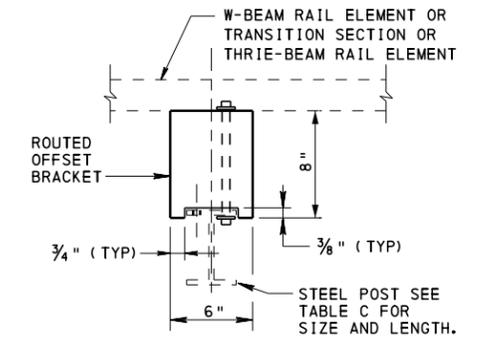
W8x21 STEEL POSTS  
8'-0" LONG w/ROUTED OFFSET  
BRACKET (SEE DETAIL)



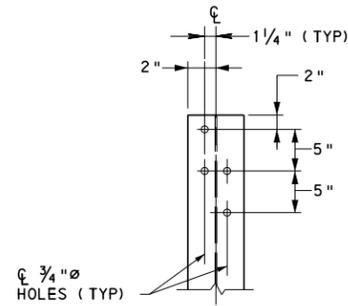
**MIDSPAN  
TUBE SUPPORT**  
TWO 6"x6"x8" WOOD BLOCKS  
ATTACHED TO 4"x4"x3/8" SQUARE TUBE  
w/6"x8"x1'-4" WOOD BRACKET



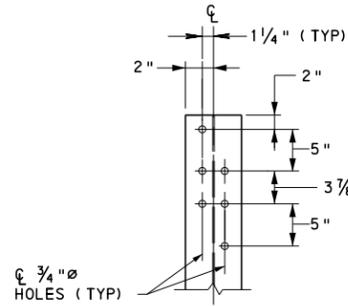
**SECTION A-A**



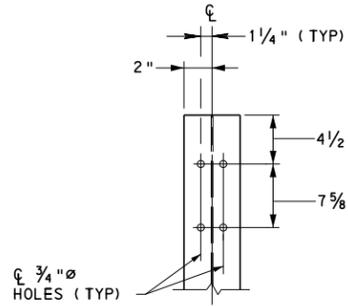
**SECTION B-B**



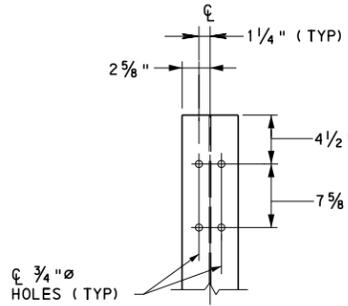
**POST 7**



**POST 6**



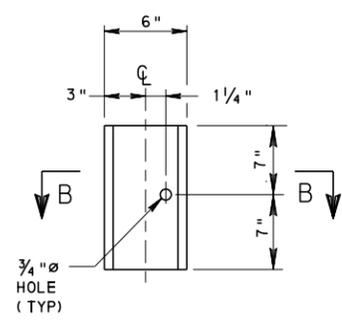
**POSTS 2 THRU 5**



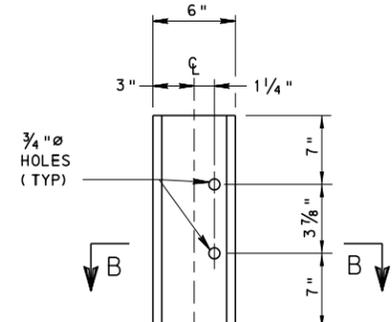
**POST 1**

TABLE C		
POSTS	LENGTH	SIZE
1	8'-0"	W8x21
2 THRU 7	7'-0"	W6x9
BEYOND 7	6'-0"	W6x9

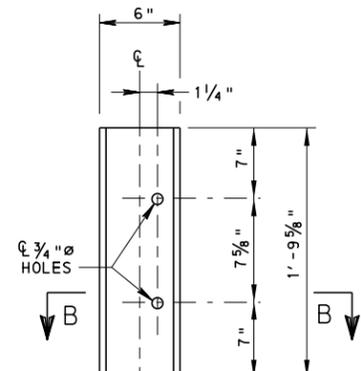
**POST DETAILS**



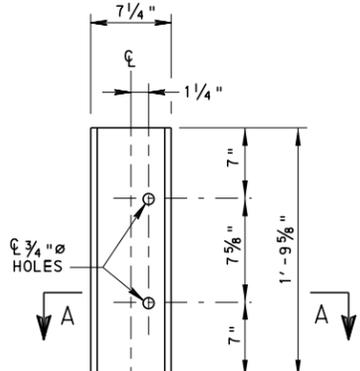
**POST 7**



**POST 6**



**POSTS 2 THRU 5**



**POST 1**

**ROUTED OFFSET BRACKET DETAILS**

**NOTES**

- FOR LOCATION OF POSTS, SEE SHEET 8.
- FOR ADDITIONAL NOTES, SEE SHEET 1.

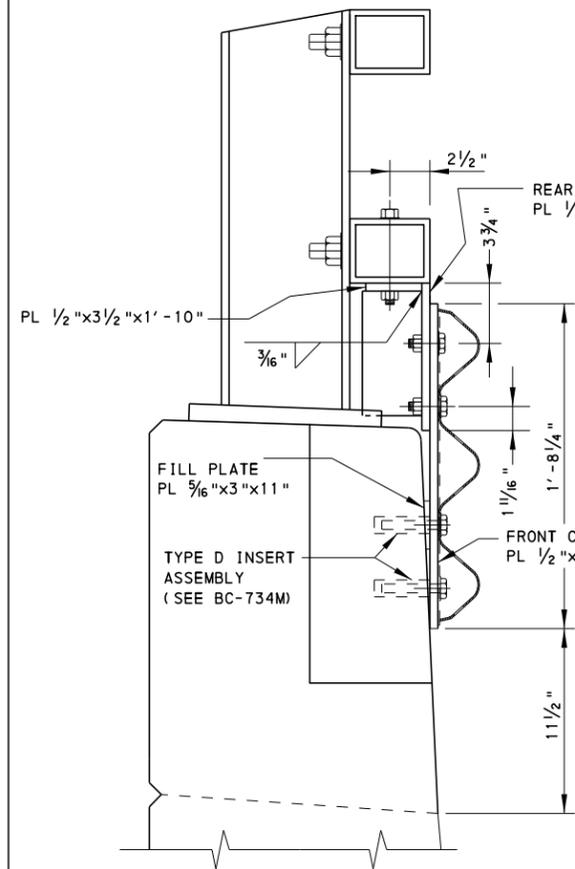
**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY**

**GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO PA  
BRIDGE BARRIER  
POST AND OFFSET BRACKET DETAILS**

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

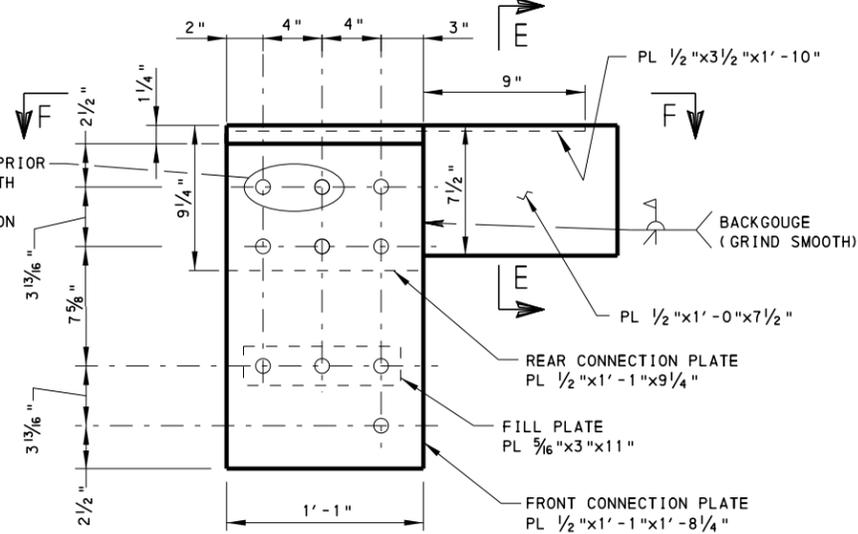
SHT 9 OF 16  
**RC-50M**



END VIEW

(DELINEATOR NOT SHOWN FOR CLARITY)

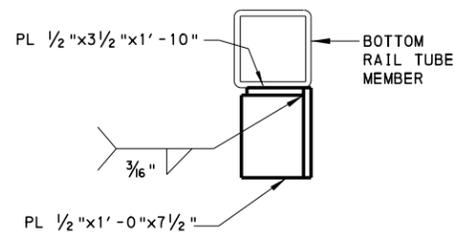
INSTALL BOLTS PRIOR  
TO ASSEMBLY WITH  
THRIE-BEAM  
TERMINAL SECTION



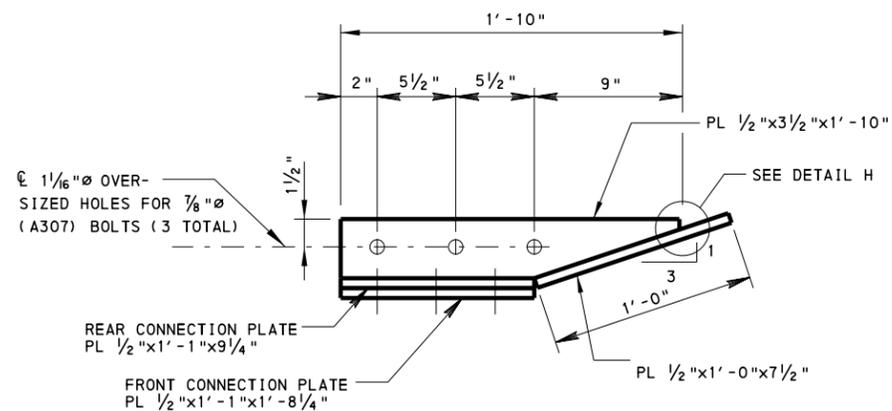
ELEVATION VIEW

(RAIL TUBES NOT SHOWN  
FOR CLARITY)

CONNECTION PLATE ASSEMBLY DETAILS

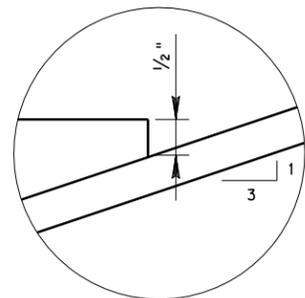


SECTION E-E

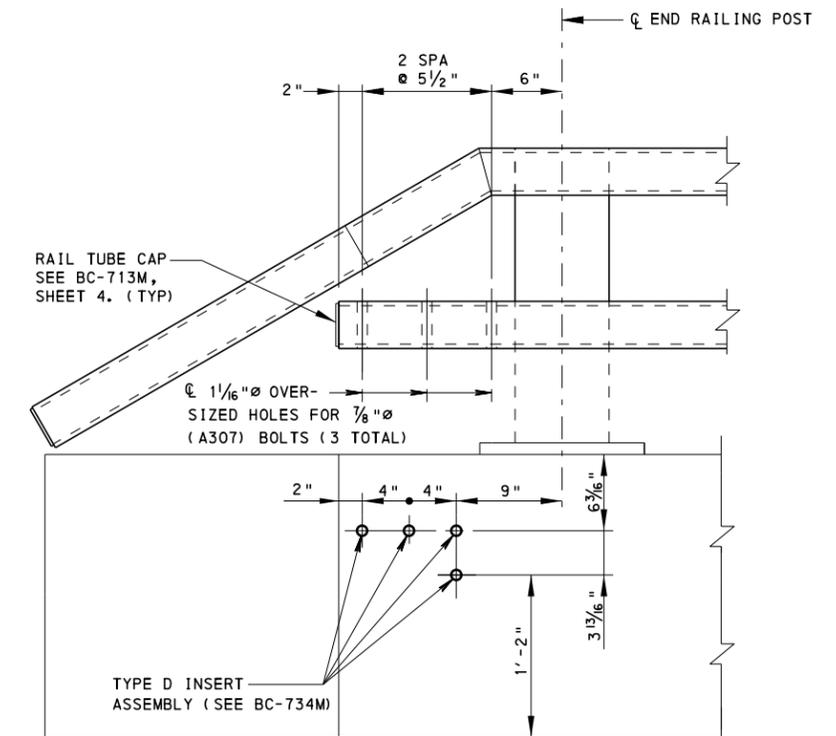


SECTION F-F

(RAIL TUBES NOT SHOWN FOR CLARITY)

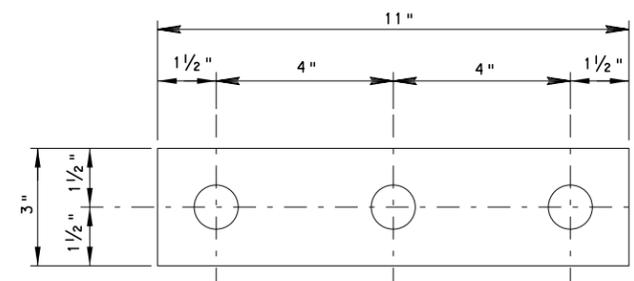


DETAIL H



END OF RAIL DETAIL

(CONNECTION PLATES NOT SHOWN)



FILL PLATE DETAIL

NOTES

1. USE THIS SHEET WITH SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 8.
3. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M AND BC-713M.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER  
CONNECTION PLATE DETAILS

RECOMMENDED SEPT. 15, 2016

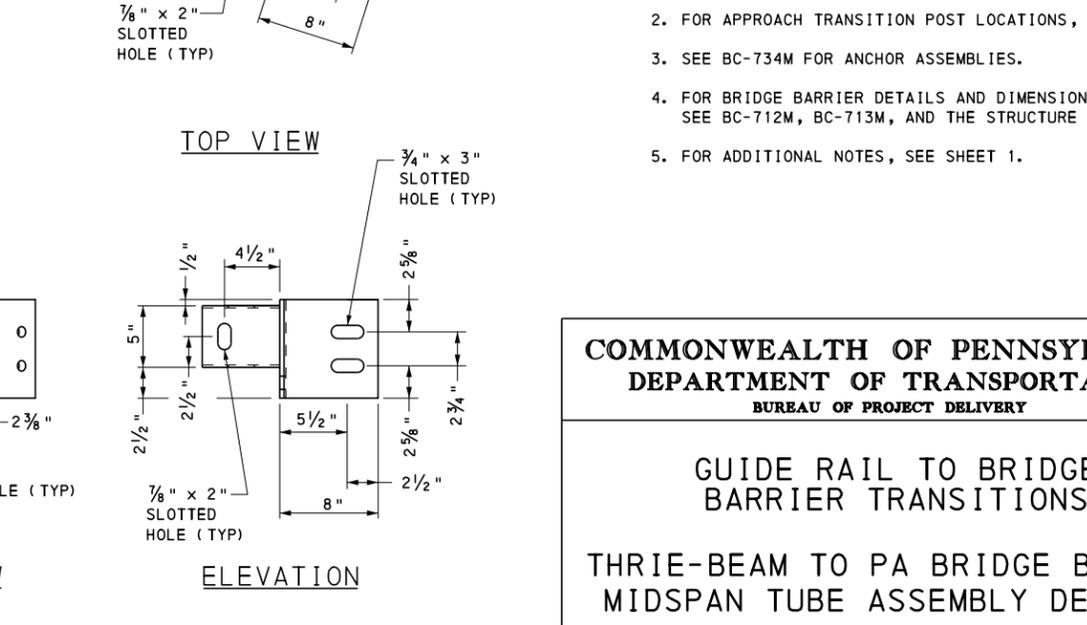
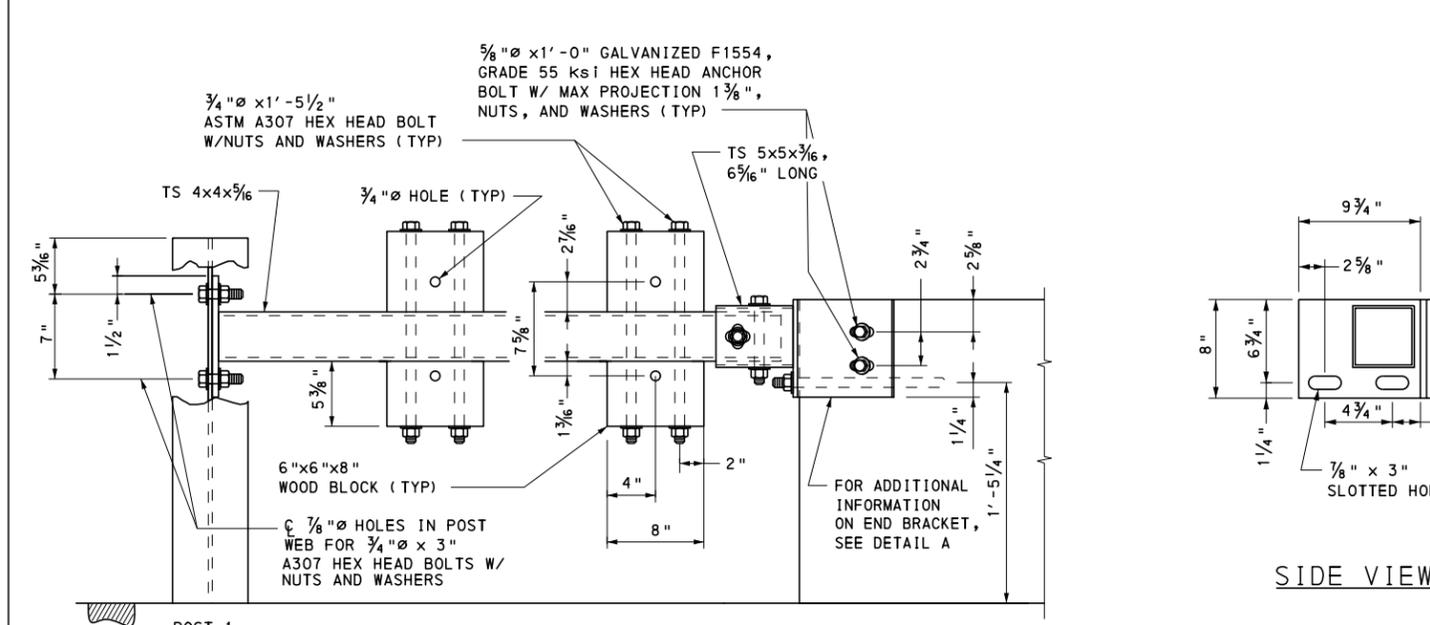
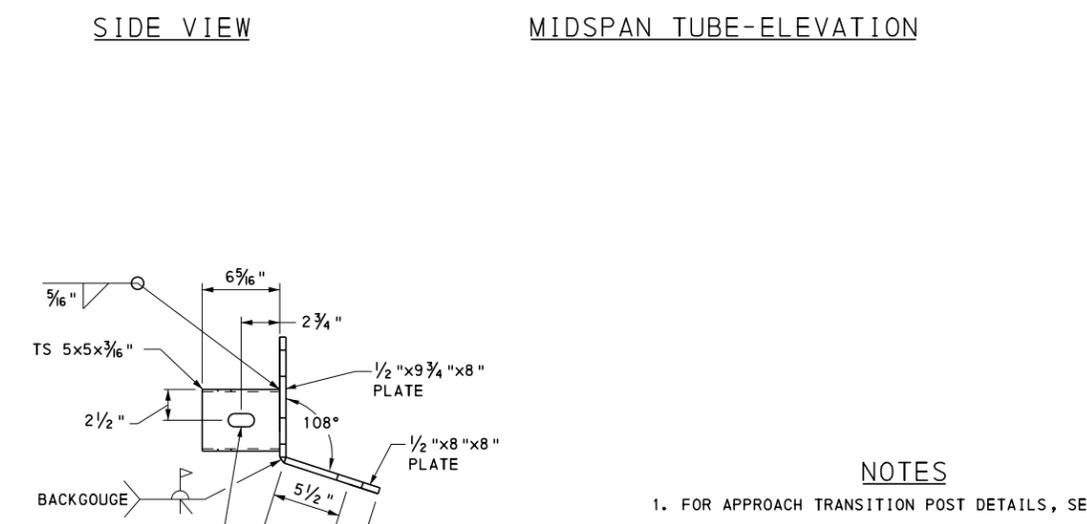
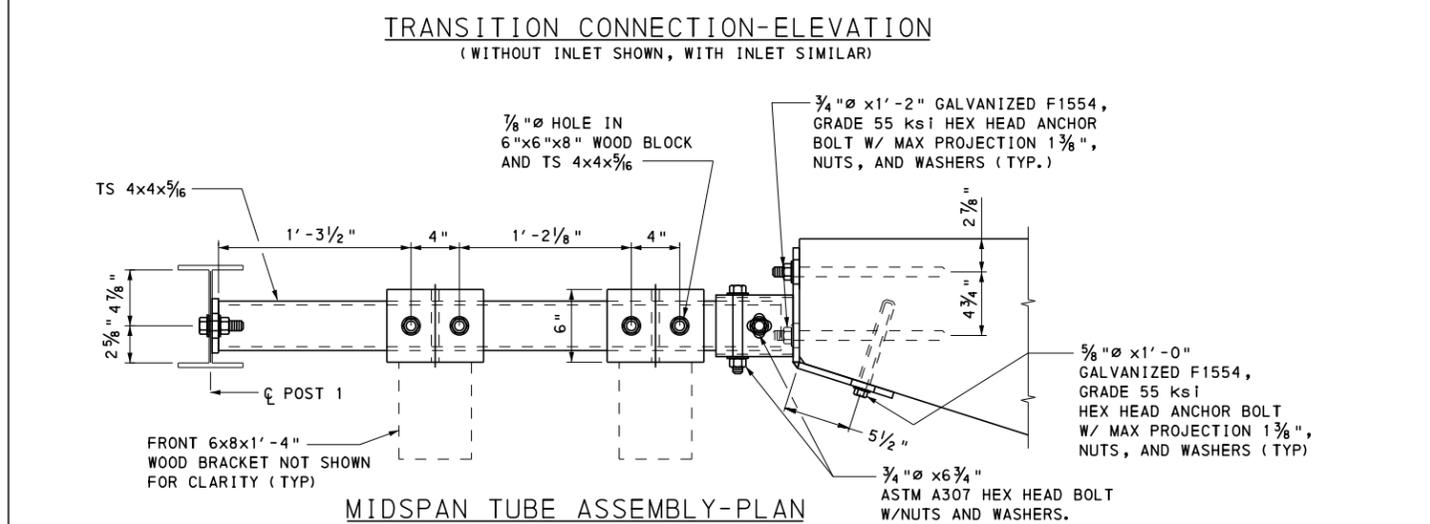
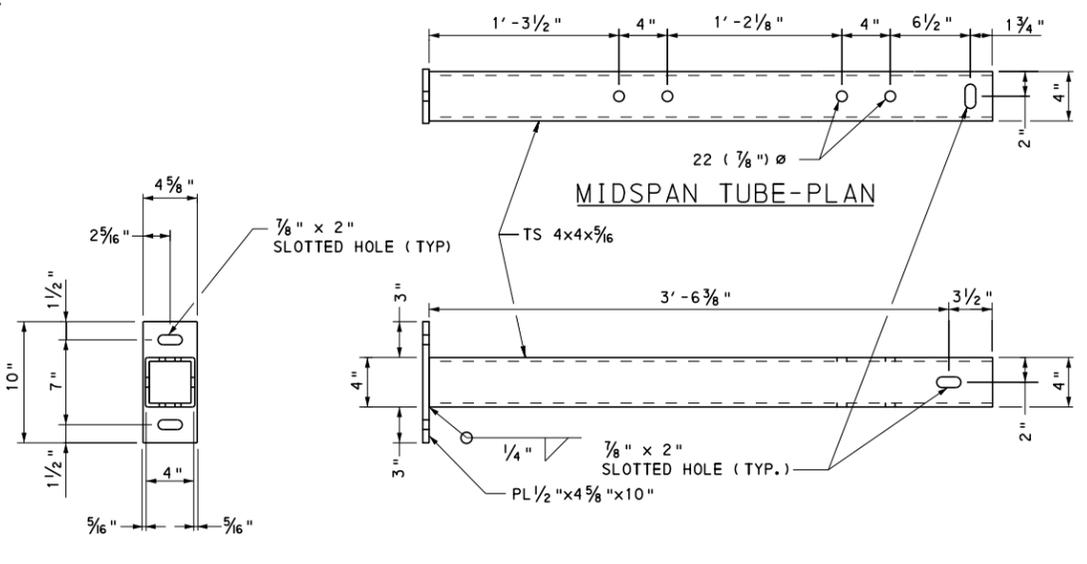
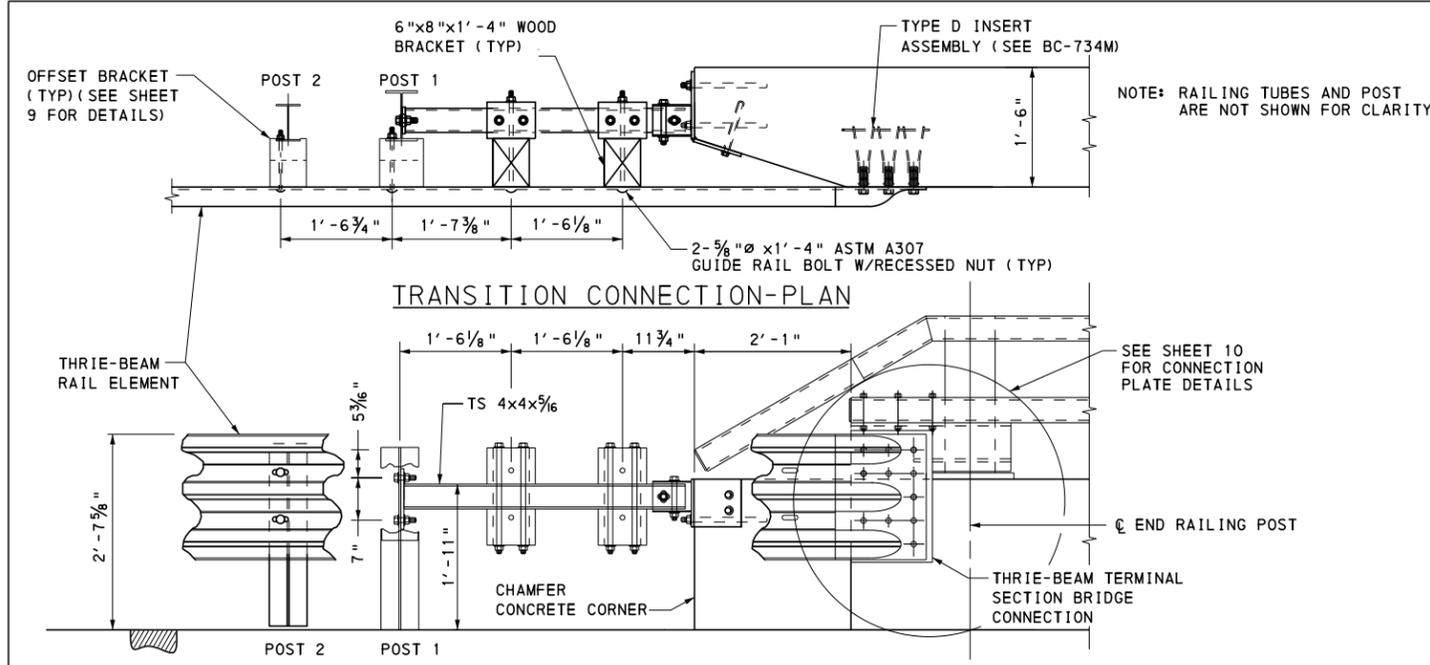
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016

*Burt J. Wilson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 10 OF 16

RC-50M



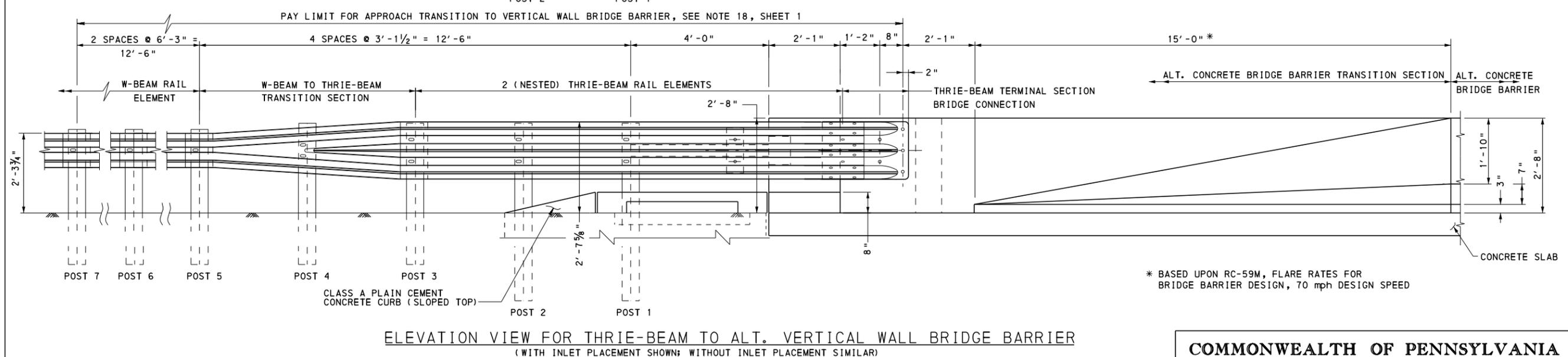
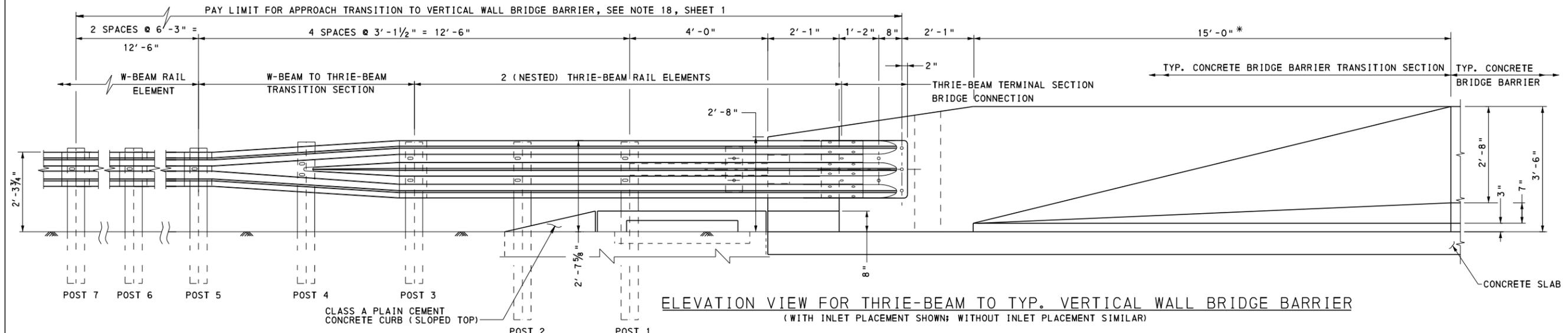
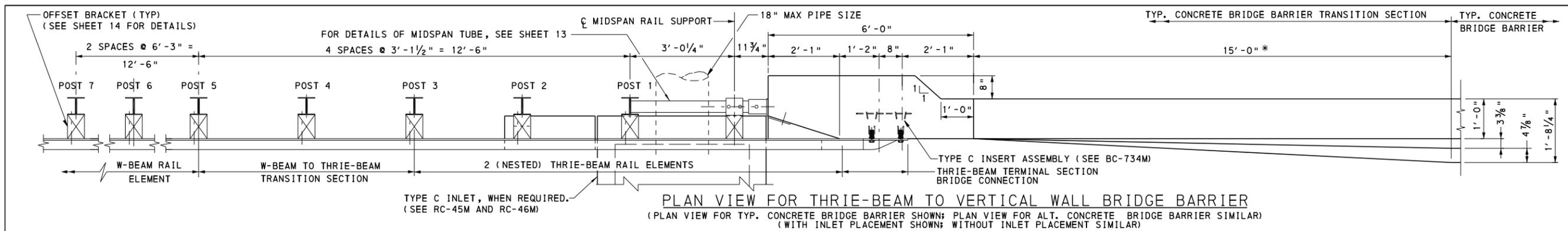
- NOTES**
1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
  2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 8.
  3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
  4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M, BC-713M, AND THE STRUCTURE PLANS.
  5. FOR ADDITIONAL NOTES, SEE SHEET 1.

**COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY**

**GUIDE RAIL TO BRIDGE  
 BARRIER TRANSITIONS**

**THRIE-BEAM TO PA BRIDGE BARRIER  
 MIDSPAN TUBE ASSEMBLY DETAILS**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt E. Johnson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 11 OF 16 <b>RC-50M</b>
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\* BASED UPON RC-59M, FLARE RATES FOR BRIDGE BARRIER DESIGN, 70 mph DESIGN SPEED

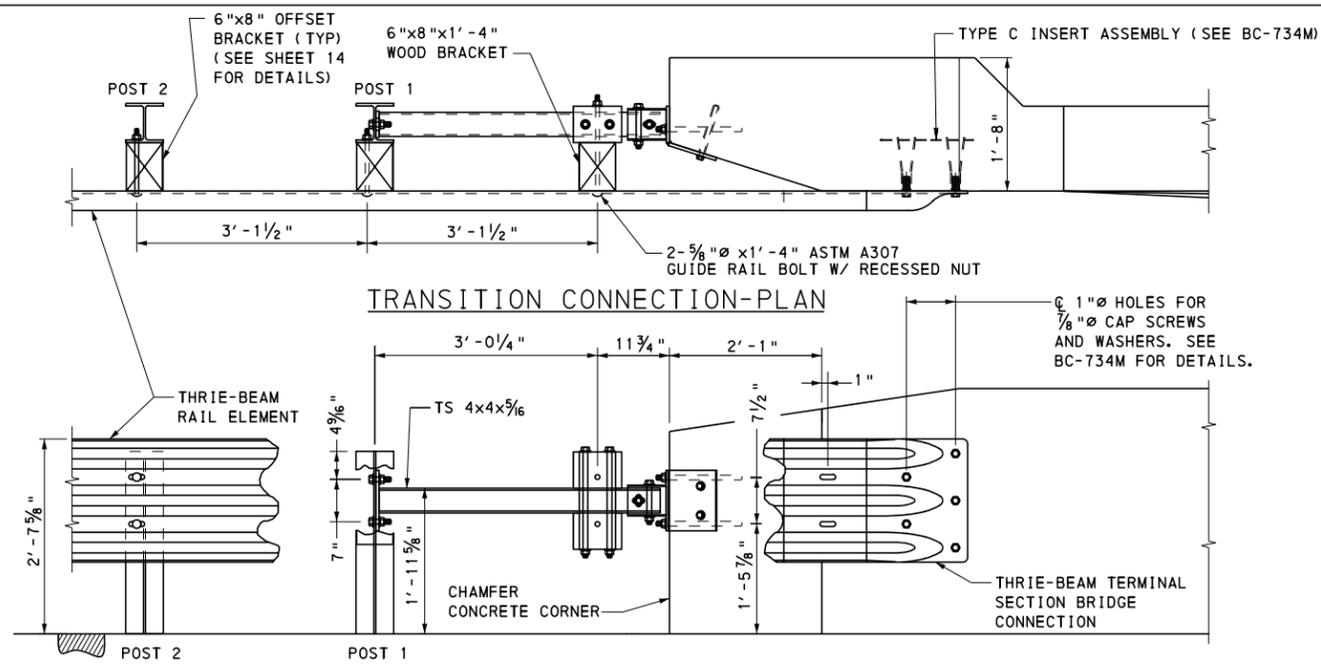
- NOTES**
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
  2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
  3. SEE BC-703M FOR BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
  4. SEE STRUCTURE DRAWINGS FOR OTHER BRIDGE BARRIER DETAILS AND DIMENSIONS.
  5. FOR ADDITIONAL NOTES, SEE SHEET 1.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF PROJECT DELIVERY

**GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS**

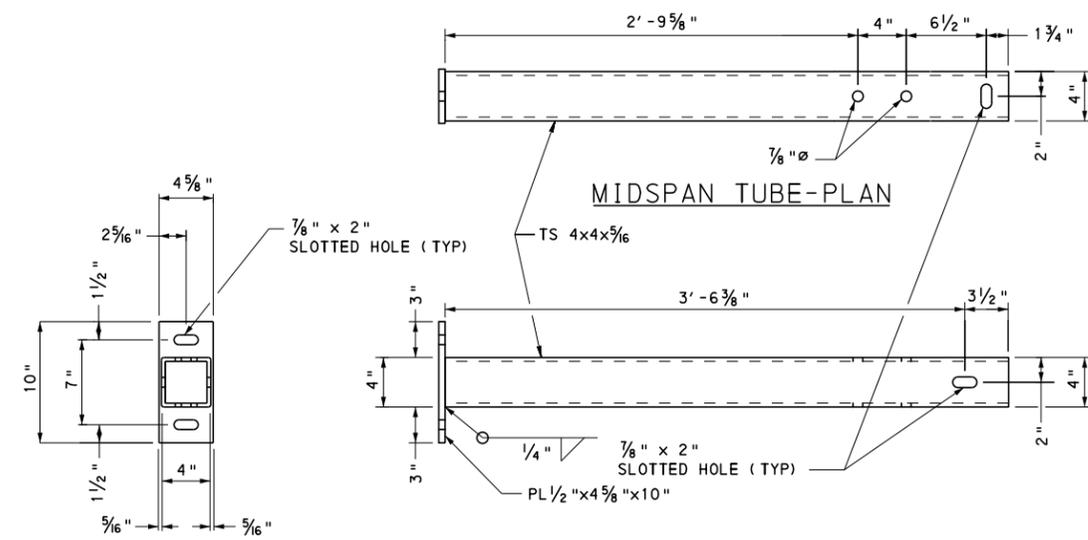
**THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER**

RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betub</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Burt J. Johnson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 12 OF 16
		<b>RC-50M</b>



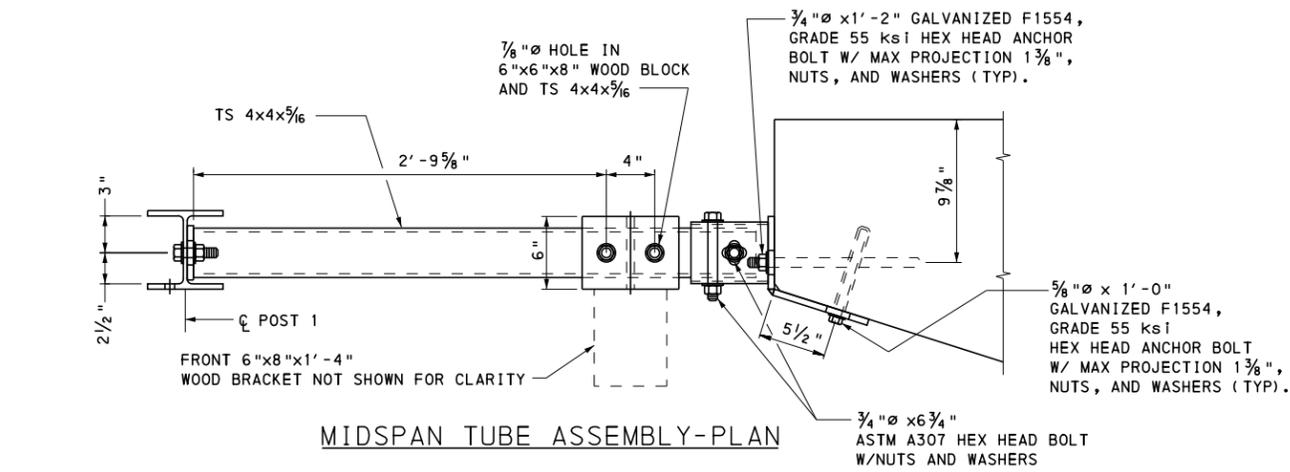
TRANSITION CONNECTION-PLAN

TRANSITION CONNECTION-ELEVATION

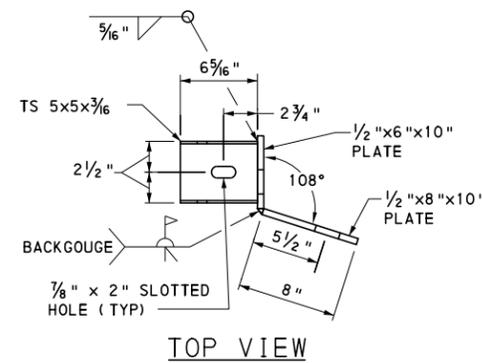


SIDE VIEW

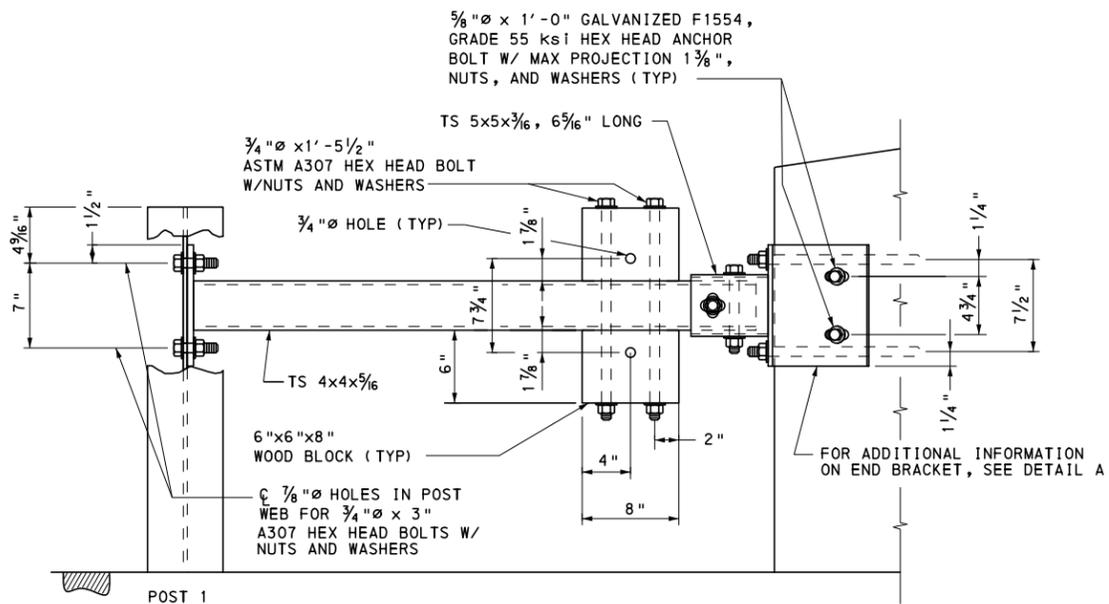
MIDSPAN TUBE-ELEVATION



MIDSPAN TUBE ASSEMBLY-PLAN

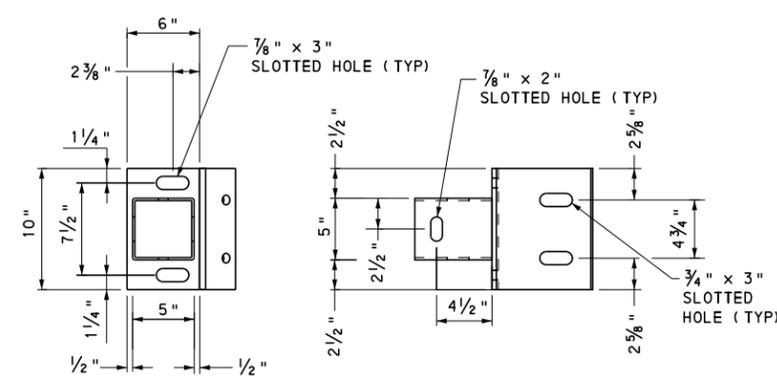


TOP VIEW



MIDSPAN TUBE ASSEMBLY-ELEVATION

(FRONT 6" x 8" x 1'-4" WOOD BRACKET NOT SHOWN FOR CLARITY)



SIDE VIEW

ELEVATION

DETAIL A - END BRACKET

NOTES

1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 12.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

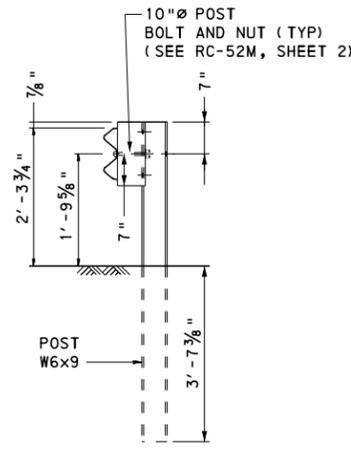
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO VERTICAL WALL  
BRIDGE BARRIER  
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

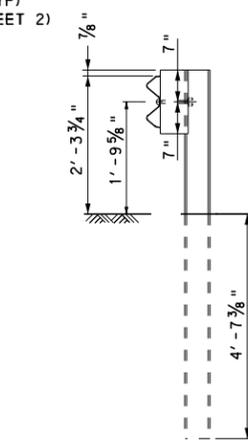
RECOMMENDED SEPT. 15, 2016  
*Burt E. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 13 OF 16  
RC-50M

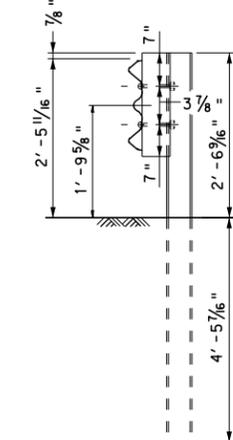


**BEYOND POST 6**  
(AT W-BEAM RAIL ELEMENT)

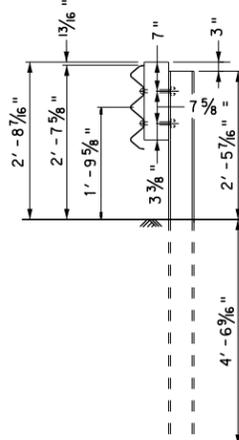
- SEE NOTE 7, SHEET 1.
- FOR POST DETAILS SEE RC-52M, SHEET 1.



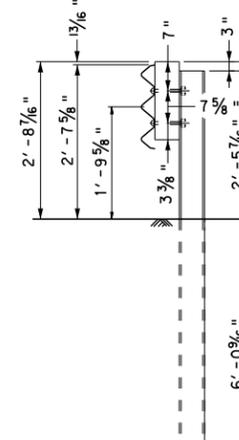
**POSTS 5 AND 6**  
W6x15 STEEL POSTS 7'-0" LONG  
w/6"x8"x1'-2" ROUTED OFFSET BRACKET



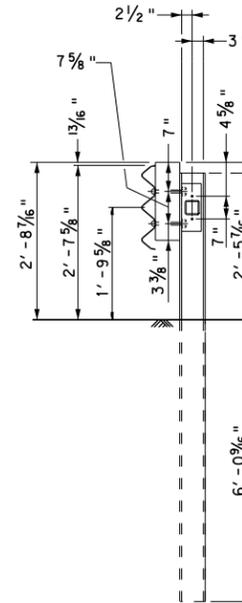
**POST 4**  
W6x15 STEEL POST 7'-0" LONG  
w/6"x8"x1'-6" ROUTED OFFSET BRACKET



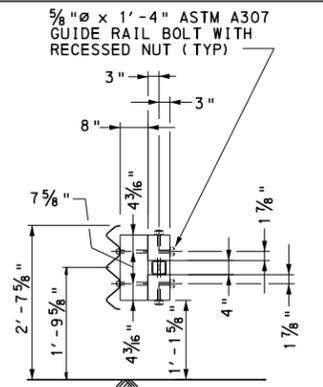
**POST 3**  
W6x15 STEEL POST 7'-0" LONG  
w/6"x8"x1'-6" OFFSET BRACKET



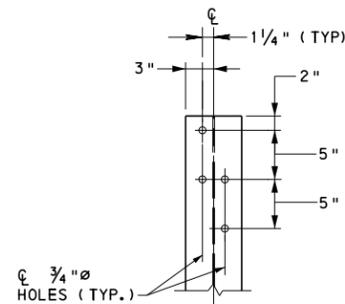
**POST 2**  
W6x25 STEEL POST 8'-6" LONG  
w/6"x8"x1'-6" OFFSET BRACKET



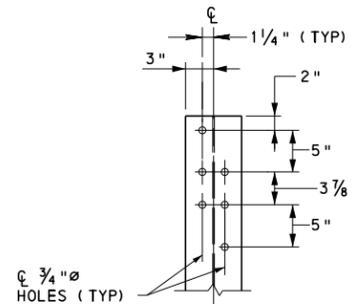
**POST 1**  
W6x25 STEEL POST 8'-6" LONG  
w/6"x8"x1'-6" OFFSET BRACKET



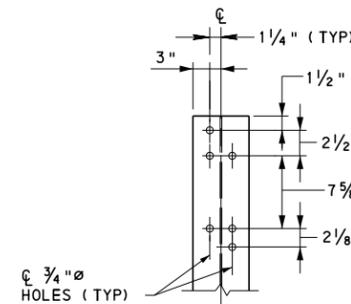
**MIDSPAN TUBE SUPPORT**  
TWO 6"x6"x8" WOOD BLOCKS  
ATTACHED TO 4"x4"x3/16" SQUARE TUBE  
W/6"x8"x1'-4" WOOD BRACKET



**POSTS 5 AND 6**

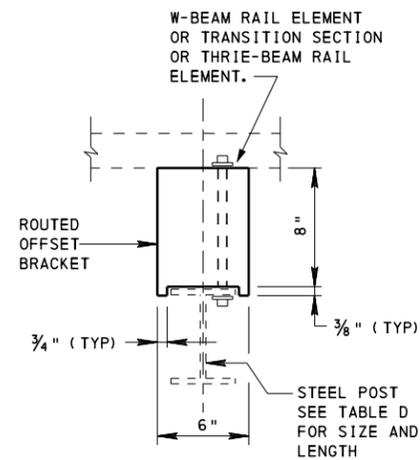


**POST 4**

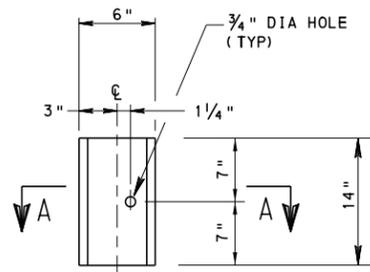


**POSTS 1 THRU 3**

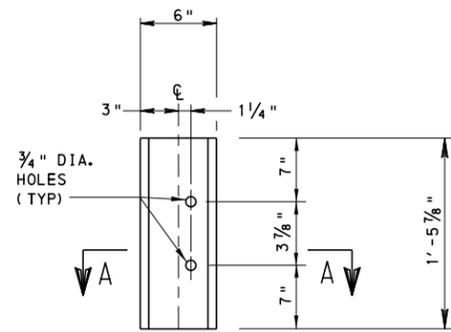
**POST DETAILS**



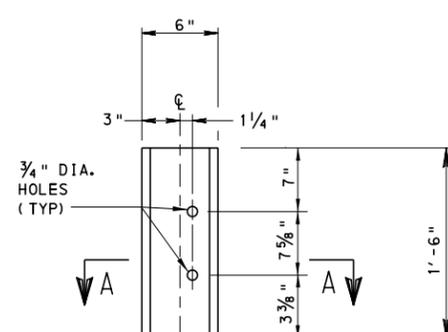
**SECTION A-A**



**POSTS 5 AND 6**



**POST 4**



**POSTS 1 THRU 3**

**OFFSET BRACKET DETAILS**

TABLE D		
POST	LENGTH	SIZE
1 THRU 2	8'-6"	W6x25
3 THRU 6	7'-0"	W6x15
BEYOND 6	6'-0"	W6x9

**NOTES**

1. FOR LOCATION OF POSTS, SEE SHEET 12.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

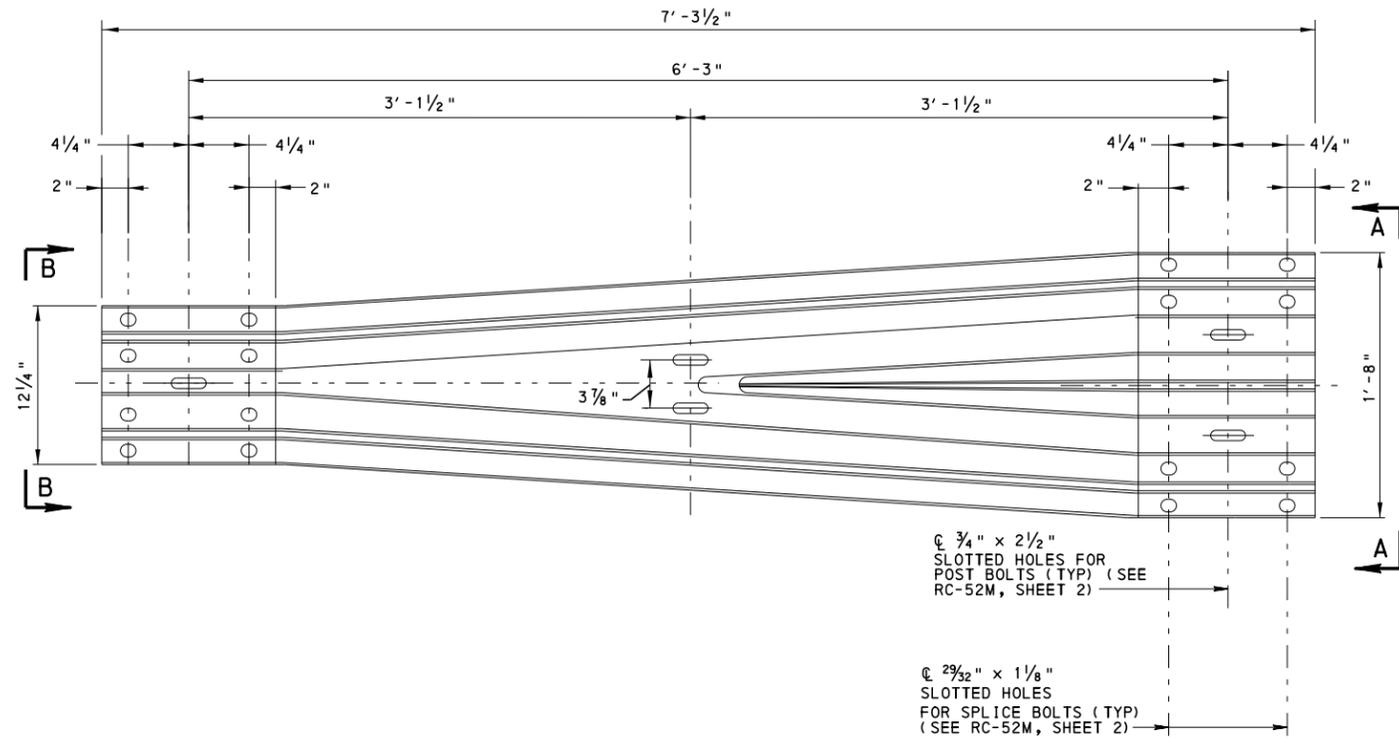
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF PROJECT DELIVERY

**GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS**  
**THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER**  
**POST AND OFFSET BRACKET DETAILS**

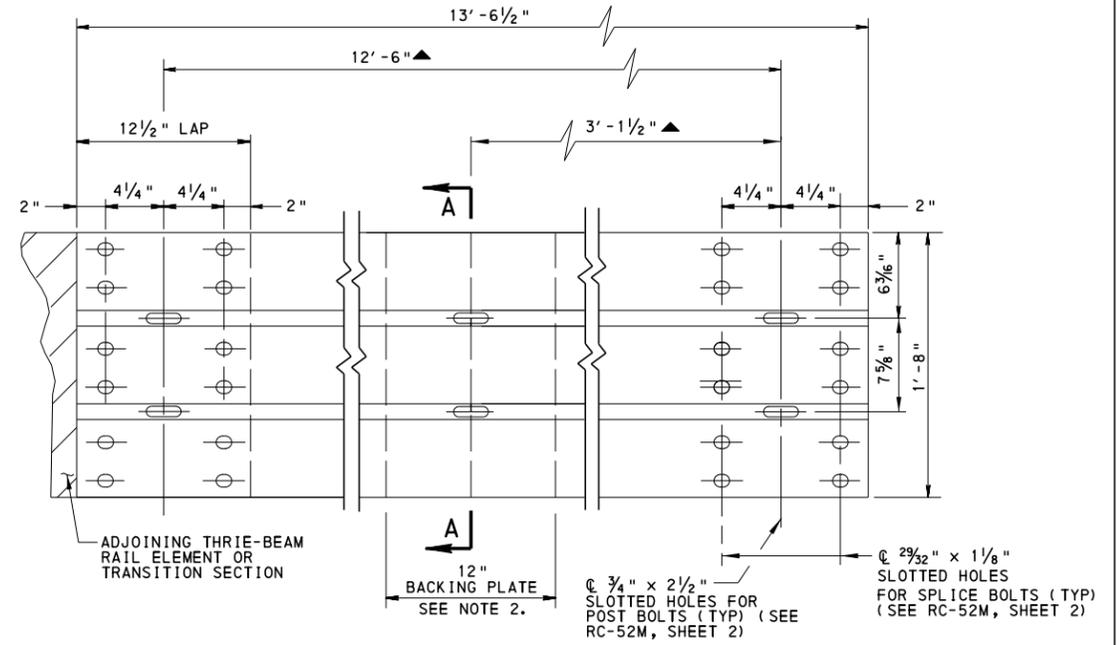
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Burt J. Iversen*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 14 OF 16  
**RC-50M**

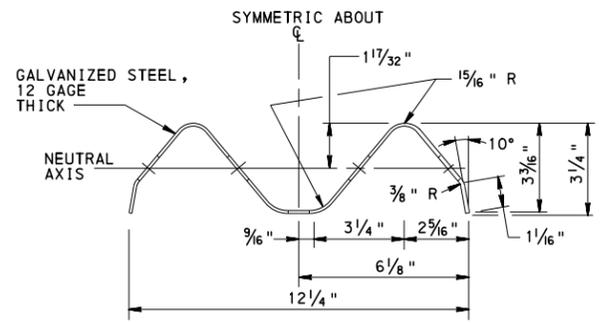


**TRANSITION SECTION**

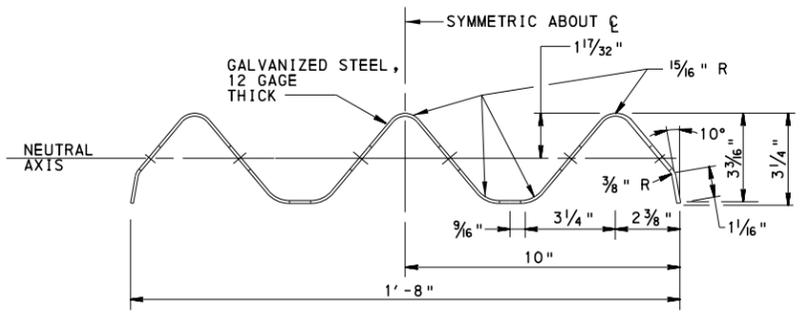


**THRIE-BEAM RAIL ELEMENT**

▲ AT TYPICAL THRIE-BEAM RAIL ELEMENT SHOWN:  
 AT THRIE-BEAM TO VERTICAL WALL TRANSITION, SEE BC-703M, AT THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER TRANSITION, SEE BC-708M, AT THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION, SEE BC-712M.



**RAIL ELEMENT SECTION B-B**



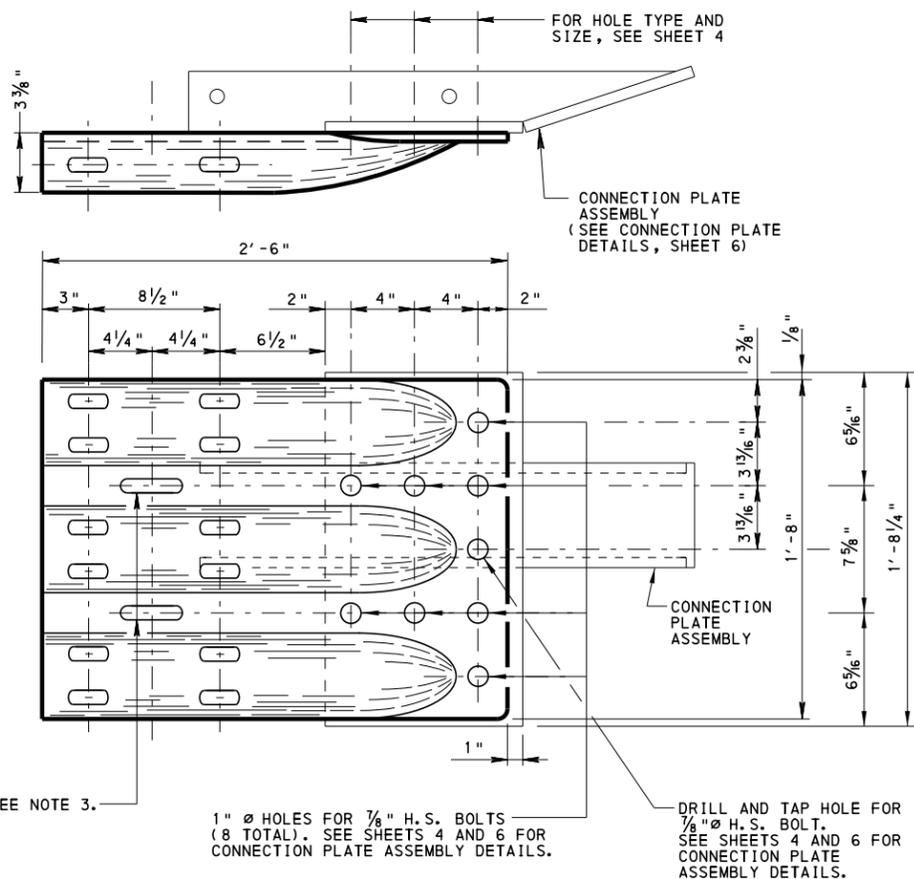
**THRIE-BEAM RAIL ELEMENT SECTION A-A**  
 (BACKING PLATE NOT SHOWN FOR CLARITY)

**NOTES**

1. THE THRIE-BEAM RAIL ELEMENTS AND TRANSITION SECTIONS ARE ONLY USED IN THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER, THRIE-BEAM TO PA BRIDGE BARRIER, AND THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTIONS.
2. USE 12" BACKING PLATE FOR THE THRIE-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS ON THE THRIE-BEAM RAIL ELEMENT.
3. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
 THRIE-BEAM TRANSITION SECTION AND RAIL ELEMENT DETAILS

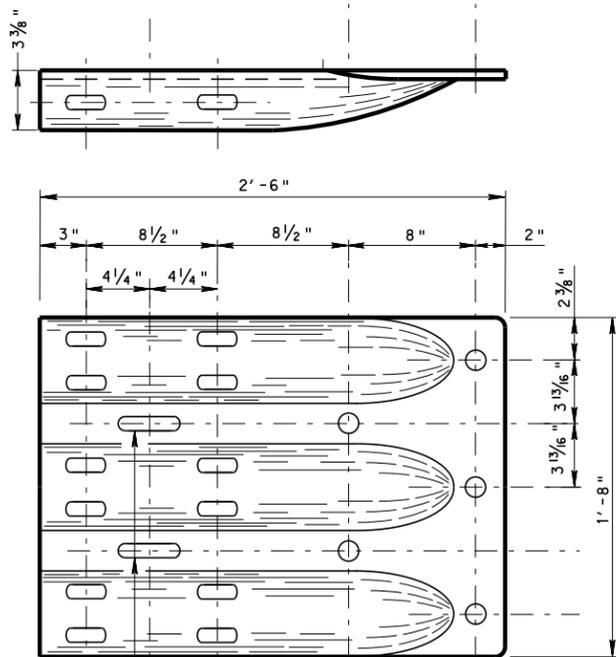


THRIE-BEAM TERMINAL SECTION  
AT PA TYPE 10M BRIDGE BARRIER  
SHOWN WITH CONNECTION PLATE ASSEMBLY

SEE NOTE 3.

1" Ø HOLES FOR 7/8" H.S. BOLTS  
(8 TOTAL). SEE SHEETS 4 AND 6 FOR  
CONNECTION PLATE ASSEMBLY DETAILS.

DRILL AND TAP HOLE FOR  
7/8" Ø H.S. BOLT.  
SEE SHEETS 4 AND 6 FOR  
CONNECTION PLATE  
ASSEMBLY DETAILS.



THRIE-BEAM TERMINAL SECTION  
AT PA BRIDGE BARRIER  
SHOWN WITH CONNECTION PLATE ASSEMBLY

SEE NOTE 3.

4-1" Ø HOLES FOR 7/8" H.S. BOLTS.  
SEE SHEETS 8 AND 10 FOR CONNECTION  
PLATE AND ANCHOR INSERT ASSEMBLIES.

2-1" Ø HOLES FOR 7/8" H.S. BOLTS.  
SEE SHEETS 8 AND 10 FOR  
CONNECTION PLATE ASSEMBLY.  
NOTE: THESE HOLES ARE IN THE  
CONNECTION PLATES ONLY.

SEE NOTE 3.

1" Ø HOLES FOR 7/8" Ø HEXAGON  
HEAD CAP SCREWS AND WASHERS. SEE CURRENT  
BRIDGE CONSTRUCTION STANDARD DRAWING,  
BC-734M, FOR DETAILS.

THRIE-BEAM TERMINAL SECTION  
AT VERTICAL WALL BRIDGE BARRIER

NOTES

1. USE THIS SHEET WITH SHEETS 4-15.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. PROVIDE 5/8" Ø SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

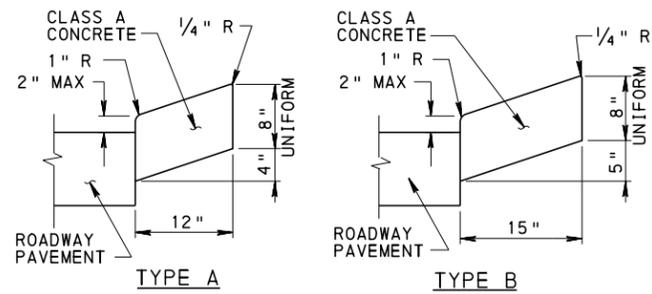
GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

THRIE-BEAM TERMINAL SECTION  
BRIDGE CONNECTION DETAILS

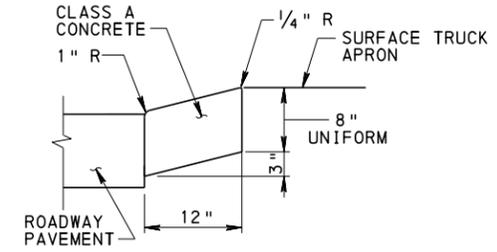
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Brian J. Johnson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 16 OF 16  
RC-50M

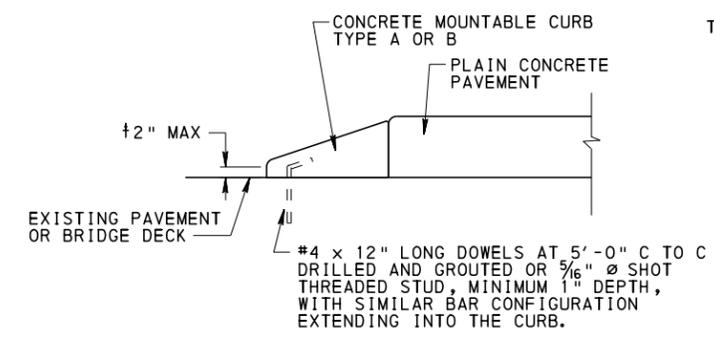


TYPE A TYPE B



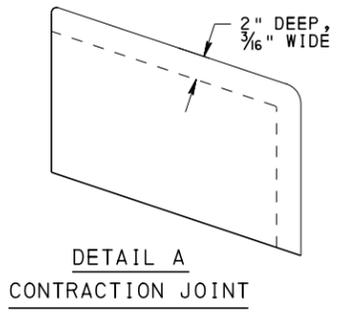
ROUNDBOUT TRUCK APRON CURB

**CONCRETE MOUNTABLE CURBS**

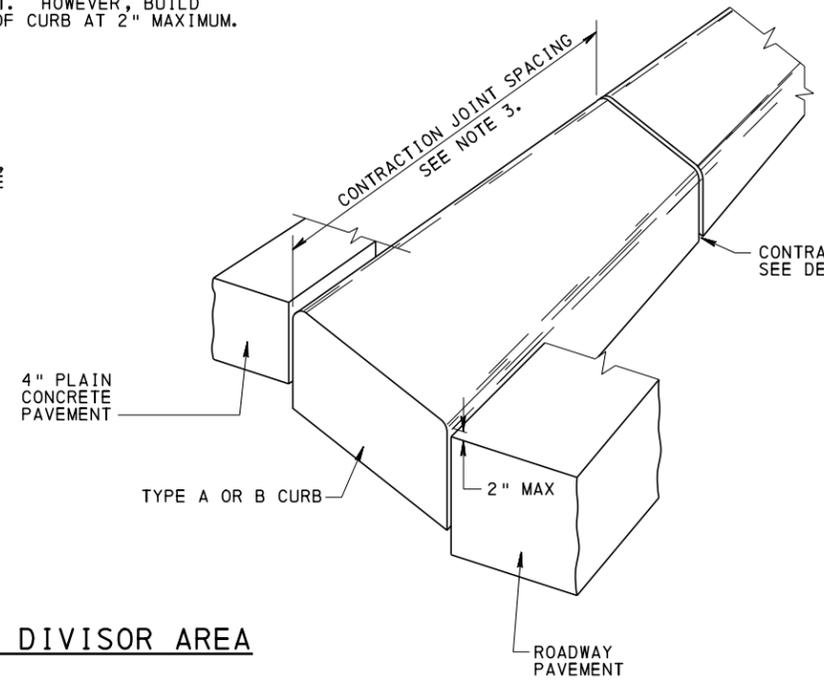


**CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS**

† PLANS MAY PROVIDE FOR A DEEPER FACE AT CURB WHEN AN OVERLAY IS PLACED ON THE EXISTING PAVEMENT. HOWEVER, BUILD EXPOSED FINAL FACE OF CURB AT 2" MAXIMUM.



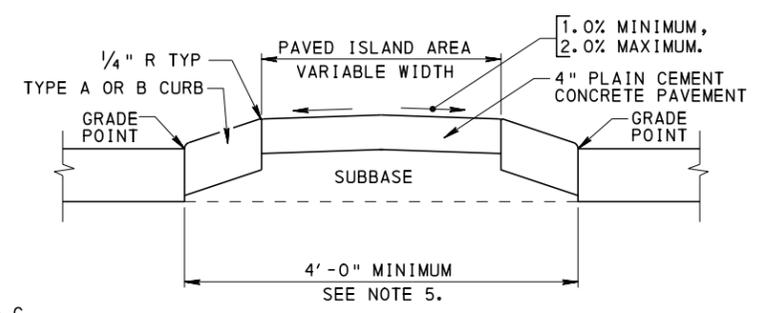
DETAIL A  
CONTRACTION JOINT



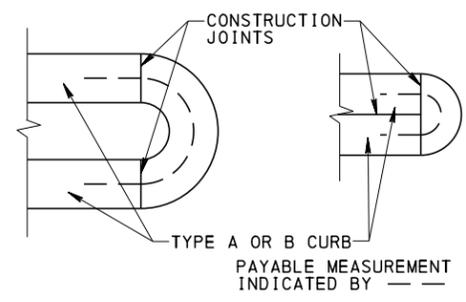
TYPICAL DIVISOR AREA

**NOTES**

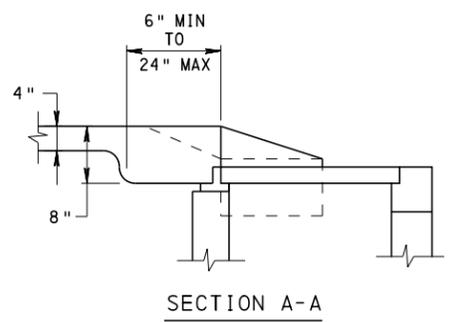
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
2. INSTALL TYPE M INLET WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLET AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
3. SPACE CONTRACTION JOINTS TO ALIGN WITH ADJACENT PAVEMENT JOINTS TO ELIMINATE SAWCUT AND SYMPATHY CRACKING. SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 501.3(n).
4. PLACE PREMOLDED EXPANSION JOINT FILLER MATERIAL 1/2" THICK AND POLYSTYRENE BOND BREAKER 1/4" THICK ADJACENT TO CURBS AND OTHER STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
5. PROVIDE ELONGATED ISLANDS NOT LESS THAN 4'-0" WIDE AND 20'-0" LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.



**TYPICAL CONSTRUCTION**

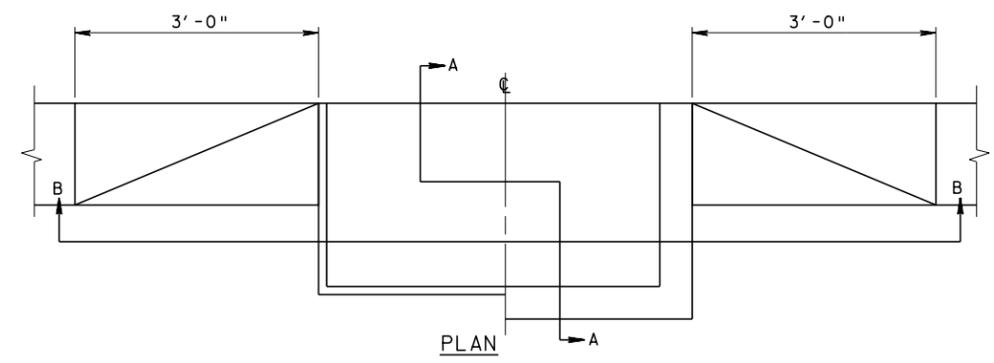
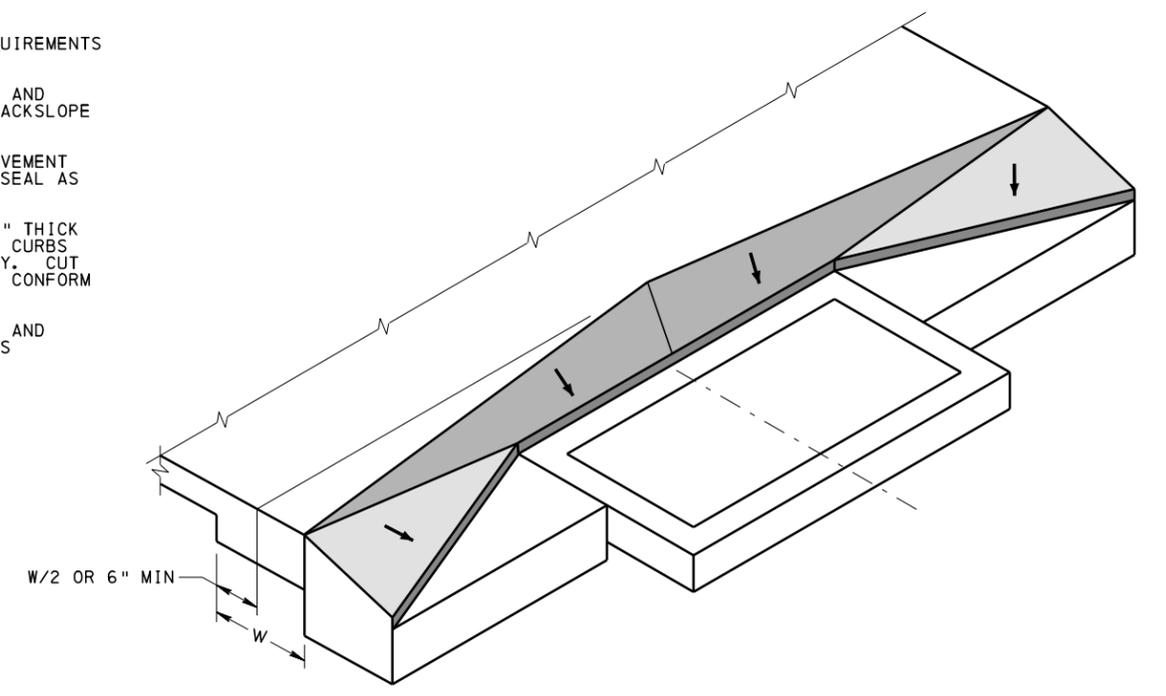


**END DETAILS**

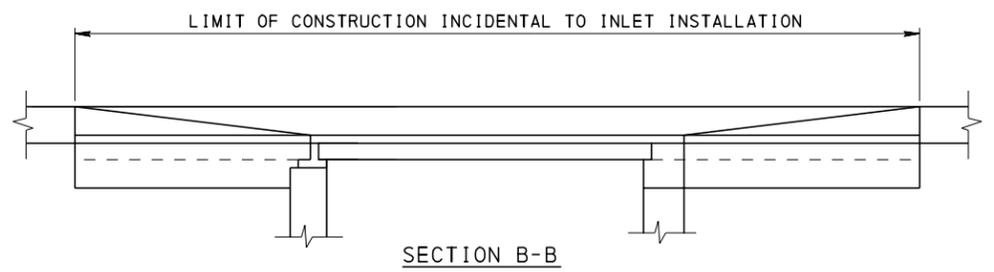


SECTION A-A

**TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS**



PLAN



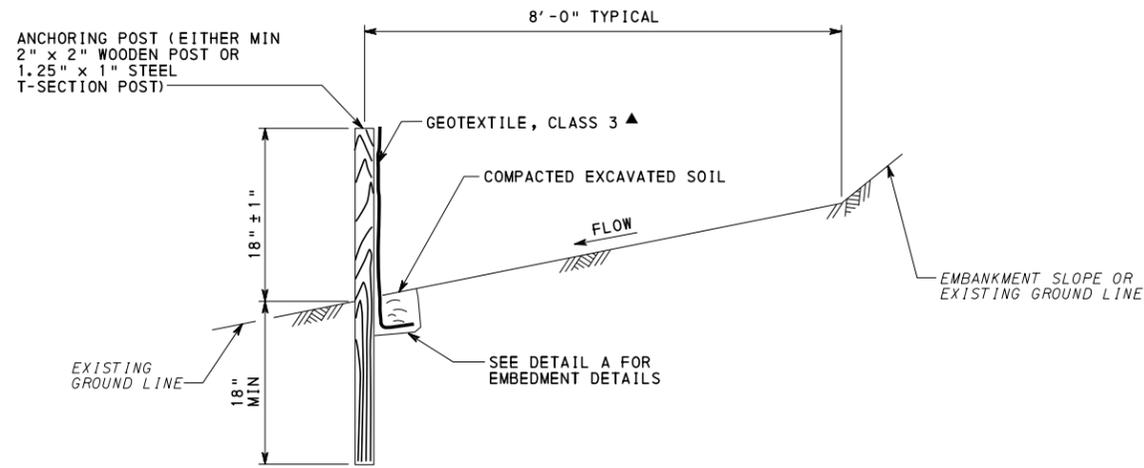
SECTION B-B

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

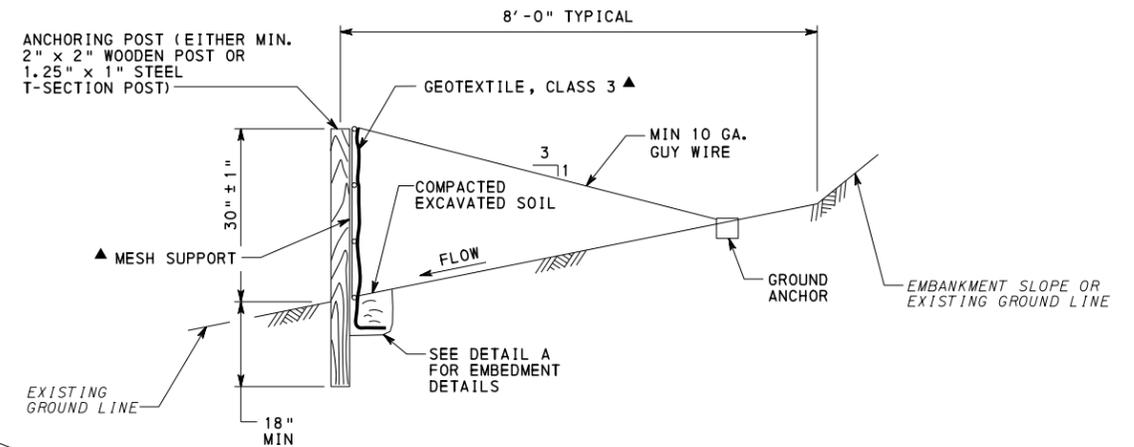
**CONCRETE MOUNTABLE CURBS**

**NOTES**

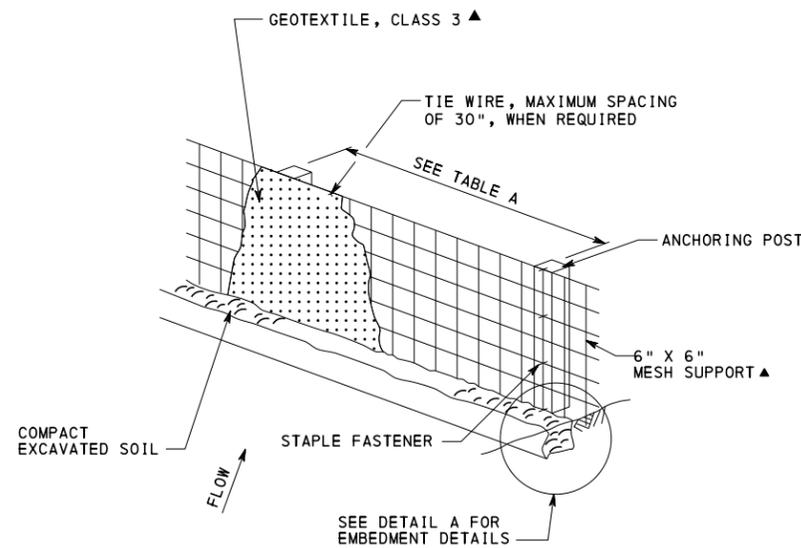
1. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT FENCE.
2. ADHERE TO THE MANUFACTURER'S RECOMMENDATIONS RELATIVE TO REQUIRED GEOTEXTILE REPLACEMENT DUE TO WEATHERING.
3. PLACE SILT FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 8'-0" UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE FENCE WITH A ROCK FILTER OUTLET (SEE SHEET 2). ROCK FILTER OUTLETS SHOULD BE INSTALLED ALONG THE SILT BARRIER FENCE AT POINTS OF FREQUENT FAILURES AND WHERE REQUIRED BY THE EROSION AND SEDIMENT POLLUTION CONTROL PLAN.
5. PROVIDE MESH SUPPORT MEETING THE MATERIAL REQUIREMENTS AS SPECIFIED IN PUBLICATION 408, SECTION 865.2(b).



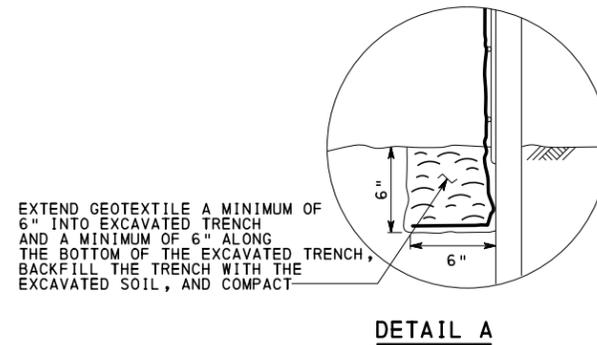
**SILT BARRIER FENCE, 18" HEIGHT**  
▲ SEE TABLE A



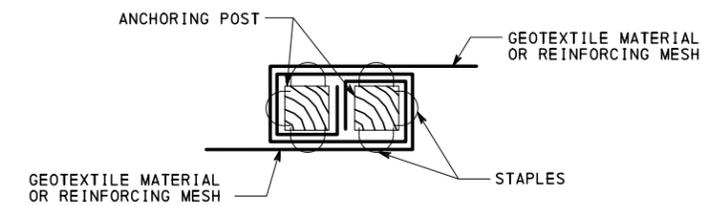
**SILT BARRIER FENCE, 30" HEIGHT**  
▲ SEE TABLE A



**SILT BARRIER FENCE**  
▲ SEE TABLE A



**DETAIL A**



**SILT BARRIER FENCE JOINING DETAIL**

**TABLE A  
SILT BARRIER FENCE  
GEOTEXTILE SELECTION**

SILT BARRIER FENCE, HEIGHT	TYPE OF CLASS 3 GEOTEXTILE MATERIAL	NOMINAL GEOTEXTILE HEIGHT	POST SPACING WITHOUT MESH SUPPORT	MAX POST SPACING WITH MESH SUPPORT
18 "	3A	30 "	8' - 0"	NA
30 "	3A	42 "	NA	8' - 0"
18 "	3B	30 "	4' - 0"	NA
30 "	3B	42 "	NA	4' - 0"

NA = NOT APPLICABLE

COMMONWEALTH OF PENNSYLVANIA  
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PERIMETER CONTROL DEVICES

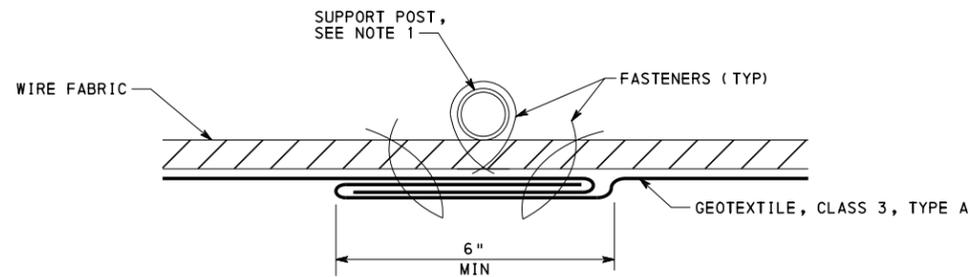
RECOMMENDED SEPT. 15, 2016  
*Melissa J. Betub*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED SEPT. 15, 2016  
*Bruce J. Degan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

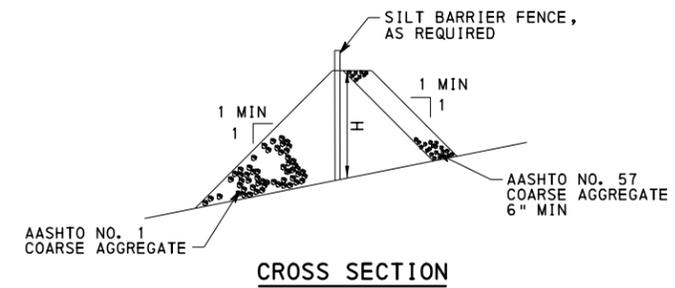
SHT 1 OF 3  
RC-70M

NOTES

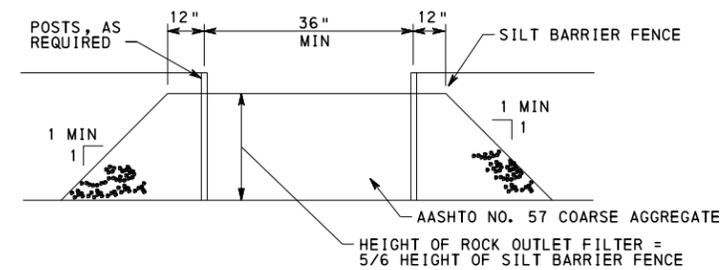
1. SPACE POSTS AT 10'-0" MAXIMUM. USE 2.5" DIAMETER GALVANIZED STEEL OR ALUMINUM POSTS.
2. EXTEND GEOTEXTILE AND WIRE FABRIC 8" MIN INTO EXCAVATED TRENCH.
3. PLACE HEAVY DUTY SILT BARRIER FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 8'-0" UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT FENCE.
5. ADHERE TO THE MANUFACTURER'S RECOMMENDATIONS RELATIVE TO REQUIRED GEOTEXTILE REPLACEMENT DUE TO WEATHERING.
6. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE FENCE WITH A ROCK FILTER OUTLET. ROCK FILTER OUTLETS SHOULD BE INSTALLED ALONG THE SILT BARRIER FENCE AT POINTS OF FREQUENT FAILURES AND WHERE REQUIRED BY THE EROSION AND SEDIMENT POLLUTION CONTROL PLAN.
7. SPACE GEOTEXTILE TO WIRE FABRIC FASTENERS AT 24" MAX CENTER TO CENTER.



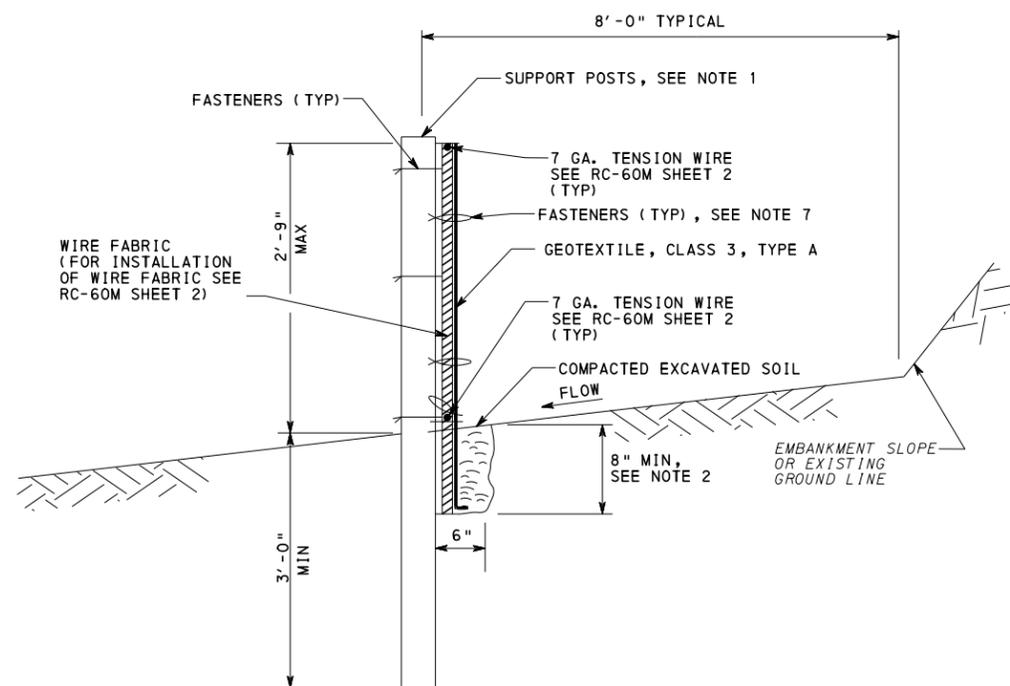
**GEOTEXTILE OVERLAP DETAIL**



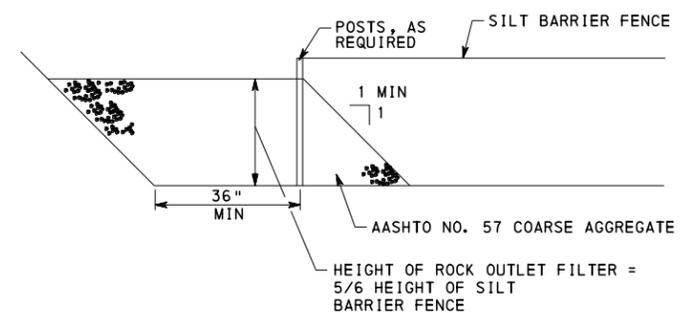
**CROSS SECTION**



**FILTER AT INTERSECTION OF SILT BARRIER FENCE UPSLOPE FACE**



**HEAVY DUTY SILT BARRIER FENCE**



**FILTER AT TOE OF SLOPE**

**ROCK FILTER OUTLET**

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PERIMETER CONTROL DEVICES

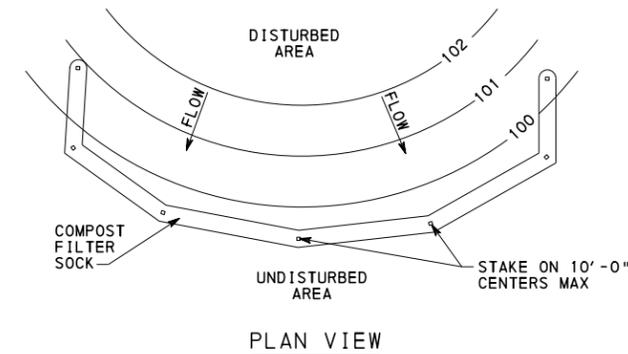
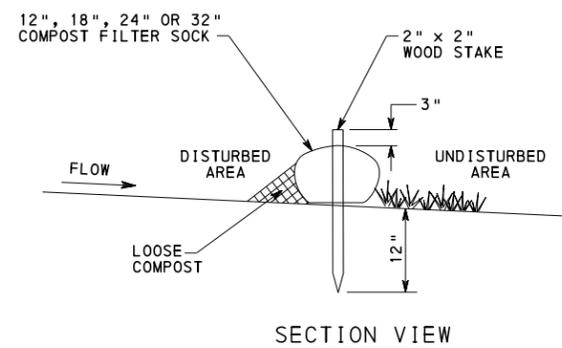
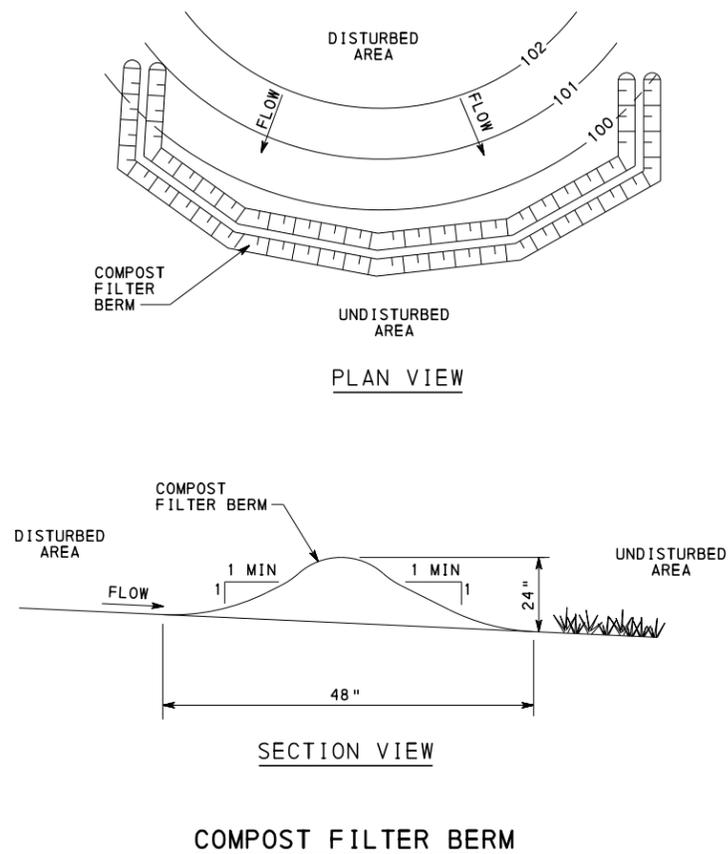
RECOMMENDED SEPT. 15, 2016  
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SHT 2 OF 3  
RC-70M

**NOTES**

1. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-THIRD THE HEIGHT OF THE EXPOSED COMPOST FILTER BERM OR ONE-HALF OF THE EXPOSED COMPOST FILTER SOCK.
2. PLACE COMPOST FILTER SOCK/BERM ON LEVEL GRADE. EXTEND BOTH ENDS OF THE COMPOST FILTER SOCK/BERM AT LEAST 8'-0" UPSLOPE AT 45 DEGREES TO THE MAIN ALIGNMENT.
3. REPLACE BIODEGRADABLE FILTER SOCK AFTER 6 MONTHS; PHOTODEGRADABLE AFTER 12 MONTHS.



**COMPOST FILTER SOCK**

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PERIMETER CONTROL DEVICES