


OS-299 (7-18)   <b>pennsylvania</b> DEPARTMENT OF TRANSPORTATION www.penndot.gov	TRANSMITTAL LETTER	PUBLICATION:  Publication 72M June 2010 Edition Change #7 <hr/> DATE: 2/19/2021												
SUBJECT:  <div style="text-align: center;"> <b>Revisions to Standards for Roadway Construction June 2010 Edition, Change No. 7</b> </div>														
<p>INFORMATION AND SPECIAL INSTRUCTIONS:</p> <p>Incorporate the attached revisions into the June 2010 Edition of Publication 72M.</p> <p>These standards may be used immediately and can be adopted as soon as practical on new and existing designs without affecting letting schedules. However, projects let after April 1, 2022 shall incorporate these standards.</p> <table border="0"> <thead> <tr> <th>STANDARD</th> <th>SHEET</th> <th>DESCRIPTION OF CHANGES</th> </tr> </thead> <tbody> <tr> <td>RC-24M</td> <td>Sheet 1</td> <td>           Revised Section A-A as follows:             -Changed "PG 64-22" to "PG 64S-22" (3 locations).            -Removed "HMA OR WMA" (2 locations).             Added Note 10, "PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 504."         </td> </tr> <tr> <td>RC-24M</td> <td>Sheet 2</td> <td>           Revised the flared bridge barriers in Plan Views to match the new bridge barrier transition (4 locations).             Revised Plan View (right side) as follows:             -Changed "8" CURB" to "CURB".             -Changed "FORM CURB SECTION WITH BITUMINOUS" to "FORM CURB SECTION WITH ASPHALT".             Revised Section C-C as follows:             -Changed the curb height from 8" to 4".            -Changed the 7" dimension to 7 1/2".            -Changed the 1" dimension to 1/2".            -Added "1/4" RADIUS" and "3/4" RADIUS".         </td> </tr> <tr> <td>RC-24M</td> <td>Sheet 3</td> <td>           Revised Section D-D as follows:             -Changed "PG 64-22" to "PG 64S-22" (3 locations).            -Removed "HMA OR WMA" (2 locations).         </td> </tr> </tbody> </table>			STANDARD	SHEET	DESCRIPTION OF CHANGES	RC-24M	Sheet 1	Revised Section A-A as follows:  -Changed "PG 64-22" to "PG 64S-22" (3 locations). -Removed "HMA OR WMA" (2 locations).  Added Note 10, "PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 504."	RC-24M	Sheet 2	Revised the flared bridge barriers in Plan Views to match the new bridge barrier transition (4 locations).  Revised Plan View (right side) as follows:  -Changed "8" CURB" to "CURB".  -Changed "FORM CURB SECTION WITH BITUMINOUS" to "FORM CURB SECTION WITH ASPHALT".  Revised Section C-C as follows:  -Changed the curb height from 8" to 4". -Changed the 7" dimension to 7 1/2". -Changed the 1" dimension to 1/2". -Added "1/4" RADIUS" and "3/4" RADIUS".	RC-24M	Sheet 3	Revised Section D-D as follows:  -Changed "PG 64-22" to "PG 64S-22" (3 locations). -Removed "HMA OR WMA" (2 locations).
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RC-39M	Sheet 1	<p>Revised Notes 6-15 from "IN ACCORDANCE WITH" to "AS SPECIFIED IN".</p> <p>Revised reference in Note 8 for mortar from "SECTION 705.7(b)" to "SECTION 705.6(b)".</p> <p>Revised reference in Note 9 for caulking compound from "SECTION 705.8(a)" to "SECTION 705.7(a)".</p>
RC-39M	Sheet 2	<p>Revised Cast-in-Place Concrete Manhole Notes, Note 1 from "IN ACCORDANCE WITH THE REQUIREMENTS OF" to "AS SPECIFIED IN".</p> <p>Revised Precast Concrete Manhole Notes, Note 1 from "IN ACCORDANCE WITH THE REQUIREMENTS OF" to "AS SPECIFIED IN".</p>
RC-39M	Sheet 3	<p>Revised the Reinforcement Bar Splice Lengths Table as follows:</p> <ul style="list-style-type: none"> <li>-Revised splice lengths to be in accordance with AASHTO LRFD Bridge Design Specification, 8<sup>th</sup> Edition, 2017.</li> <li>-Revised Note 2 to "SPlice LENGTHS BASED ON HORIZONTAL BARS WITH A CLASS B SPlice."</li> </ul>
RC-39M	Sheet 8	<p>Revised Grade Adjustment General Notes, Note 3 from "WORKMANSHIP" TO "PERFORM WORK".</p> <p>Revised Precast Concrete Grade Adjustment Ring – Plan View as follows:</p> <ul style="list-style-type: none"> <li>-Changed lap length for #3 bar from 1'-0" to 1'-7".</li> <li>-Changed lap length for #4 bar from 1'-4" to 2'-1".</li> </ul> <p>Revised Structural Steel Grade Adjustment Riser Notes as follows:</p> <ul style="list-style-type: none"> <li>-Changed Note 1 from "MEETING THE REQUIREMENTS OF" to "AS SPECIFIED IN".</li> <li>-Changed Note 12 from "BITUMINOUS" to "ASPHALT" (2 locations) and from "IN ACCORDANCE WITH" to "AS SPECIFIED IN" (2 locations).</li> </ul>
RC-39M	Sheet 9	<p>Revised Manhole Cover and Frame Notes as follows:</p> <ul style="list-style-type: none"> <li>-Changed Note 1 from "MEETING THE REQUIREMENTS OF" to "AS SPECIFIED IN".</li> <li>-Changed Note 10 from "IN ACCORDANCE WITH" to "AS SPECIFIED IN".</li> </ul>
RC-39M	Sheet 13	<p>Added "(SEE NOTE 6)" after "TYPE C OR TYPE C ALTERNATE TOP UNITS" (6 locations).</p> <p>Added Note 6, "REFER TO CONTRACT DRAWINGS FOR CURB HEIGHT."</p>
RC-45M	General	Revised total number of sheets from 20 to 24.
RC-45M	Sheet 1	Revised Placement Notes, Note 1, first bullet by adding "REFER TO CONTRACT DRAWINGS FOR CURB HEIGHT".

Revised Concrete Top Unit Notes as follows:

- Changed Note 1 by adjusting sheet numbers.
- Changed Note 5 from "WORKMANSHIP" to "PERFORM WORK".
- Changed Note 12 by removing "GRADE 420", "A615M", and "A706M".
- Changed Note 16 from "IN ACCORDANCE WITH" to "AS SPECIFIED IN".
- Changed Note 19, first and second bullets by revising sheet numbers.

Revised Index of Sheets by changing sheet numbers, adding four new sheets, and adding "- 1" to signify the first of two sheets for Sheets 3, 5, 21, and 23.

RC-45M	Sheet 2	<p>Revised Plan View – Type M &amp; Type S by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".</p> <p>-Revised Alternate One Bar Options for #4 Horizontal U-Bars – Option 1 by changing "MIN. LAP LENGTH" from 16" to 22".</p>
RC-45M	Sheet 3	<p>Added "TABLE OF DIMENSIONS" to show the dimensions for 4", 6", and 8" curb heights.</p> <p>Revised Plan View – Type C by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".</p> <p>Revised Section F-F as follows:</p> <ul style="list-style-type: none"><li>-Changed "SEE DETAIL 4" to "SEE DETAIL 4 ON SHEET 4".</li><li>-Added 3/8" dimension.</li></ul> <p>Revised Section G-G by adding 3/8" dimension.</p> <p>Moved Detail 4 for 8" curb height to Sheet 4.</p>
RC-45M	Sheet 4	<p>Inserted this new sheet for Detail 4; added details for 4" and 6" curb heights.</p> <p>Revised detail for 8" curb height as follows:</p> <ul style="list-style-type: none"><li>-Added "8" CURB HEIGHT" to title.</li><li>-Added 8" dimension for the width and height of curb.</li><li>-Revised "SEE NOTE 4" to "SEE NOTE 4 ON SHEET 3".</li><li>-Revised "#3 BARS (SEE PLAN FOR SPACING AND SEE NOTE 3)" to "#3 BARS (SEE PLAN FOR SPACING AND NOTE 3 ON SHEET 3)".</li></ul>
RC-45M	Sheet 5	<p>This sheet was previously Sheet 4 of 20.</p> <p>Added "TABLE OF DIMENSIONS" to show the dimensions for 4", 6", and 8" curb heights.</p>

Revised Plan View – Type C Alternate by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".

Revised Section J-J as follows:

- Changed "SEE DETAIL 6" to "SEE DETAIL 6 ON SHEET 6".
- Added 3/8" dimension.

Moved Detail 6 for 8" curb height to Sheet 6.

Revised Note 2 from "SHEET 14" to "SHEET 16".

RC-45M

Sheet 6

Inserted this new sheet for Detail 6; added details for 4" and 6" curb heights.

Revised detail for 8" curb height as follows:

- Added "8" CURB HEIGHT" to title.
- Added 8" dimension for the width and height of curb.
- Revised "SEE NOTE 4" to "SEE NOTE 4 ON SHEET 5".
- Revised "#3 @ 9" (TYP.) (SEE NOTE 3)" to "#3 @ 9" (TYP.) (SEE NOTE 3 ON SHEET 5)".

RC-45M

Sheet 7

This sheet was previously Sheet 5 of 20.

Revised Plan View – Type D-H by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".

Revised Plan View for Upstream Bar Grate by changing "SHEET 7" to "SHEET 9".

Revised Detail 9 by changing "(SEE SHEET 7 OR 8)" to "(SEE SHEET 9 OR 10)".

Revised Notes as follows:

- Changed Note 2 from "SHEET 7" to "SHEET 9".
- Changed Note 3 from "SHEET 12" to "SHEET 14".

RC-45M

Sheet 8

This sheet was previously Sheet 6 of 20.

Revised Plan View – Type D-H Level by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".

Revised Section Q-Q and Section R-R by changing "SHEET 5" to "SHEET 7".

Revised Section S-S by removing "OR CONCRETE GLARE SCREEN" (2 locations).

Revised Section T-T as follows:

- Indicated that the formed opening needs to be "30" MINIMUM (TYP.)" from a joint in the median barrier.



-Removed "OR CONCRETE GLARE SCREEN".

-Changed "2" PRECAST BARRIER / 6" CAST-IN-PLACE BARRIER" to "BARRIER EMBEDMENT DEPTH".

-Added Notes 1 and 2 in circles.

Revised Notes as follows:

-Changed Note 2 from "SHEET 12" to "SHEET 14".

-Changed Note 3 to "FOR INLET PLACEMENT NOTES, SEE SHEET 18".

-Added Note 4, "PROVIDE A 15'-0" MINIMUM PRECAST CONCRETE MEDIAN BARRIER SEGMENT WHEN USING A TYPE D-H INLET BOX IN THE MEDIAN."

RC-45M      Sheet 9

This sheet was previously Sheet 7 of 20.

Revised Structural Steel Grate Notes as follows:

-Changed Note 1 by revising sheet numbers.

-Changed Note 3 from "WORKMANSHIP" to "PERFORM WORK".

-Changed Note 10 from "BITUMINOUS" to "ASPHALT" (2 locations) and from "IN ACCORDANCE WITH" to "AS SPECIFIED IN" (2 locations).

RC-45M      Sheet 10

This sheet was previously Sheet 8 of 20.

Revised "SHEET 7" to "SHEET 9" (5 locations).

RC-45M      Sheet 11

This sheet was previously Sheet 9 of 20.

Revised Cast Iron Grate Notes as follows:

-Changed Note 1 by revising sheet numbers.

-Changed Note 3 from "WORKMANSHIP" to "PERFORM WORK".

RC-45M      Sheet 12

This sheet was previously Sheet 10 of 20.

Revised Section Marks so "SECTION C-C" was not repeated from Sheet 9.

Revised Notes 1 and 2 from "SHEET 9" to "SHEET 11".

RC-45M      Sheet 13

This sheet was previously Sheet 11 of 20.

Revised Cast Iron Vane Grate Notes, Note 3 from "WORKMANSHIP" to "PERFORM WORK".

RC-45M      Sheet 14

This sheet was previously Sheet 12 of 20.

Revised Precast Concrete Grade Adjustment Ring – Top Detail as follows:

-Changed "MIN. LAP LENGTH (TYP)" from 16" to 22".

-Revised dimension for "MAX." from 10" to <12" (2 locations).

Revised Precast Concrete Grade Adjustment Ring – Bottom Detail as follows:

- Changed "MIN. LAP LENGTH (TYP)" from 16" to 22".
- Revised dimension for "MAX." from 10" to <12" (2 locations).

Revised Grate Adjustment Ring General Notes as follows:

- Changed Note 1 by revising sheet numbers.
- Changed Note 3 from "WORKMANSHIP" to "PERFORM WORK".

Revised Precast Concrete Grade Adjustment Ring Notes as follows:

- Changed Note 9, second bullet from "LESS THAN OR EQUAL TO 10"" to "LESS THAN 12"".
- Changed Note 10, first bullet from "IN ACCORDANCE WITH" to "AS SPECIFIED IN".
- Changed Note 11's maximum dimension from "10"" to "LESS THAN 12"".

RC-45M	Sheet 15	<p>This sheet was previously Sheet 13 of 20.</p> <p>Revised Structural Steel Grade Adjustment Riser Notes as follows:</p> <ul style="list-style-type: none"><li>-Changed Note 10 from "BITUMINOUS" to "ASPHALT" (2 locations) and from "IN ACCORDANCE WITH" to "AS SPECIFIED IN" (2 locations).</li><li>-Changed Note 11 from "SHEET 12" to "SHEET 14".</li></ul>
RC-45M	Sheet 16	<p>This sheet was previously Sheet 14 of 20.</p> <p>Revised Note 1 from "SHEET 15" to "SHEET 17".</p>
RC-45M	Sheet 17	<p>This sheet was previously Sheet 15 of 20.</p> <p>Revised Inlet Frame Notes as follows:</p> <ul style="list-style-type: none"><li>-Changed Note 1 by revising sheet numbers.</li><li>-Changed Note 3 from "WORKMANSHIP" to "PERFORM WORK".</li><li>-Changed Note 6, fourth bullet from "BITUMINOUS" to "ASPHALT" (2 locations) and from "IN ACCORDANCE WITH" to "AS SPECIFIED IN" (2 locations).</li></ul>
RC-45M	Sheet 18	<p>This sheet was previously Sheet 16 of 20.</p> <p>Revised Type M Concrete Top Unit Placed Along 1'-0" and 2'-0" Wide Shoulder Details by removing "OR CONCRETE GLARE SCREEN".</p> <p>Revised Section A-A as follows:</p> <ul style="list-style-type: none"><li>-Indicated that the formed opening needs to be "30" MINIMUM (TYP.)" from a joint in the median barrier.</li><li>-Removed "OR CONCRETE GLARE SCREEN".</li></ul>

-Changed 2" PRECAST BARRIER / 6" CAST-IN-PLACE BARRIER" to "BARRIER EMBEDMENT DEPTH".

-Added Notes 1 and 2 in circles.

Revised Detail A and Detail B by removing "OR CONCRETE GLARE SCREEN".

Revised Detail C as follows:

-Removed "OR CONCRETE GLARE SCREEN".

-Changed "BITUMINOUS" to "ASPHALT".

Revised Inlet Placement Notes as follows:

-Changed Note 1 by revising sheet numbers.

-Inserted comma in Note 3 after "DETAILS".

-Added Note 5, "NO JOINT IN A PRECAST CONCRETE MEDIAN BARRIER IS PERMITTED WITHIN 30" OF THE FORMED OPENING AND ABOVE THE FORMED OPENING."

-Added Note 6, "NO EXPANSION OR CONTRACTION JOINT IN A CAST-IN-PLACE CONCRETE MEDIAN BARRIER IS PERMITTED WITHIN 30" OF THE FORMED OPENING AND ABOVE THE FORMED OPENING."

RC-45M

Sheet 19

This sheet was previously Sheet 17 of 20.

Revised Inlet Box with Top Slab and Double Type M Concrete Top Unit Placed Along 1'-0" And 2'-0" Wide Shoulders Details by removing "OR CONCRETE GLARE SCREEN".

Revised Section B-B as follows:

-Indicated that the formed opening needs to be "30" MINIMUM (TYP.)" from a joint in the median barrier.

-Removed "OR CONCRETE GLARE SCREEN".

-Changed 2" PRECAST BARRIER / 6" CAST-IN-PLACE BARRIER" to "BARRIER EMBEDMENT DEPTH".

-Added Notes 1 and 2 in circles.

Revised Note 1 from "SHEET 16" to "SHEET 18".

RC-45M

Sheet 20

This sheet was previously Sheet 18 of 20.

Revised Plan View – Type M & Type S Detail by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".

Revised Alternate One Bar Options for #4 Horizontal U-Bars – Option 1 by changing "MIN. LAP LENGTH" from 16" to 22".

Revised Note 1 by changing "20" to "23".

RC-45M	Sheet 21	<p>This sheet was previously Sheet 19 of 20.</p> <p>Added "TABLE OF DIMENSIONS" to show the dimensions for 4", 6", and 8" curb heights.</p> <p>Revised Plan View – Type C by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".</p> <p>Revised Section F-F as follows:</p> <ul style="list-style-type: none"> <li>-Changed "SEE DETAIL 4" to "SEE DETAIL 4 ON SHEET 22".</li> <li>-Changed "SEE DETAIL 1 ON SHEET 18" to "SEE DETAIL 1 ON SHEET 20".</li> <li>-Added 3/8" dimension.</li> </ul> <p>Revised Section G-G by adding 3/8" dimension.</p> <p>Moved Detail 4 for 8" curb height to Sheet 22.</p> <p>Revised Note 1 by changing "20" to "23".</p>
RC-45M	Sheet 22	<p>Inserted this new sheet for Detail 4; added details for 4" and 6" curb heights.</p> <p>Revised detail for 8" curb height as follows:</p> <ul style="list-style-type: none"> <li>-Added "8" CURB HEIGHT" to title.</li> <li>-Added 8" dimension for the width and height of curb.</li> <li>-Revised "SEE NOTE 4" to "SEE NOTE 4 ON SHEET 21".</li> <li>-Revised "#3 BARS (SEE PLAN FOR SPACING AND SEE NOTE 3)" to "#3 BARS (SEE PLAN FOR SPACING AND NOTE 3 ON SHEET 21)".</li> </ul>
RC-45M	Sheet 23	<p>This sheet was previously Sheet 20 of 20.</p> <p>Added "TABLE OF DIMENSIONS" to show the dimensions for 4", 6", and 8" curb heights.</p> <p>Revised Plan View – Type C Alternate by changing "MIN. LAP LENGTH (TYP)" from 16" to 22".</p> <p>Revised Section J-J as follows:</p> <ul style="list-style-type: none"> <li>-Changed "SEE DETAIL 6" to "SEE DETAIL 6 ON SHEET 24".</li> <li>-Added 3/8" dimension.</li> </ul> <p>Moved Detail 6 for 8" curb height to Sheet 24.</p> <p>Revised Concrete Top Unit Notes for Rehabilitation Projects from "SHEETS 18 THRU 20" to "SHEETS 20 THRU 24" and "SHEETS 2 THRU 4" to "SHEETS 2 THRU 6".</p> <p>Revised Note 2 from "SHEET 14" to "SHEET 16".</p>

RC-45M	Sheet 24	<p>Inserted this new sheet for Detail 6; added details for 4" and 6" curb heights.</p> <p>Revised detail for 8" curb height as follows:</p> <ul style="list-style-type: none"> <li>-Added "8" CURB HEIGHT" to title.</li> <li>-Added 8" dimension for the width and height of curb.</li> <li>-Changed "SEE NOTE 4" to "SEE NOTE 4 ON SHEET 23".</li> <li>-Changed "#3 @ 9" (TYP.) (SEE NOTE 3)" to "#3 @ 9" (TYP.) (SEE NOTE 3 ON SHEET 23)".</li> </ul>
RC-46M	Sheet 1	<p>Revised Material Notes as follows:</p> <ul style="list-style-type: none"> <li>-Changed Note 3, second bullet to, "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)".</li> <li>-Changed Notes 5-11 from "IN ACCORDANCE WITH" to "AS SPECIFIED IN".</li> <li>-Changed reference in Note 7 for mortar from "SECTION 705.7(b)" to "SECTION 705.6(b)".</li> <li>-Changed reference in Note 8 for caulking compound from "SECTION 705.8(a)" to "SECTION 705.7(a)".</li> </ul>
RC-46M	Sheet 2	<p>Revised Cast-in-Place Concrete Inlet Box Notes, Note 1 by changing "IN ACCORDANCE WITH THE REQUIREMENTS OF" to "AS SPECIFIED IN".</p> <p>Revised Precast Concrete Inlet Box Notes, Note 1 by changing "IN ACCORDANCE WITH THE REQUIREMENTS OF" to "AS SPECIFIED IN".</p>
RC-46M	Sheet 3	<p>Revised Reinforcement Bar Splice Lengths Table as follows:</p> <ul style="list-style-type: none"> <li>-Changed splice lengths to be in accordance with AASHTO LRFD Bridge Design Specification, 8<sup>th</sup> Edition, 2017.</li> <li>-Changed Note 2 to "SPLICE LENGTHS BASED ON HORIZONTAL BARS WITH A CLASS B SPLICE."</li> </ul>
RC-46M	Sheet 4	<p>Revised Concrete Top Unit – Type C from "TYPE C CONCRETE TOP UNIT" to "TYPE C CONCRETE TOP UNIT (SEE NOTE 5)".</p> <p>Revised Concrete Top Unit – Type C Alternate with Type C Frame from "TYPE C ALTERNATE CONCRETE TOP UNIT" to "TYPE C ALTERNATE CONCRETE TOP UNIT (SEE NOTE 5)".</p> <p>Added Note 5, "REFER TO CONTRACT DRAWINGS FOR CURB HEIGHT."</p>
RC-50M	General	<p>This Standard Drawing was updated to include transition details for the 45" F-Shape Concrete Barrier, Vertical Wall Concrete Barrier, PA Bridge Barrier and PA Type 10M Bridge Barrier. Details for the Vertical Wall Concrete Bridge Barrier with Alternate Sidewalk were added.</p>

RC-50M	Sheet 1 of 18 (Old)	Total number of sheets were revised from 18 to 12.
	Sheet 1 of 12 (New)	<p>Revised Title Block as follows:</p> <ul style="list-style-type: none"> <li>-Changed "TYPICAL CONCRETE BRIDGE BARRIER" to "GUIDE RAIL TRANSITIONS - 1".</li> <li>-Changed "SHT 1 OF 18" to "SHT 1 OF 12".</li> </ul> <p>Revised Reference Drawings as follows:</p> <ul style="list-style-type: none"> <li>-Deleted "RC-59M CONCRETE GLARE SCREEN".</li> <li>-Deleted "BC-703M THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION".</li> <li>-Deleted "BC-708M THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION".</li> <li>-Deleted "BC-712M THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION".</li> <li>-Deleted "BC-739M TYPE F-BRIDGE BARRIER TO GUIDE RAIL TRANSITION".</li> <li>-Added "RC-64M CURBS AND GUTTERS".</li> </ul> <p>Revised Plan View for Typ. Concrete Bridge Barrier as follows:</p> <ul style="list-style-type: none"> <li>-Changed "PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER" to "PLAN VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION".</li> <li>-Changed plan view for updated MASH requirements for guide rail to bridge barrier transition. Transitions are now applicable to the F-Shape Concrete Bridge Barriers, Vertical Wall Concrete Bridge Barrier, PA Bridge Barrier, and PA Type 10M Bridge Barrier.</li> </ul> <p>Revised Elevation View for Typ. Concrete Bridge Barrier as follows:</p> <ul style="list-style-type: none"> <li>-Changed "ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER" to "ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITH CURB AND INLET".</li> <li>-Changed elevation view for updated MASH requirements for guide rail to bridge barrier transition. Revised to show inlet at the preferred location.</li> </ul> <p>Revised Elevation View for Typ. Concrete Bridge Barrier as follows:</p> <ul style="list-style-type: none"> <li>-Changed "ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER" to "ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITHOUT CURB".</li> <li>-Changed elevation view for updated MASH requirements for guide rail to bridge barrier transition.</li> </ul> <p>Removed Section A-A, Section B-B, Section C-C, and Section D-D.</p>

Revised Table A with updated post dimensions and sizes.

Deleted Legend.

Revised Notes as follows:

-Note 1: Changed to "PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 620."

-Note 2: Deleted.

-Note 3: Changed Note "3" to "2". Changed "INLET PLACEMENT" to "CURB".

-Note 4: Changed Note "4" to "3". Changed "W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS" to "THREE-BEAM AND W-BEAM RAIL ELEMENTS ARE BOLTED TO ALL POSTS".

-Note 5: Changed Note "5" to "4".

-Note 6: Changed Note "6" to "5". Revised "EMBEDDED INSERTS" to "BRIDGE RAILINGS".

-Note 7: Deleted.

-Note 8: Deleted.

-Note 9: Changed Note "9" to "6". Changed "SECTION AND RUBBING RAIL" to "CONNECTOR". Deleted "INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER."

-Note 10: Deleted.

-Note 11: Changed Note "11" to "7". Deleted "RUBBING RAIL". Changed "SECTION BRIDGE CONNECTIONS" to "CONNECTORS".

-Note 12: Deleted.

-Note 13: Changed Note "13" to "8". Deleted "BC-739M AND".

-Note 14: Deleted.

-Note 15: Changed Note "15" to "9". Changed "TABLES A, B, C, AND D AS APPROPRIATE" to "TABLE A".

-Note 16: Changed Note "16" to "10". Changed "TWO-LANE HIGHWAYS" to "UNDIVIDED HIGHWAYS".

-Note 17: Deleted.

-Note 18: Deleted.

-Note 19: Deleted.

-Note 20: Revised Note "20" to "11".

-Added Note 12, "PAYMENT FOR THE GUIDE RAIL TO BRIDGE BARRIER TRANSITION, WITHOUT CURB, WITH CURB AND INLET OR WITH CURB AND INLET NEAR BRIDGE BARRIER, INCLUDES ALL RAIL ELEMENTS, FABRICATED STRUCTURAL STEEL, TERMINAL CONNECTION, BOLTS, POSTS, OFFSET BRACKETS, CLASS A CEMENT CONCRETE FOR CURB INCLUDING SLOPED END SECTION, AND ASSOCIATED HARDWARE. GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS ARE ROADWAY ITEMS."

-Added Note 13, "PROVIDE CONNECTION PLATES IN ACCORDANCE WITH AASHTO M270 (ASTM A709) GRADE 36. PROVIDE BOLTS, NUTS AND WASHERS AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(c)."

-Added Note 14, "THE INLET TOP AND INLET BOX IS PERMITTED BETWEEN POSTS 7 & 8, 8 & 9, 9 & 10, AND 11 & 12. THE PREFERRED LOCATION IS BETWEEN POSTS 11 AND 12."

-Added Note 15, "IF THE CURB IS REQUIRED BEYOND POST 4, THEN THE CURB MUST EXTEND 2'-6" BEYOND THE CENTERLINE OF THE RAIL SPLICE AT THE BEGINNING OF THE TYPE 31-S GUIDE RAIL."

-Added Note 16, "THE INLET TOP AND INLET BOX IS PERMITTED BETWEEN POSTS 1 & 2 OR 2 & 3."

-Added Note 17, "SEE SHEET 3 FOR SECTIONS A-A, B-B, C-C AND D-D."

-Added Note 18, "CONCRETE BRIDGE BARRIER SHOWN. PA TYPE 10M BRIDGE BARRIER AND PA BRIDGE BARRIER SIMILAR."

-Added Note 19, "IF SIDEWALK IS PROVIDED, BARRIER HEIGHT IS MEASURED FROM THE TOP OF THE SIDEWALK TO TOP OF THE BARRIER."

RC-50M	Sheet 2 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 2 of 12 (New)	<p>New Sheet. GUIDE RAIL TRANSITIONS – 2.</p> <p>Added "PLAN VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITH CURB AND INLET NEAR BRIDGE BARRIER".</p> <p>Added "ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITH CURB AND INLET NEAR BRIDGE BARRIER".</p> <p>Added "NOTES".</p>
RC-50M	Sheet 3 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 4 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 3 of 12 (New)	<p>New Sheet. POST DETAILS.</p> <p>Added new "SECTION A-A", "SECTION B-B", "SECTION C-C", and "SECTION D-D".</p>



Added new "DETAIL A" and "DETAIL B".

Added "NOTES".

RC-50M Sheet 15 of 18  
(Old)  
Sheet 4 of 12  
(New)

Revised Title Block as follows:

-Changed "THRIE-BEAM TRANSITION SECTION AND RAIL ELEMENTS DETAILS" to "MISCELLANEOUS DETAILS".

-Changed "SHT 15 OF 18" to "SHT 4 OF 12".

Added "OFFSET BRACKET" details for posts 1-12.

Added "DETAIL OF POST, OFFSET BRACKET AND RAIL ELEMENT".

Removed "TRANSITION SECTION".

Revised Asymmetric W-Beam to Thrie Beam Transition Section as follows:

-Flipped section view.

-Changed "ASYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION" to "ASYMMETRIC W-BEAM TO THRIE-BEAM TRANSITION".

-Changed "STANDARD THRIE-BEAM" to "THRIE-BEAM RAIL ELEMENT".

-Changed "STANDARD W-BEAM" to "W-BEAM RAIL ELEMENT".

-Added 6'-3" dimension.

-Added 6 1/4" dimension (2 locations).

-Added 12 1/2" LAP dimension (2 locations).

-Added 7 5/8" dimension.

-Added 6 3/16" dimension.

-Added "10-GAUGE THICK STEEL".

-Added section marks "E-E" and "F-F".

Revised Thrie-Beam Rail Element Section A-A from "THRIE-BEAM RAIL ELEMENT SECTION A-A" to "THRIE-BEAM RAIL ELEMENT SECTION E-E".

Revised Rail Element Section B-B from "RAIL ELEMENT SECTION B-B" to "W-BEAM RAIL ELEMENT SECTION F-F".

Moved Thrie-Beam Rail Element detail to new Sheet 5 of 12.

Revised Notes as follows:

-Note 1: Deleted.

-Note 2: Deleted.

-Note 3: Revised Note "3" to Note "1".

RC-50M	Sheet 5 of 12 (New)	<p>New Sheet. RAIL ELEMENT DETAILS.</p> <p>Added "THRIE-BEAM RAIL ELEMENT".</p> <p>Added "THRIE-BEAM TERMINAL CONNECTOR".</p> <p>Added "SQUARE WASHER PLATE DETAIL".</p> <p>Added "LAPPING OF THRIE-BEAM TERMINAL CONNECTOR".</p> <p>Added "LEGEND".</p> <p>Added "NOTES".</p> <p>Added "THRIE-BEAM RAIL ELEMENT"; moved detail from old Sheet 15 of 18. Revised this detail as follows:</p> <ul style="list-style-type: none"> <li>-Removed detail break lines.</li> <li>-Changed dimension from 13'-6 1/2" to 7'-3 1/2".</li> <li>-Changed dimension from 12'-6" to 6'-3".</li> <li>-Added 6 1/4" dimension (2 locations).</li> <li>-Added 1'-6 3/4" dimension.</li> <li>-Added "12-GAUGE THICK STEEL".</li> <li>-Removed "OR TRANSITION SECTION" after "ADJOINING THRIE-BEAM RAIL ELEMENT".</li> <li>-Added "TYPE G" before "SPlice BOLTS".</li> <li>-Changed "(SEE RC-51M, SHEET 2)" to "(SEE RC-51M, SHEET 3)".</li> </ul>
RC-50M	Sheet 6 of 12 (New)	<p>New Sheet. THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER DETAILS.</p> <p>Added "PLAN VIEW TERMINAL CONNECTOR DETAIL".</p> <p>Added "PLAN VIEW FOR THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER".</p> <p>Added "ELEVATION VIEW FOR THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER".</p> <p>Added "SECTION G-G".</p> <p>Added "SECTION H-H".</p> <p>Added "NOTES".</p>
RC-50M	Sheet 7 of 12 (New)	<p>New Sheet. THRIE-BEAM TO 42" VERTICAL WALL CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK DETAILS.</p> <p>Added "PLAN VIEW TERMINAL CONNECTOR DETAIL".</p>

		<p>Added "PLAN VIEW FOR THRIE-BEAM TO 42" VERTICAL WALL CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK".</p> <p>Added "ELEVATION VIEW FOR THRIE-BEAM TO 42" VERTICAL WALL CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK".</p> <p>Added "NOTES".</p>
RC-50M	Sheet 8 of 12 (New)	<p>New Sheet. THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER DETAILS.</p> <p>Added "PLAN VIEW TERMINAL CONNECTOR DETAIL".</p> <p>Added "PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER".</p> <p>Added "ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER".</p> <p>Added "CONNECTION PLATE DETAIL".</p> <p>Added "DETAIL C".</p> <p>Added "DETAIL D".</p> <p>Added "FILLER PLATE DETAIL".</p> <p>Added "NOTES".</p>
RC-50M	Sheet 9 of 12 (New)	<p>New Sheet. THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER DETAILS.</p> <p>Added "SECTION J-J".</p> <p>Added "SECTION K-K".</p> <p>Added "SECTION L-L".</p> <p>Added "SECTION M-M".</p> <p>Added "NOTES".</p>
RC-50M	Sheet 5 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 6 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 7 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 8 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 10 of 12 (New)	<p>New Sheet. THRIE-BEAM TO PA BRIDGE BARRIER DETAILS.</p> <p>Added "PLAN VIEW TERMINAL CONNECTOR DETAIL".</p> <p>Added "PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER".</p>

		Added "ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER".
		Added "CONNECTION PLATE DETAIL".
		Added "DETAIL E".
		Added "BEVELED FILL PLATE DETAIL".
		Added "SECTION R-R".
		Added "NOTES".
		Added "LEGEND".
RC-50M	Sheet 11 of 12 (New)	New Sheet. THRIE-BEAM TO PA BRIDGE BARRIER DETAILS.
		Added "SECTION N-N".
		Added "SECTION P-P".
		Added "SECTION Q-Q".
		Added "DETAIL F".
		Added "NOTES".
RC-50M	Sheet 12 of 12 (New)	New Sheet. BARRIER END TRANSITION IMAGES.
		Added the following "BARRIER END TRANSITION IMAGES":
		- "F-SHAPE & VERTICAL WALL CONCRETE BARRIER END DETAIL (WITH CURB)".
		- "PA BRIDGE BARRIER END DETAIL (WITH CURB)".
		- "PA TYPE 10M BRIDGE BARRIER END DETAIL (WITH CURB)".
		- "F-SHAPE & VERTICAL WALL CONCRETE BARRIER END DETAIL (WITHOUT CURB)".
		- "PA BRIDGE BARRIER END DETAIL (WITHOUT CURB)".
		- "PA TYPE 10M BRIDGE BARRIER END DETAIL (WITHOUT CURB)".
RC-50M	Sheet 9 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 10 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 11 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 12 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 13 of 18 (Old)	Deleted Sheet.

RC-50M	Sheet 14 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 15 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 16 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 17 of 18 (Old)	Deleted Sheet.
RC-50M	Sheet 18 of 18 (Old)	Deleted Sheet.
RC-51M	General	Increased total number of sheets from 14 to 15.
	Sheet 1	<p>Revised Typical Hardware Arrangement with Post/Routed Offset Bracket/Rail Detail by indicating two holes in each flange of the guide rail post, increasing the total number of holes in a post from two to four.</p> <p>Revised Isometric View Detail by indicating two holes in each flange of the two guide rail posts on the right side, increasing the total number of holes in a post from two to four.</p> <p>Revised 12'-6" W-Beam Rail Element (Type 31-SC and Type 31-SCC) Detail from "OPTIONAL HOLE (FOR 31-SC RAIL ELEMENT)" to "HOLE FOR TYPE 31-SCC RAIL ELEMENT (OPTIONAL FOR TYPE 31-SC)".</p> <p>Revised Note 1 from "CONSTRUCTION MEETING THE REQUIREMENTS OF" to "CONSTRUCT AS SPECIFIED IN".</p>
RC-51M	Sheet 2	<p>Revised W6x9 or W6x8.5 Post Details, Front and Side Views, by indicating two holes in each flange of the guide rail post, increasing the total number of holes in a post from two to four.</p> <p>Revised Type 31-SM Median Barrier, W6x9 or W6x8.5 Post Details, Front View, as follows:</p> <ul style="list-style-type: none"> <li>-Indicated two holes in each flange of the guide rail post, increasing the total number of holes in a post from two to four.</li> <li>-Deleted the callout, "13/16" DIAMETER HOLE IN OPPOSITE FLANGE (SEE NOTE 3)".</li> </ul> <p>Revised Guide Rail with Curb Detail by deleting the callout, "2 OPTIONAL HOLES FOR MEDIAN BARRIER APPLICATIONS."</p> <p>Revised wording in sheet title from "BRIDGE CONNECTIONS" to "TERMINAL CONNECTOR".</p> <p>Revised Terminal Section Bridge Connection Detail as follows:</p> <ul style="list-style-type: none"> <li>-Changed the title of the detail from "TERMINAL SECTION BRIDGE CONNECTION" to "W-BEAM TERMINAL CONNECTOR".</li> </ul>

		-Changed Detail A from "THE BRIDGE CONNECTION TERMINAL" to "TERMINAL CONNECTOR".
RC-51M	Sheet 13	<p>Added Elevation View for Steel Posts over Underground Structures.</p> <p>Changed the title of the Steel Post over Underground Structures Detail from "STEEL POST OVER UNDERGROUND STRUCTURES" to "SECTION A-A" and from "SEE NOTE 4" to "SEE NOTES 4 AND 5".</p> <p>Modified Section A-A by adding callouts with references to Sheet 14 for Steel Post Detail, Steel Plate, Bolt Detail, and Concrete Slab Detail.</p> <p>Revised Note 1 to say, "FOR POSTS IN ROCK, SEE SHEET 15."</p> <p>Added Note 5, "A MAXIMUM OF SIX CONSECUTIVE STEEL POSTS OVER UNDERGROUND STRUCTURES IS PERMITTED FOR AN INSTALLATION OF TYPE 31 STRONG POST GUIDE RAIL."</p>
	Sheet 14	<p>Inserted this new Sheet.</p> <p>Moved Steel Post Detail, Concrete Slab Detail, and Bolt Detail from Sheet 13 to this Sheet (Sheet 14). (The Steel Post Detail includes the steel post.)</p> <p>Moved Steel Posts in Rock Detail from Sheet 14 to Sheet 15.</p> <p>Added Note 1, "FOR NOTES, SEE SHEET 13 OF 15."</p>
	Sheet 15	Created this new Sheet to show Steel Posts in Rock Detail.
RC-64M	General	<p>Increased total number of sheets from 1 to 2.</p> <p>Removed all metric dimensions.</p>
	Sheet 1	<p>Moved Typical Cross Section for 8" curb height to Sheet 2.</p> <p>Revised Depressed Curb for Driveways – Section A-A as follows:</p> <ul style="list-style-type: none"> <li>-Changed the 8" vertical dimension to "CURB HEIGHT – 8", 6" OR 4".</li> <li>-Removed the 1" and 7" dimensions and added "*".</li> <li>-Added Note, "* - VARIES BASED ON CURB HEIGHT".</li> <li>-Added the 10" dimension.</li> <li>-Removed the 18" dimension.</li> </ul> <p>Revised Note 1 from "CONSTRUCTION MEETING THE REQUIREMENTS OF" to "CONSTRUCT AS SPECIFIED IN".</p> <p>Revised Note 4 by inserting ", 4" HEIGHT" before "SLOPED" and by changing "AT END OF" to "ADJACENT TO".</p> <p>Removed Note 5 and Note 6.</p>
RC-64M	Sheet 2	<p>Added this new Sheet.</p> <p>Added details for "PLAIN CEMENT CONCRETE CURB – TRANSITIONS".</p> <p>Added detail for Plain Cement Concrete Curb, 6" Height.</p>

Added detail for Plain Cement Concrete Curb, 4" Height.

Added Table 1 and Table 2.

RC-67M      Sheet 1

Revised Depressed Curb for Curb Ramps Detail as follows:

- Removed the 7" and 18" dimensions so detail is more generic.
- Changed the 8" vertical dimension to "CURB HEIGHT".

Revised Note 1 as follows:

-Changed from "CONSTRUCTION MEETING THE REQUIREMENTS OF" to "CONSTRUCT AS SPECIFIED IN".

-Removed Publication 408 Sections "409" & "694" since these sections are not in the current Publication 408.

-Added Section "413".

Revised Note 6 by inserting "NEW OR" before "EXISTING".

RC-67M      Sheet 13

Revised Section E-E from "BITUMINOUS WEDGE" to "ASPHALT WEDGE".

Gender neutral language has been updated in all revised Standard Drawings, i.e., RC-24M, RC-39M, RC-45M, RC-46M, RC-50M, RC-51M, RC-64M, and RC-67M.

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 - Dec. 17, 2019  
RC-24M - Apr. 29, 2019  
RC-39M - Sept. 15, 2016  
RC-45M - Sept. 15, 2016  
RC-46M - Sept. 15, 2016  
RC-50M - Feb. 8, 2019  
RC-51M - Dec. 17, 2019  
RC-64M - Jun. 1, 2010  
RC-67M - Dec. 17, 2019

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APPROVED FOR ISSUANCE BY:

YASSMIN GRAMIAN, P.E.  
Secretary of Transportation

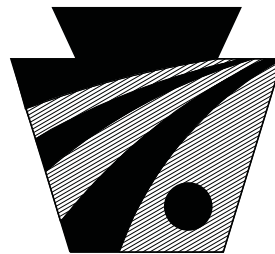
BY:



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

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
<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) _____	FEB. 8, 2019	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 ____ (13 Sheets) _____	DEC. 17, 2019	CONCRETE PAVEMENT JOINTS
RC-21M _____	JUN. 1, 2010	REINFORCED CONCRETE PAVEMENT
**** RC-22M ____ (6 Sheets) _____	FEB. 8, 2019	RUMBLE STRIPS
**** RC-23M ____ (3 Sheets) _____	FEB. 8, 2019	BRIDGE APPROACH SLABS
▲▲▲ RC-24M ____ (3 Sheets) _____	FEB. 19, 2021	PAVEMENT RELIEF JOINT
**** RC-25M ____ (4 Sheets) _____	FEB. 8, 2019	SHOULDERS
▲▲ RC-26M ____ (13 Sheets) _____	DEC. 17, 2019	CONCRETE PAVEMENT REHABILITATION
RC-27M ____ (2 Sheets) _____	JUN. 1, 2010	PLAIN CONCRETE PAVEMENT
**** RC-28M ____ (2 Sheets) _____	FEB. 8, 2019	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) _____	DEC. 17, 2019	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) _____	FEB. 19, 2021	STORM WATER MANHOLES
**** RC-40M _____	FEB. 8, 2019	SLOPE PROTECTION
**** RC-43M ____ (5 Sheets) _____	FEB. 8, 2019	GABIONS
▲▲▲ RC-45M ____ (24 Sheets) _____	FEB. 19, 2021	INLET TOPS, GRATES AND FRAMES
▲▲▲ RC-46M ____ (34 Sheets) _____	FEB. 19, 2021	INLET BOXES
<u>GUIDE RAIL AND MEDIAN BARRIER</u>		
▲▲▲ RC-50M ____ (12 Sheets) _____	FEB. 19, 2021	GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
▲▲▲ RC-51M ____ (15 Sheets) _____	FEB. 19, 2021	TYPE 31 STRONG POST GUIDE RAIL
▲▲ RC-53M ____ (3 Sheets) _____	DEC. 17, 2019	TYPE 2 WEAK POST GUIDE RAIL
▲▲ RC-54M ____ (12 Sheets) _____	DEC. 17, 2019	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-57M ____ (6 Sheets) _____	JUN. 1, 2010	CONCRETE MEDIAN BARRIER
*** RC-58M ____ (4 Sheets) _____	AUG. 4, 2017	SINGLE FACE CONCRETE BARRIER
RC-59M ____ (4 Sheets) _____	JUN. 1, 2010	CONCRETE GLARE SCREEN

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
<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 ____ (2 Sheets) _____	FEB. 19, 2021	CURBS AND GUTTERS
▲▲ RC-65M _____	DEC. 17, 2019	CONCRETE MOUNTABLE CURBS
▲▲▲ RC-67M ____ (14 Sheets) _____	FEB. 19, 2021	CURB RAMPS AND SIDEWALKS

## EROSION AND SEDIMENTATION CONTROL

**** RC-70M ____ (3 Sheets) _____	FEB. 8, 2019	PERIMETER CONTROL DEVICES
*** RC-71M ____ (4 Sheets) _____	AUG. 4, 2017	SEDIMENT BASIN AND SEDIMENT TRAP
**** RC-72M ____ (7 Sheets) _____	FEB. 8, 2019	INLET AND OUTLET PROTECTION
**** RC-73M ____ (4 Sheets) _____	FEB. 8, 2019	CHANNEL AND SLOPE PROTECTION
**** RC-74M _____	FEB. 8, 2019	TEMPORARY DIVERSIONS
RC-75M _____	JUN. 1, 2010	DEWATERING DEVICES
RC-76M _____	JUN. 1, 2010	STRAW BALE BARRIER
▲▲ RC-77M _____	DEC. 17, 2019	ROCK CONSTRUCTION ENTRANCE
**** RC-78M ____ (4 Sheets) _____	FEB. 8, 2019	SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS

## HIGHWAY LIGHTING

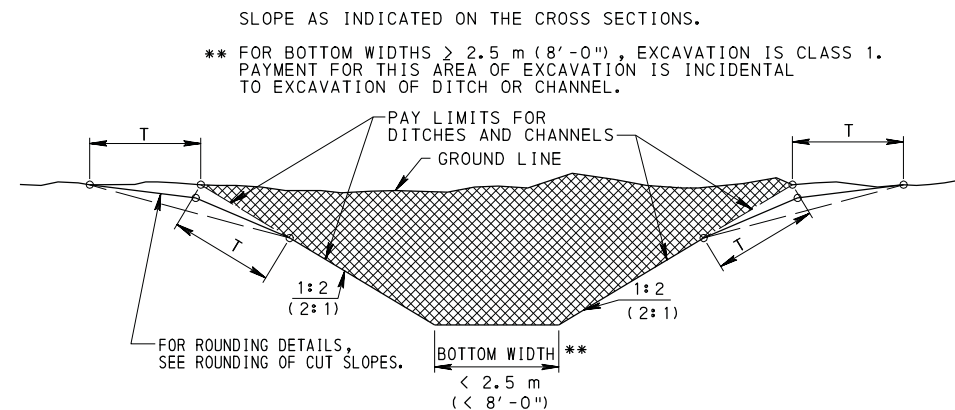
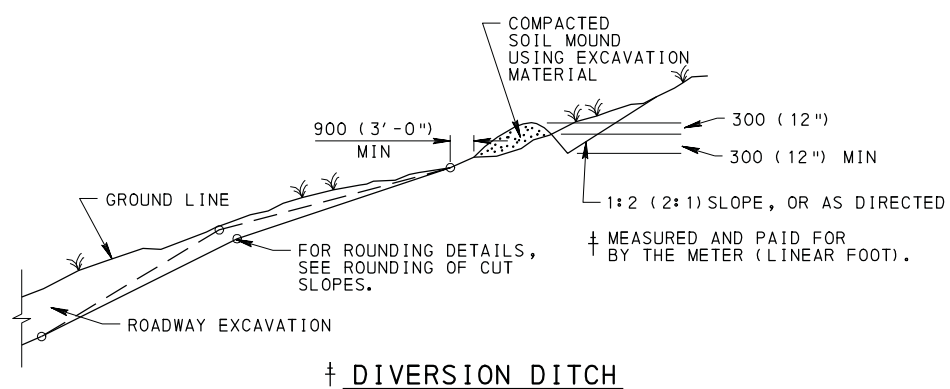
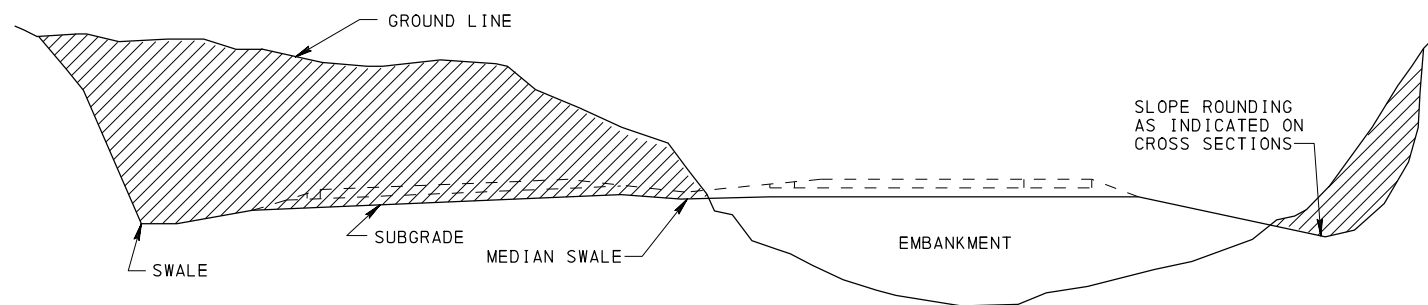
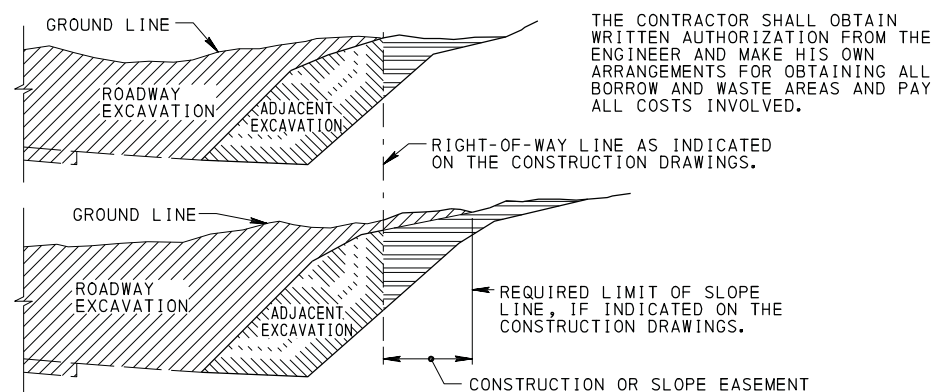
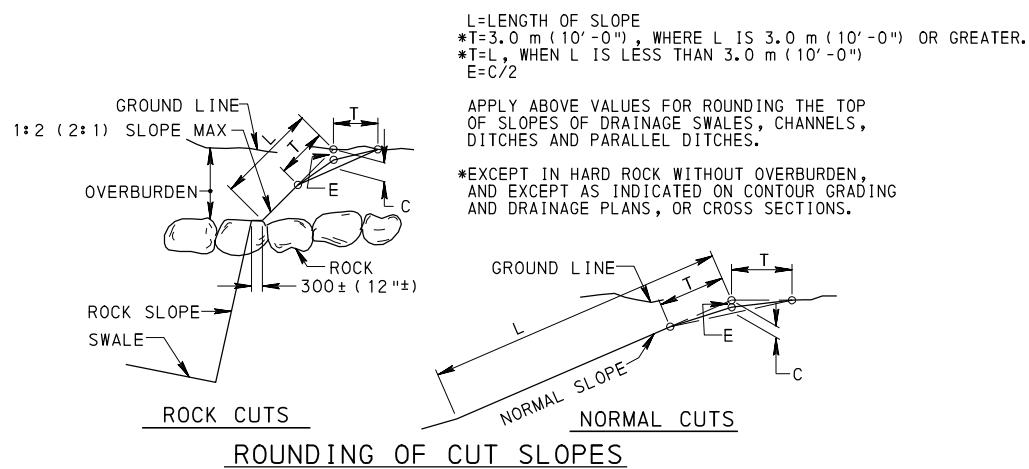
RC-80M ____ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M _____	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M ____ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
**** RC-83M ____ (2 Sheets) _____	FEB. 8, 2019	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M ____ (2 Sheets) _____	JUN. 1, 2010	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS

## ROADSIDE DEVELOPMENT AND PLANTING

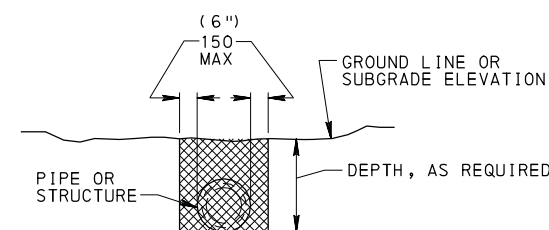
▲▲ RC-91M ____ (3 Sheets) _____	DEC. 17, 2019	BRACING AND PLANTING DETAILS
RC-92M _____	JUN. 1, 2010	REMOVAL LIMITS OF TREE TRIMMING

### JUNE, 2010 EDITION

* SEE CHANGE #1 FOR JUNE 10, 2013 STANDARD REVISIONS
** SEE CHANGE #2 FOR SEPT. 15, 2016 STANDARD REVISIONS
*** SEE CHANGE #3 FOR AUG. 4, 2017 AND AUG. 28, 2017 STANDARD REVISIONS
**** SEE CHANGE #4 FOR FEB. 8, 2019 STANDARD REVISIONS
▲ SEE CHANGE #5 FOR APR. 29, 2019 STANDARD REVISIONS
▲▲ SEE CHANGE #6 FOR DEC. 17, 2019 STANDARD REVISIONS
▲▲▲ SEE CHANGE #7 FOR FEB. 19, 2021 STANDARD REVISIONS



EXCAVATION FOR REMOVAL OF EXISTING PIPE OR STRUCTURE WHERE NO REPLACEMENT IS REQUIRED

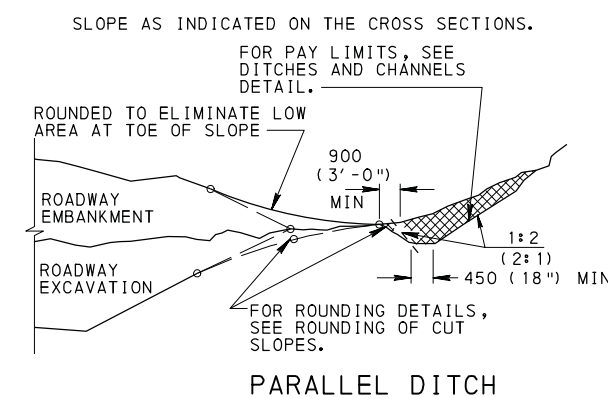
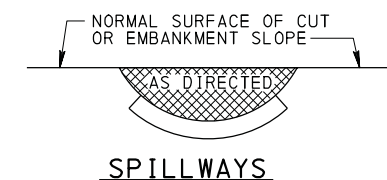


# NOTES

1. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

# LEGEND

	CLASS 1 EXCAVATION
	CLASS 2 EXCAVATION
	BORROW EXCAVATION
	CLASS 1 OR BORROW EXCAVATION



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

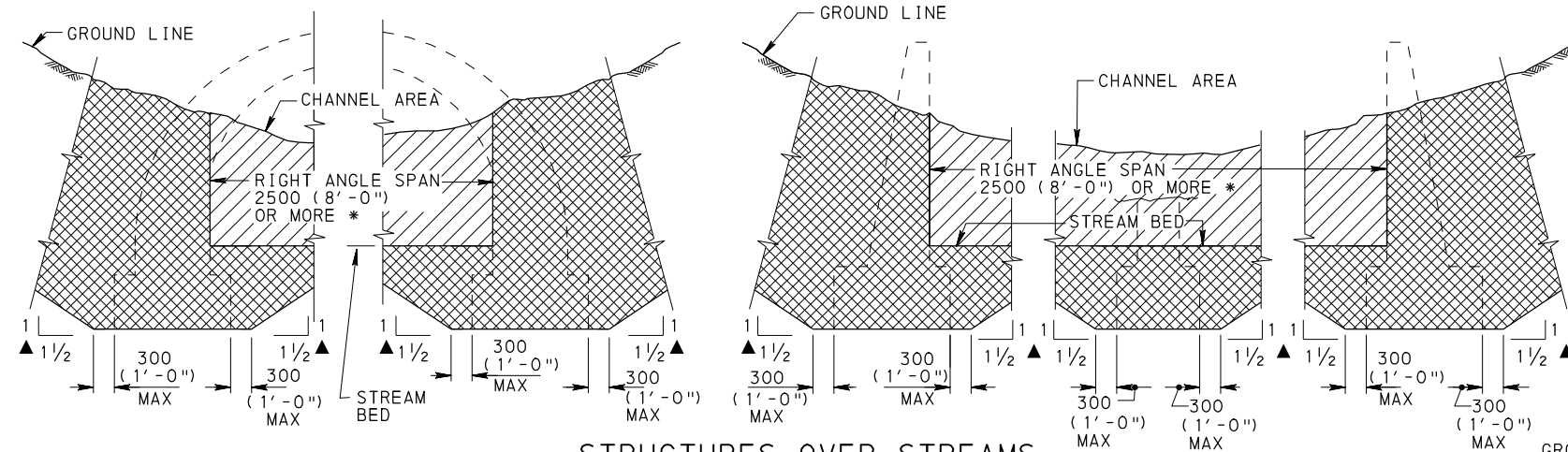
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

CLASSIFICATION OF EARTHWORK

RECOMMENDED JUN. 1, 2010  
  
 CHIEF, HWY. DIVISION

RECOMMENDED JUN. 1, 2010  
  
 DIRECTOR, BUREAU OF DESIGN

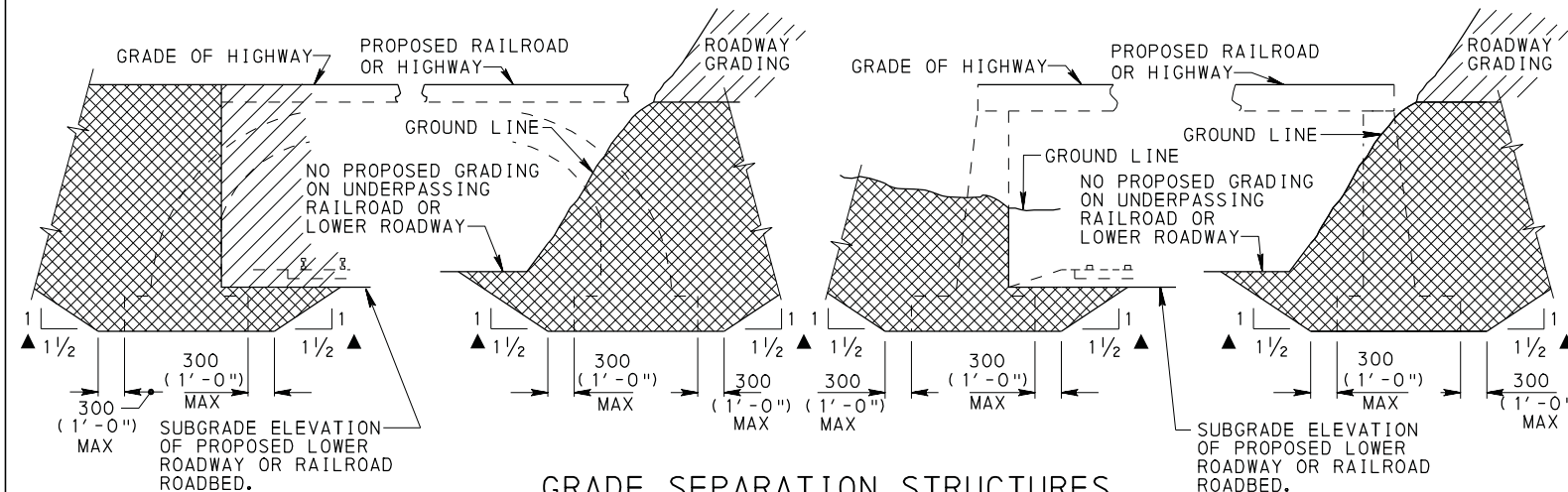
SHT 1 OF 1  
 RC-10M



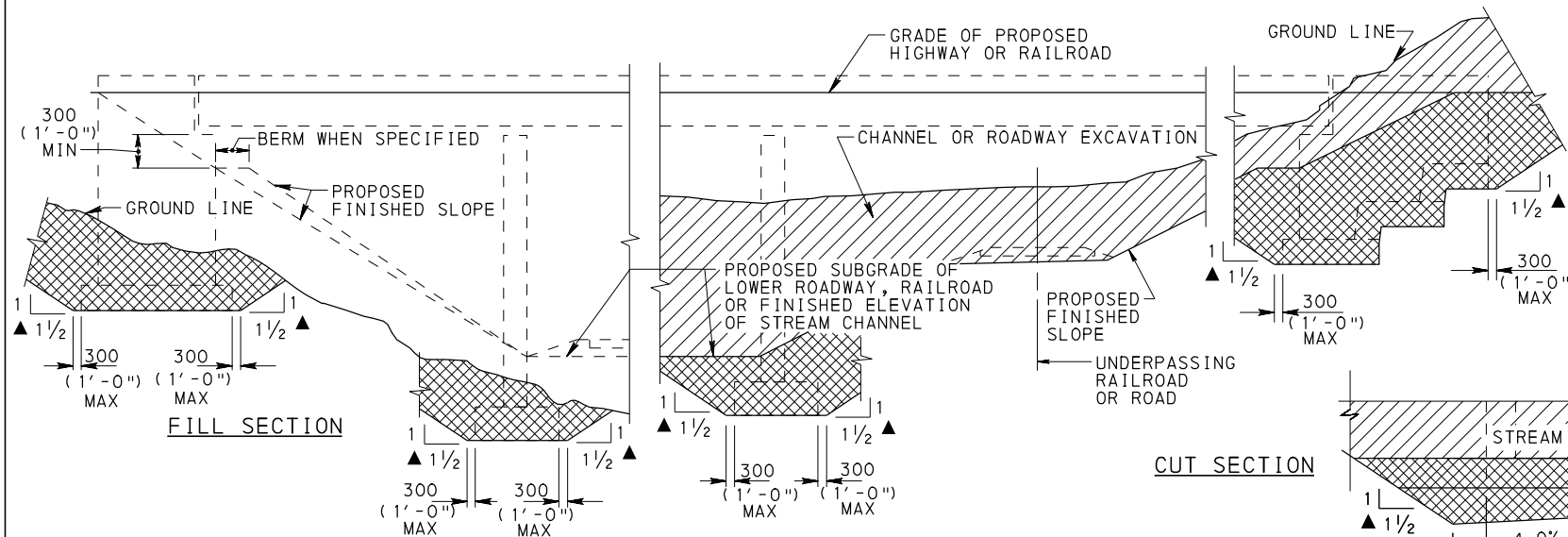
### STRUCTURES OVER STREAMS

INCLUDING METAL PLATE ARCH WITH FOOTING

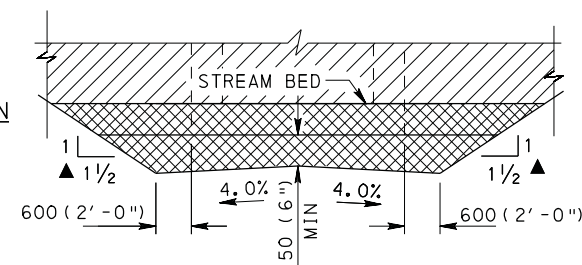
\* WHEN RIGHT ANGLE SPAN IS LESS THAN 2500 (8'-0"), ALL EXCAVATION IS CLASS 3.



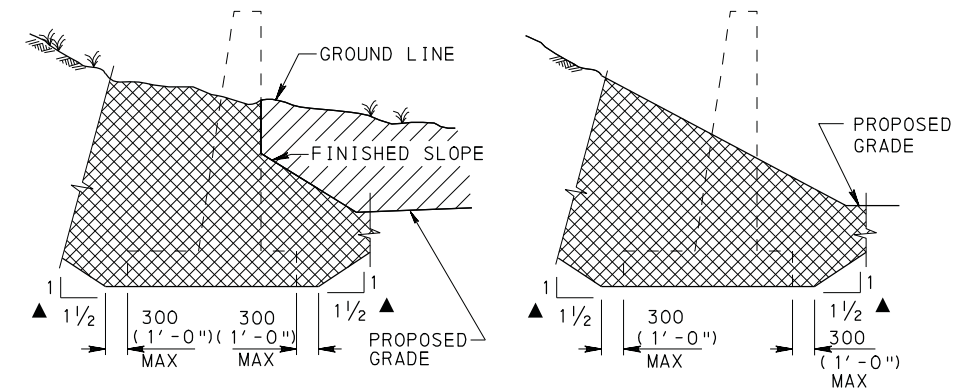
### GRADE SEPARATION STRUCTURES



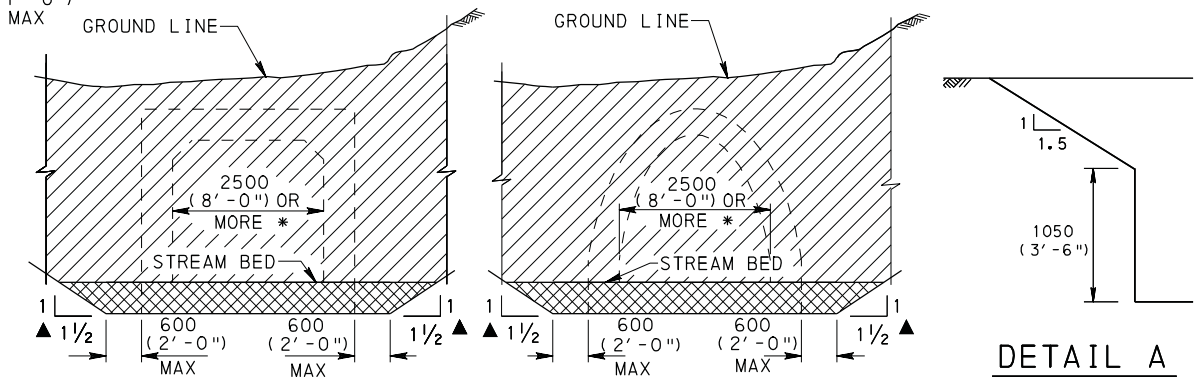
### TYPICAL STRUCTURE SECTION



### EXTRA DEPTH EXCAVATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL



### WING WALLS & RETAINING WALLS



### RC BOX CULVERTS

\* WHEN LESS THAN 2500 (8'-0"), ALL EXCAVATION IS CLASS 3.

### RC TIED ARCH CULVERTS

### NOTES

1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS. USE DETAIL 'A' FOR COHESIVE SOILS ONLY AS DEFINED IN OSHA 29 CFR SECTION 1926.652 AND DETERMINED BY APPROPRIATE SOILS REPORT: 1500 (5'-0") MAXIMUM FOR VERTICAL CUT, OTHERWISE 1050 (3'-6") MAXIMUM FROM BOTTOM OF EXCAVATION TO START OF 1:1.5 (1 1/2:1) LAYBACK SLOPE. IF THE TOTAL EXCAVATION DEPTH EXCEEDS 3600 (12'-0"), DO NOT USE DETAIL 'A'.
2. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
3. DEFINE SPECIAL SITUATIONS (SUCH AS ROCK EXCAVATION, SHORED CONSTRUCTION, ETC.) INVOLVING EXCAVATION NOT ENTIRELY COVERED BY THIS STANDARD, ON THE DESIGN DRAWING BY SKETCHES AND/OR DESCRIBE IN THE SPECIAL PROVISIONS.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

### LEGEND

- CLASS 1 EXCAVATION
- ROADWAY ITEM  
(TO BE INCLUDED IN ROADWAY QUANTITIES)
- CLASS 3 EXCAVATION
- STRUCTURE ITEM  
(TO BE INCLUDED IN STRUCTURE QUANTITIES)

▲ CONTINUE 1:1.5 (1 1/2:1) SLOPE FOR THE APPROPRIATE CLASS OF EXCAVATION TO FINISHED GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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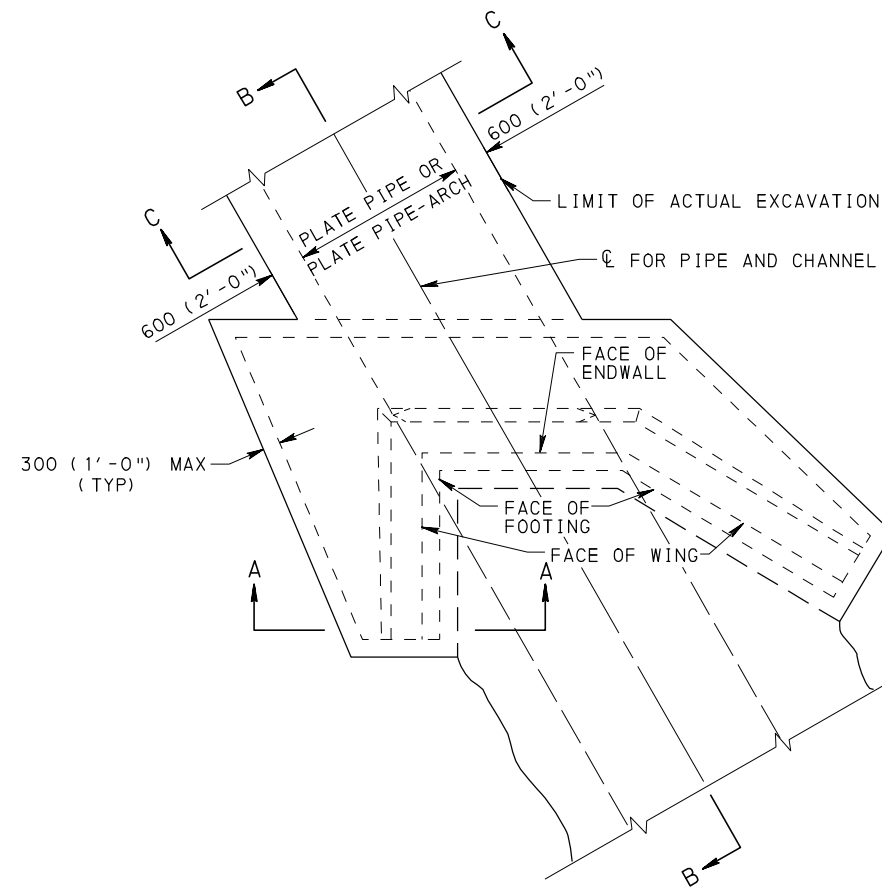
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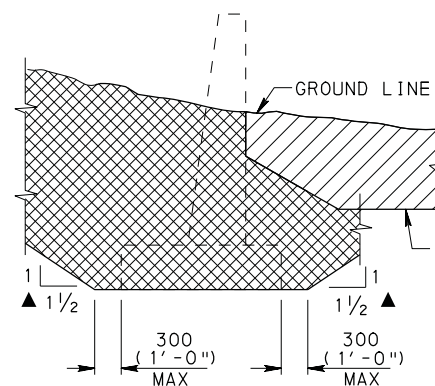
RECOMMENDED JUN. 1, 2010  
  
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SHT 1 OF 2  
RC-11M

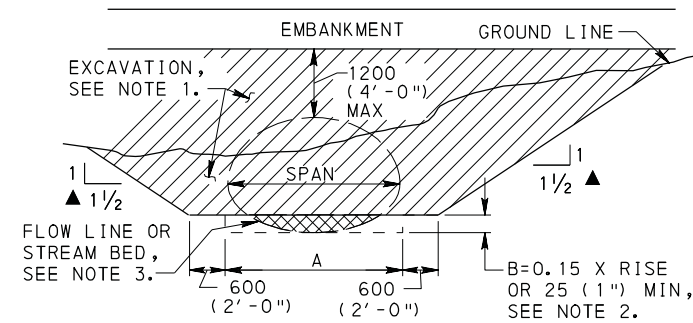




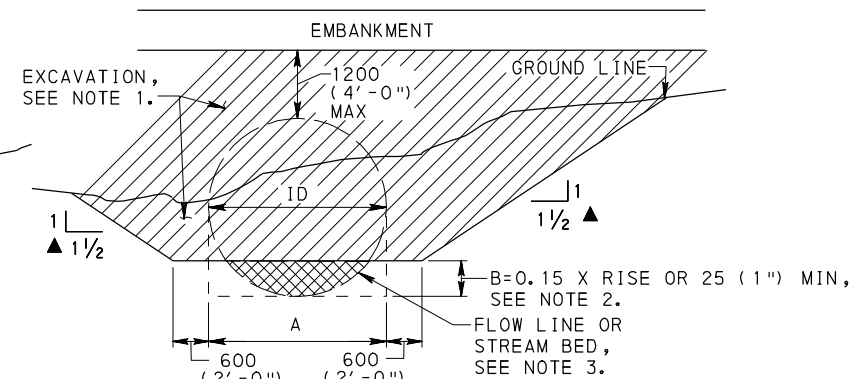
PLAN VIEW



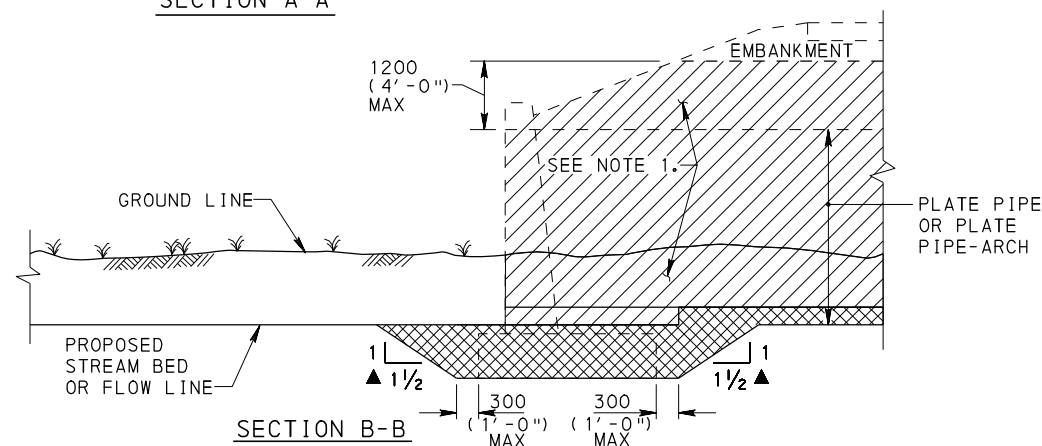
SECTION A-A



SECTION C-C  
(METAL PLATE PIPE-ARCH)



SECTION C-C  
(METAL PLATE PIPE)




SECTION B-B


METAL PLATE PIPE AND METAL PLATE  
PIPE-ARCH CULVERTS WITH ENDWALL

## NOTES

1. PROVIDE EXCAVATION, INCLUDING THE PORTIONS OF ENDWALLS ABOVE THE FLOW LINE AND TO A MAXIMUM OF 1200 (4'-0") ABOVE THE TOP OF THE PIPE OR PIPE-ARCH, AS CLASS 4 EXCAVATION FOR PIPE OR PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND CLASS 1 EXCAVATION FOR PIPE OR PIPE-ARCH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY.
2. FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, PROVIDE EXCAVATION BETWEEN THE FLOW LINE AND THE LOWER LIMIT OF CLASS 1 EXCAVATION CONFORMING TO THE AREA SHOWN WITH THE CLASS 3 EXCAVATION SYMBOL.
3. WHEN DEEMED NECESSARY TO EXCAVATE BELOW THE BOTTOM OF THE FLOW LINE, PAY ALL EXCAVATION WITHIN THE LIMITS OF THE BOTTOM OF THE EXCAVATED TRENCH AND THE TOP OF THE EXISTING GROUND AS CLASS 1 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND AS CLASS 4 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY. PLACE AND SHAPE BACKFILL MATERIAL FOR THE UNDERCUT AREA CONFORMING TO THE BOTTOM OF THE CULVERT AND CONSIDER INCIDENTAL TO THE CLASS SPECIFIED.
4. MEASURE AND PAY EXCAVATION AS SHOWN IN SECTION A-A, SECTION B-B AND SECTION C-C.
5. SEE RC-30M, SHEET 4 OF 5, NOTE 1.

## LEGEND

CLASS 1 OR 4 EXCAVATION   
ROADWAY ITEM  
(TO BE INCLUDED IN ROADWAY QUANTITIES)

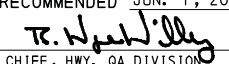
CLASS 3 EXCAVATION   
STRUCTURE ITEM  
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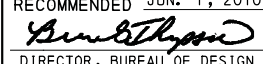
▲ CONTINUE 1:1.5 (1 1/2:1) SLOPE FOR CLASS 3 EXCAVATION TO FINISH GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

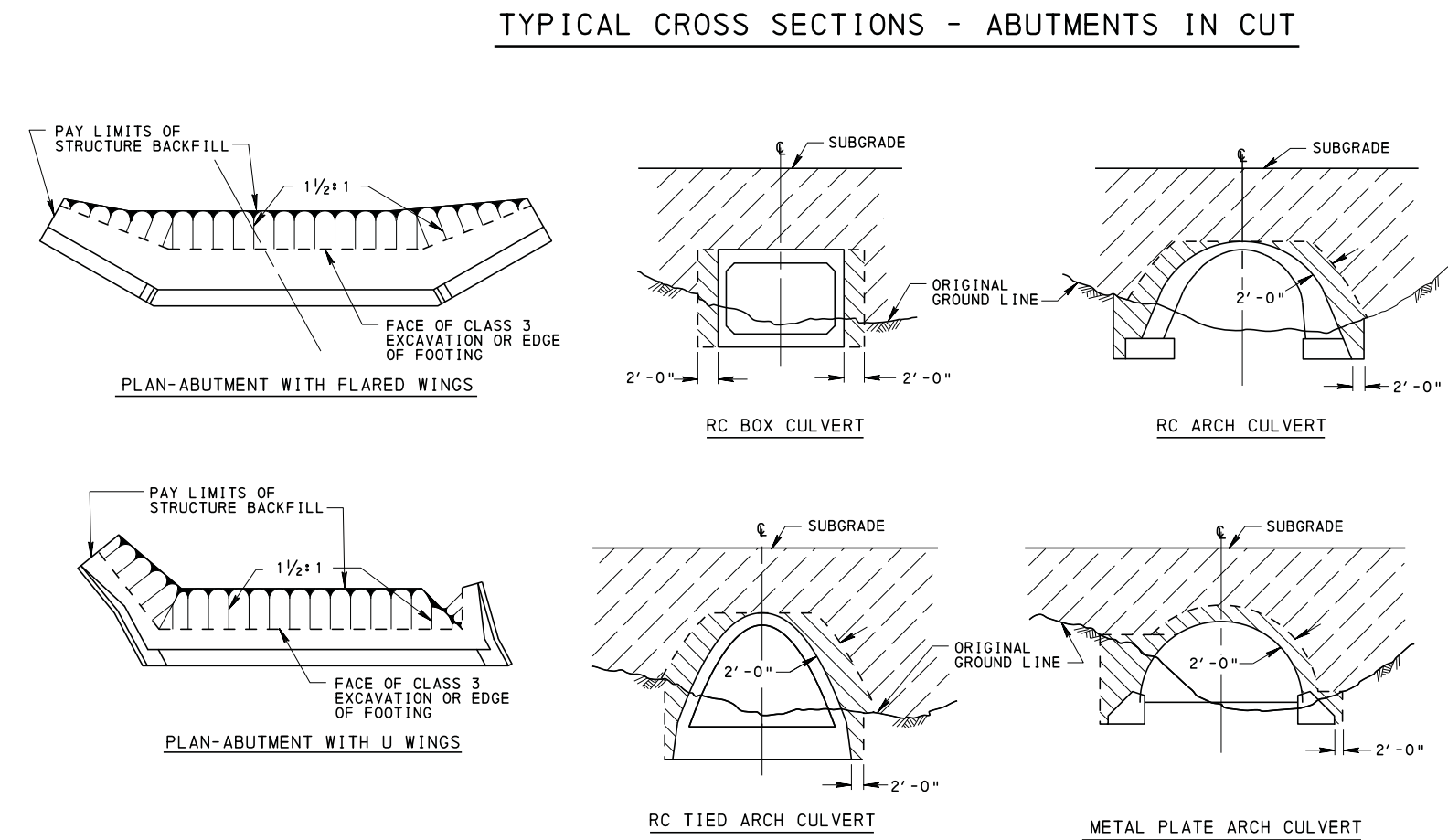
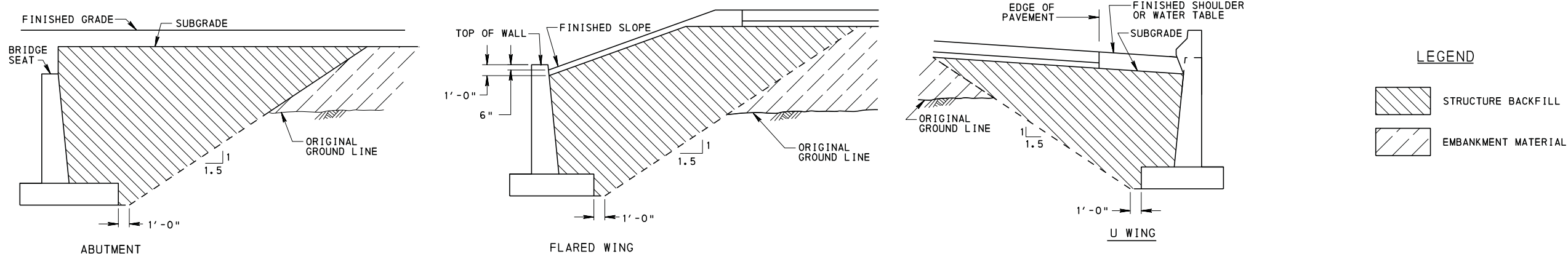
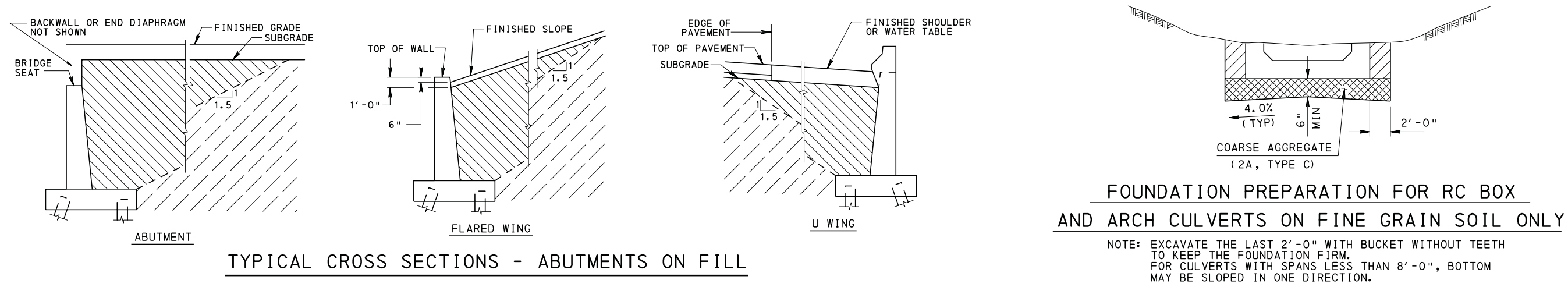
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CLASSIFICATION OF EARTHWORK  
FOR STRUCTURES

RECOMMENDED JUN. 1, 2010  
  
CHIEF, HWY. QA DIVISION

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DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2  
RC-11M

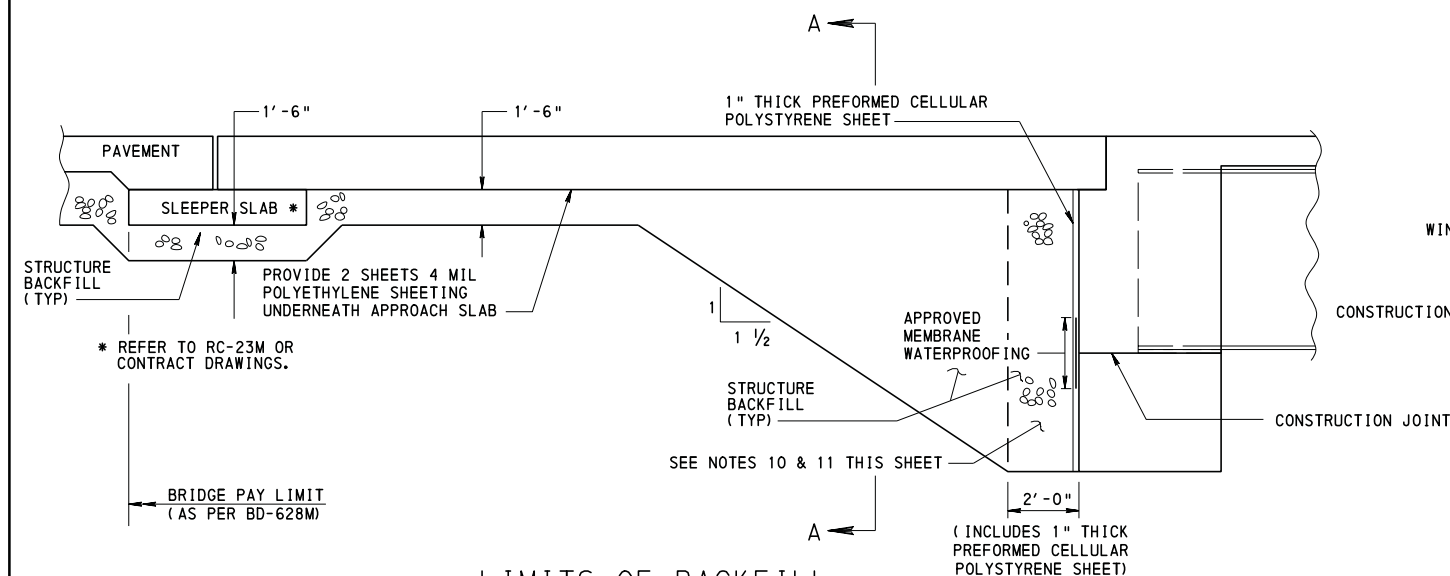


**BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES**

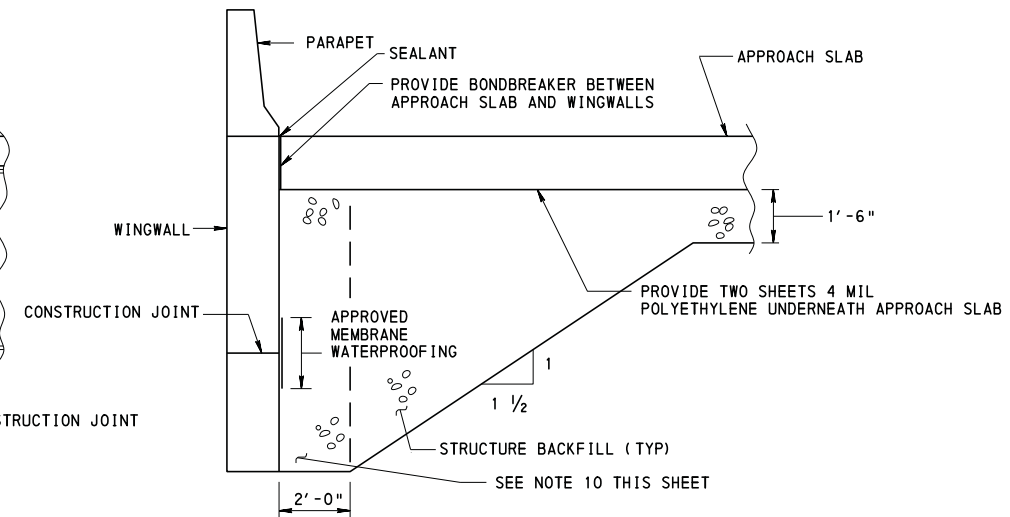
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BACKFILL AT STRUCTURES

RECOMMENDED FEB. 8, 2019 <i>Mark J. Chappell</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 2 RC-12M
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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 GEOTEXTILE, CLASS 4, TYPE A BLANKET AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A GEOTEXTILE, CLASS 4, TYPE A 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.

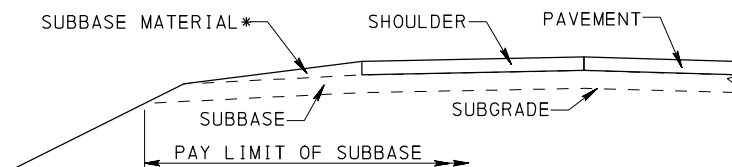
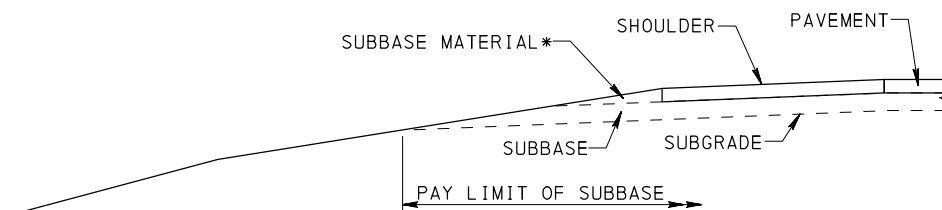
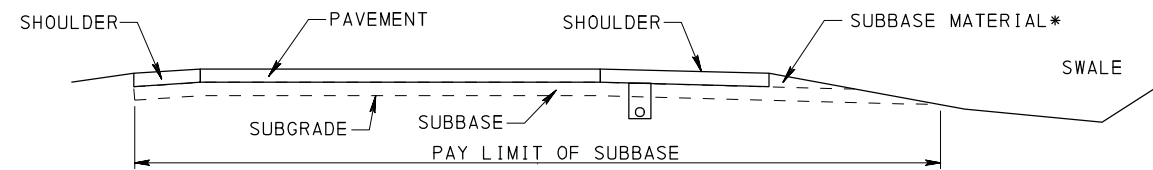
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BACKFILL AT STRUCTURES

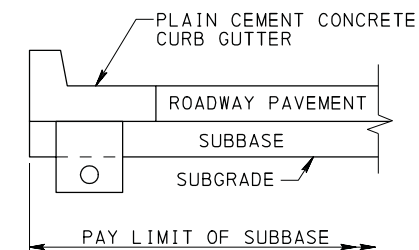
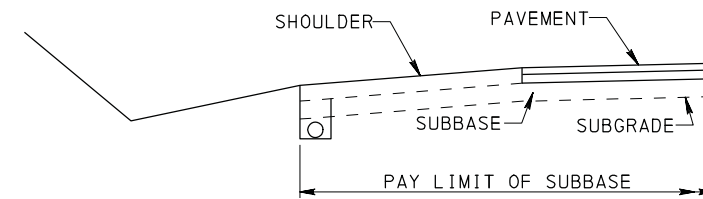
RECOMMENDED FEB. 8, 2019  
*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Betcher*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 2  
RC-12M

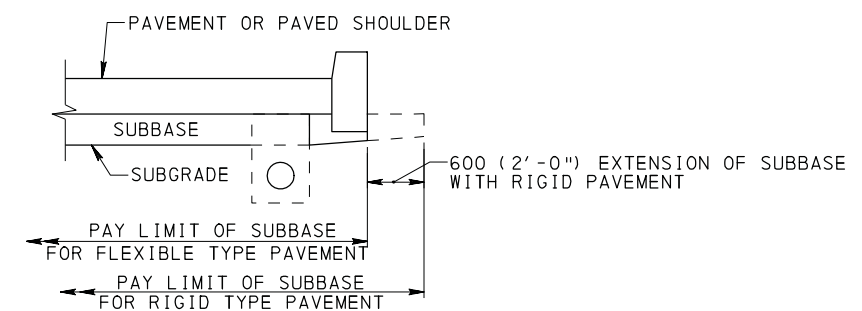


\*CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE INCIDENTAL TO THE SHOULDER.



#### NOTES

1. SUBGRADE IS INCIDENTAL TO THE IMMEDIATE OVERLYING PAVEMENT STRUCTURE.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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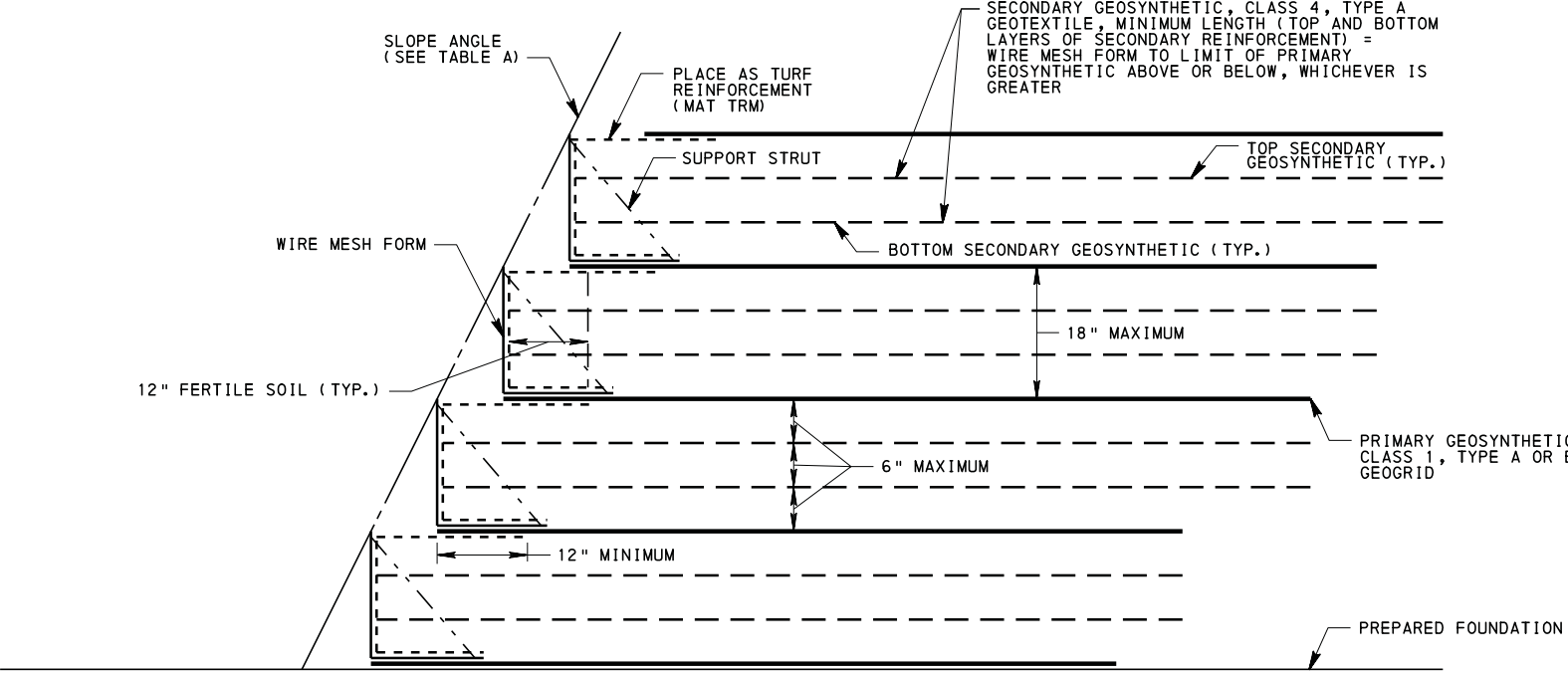
PAY LIMIT OF SUBBASE

RECOMMENDED JUN. 1, 2010  
*R. W. Kelly*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*David Thompson*  
DIRECTOR, BUREAU OF DESIGN

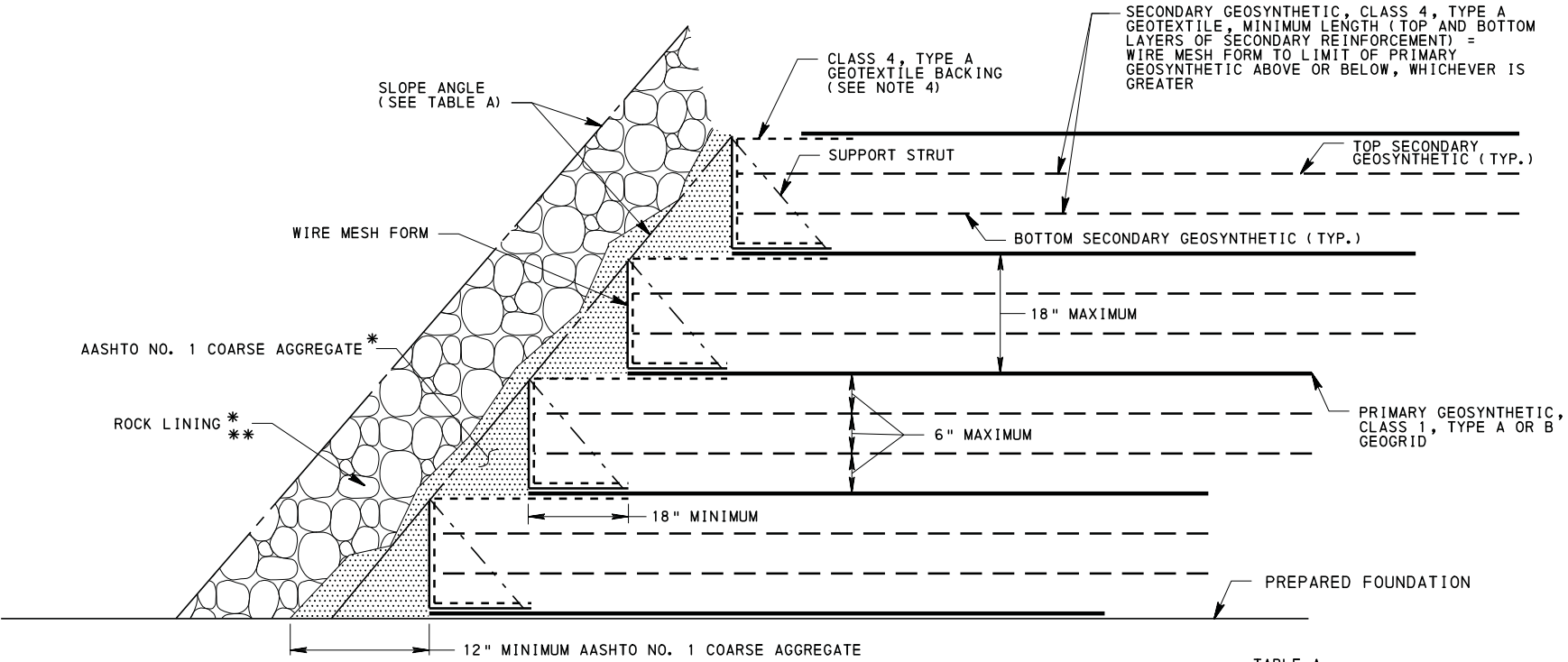
SHT 1 OF 1  
RC-13M





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.

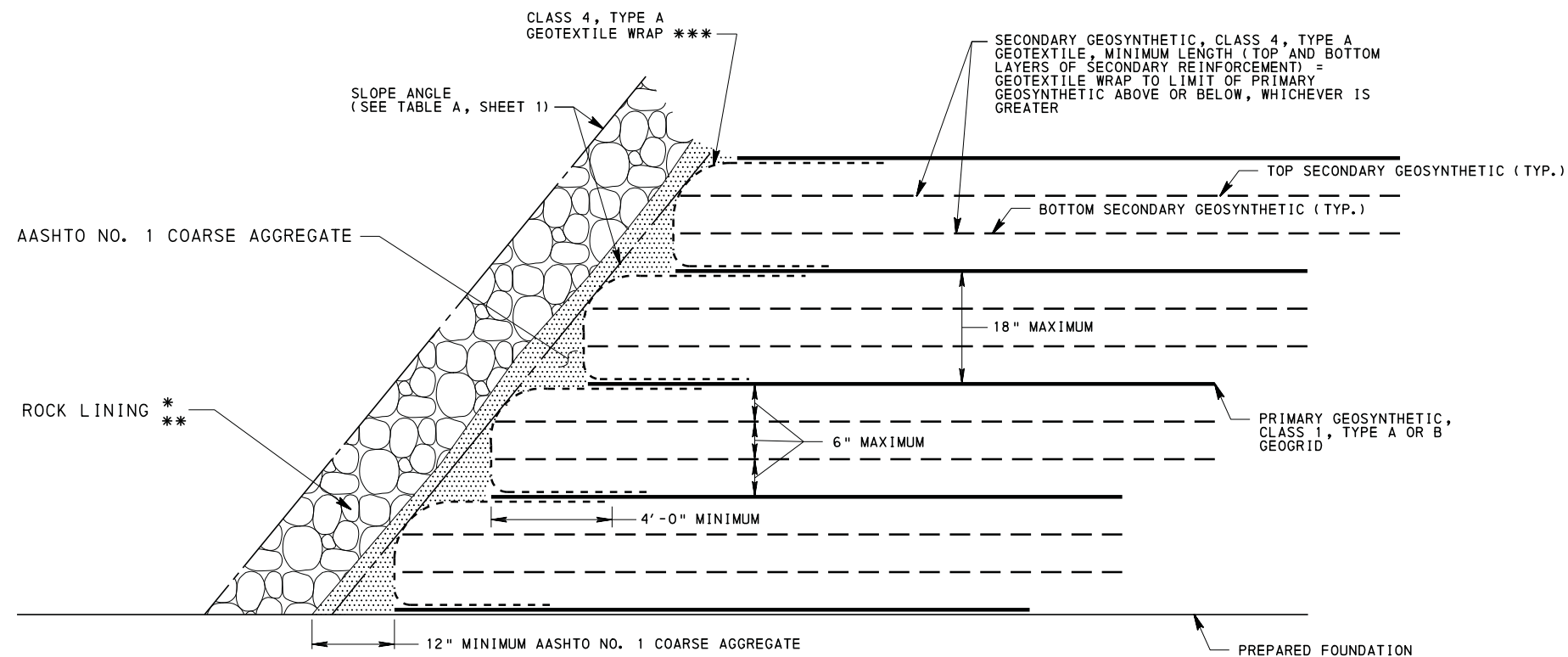
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GEOSYNTHETIC REINFORCED  
SOIL SLOPE  
TYPE A AND B SLOPE

RECOMMENDED SEPT. 15, 2016  
  
CHIEF, HWY. DELIVERY DIVISION

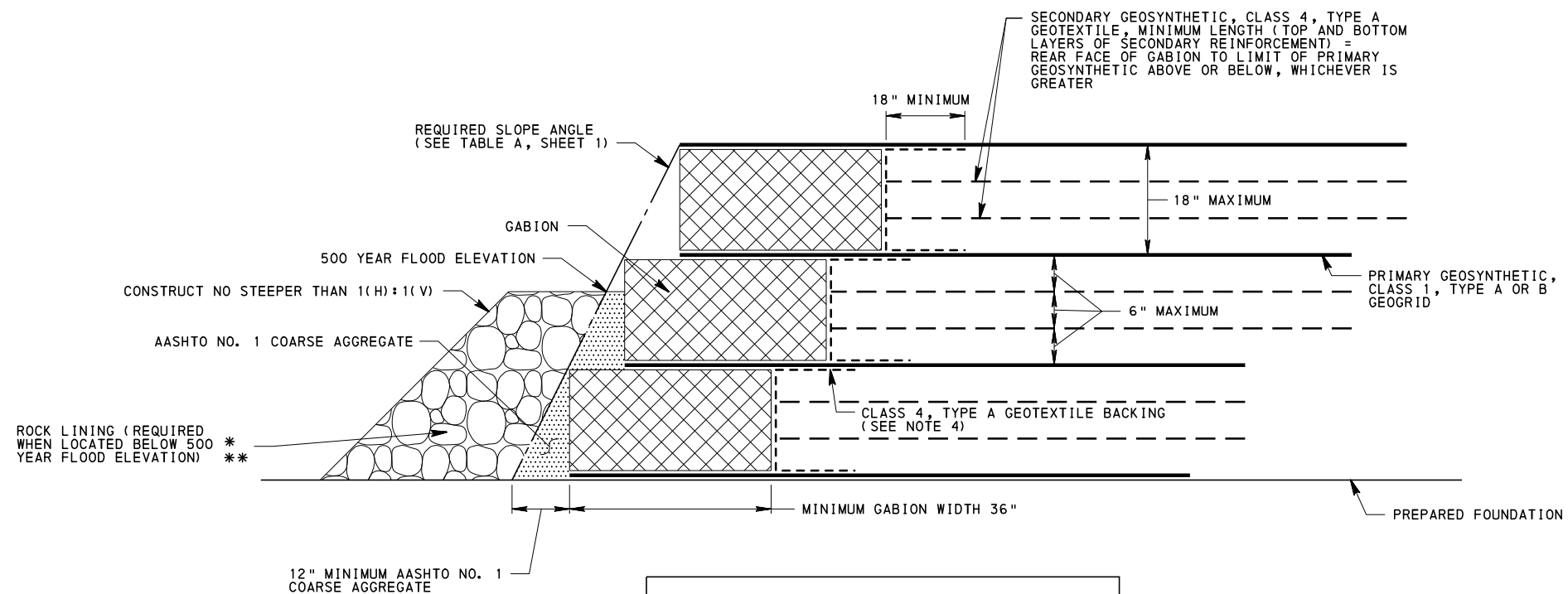
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DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 3  
RC-14M



TYPE C SLOPE LEGEND	
	= PRIMARY GEOSYNTHETIC
	= SECONDARY GEOSYNTHETIC
	= CLASS 4, TYPE A GEOTEXTILE WRAP
	= SLOPE ANGLE

TYPE C SLOPE



TYPE D SLOPE LEGEND	
	= PRIMARY GEOSYNTHETIC
	= SECONDARY GEOSYNTHETIC
	= CLASS 4, TYPE A GEOTEXTILE BACKING
	= SLOPE ANGLE
	= GABION

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

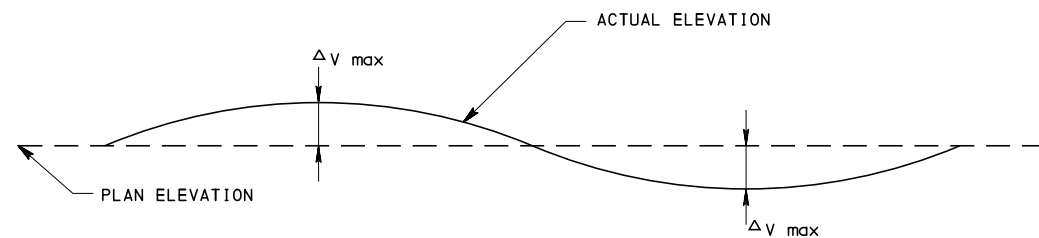
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GEOSYNTHETIC REINFORCED  
SOIL SLOPE  
TYPE C AND D SLOPE

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

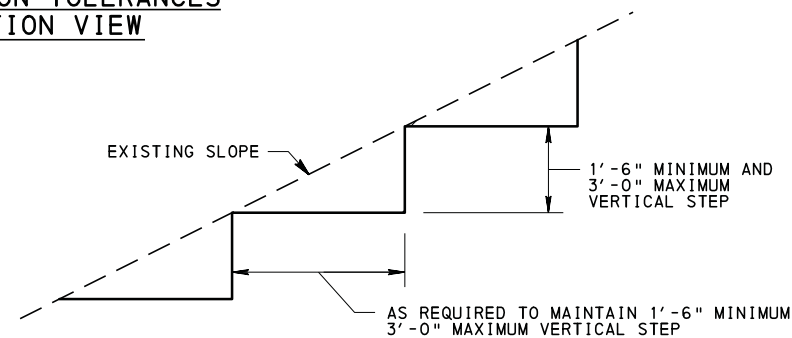
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*Brian J. Thompson*  
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SHT 2 OF 3  
RC-14M

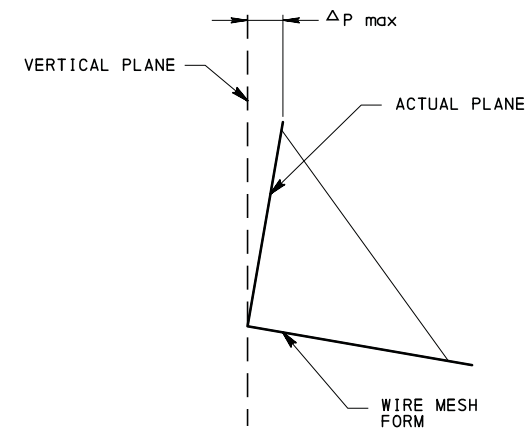


$\Delta V_{max}$	
PRIMARY AND SECONDARY REINFORCEMENT	$\pm 1/2"$
WIRE MESH FORM	$\pm 1/2"$
GABION BASKETS	$\pm 1"$

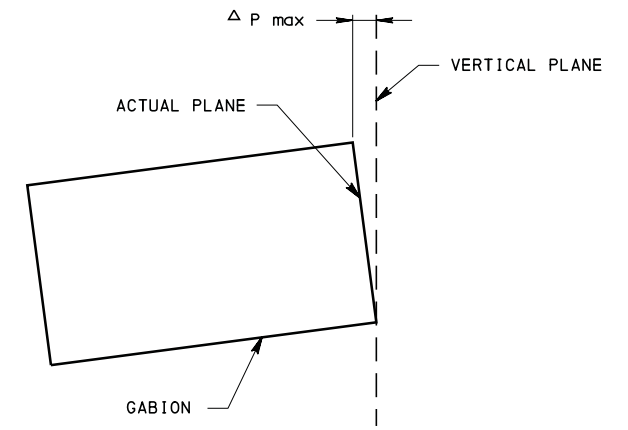
**CONSTRUCTION TOLERANCES  
ELEVATION VIEW**



**BENCHING REQUIREMENTS  
FOR EXISTING SLOPE**



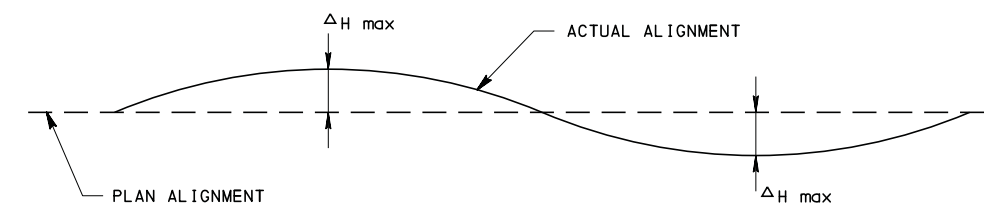
**TYPE A OR TYPE B SLOPES**



**TYPE D SLOPE**

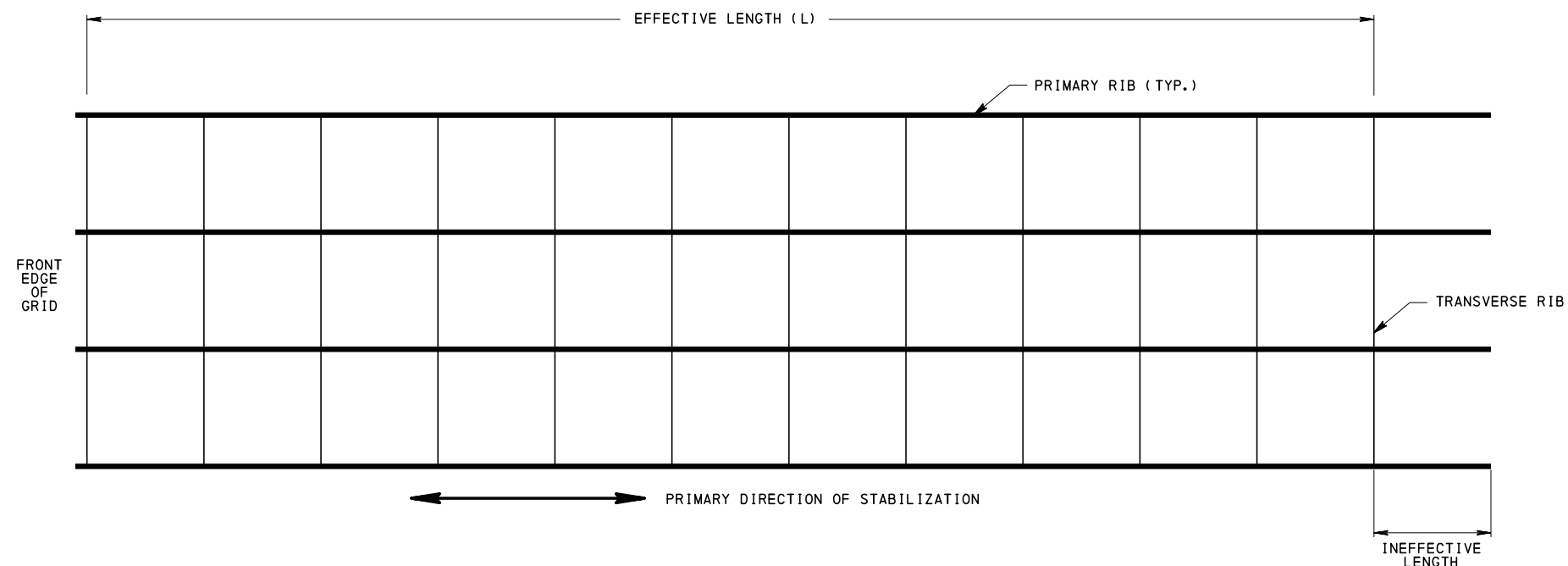
$\Delta P_{max}$	
WIRE MESH FORM FACE	$\pm 1/4"$
GABION FACE	$\pm 1/2"$

**CONSTRUCTION TOLERANCES  
PLUMBNESS (VERTICALITY) REQUIREMENTS**



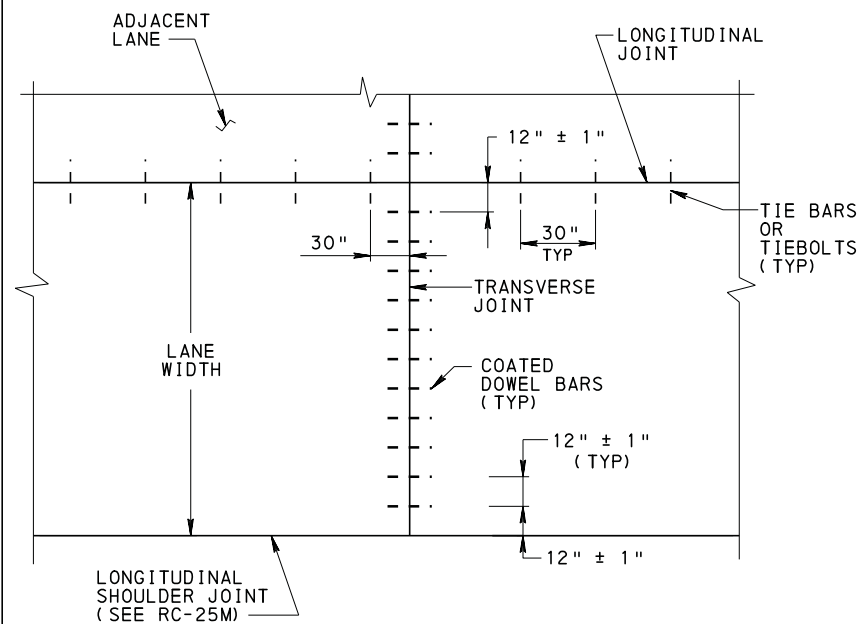
$\Delta H_{max}$	
WIRE MESH FORM	$\pm 1"$
GABION BASKETS	$\pm 1"$
GEOTEXTILE WRAP (TYPE C SLOPES)	$\pm 2"$

**CONSTRUCTION TOLERANCES  
HORIZONTAL VIEW**

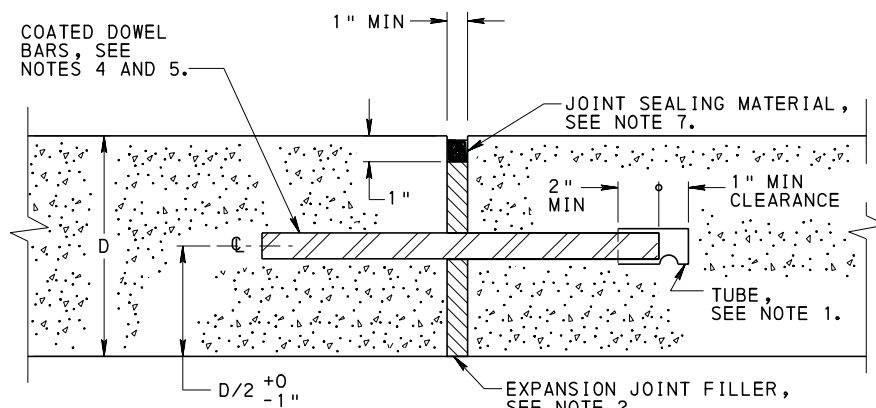


**MEASURING THE EFFECTIVE LENGTH OF GEOGRID REINFORCEMENT**

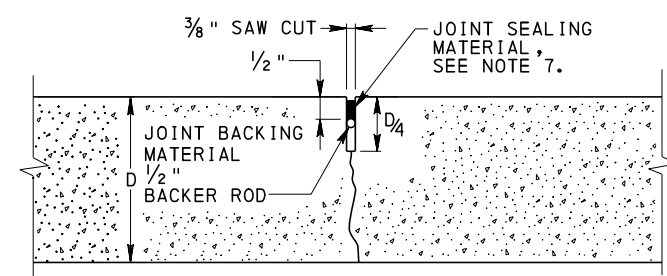
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
GEOSYNTHETIC REINFORCED SOIL SLOPE EFFECTIVE LENGTH, CONSTRUCTION TOLERANCES, AND BENCHING REQUIREMENTS FOR EXISTING SLOPES		
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betak</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 3 OF 3 RC-14M



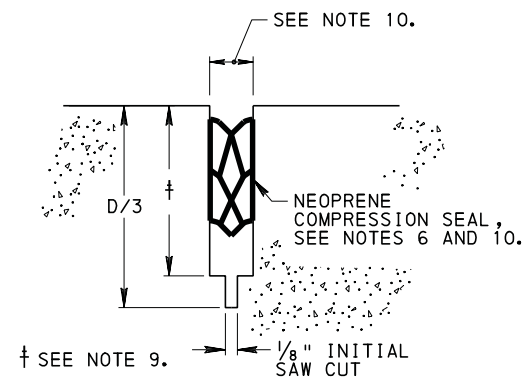
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SEE NOTE 13



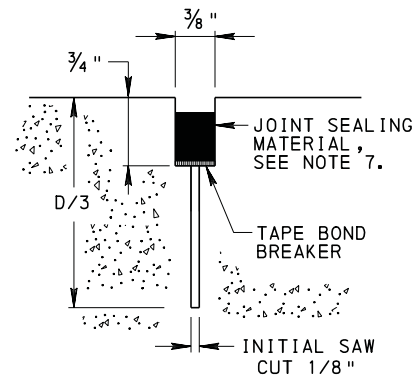
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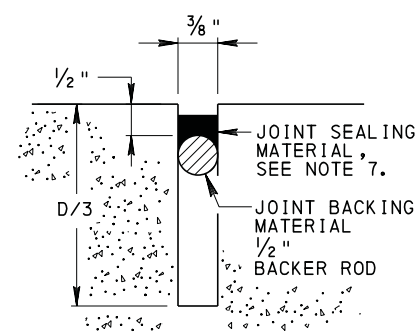
TYPE P  
SEE RC-27M



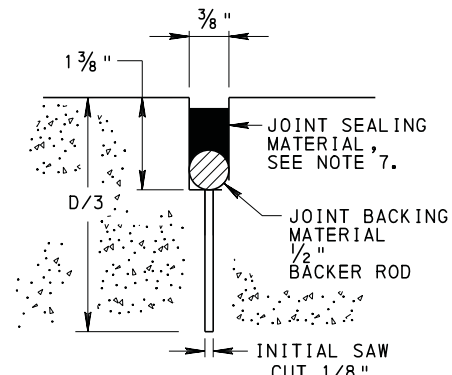
DETAIL A



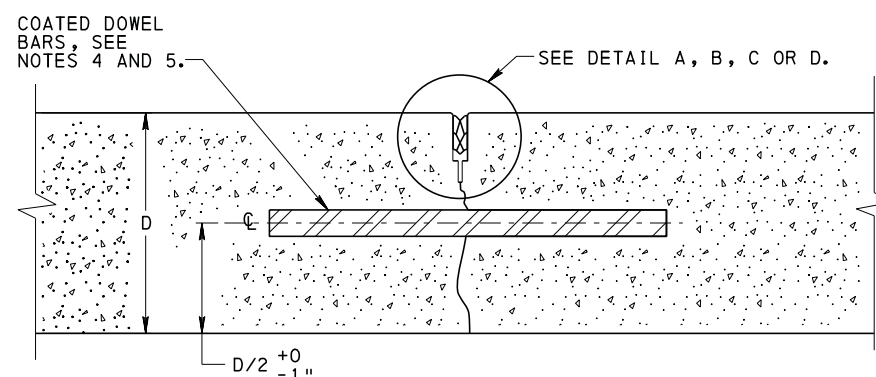
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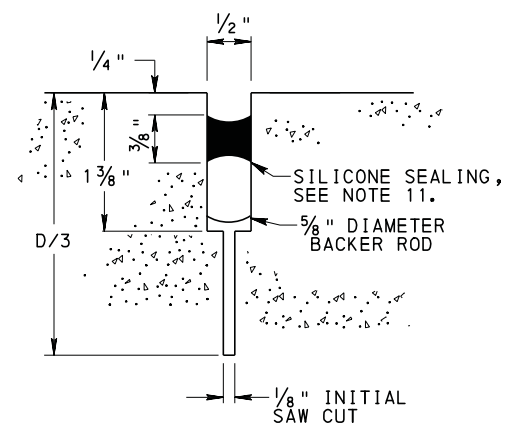
DETAIL B



DETAIL D



TYPE D



ALTERNATE TYPE P  
JOINT DETAIL

## NOTES

1. 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.
2. 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.
3. CONSTRUCT ALL TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE.
4. USE MINIMUM  $1\frac{1}{4}" \phi \times 18"$  LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM  $1\frac{1}{2}" \phi \times 18"$  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.
5. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB.
6. USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL FROM  $\frac{1}{4}"$  TO  $\frac{3}{8}"$  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.
7. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM  $\frac{1}{8}"$  TO  $\frac{1}{4}"$  BELOW THE SURFACE OF THE PAVEMENT. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT POURED JOINTS.
8. THE INITIAL SAW CUT FOR TYPE D JOINT IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
9. SAW DEPTHS OF NEOPRENE SEALS:
 

<u>SEAL SIZE</u>	<u>SAW CUT DEPTHS</u>
1"	$1\frac{7}{8}" - 2"$
$1\frac{1}{4}"$	$2" - 2\frac{1}{8}"$
10. 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 "

11. WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(d), 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).
12. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408.
13. 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.
14. 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 DEC. 17, 2019

RECOMMENDED \_\_\_\_\_  
*W. L. Chappell*  
 CHIEF, HWY. DELIVERY DIVISION

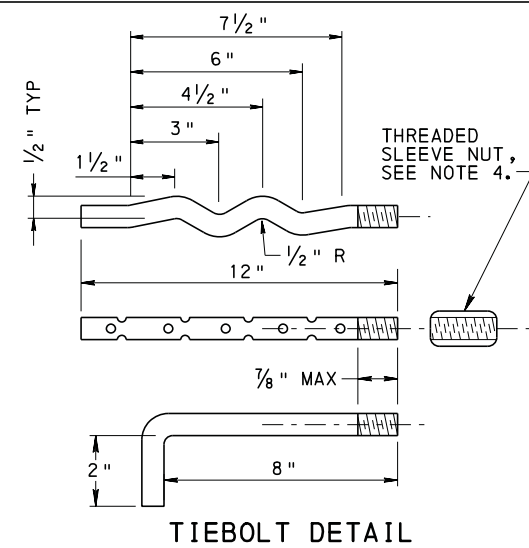
RECOMMENDED DEC. 17, 2019

RECOMMENDED \_\_\_\_\_  
*Melissa J. Betah*  
 DIRECTOR, BUREAU OF PROJECT DELIVERY

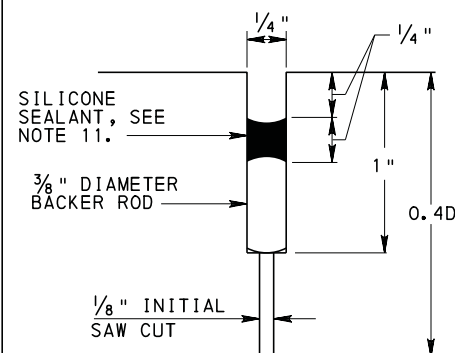
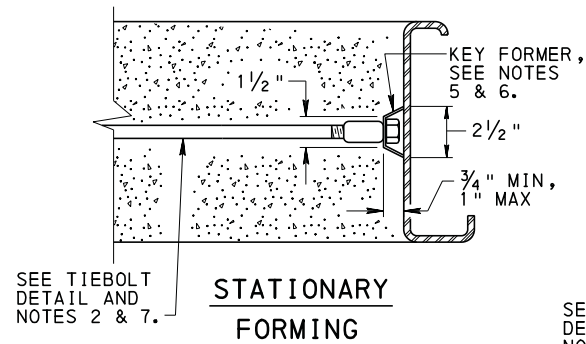
SHT 1 OF 13

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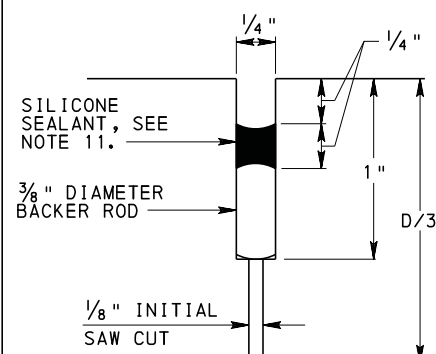




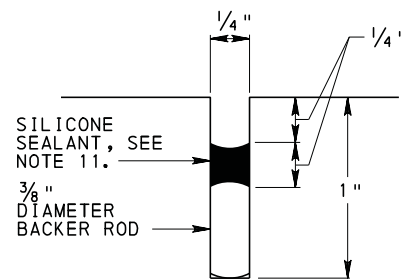
MAKE TIEBOLTS  $\frac{3}{16}$ "  $\varnothing$  BAR WITH ROLLED THREADS OR  $\frac{5}{16}$ "  $\varnothing$  BAR WITH CUT THREADS. PERMIT ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15. SEE PUBLICATION 408, SECTIONS 709.1 AND 705.2(b).



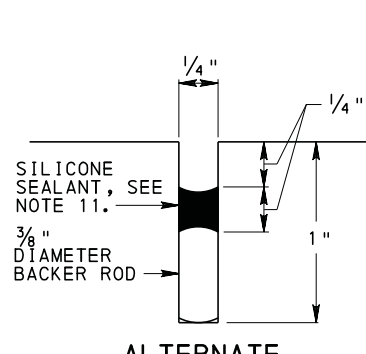
**ALTERNATE TYPE L CONTRACTION JOINT**



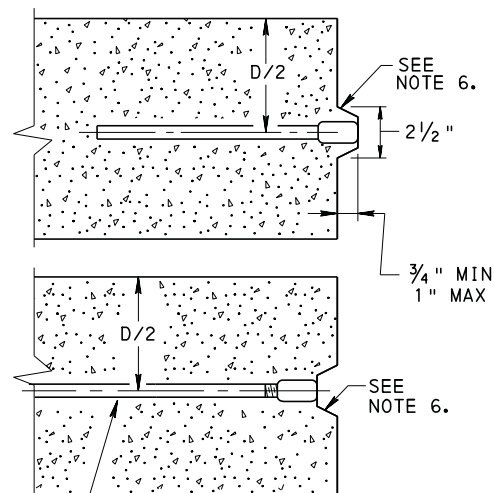
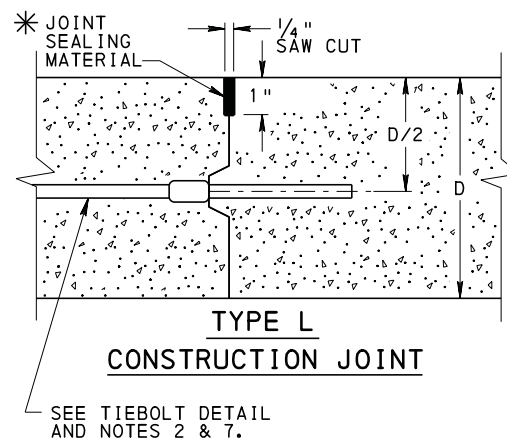
**ALTERNATE TRANSVERSE SHOULDER JOINT**



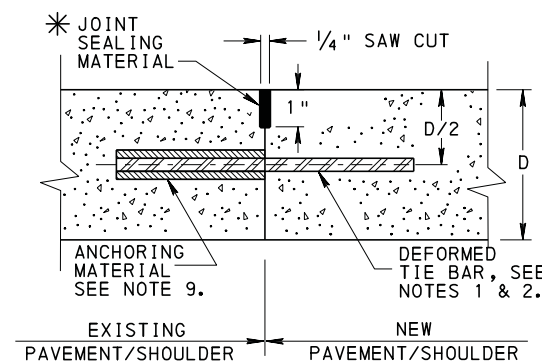
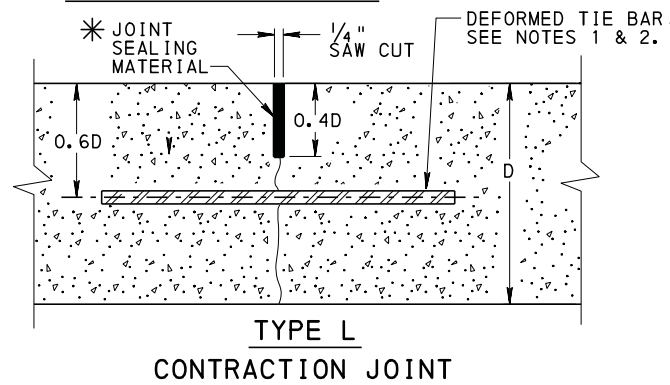
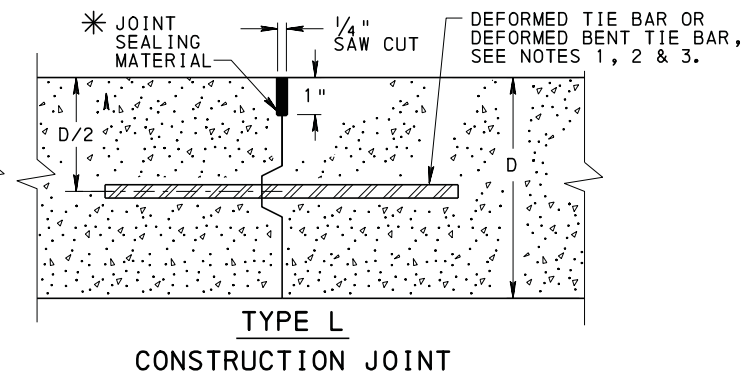
**ALTERNATE TYPE L CONSTRUCTION JOINT**



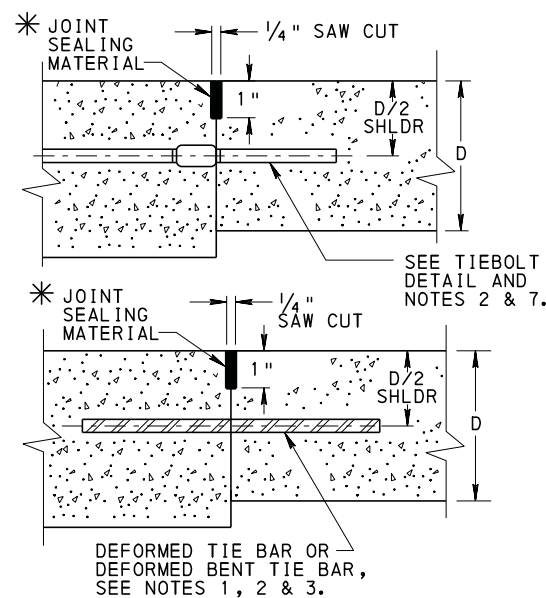
**ALTERNATE LONGITUDINAL SHOULDER JOINT**



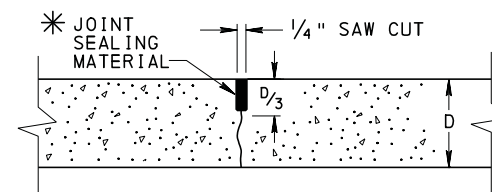
**SLIP FORMING**



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



SEE NOTE 8



**TRANSVERSE SHOULDER JOINT**

## NOTES

- SPECIFY #5 TIE BARS  $30" \pm \frac{1}{4}"$  LONG, SPACED  $30"$  CENTER TO CENTER MAXIMUM. PLACE PERPENDICULAR TO AND CENTERED OVER THE LONGITUDINAL JOINT  $\pm 1"$ . EMBED TIE BARS  $D/2 \pm \frac{3}{4}"$  OR  $4" \pm \frac{1}{2}"$ , 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  $1\frac{1}{16}" \varnothing \times 1\frac{7}{8}"$  LONG OR HIGH STRENGTH STEEL BAR  $2\frac{7}{32}" \varnothing \times 2"$  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  $D/2 \pm \frac{3}{4}"$  OR  $4" \pm \frac{1}{2}"$ , 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  $\frac{1}{8}"$  TO  $\frac{1}{4}"$  BELOW THE PAVEMENT SURFACE.

(\*) DENOTES, SEE NOTE 12.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## CONCRETE PAVEMENT JOINTS

RECOMMENDED DEC. 17, 2019

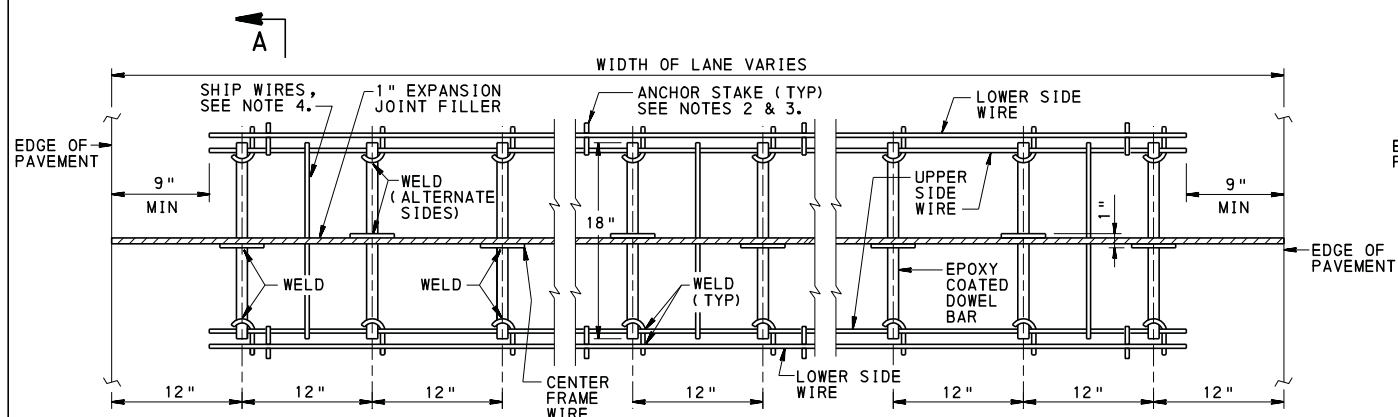
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

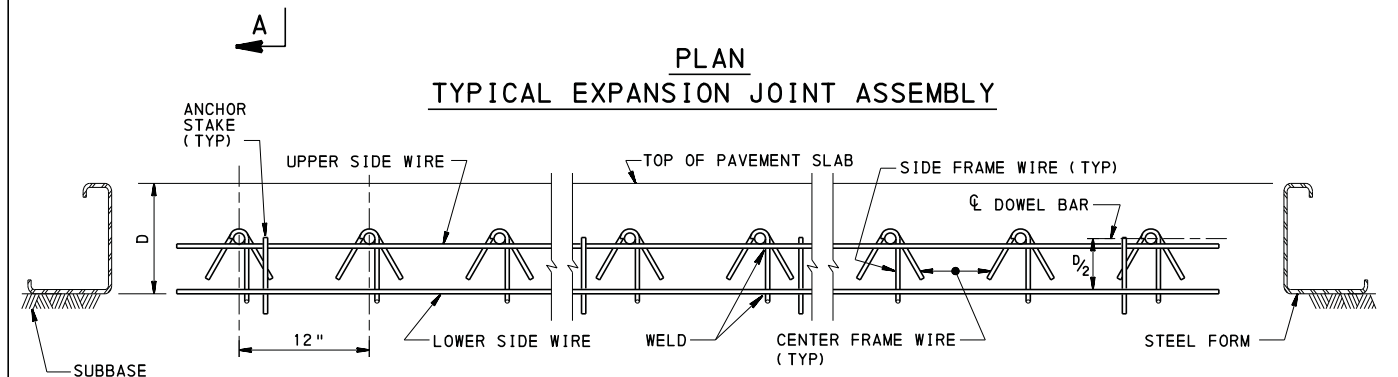
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 13

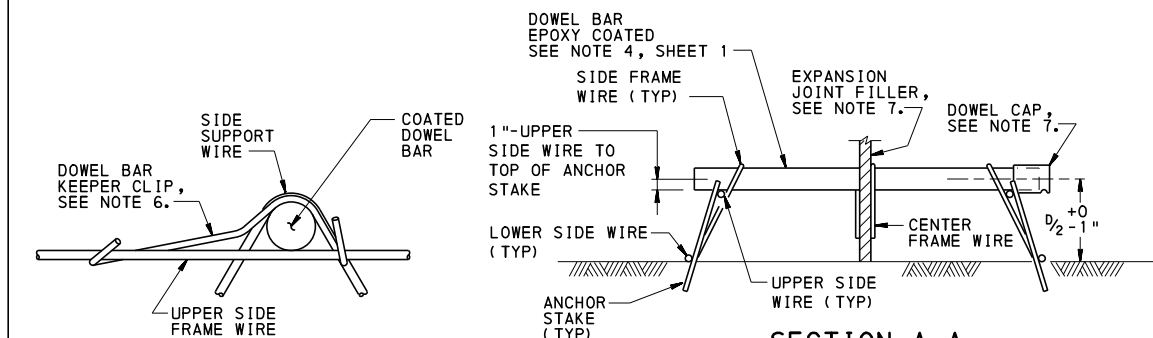
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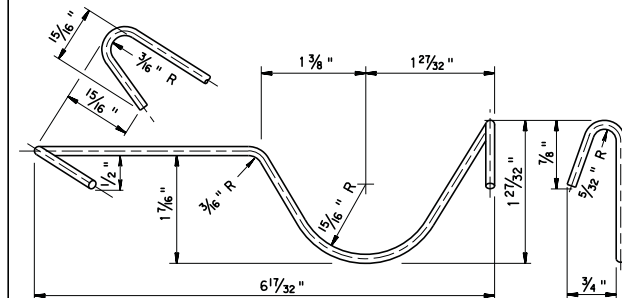
PLAN  
TYPICAL EXPANSION JOINT ASSEMBLY



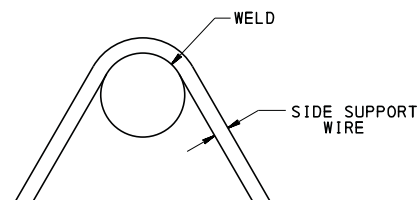
ELEVATION  
EXPANSION JOINT ASSEMBLY



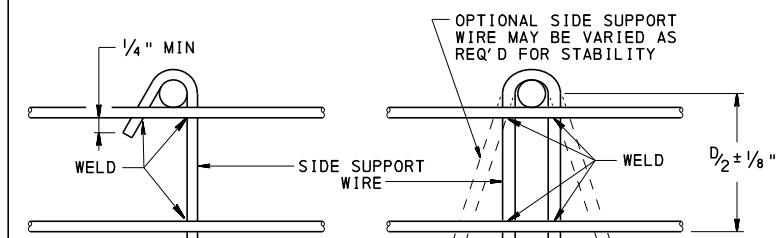
SECTION A-A  
EXPANSION JOINT ASSEMBLY



DOWEL BAR KEEPER CLIP

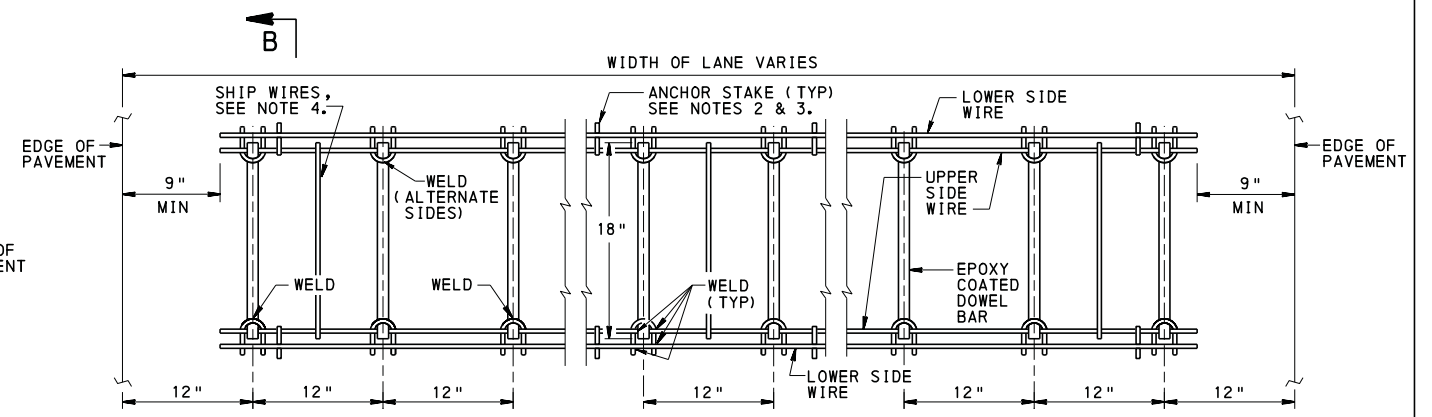


CENTER FRAME WIRE DETAIL

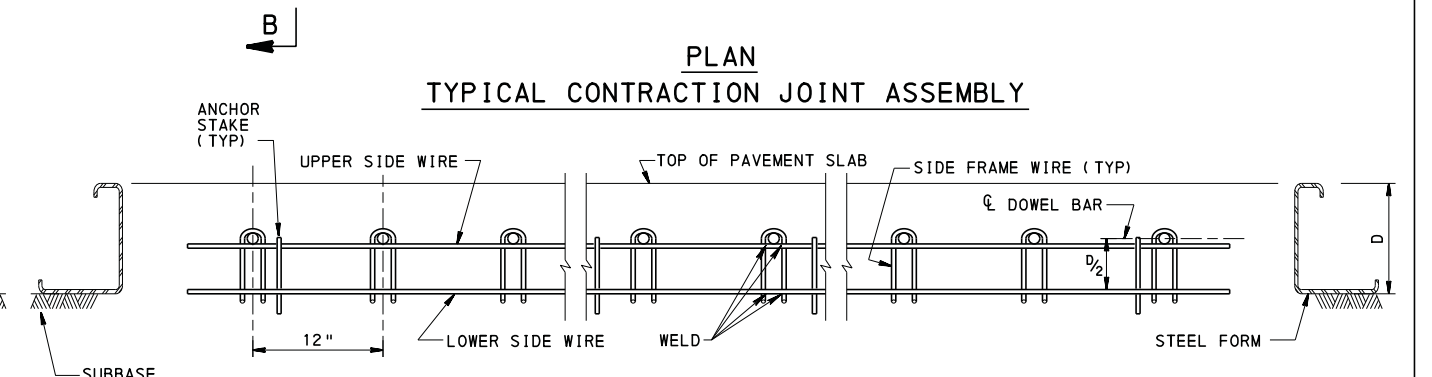


"J" DESIGN  
TYPICAL SIDE FRAME DETAILS

"A" DESIGN



PLAN  
TYPICAL CONTRACTION JOINT ASSEMBLY



ELEVATION  
CONTRACTION JOINT ASSEMBLY

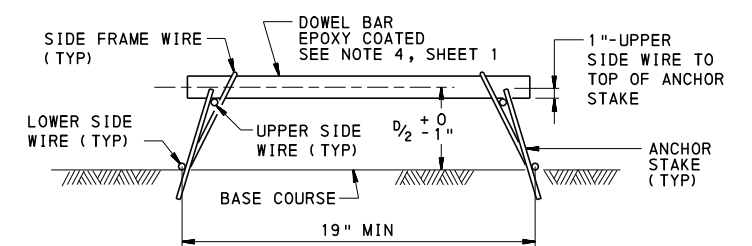
#### NOTES

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. DO NOT REMOVE 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

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



SECTION B-B  
CONTRACTION JOINT ASSEMBLY

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  
NON-SKEWED  
LOAD TRANSFER ASSEMBLIES

RECOMMENDED DEC. 17, 2019

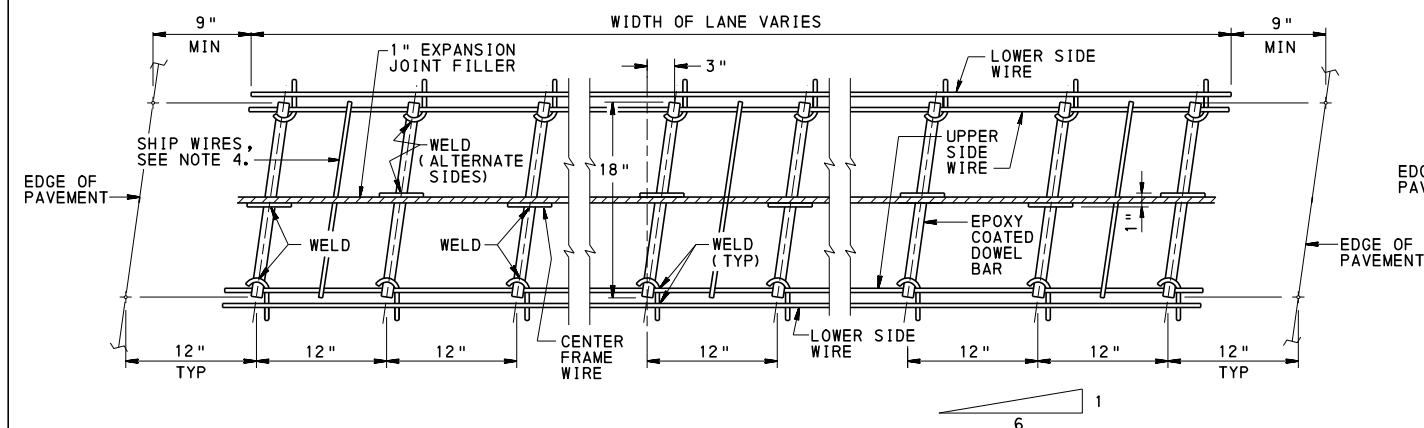
*John P. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

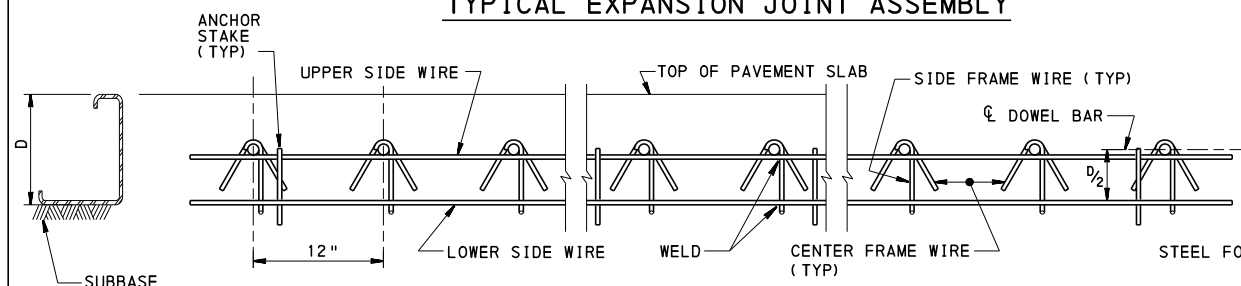
*Michael J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 13

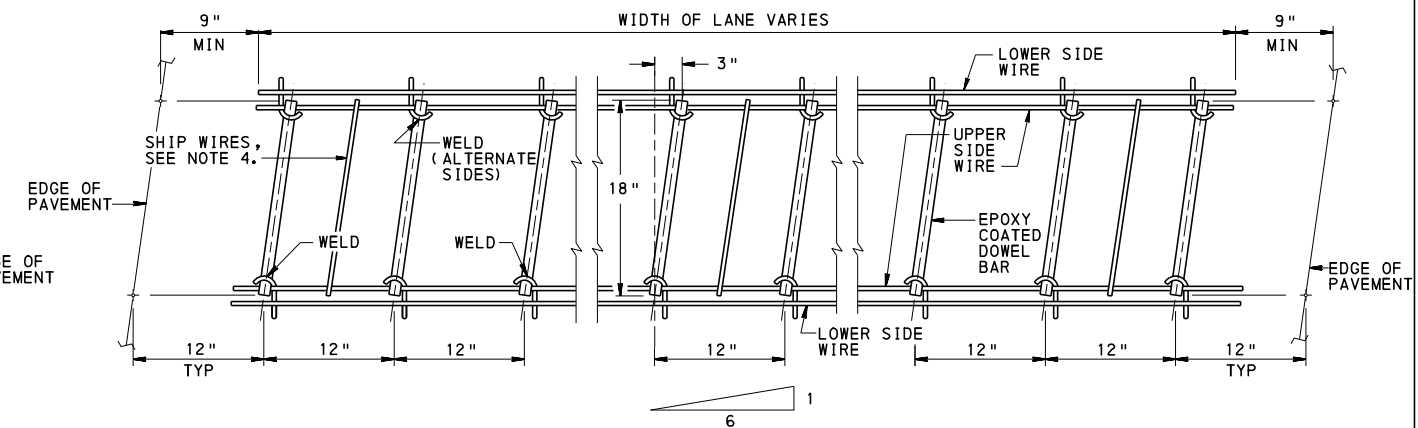
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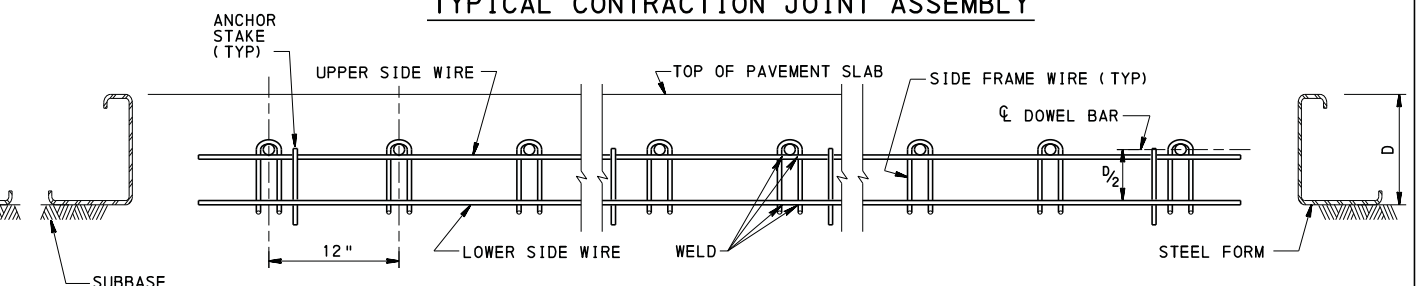
PLAN  
TYPICAL EXPANSION JOINT ASSEMBLY



ELEVATION  
EXPANSION JOINT ASSEMBLY



PLAN  
TYPICAL CONTRACTION JOINT ASSEMBLY



ELEVATION  
CONTRACTION JOINT ASSEMBLY

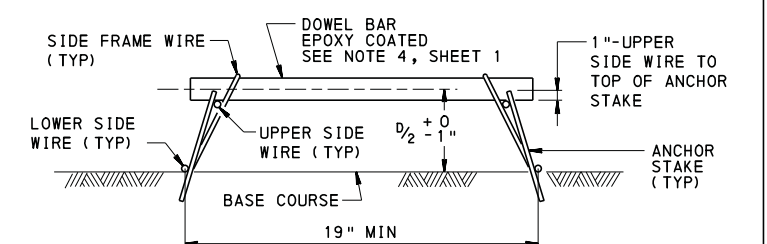
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4. DO NOT REMOVE SHIPPING WIRES.
5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

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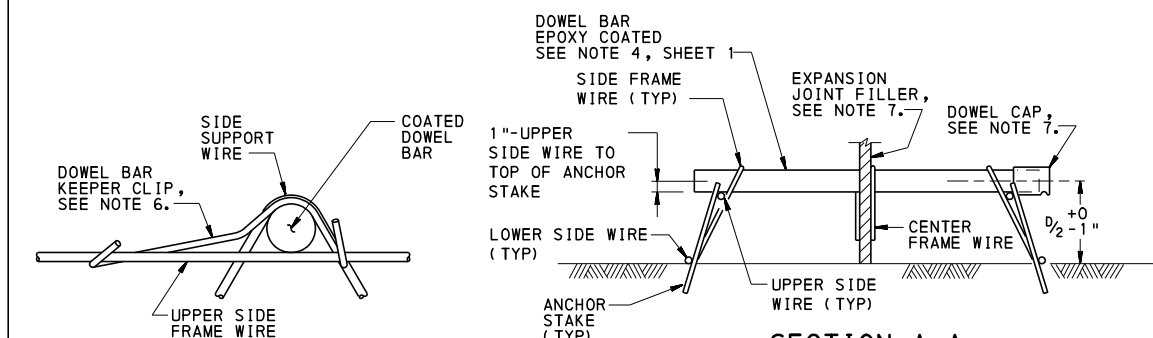
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9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.
10. WELD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.
11. WIRE TOLERANCES PER ASTM 510M IS 0.003".

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

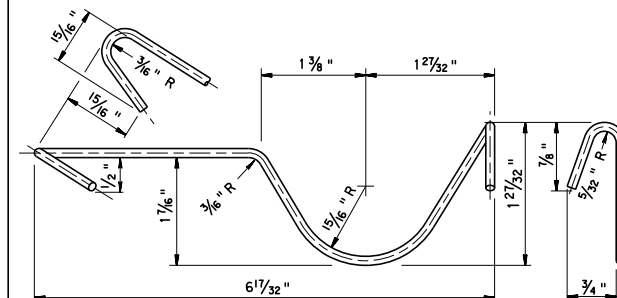


SECTION B-B  
CONTRACTION JOINT ASSEMBLY

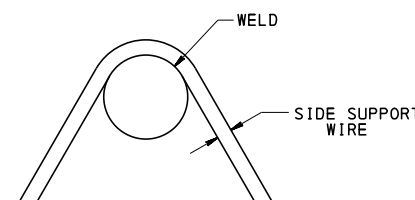
TYPICAL LOAD TRANSFER ASSEMBLY		
LANE WIDTH	OVERALL UNIT LENGTH (MAX)	NO. OF DOWELS
9'-0"	7'-6"	8
10'-0"	8'-6"	9
11'-0"	9'-6"	10
12'-0"	10'-6"	11



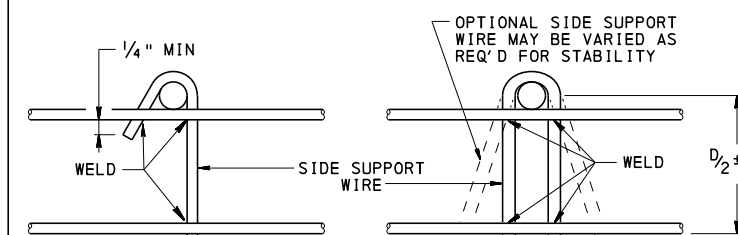
SECTION A-A  
EXPANSION JOINT ASSEMBLY



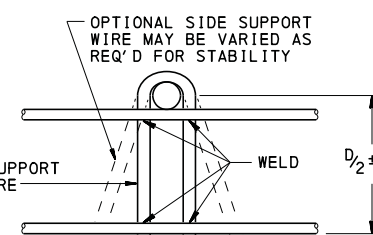
DOWEL BAR KEEPER CLIP



CENTER FRAME WIRE DETAIL



"J" DESIGN  
TYPICAL SIDE FRAME DETAILS



"A" DESIGN

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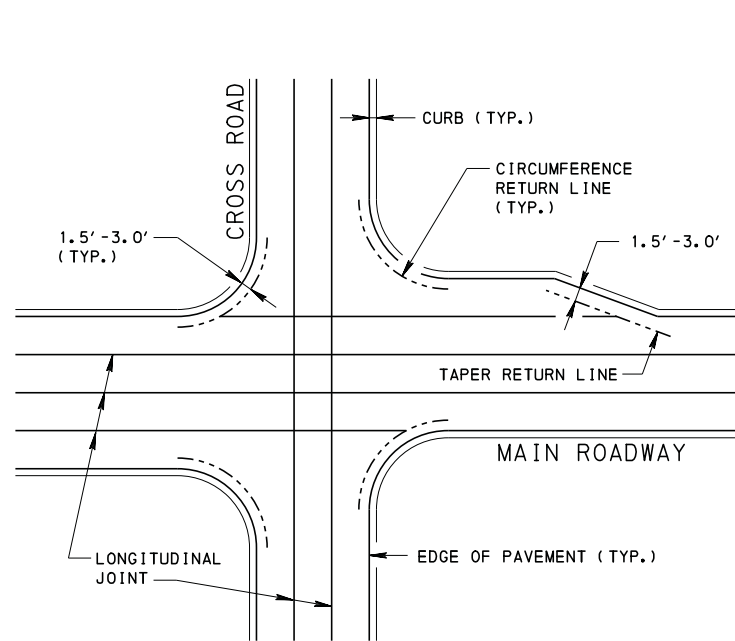
CONCRETE PAVEMENT JOINTS  
6:1 SKEWED  
LOAD TRANSFER ASSEMBLIES

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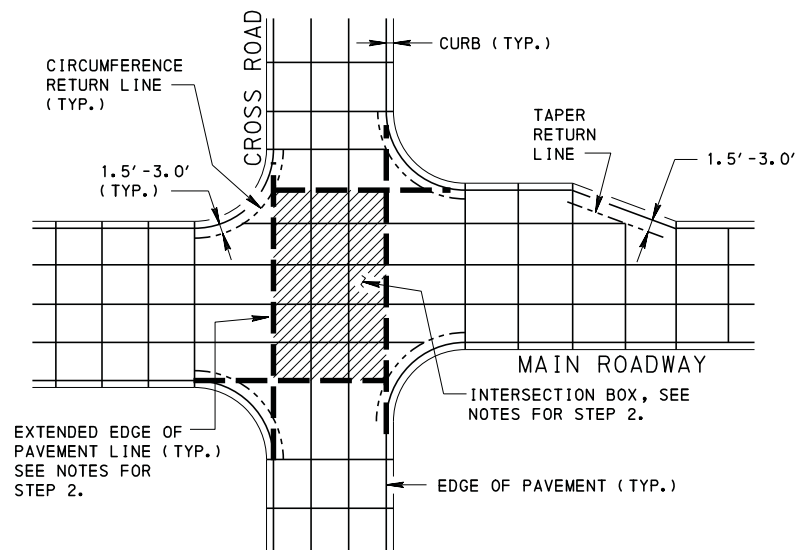




PLAN - INTERSECTION

STEP 1:

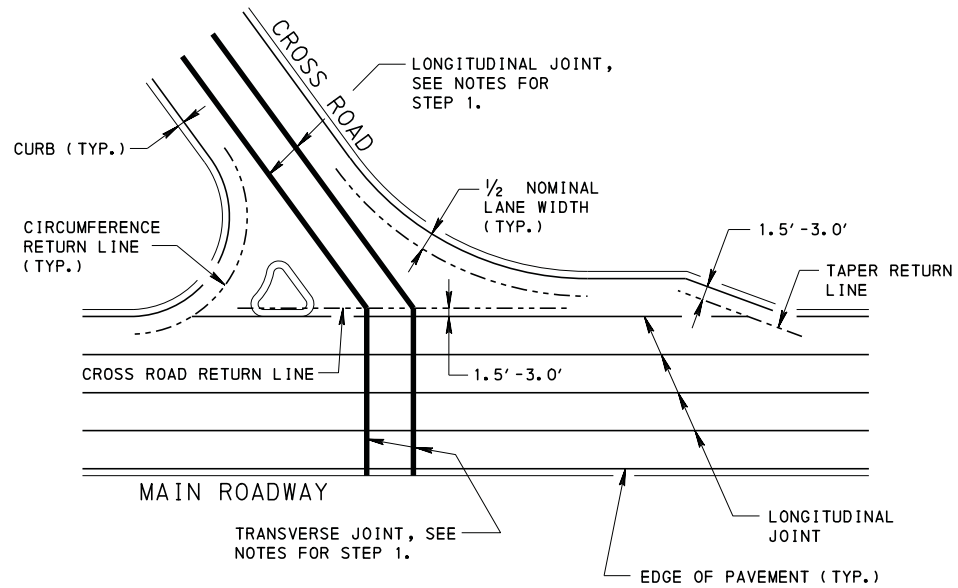
- LAYOUT THE "CIRCUMFERENCE RETURN LINE(S)", "TAPER RETURN LINE", AND "CROSS ROAD RETURN LINE", THE LONGITUDINAL JOINTS ON THE MAIN ROADWAY AND CROSS ROAD DO NOT EXTEND PAST THESE LINES.
- FOR SKEWED INTERSECTIONS EXTEND THE CROSS ROAD LONGITUDINAL JOINTS TO THE "CROSS ROAD RETURN LINE", WHERE THEY INTERSECT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



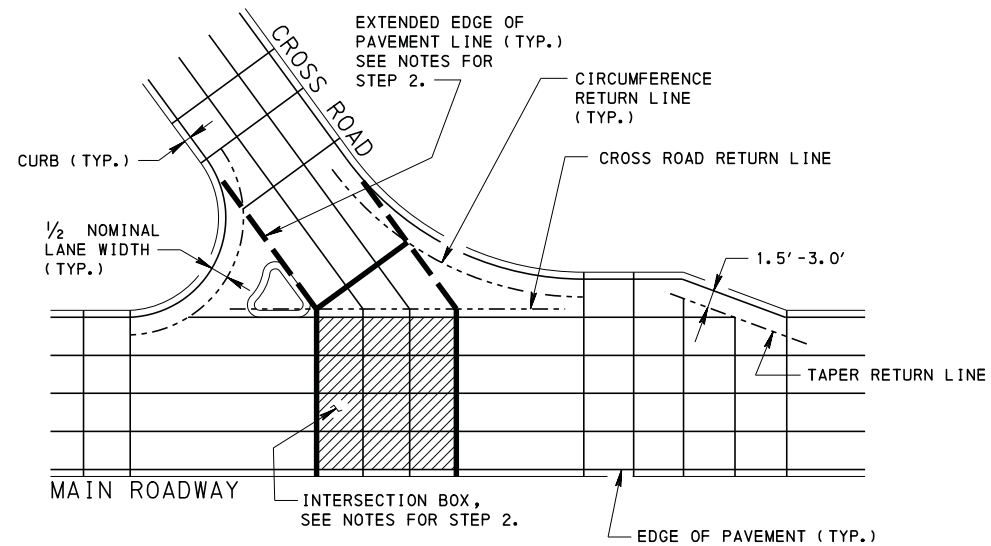
PLAN - INTERSECTION

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 CONSTRUCT AS SPECIFIED IN 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  $\frac{1}{2}$  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.

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CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT

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*John J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

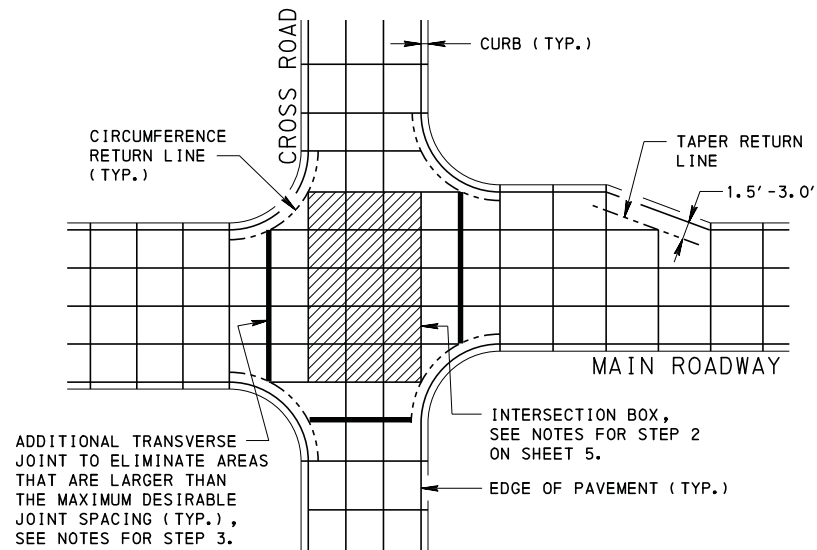
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*Michael J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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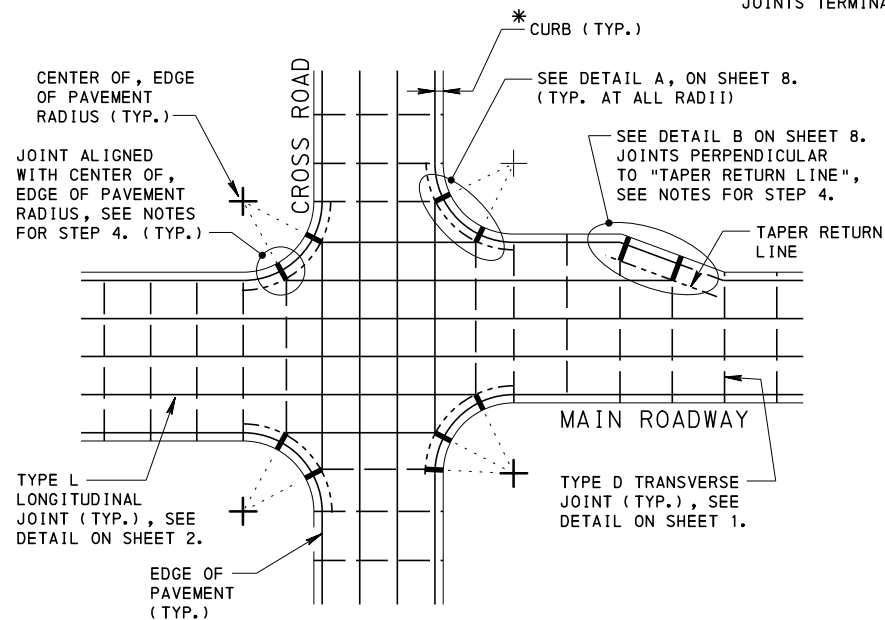
PLAN - INTERSECTION

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 RADII 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".

\*NOTES:

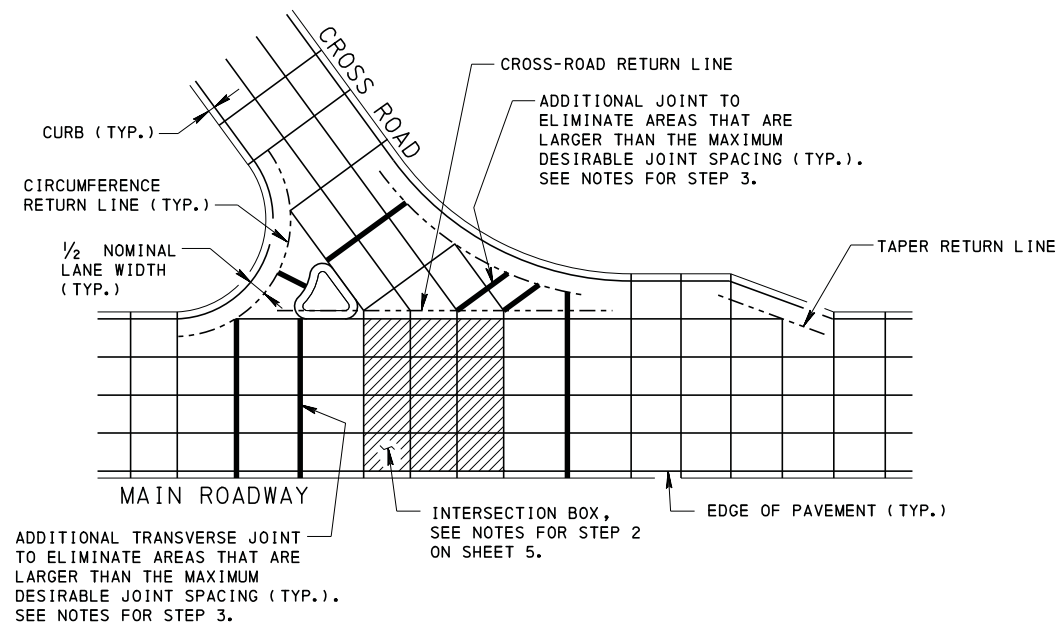
1. ALL CURB JOINTS ARE TO MATCH AND ALIGN WITH ADJACENT ROADWAY JOINTS.
2. FOR ROADWAYS WITHOUT CURB, PAVEMENT JOINTS TERMINATE AT THE EDGE OF PAVEMENT.



PLAN - INTERSECTION

STEP 4:

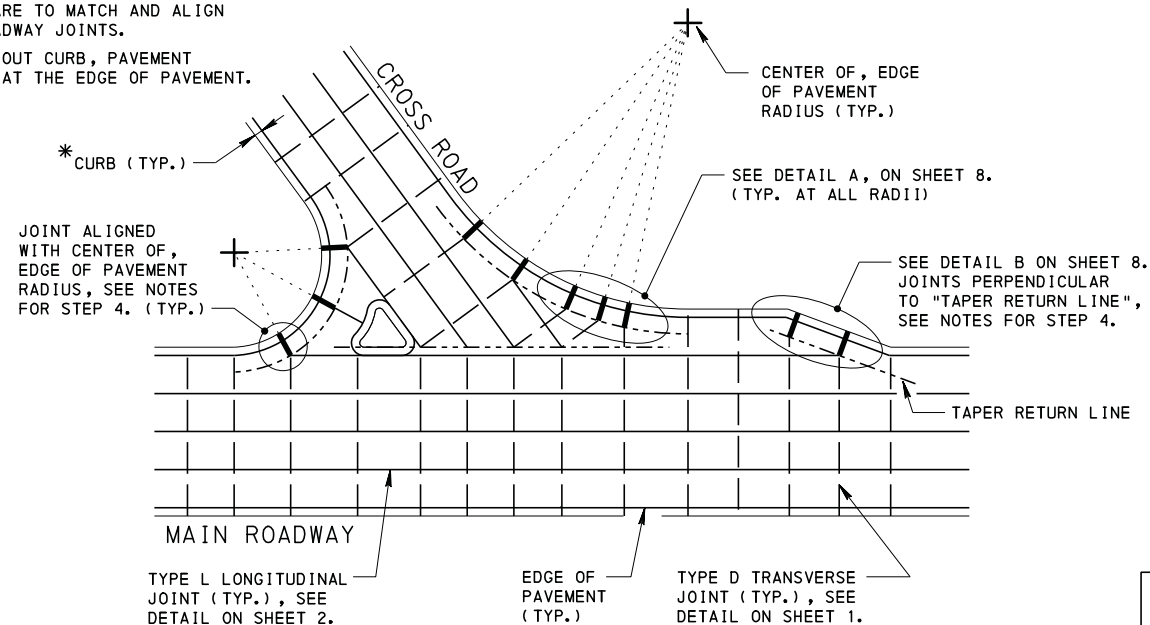
- EXTEND LINES FROM THE CENTER OF THE EDGE OF PAVEMENT RADII TO THE POINTS DEFINED BY THE "INTERSECTION BOX" AND TO THE POINTS CREATED BY INTERMEDIATE JOINTS SURROUNDING THE "INTERSECTION BOX".
- EXTEND LINES FROM THE CENTER OF THE EDGE OF PAVEMENT RADII TO THE POINTS ESTABLISHED BY ANY JOINTS IN THE RADII 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.



PLAN - SKEWED INTERSECTION

LEGEND

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



PLAN - SKEWED INTERSECTION

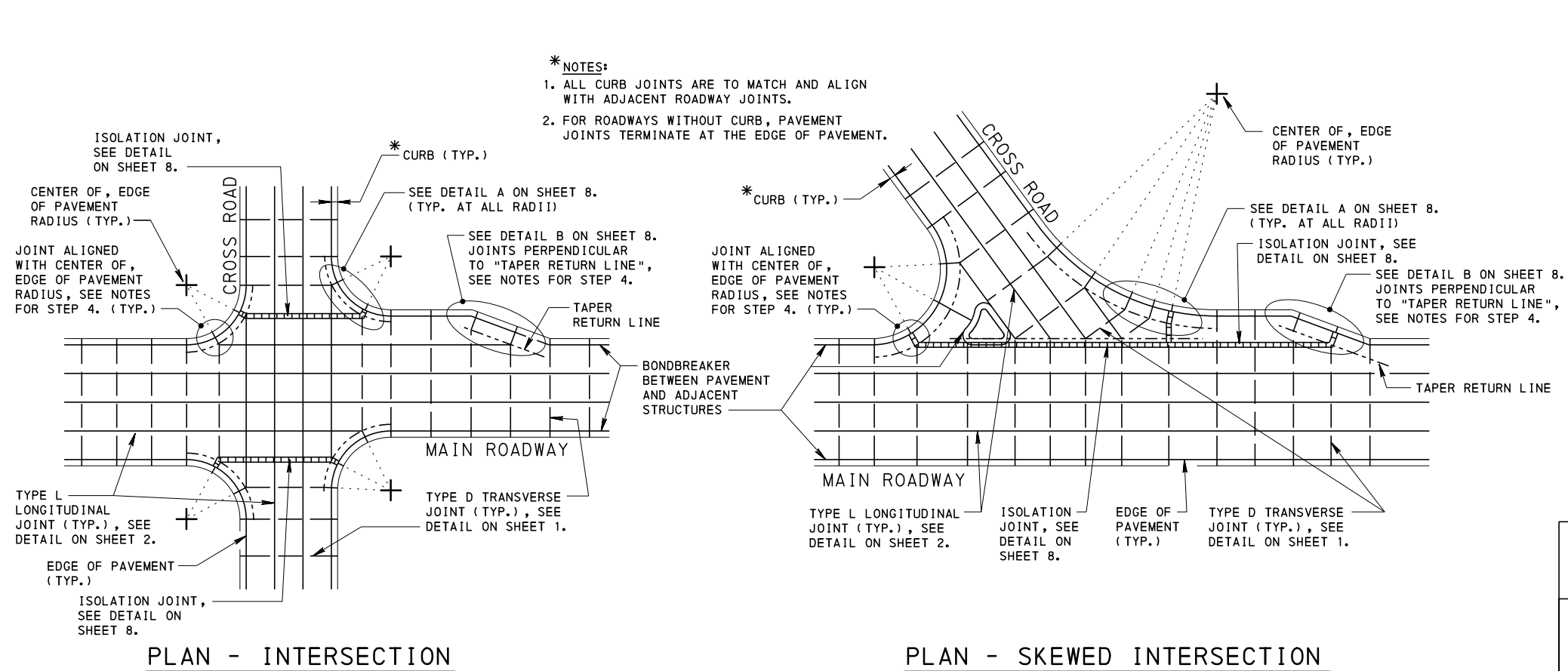
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CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT

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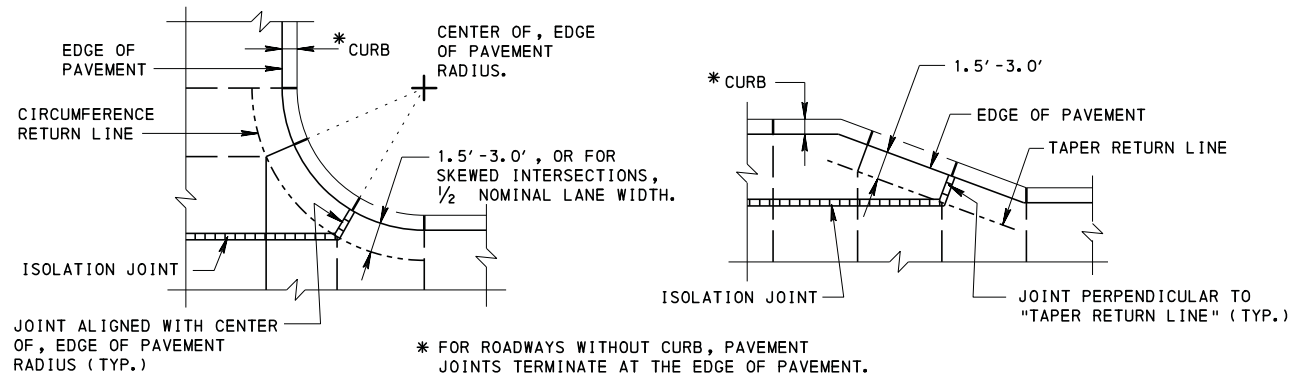


- LEGEND**
- — TYPE D JOINT, SEE SHEET 1
  - TYPE L JOINT, SEE SHEET 2
  - ===== ISOLATION JOINT, SEE SHEET 8

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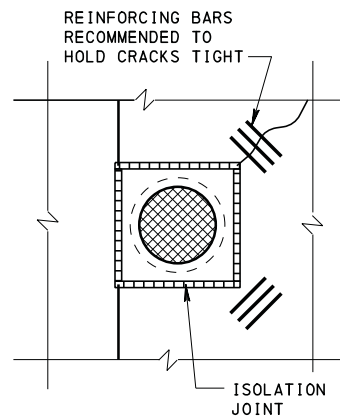
**CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT**

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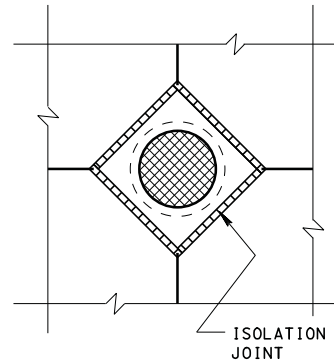


**DETAIL A**

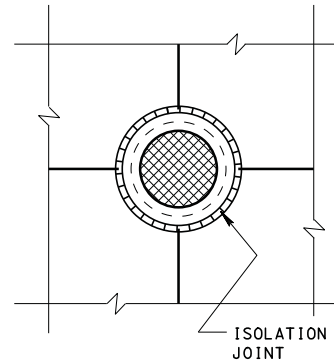
**DETAIL B**



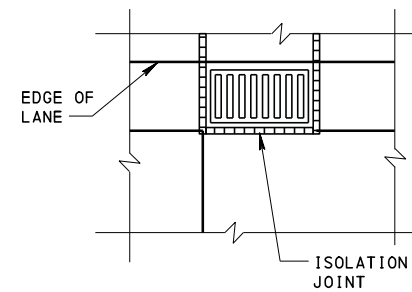
**SQUARE MANHOLE  
BOXOUT**



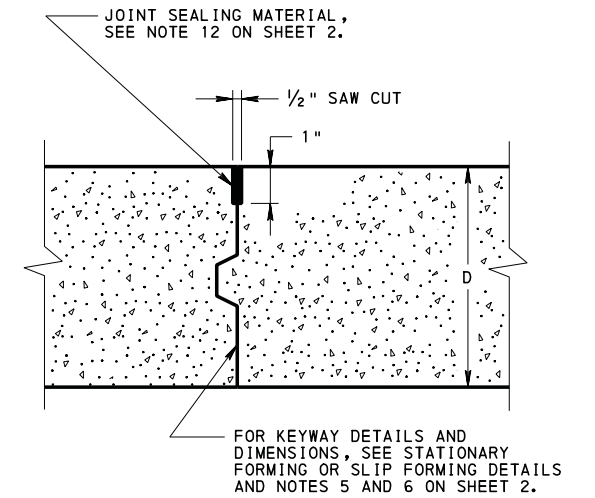
**DIAGONAL MANHOLE  
BOXOUT**



**CIRCULAR MANHOLE  
BOXOUT**



**INLET  
NO BOXOUT**



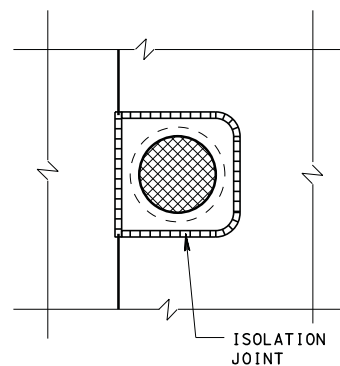
**ISOLATION JOINT**

**LEGEND**

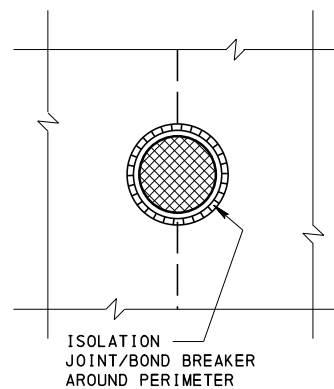
- TYPE D JOINT, SEE SHEET 1
- TYPE L JOINT, SEE SHEET 2
- ▬ ISOLATION JOINT, SEE THIS SHEET

**NOTE:**

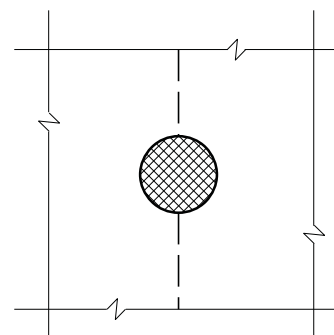
ALL OF THE JOINT DETAILS AND BOXOUT DETAILS ON THIS SHEET PERTAIN TO ONLY THE INTERSECTION LAYOUTS AS DEPICTED ON SHEETS 5, 6, AND 7.



**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

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CONCRETE PAVEMENT JOINTS  
INTERSECTION JOINT LAYOUT  
BOXOUT DETAILS

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RECOMMENDED DEC. 17, 2019

*Malcolm J. Batah*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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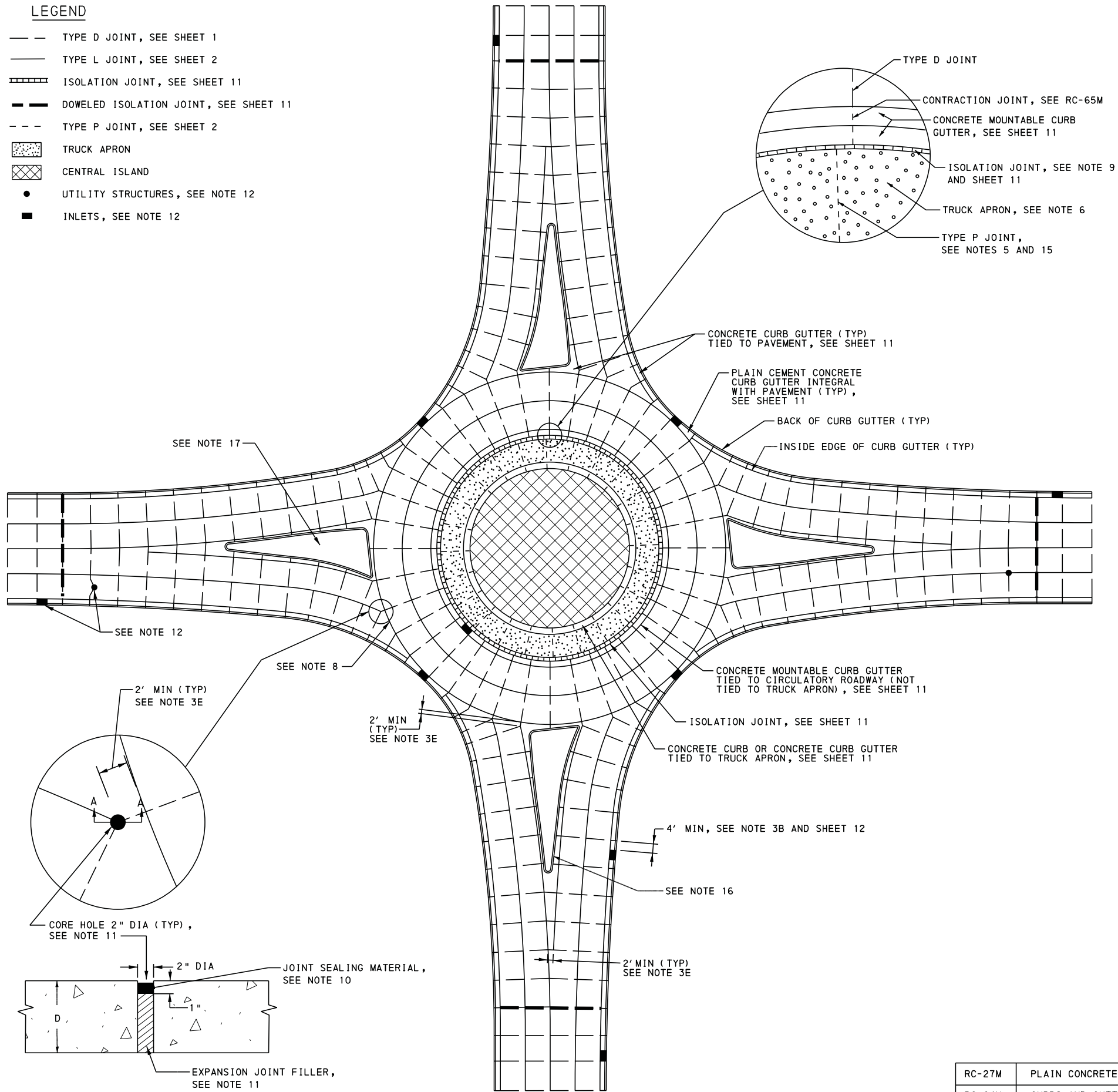
RC-20M

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN 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	

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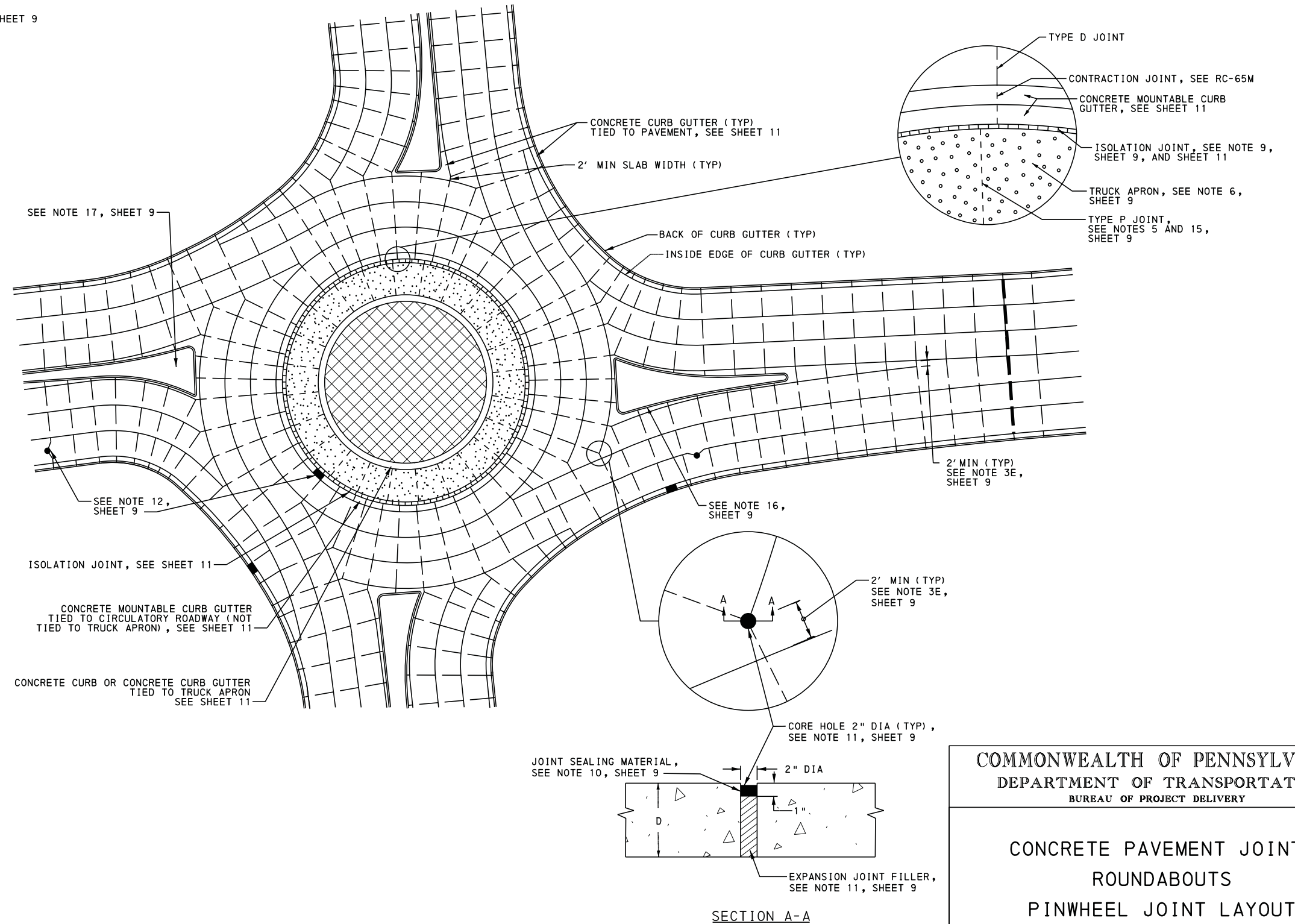
CONCRETE PAVEMENT JOINTS  
ROUNDABOUTS  
ISOLATED CIRCLE JOINT LAYOUT

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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

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CONCRETE PAVEMENT JOINTS  
ROUNDABOUTS  
PINWHEEL JOINT LAYOUT

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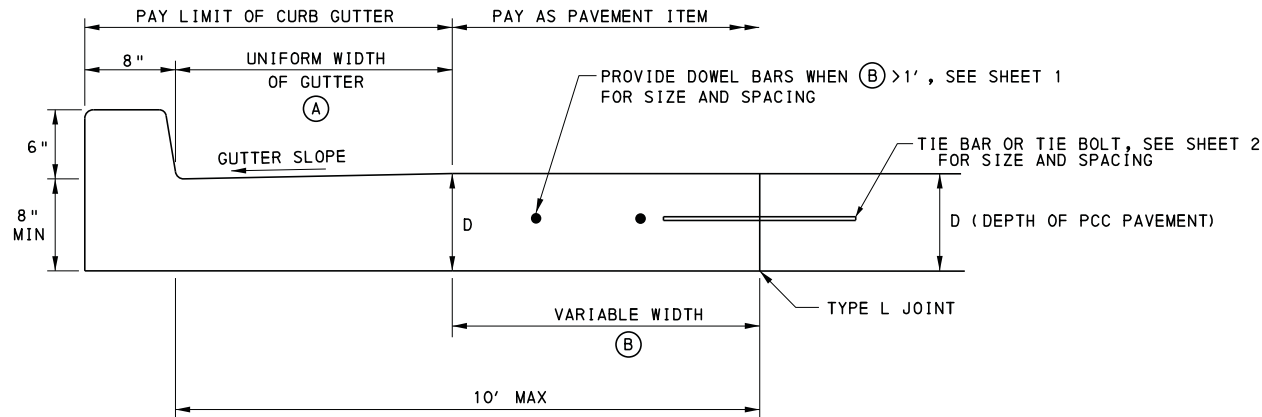
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DIRECTOR, BUREAU OF PROJECT DELIVERY

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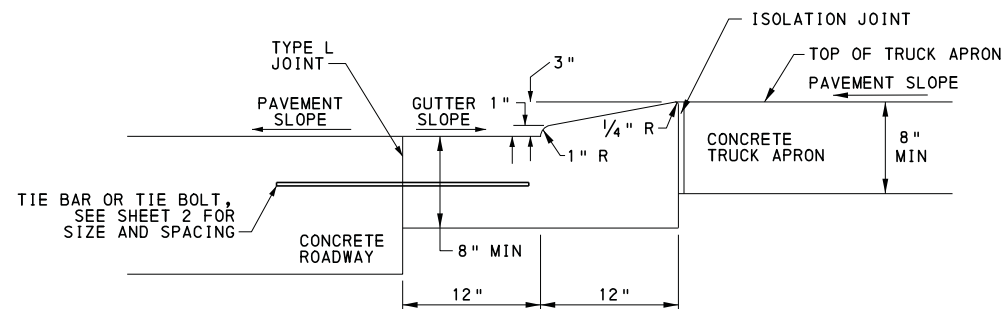
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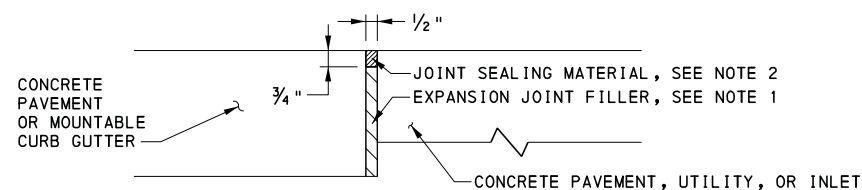
### PLAIN CEMENT CONCRETE CURB GUTTER INTEGRAL WITH PCC PAVEMENT

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

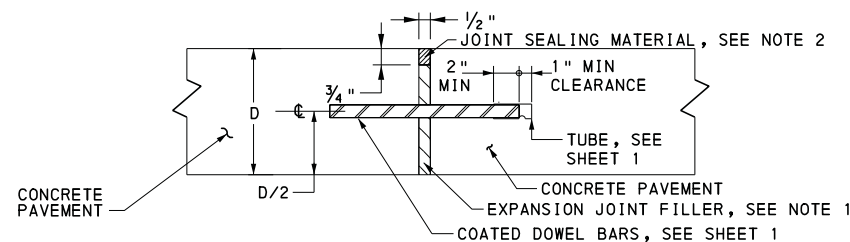
- (A) 1' TO 2' TYPICAL, AS PER CONTRACT DOCUMENTS
- (B) 0' TO 9' WHEN (A) = 1'
- (B) 0' TO 8' WHEN (A) = 2'



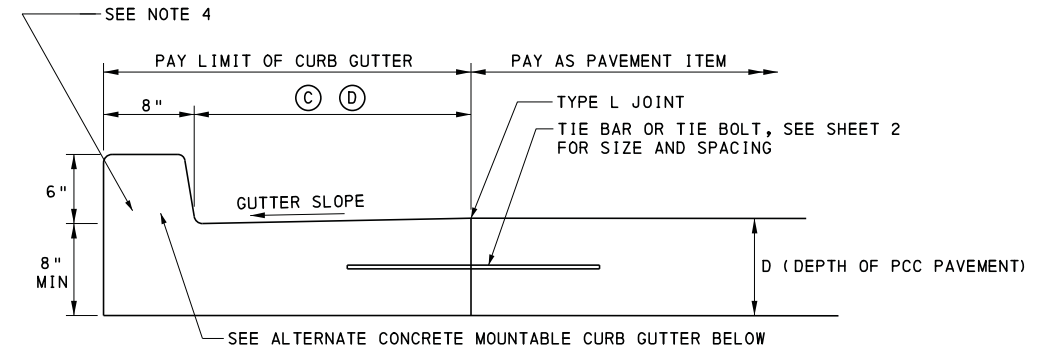
### CONCRETE MOUNTABLE CURB GUTTER TIED TO CIRCULATORY ROADWAY



### ROUNDBOUT ISOLATION JOINT

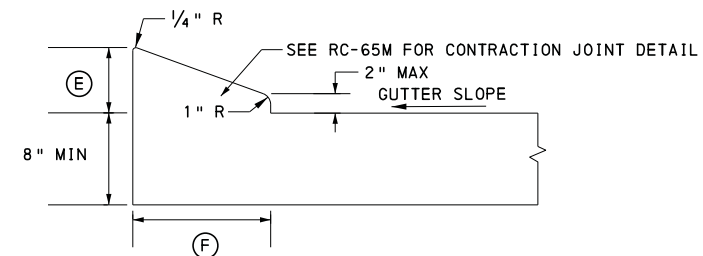


### DOWELED ISOLATION JOINT SEE NOTE 5



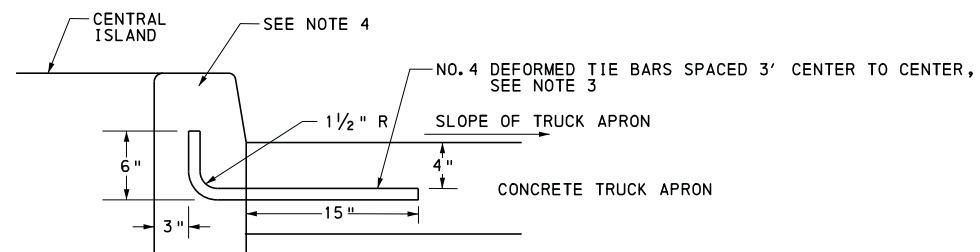
### PLAIN CEMENT CONCRETE CURB GUTTER TIED TO CONCRETE PAVEMENT ROADWAY OR TRUCK APRON

- (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.



### ALTERNATE CONCRETE MOUNTABLE CURB GUTTER

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



### 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

### NOTES

- 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.
- 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.
- BENT TIE BARS TO BE GRADE 40. EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(C).
- SEE RC-64M FOR CONTRACTION JOINT DETAILS AND OTHER DIMENSIONS.
- CONSTRUCT DOWELED ISOLATION JOINT ON THE APPROACH ROADWAY IF THE APPROACH ROADWAY IS CONCRETE PAVEMENT. LOCATE AT THE RADIUS TO TANGENT POINT.
- ALL OF THE JOINT DETAILS AND BOXOUT DETAILS ON THIS SHEET PERTAIN TO ONLY THE ROUNDBOUT LAYOUTS AS DEPICTED ON SHEETS 9 AND 10.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

### CONCRETE PAVEMENT JOINTS ROUNDBOUTS CURB AND JOINT DETAILS

RECOMMENDED DEC. 17, 2019

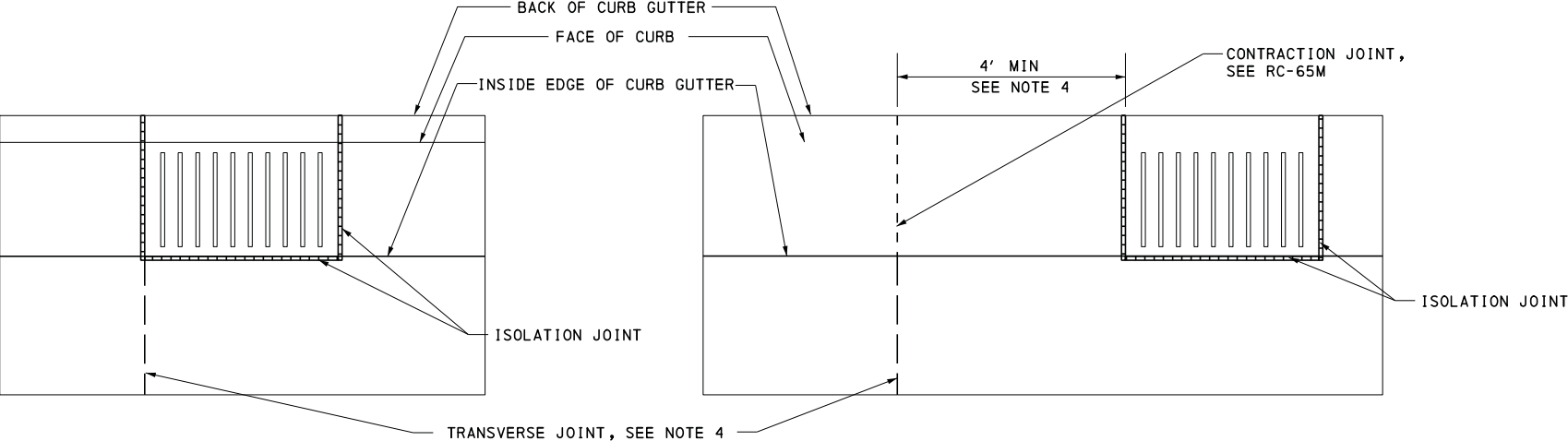
*9219 Chapel*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

*Melvin J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 11 OF 13

RC-20M



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 THEN 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.

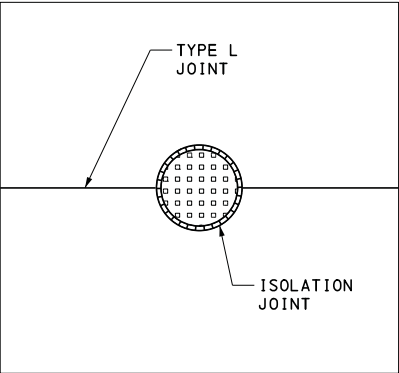
STEP 2. DRAW ALL LANE LINES ON THE LEGS AND IN THE CIRCULAR PORTION. IF USING THE "ISOLATED CIRCLE" METHOD, DO NOT EXTEND LEG LINES INTO THE CIRCLE. IF USING THE "PINWHEEL" METHOD, DETERMINE WHICH EXITING LEGS WILL BE PAVED THROUGH AND EXTEND LANE LINES INTO THE CIRCLE. ASSURE THAT WIDTHS DO NOT EXCEED 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.

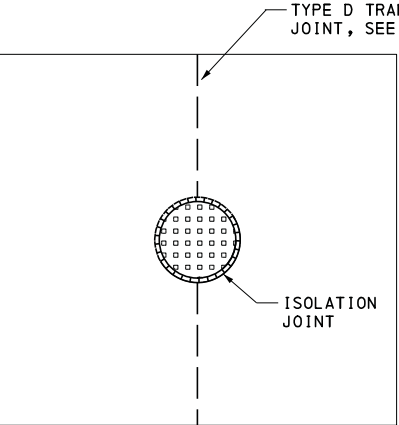
STEP 4. ON THE LEGS, ADD TRANSVERSE JOINTS AT ALL LOCATIONS WHERE A WIDTH CHANGE OCCURS IN THE PAVEMENT, E.G.: SPLITTER ISLAND APPROACHES, BEGIN AND END OF CURVES, TAPERS, TANGENTS, CURB RETURNS, ETC. EXTEND THESE JOINTS THROUGH THE BACK OF CURB GUTTER.

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.

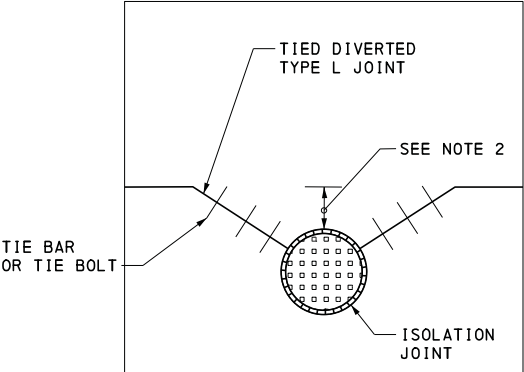
STEP 6. MAKE ADJUSTMENTS FOR IN-PAVEMENT OBJECTS, UTILITIES, DRAINAGE FEATURES AND TO ELIMINATE L-SHAPES, SMALL TRIANGULAR SLABS, ETC. CHECK SLAB DIMENSIONS, JOINT ANGLES AND LOCATIONS, ADJUST AS REQUIRED.



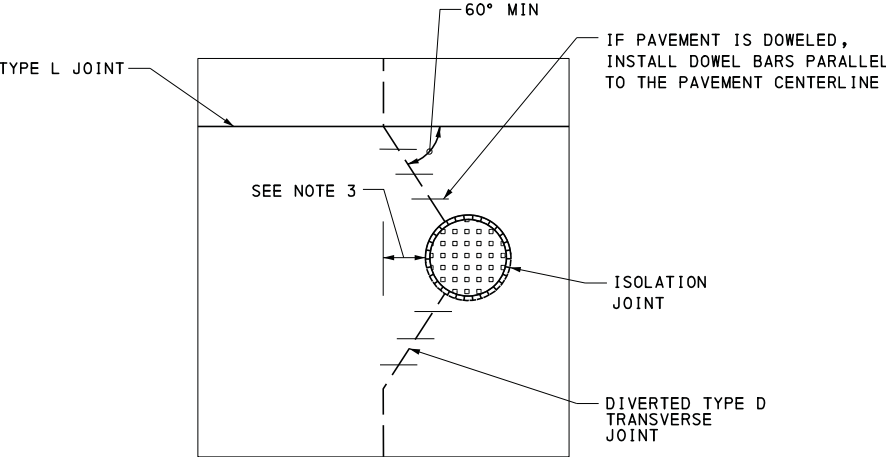
UTILITY WITH  
LONGITUDINAL JOINT



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 DEC. 17, 2019

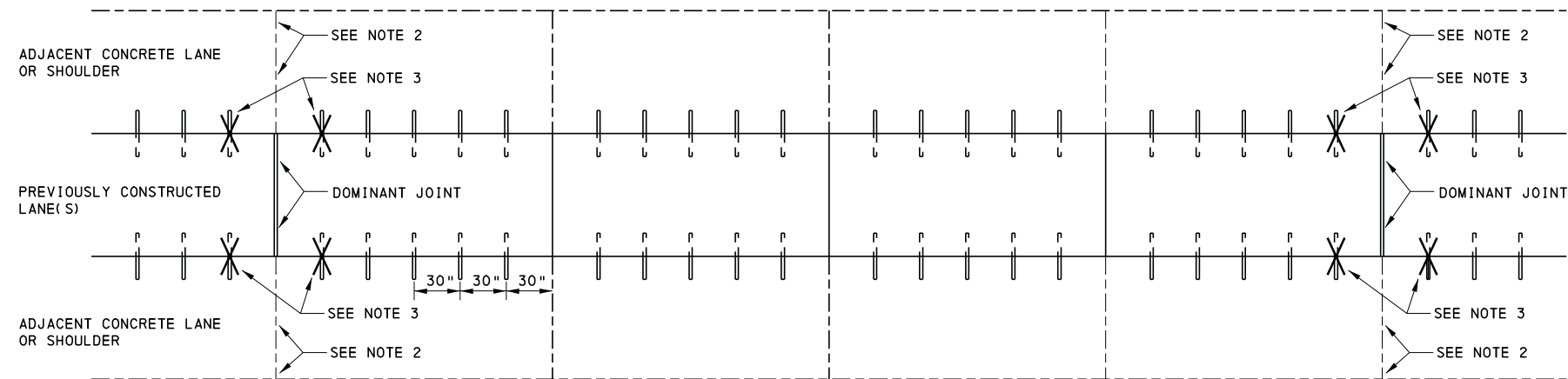
*9219 Chapel*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

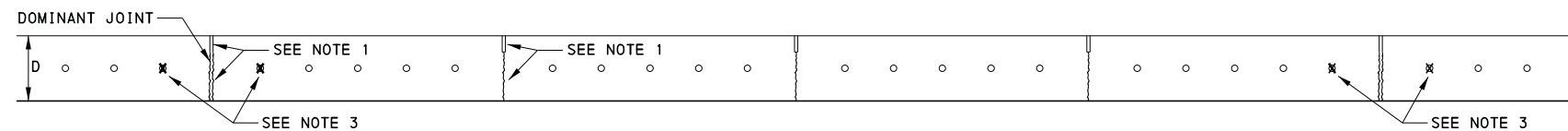
*Malcolm J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-20M



PLAN



**LATE SEASON CONCRETE PAVING DETAILS**  
(FROM OCTOBER 1 TO APRIL 1)

**NOTES**

1. PRIOR TO CONSTRUCTING ADJACENT CONCRETE PAVEMENT, SHOULDERS OR STRUCTURES AFTER PAVEMENT CONSTRUCTION, SEAL THE END OF ALL TRANSVERSE JOINTS AND CRACKS TO PREVENT INTRUSION OF CEMENT OR MORTAR INTO THE JOINT AND CRACK.
2. WHEN CONSTRUCTING ADJACENT CONCRETE PAVEMENT, SHOULDERS OR STRUCTURES, MARK THE DOMINANT JOINTS (FIRST JOINTS THAT HAVE CRACKED AND OPENED) ON THE PREVIOUS LANE PLACED. ALIGN AND SAW THESE JOINTS FIRST IN THE ADJACENT LANE TO ENCOURAGE DOMINANT JOINT DEVELOPMENT AT THE SAME LOCATION. DOMINANT JOINTS ARE THE WIDEST JOINT OPENING AND TYPICALLY OCCUR APPROXIMATELY EVERY 60'.
3. WHEN CONSTRUCTING ADJACENT CONCRETE PAVEMENT, SHOULDERS OR STRUCTURES FROM OCTOBER 1 TO APRIL 1, REMOVE ONE TIE BAR IN EACH SLAB ADJACENT TO THE DOMINANT JOINTS TO MINIMIZE SHEAR CRACKING IN THE PREVIOUS LANE PLACED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT JOINTS  
LATE SEASON CONCRETE  
PAVING DETAILS

RECOMMENDED DEC. 17, 2019

*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

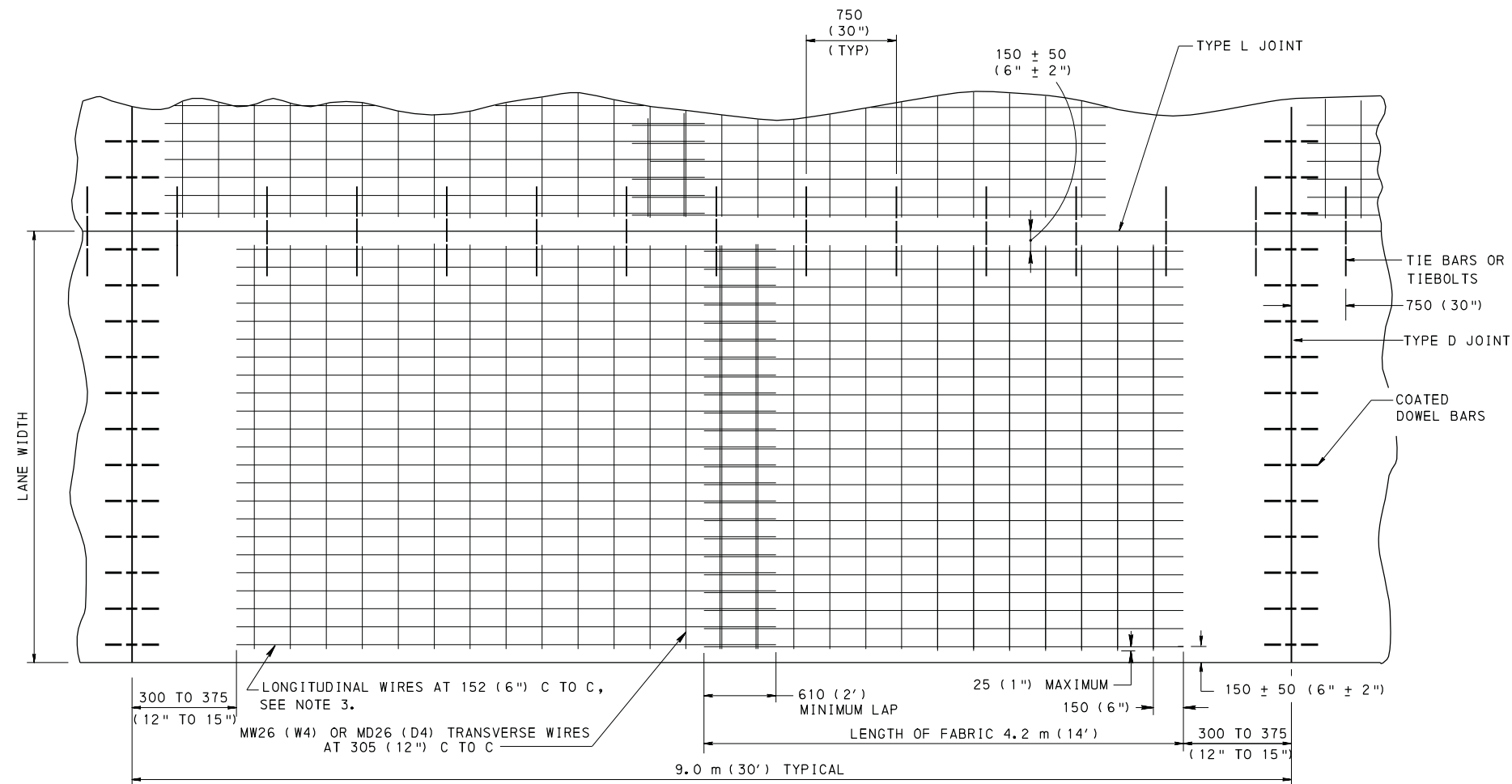
RECOMMENDED DEC. 17, 2019

*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

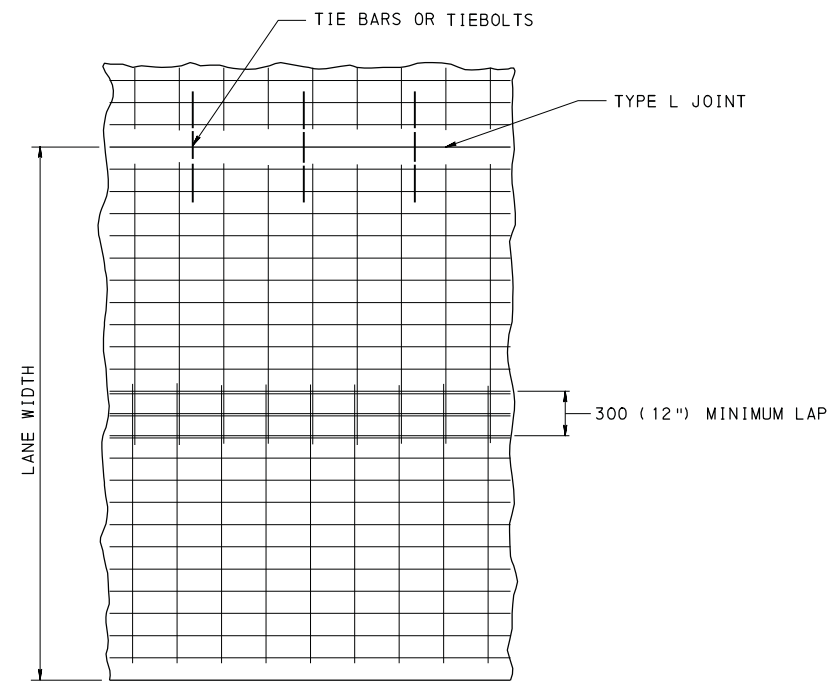
SHT 13 OF 13

RC-20M





### WIRE FABRIC REINFORCEMENT



### ALTERNATE LAPPED FABRIC

### NOTES

- FOR VARIABLE WIDTH PAVEMENT CUT THE REINFORCEMENT AS REQUIRED.
- WIRE FABRIC REINFORCEMENT MAY BE PLACED WITH TRANSVERSE WIRES ABOVE OR BELOW LONGITUDINAL WIRES.
- PROVIDE LONGITUDINAL WIRES FOR WIRE FABRIC REINFORCEMENT OF THE FOLLOWING MINIMUM SIZES:

PAV'T DEPTH	MIN LONG WIRE SIZE
200 (8'')	MW35 OR MD35 (W5.5 OR D5)
230 (9'')	MW40 OR MD35 (W6 OR D5.5)
250 (10'')	MW45 OR MD45 (W7 OR D6.5)
280 (11'')	MW50 OR MD45 (W7.5 OR D7)
300 (12'')	MW55 OR MD50 (W8 OR D7.5)
330 (13'')	MW60 OR MD50 (W9 OR D8)
- HINGED FABRIC REINFORCEMENT MAY BE USED. HAVE HINGE DETAIL APPROVED BY THE ENGINEER.
- SECURELY TIE ALL LONGITUDINAL AND TRANSVERSE LAPS OF WIRE FABRIC REINFORCEMENT.
- ON PROJECTS WHERE ADDITIONAL LANES ARE ADDED TO EXISTING CEMENT CONCRETE PAVEMENTS AND THE EXISTING JOINT SPACING IS MORE THAN 14.2 m (46.5'), USE A MINIMUM LONGITUDINAL WIRE SIZE OF MW60 OR MD60 (W9.5 OR D9).
- WIRE FABRIC REINFORCEMENT MAY BE CONSTRUCTED OF SMOOTH WIRE (SIZES DESIGNATED BY W) OR DEFORMED WIRE (SIZES DESIGNATED BY D) OR A COMBINATION OF BOTH.
- SEE RC-20M FOR JOINT DETAILS.
- PROVIDE A MINIMUM DEPTH FOR PLACEMENT OF WIRE FABRIC REINFORCEMENT, MEASURED FROM TOP OF PAVEMENT TO TOP OF FABRIC OF 60 (2 1/2'') TO A MAXIMUM OF ONE HALF THE PAVEMENT DEPTH MINUS 15 (D/2 - 1/2'').
- WHEN THE RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MID-POINT.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

REINFORCED  
CONCRETE PAVEMENT

RECOMMENDED JUN. 1, 2010  
*R. H. Wiley*  
CHIEF, HWY. QA DIVISION

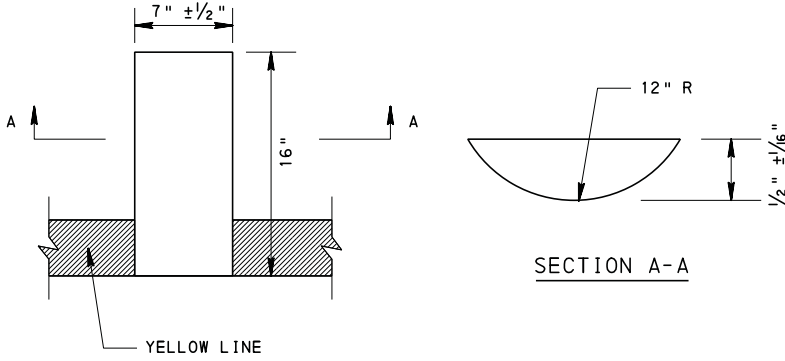
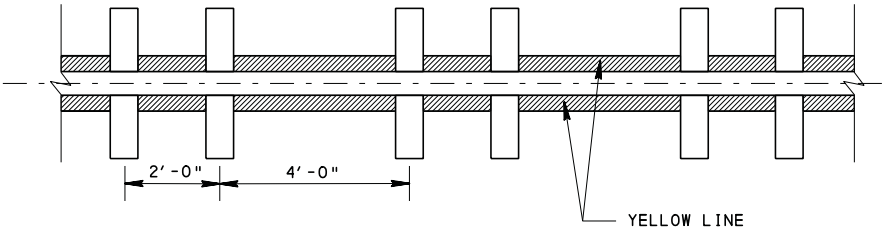
RECOMMENDED JUN. 1, 2010  
*Sam B. Thompson*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1  
RC-21M

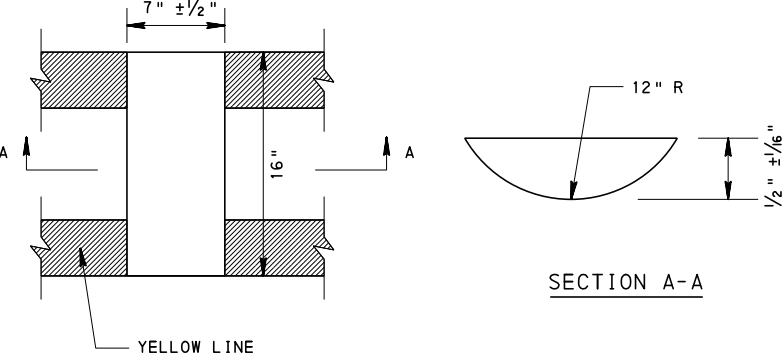
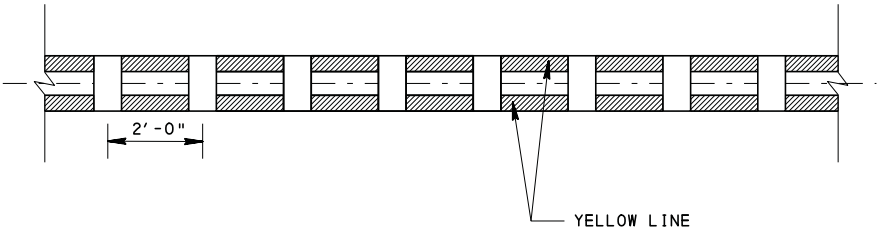
NOTES

1. USE CENTERLINE RUMBLE STRIPS (CLRS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS.
2. INSTALL MILLED CLRS ONLY ON BITUMINOUS PAVEMENT WITH AN ID-2, ID-3, OR SUPERPAVE SURFACE WITH BCBC BASE OR BETTER OR CONCRETE BASE WITH 2 1/2" OR GREATER OVERLAY.
3. IF CLRS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING AND DETERIORATING. OTHERWISE, THE PAVEMENT NEEDS TO BE UPGRADED PRIOR TO MILLING ANY DESIRED CLRS.
4. DO NOT INSTALL CLRS ON BRIDGE DECKS.
5. CLRS MAY BE INSTALLED IN PASSING ZONES WHERE DEEMED APPROPRIATE BY DISTRICT SAFETY PERSONNEL. REDUCE DEPTH OF CLRS TO 3/8" WHEN USED IN PASSING ZONES.
6. CLRS ARE TO BE BROKEN FOR INTERSECTIONS AND COMMERCIAL/INDUSTRIAL DRIVEWAYS (SEE DETAILS "C" & "D").
7. COORDINATE THE MILLING OF CLRS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE CLRS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
8. COORDINATE THE MILLING OF CLRS WITH TRAFFIC LINE PAINTING OPERATIONS TO AVOID MILLING NEWLY APPLIED TRAFFIC LINES. INSTALL NEW YELLOW CENTERLINES WITHIN 2 WEEKS OF CLRS COMPLETION.
9. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
10. CONSTRUCT CENTERLINE RUMBLE STRIPS WITH PATTERNS AND LIMITS OF PLACEMENT AS INDICATED ON THE CONTRACT DOCUMENTS.
11. DETAIL "A" SHOULD ONLY BE USED WHEN THE TRAVEL LANE IS 11' WIDE OR GREATER, AND A 3' SHOULDER IS PRESENT.
12. DETAIL "B" REQUIRES A 10' WIDE MINIMUM TRAVEL LANE. A SHOULDER IS NOT REQUIRED.

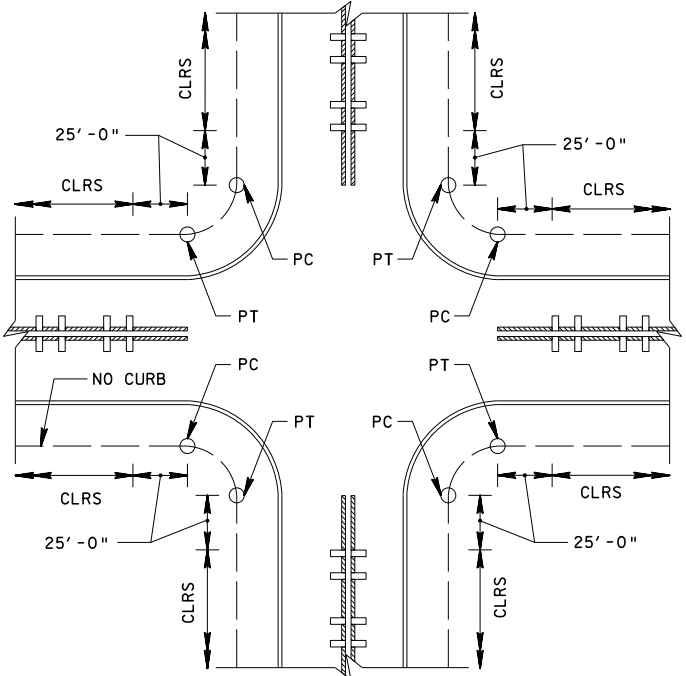
① DO NOT PROVIDE BREAK IN CLRS FOR RESIDENTIAL/MINIMUM USE DRIVEWAYS.



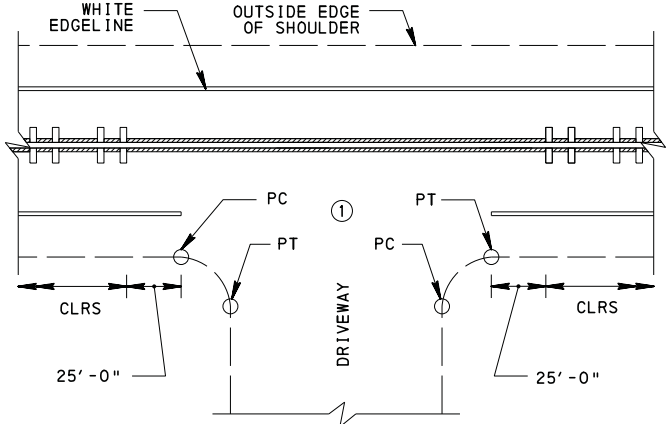
DETAIL "A"  
CENTERLINE RUMBLE STRIPS, TYPE 1  
SEE NOTE 11



DETAIL "B"  
CENTERLINE RUMBLE STRIPS, TYPE 2  
SEE NOTE 12



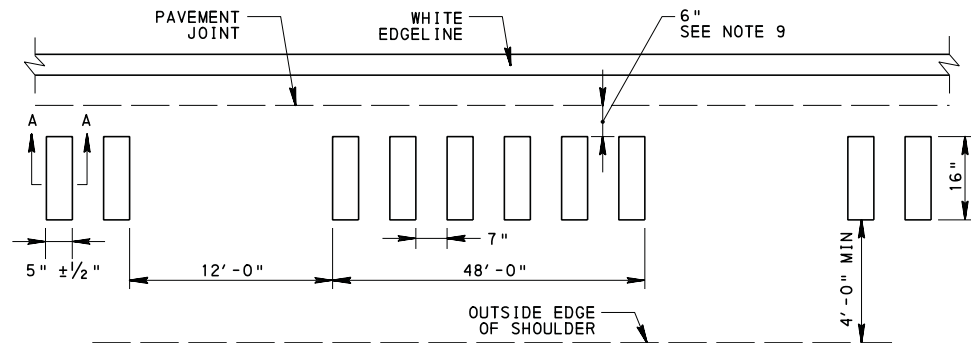
DETAIL "C"  
CLRS TYPICAL INTERSECTION



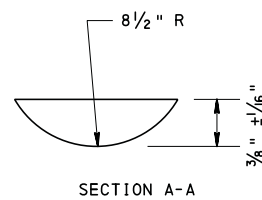
DETAIL "D"  
CLRS TYPICAL  
COMMERCIAL/INDUSTRIAL DRIVEWAY  
OR T-INTERSECTION

LEGEND:  
CLRS - CENTERLINE RUMBLE STRIPS

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
MILLED RUMBLE STRIPS UNDIVIDED ROADWAYS CENTERLINE RUMBLE STRIPS FOR NON-INTERSTATES AND NON-EXPRESSWAYS		
RECOMMENDED FEB. 8, 2019 <i>Mark J. Chappell</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 6 RC-22M

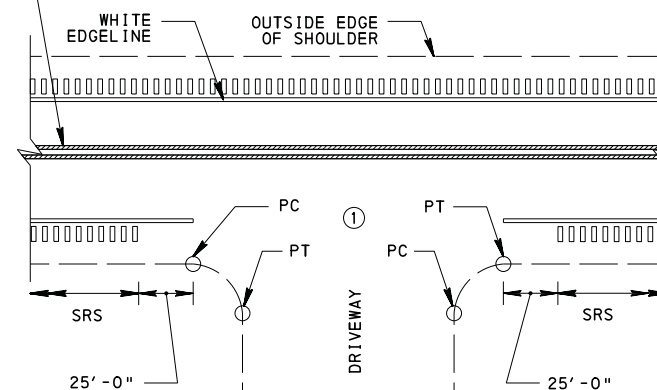


DETAIL "E"  
SHOULDER RUMBLE STRIPS  
SEE NOTE 2

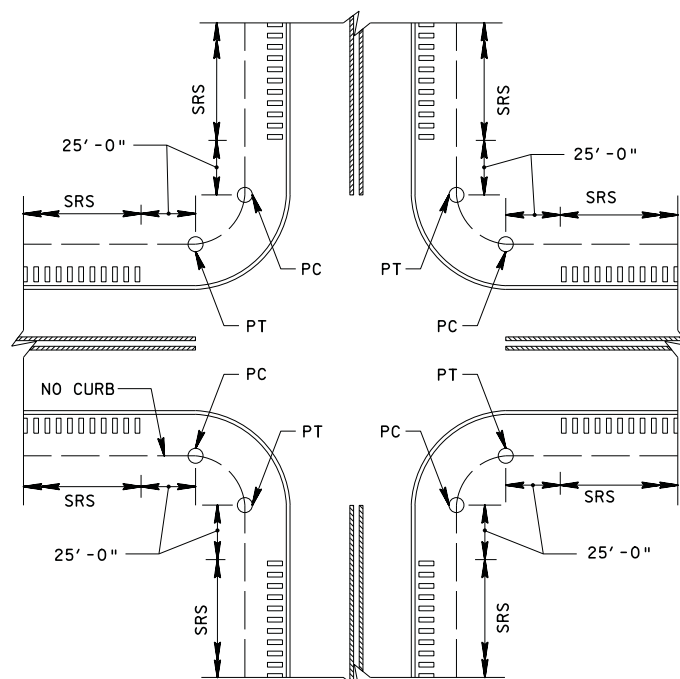


SECTION A-A

PLACE PAINT LINES AS  
INDICATED ON THE  
CONTRACT DOCUMENTS

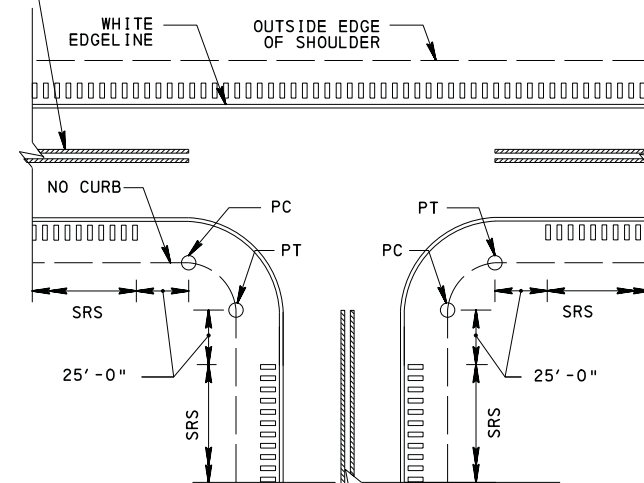


DETAIL "G"  
SRS TYPICAL  
COMMERCIAL/INDUSTRIAL DRIVEWAY  
SEE NOTE 7



DETAIL "F"  
SRS TYPICAL INTERSECTION  
SEE NOTE 7

PLACE PAINT LINES AS  
INDICATED ON THE  
CONTRACT DOCUMENTS



DETAIL "H"  
SRS TYPICAL  
T-INTERSECTION  
SEE NOTE 7

## NOTES

- USE SHOULDER RUMBLE STRIPS (SRS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS. FOR SRS ON LIMITED ACCESS HIGHWAYS, FREEWAYS AND EXPRESSWAYS, SEE SHEET 4.
- PROVIDE GAP SPACING FOR ALL SRS, EXCEPT ON CURVES WITH WARNING SIGNS, AND WHEN CRASH HISTORY SUPPORTS ELIMINATION OF GAPS.
- THE PAVED SHOULDER MUST BE TYPE 1-SP, OR 6-SP SHOULDER OR WITH BETTER PAVEMENT STRUCTURE.
- INSTALLING SRS ON BITUMINOUS PAVEMENT REQUIRES A BITUMINOUS WEARING COURSE WITH BCBC BASE COURSE OR BETTER.
- IF SRS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING AND DETERIORATING. OTHERWISE, THE PAVEMENT NEEDS TO BE UPGRADED PRIOR TO MILLING ANY DESIRED SRS.
- DO NOT INSTALL SRS ON BRIDGE DECKS.
- SRS ARE TO BE BROKEN FOR INTERSECTIONS (SEE DETAIL "F" & "H"). BREAK SRS FOR COMMERCIAL/INDUSTRIAL DRIVEWAYS (SEE DETAIL "G").
- COORDINATE THE MILLING OF SRS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE SRS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
- IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC EDGELINE.
- CONSTRUCT SRS WITH PATTERNS AND LIMITS OF PLACEMENT AS INDICATED ON THE CONTRACT DOCUMENTS.

① DO NOT PROVIDE BREAK IN SRS FOR RESIDENTIAL/MINIMUM USE DRIVEWAYS.

LEGEND:  
SRS - SHOULDER RUMBLE STRIPS

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

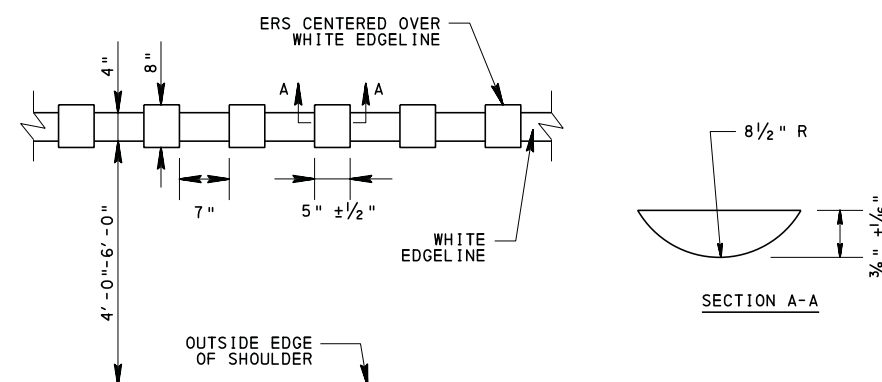
MILLED RUMBLE STRIPS  
SHOULDER RUMBLE STRIPS  
FOR NON-INTERSTATES  
AND NON-EXPRESSWAYS

RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

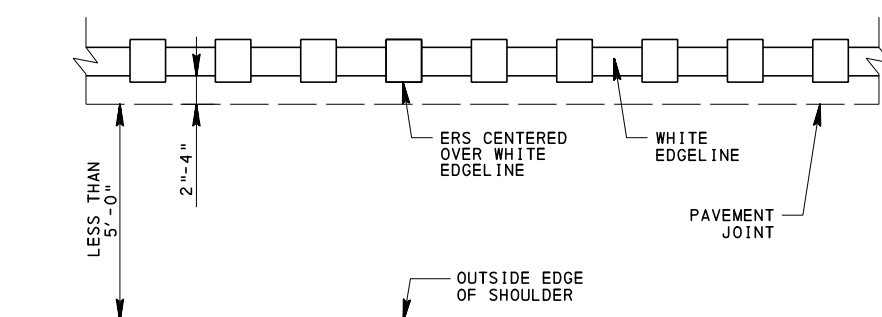
RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 6

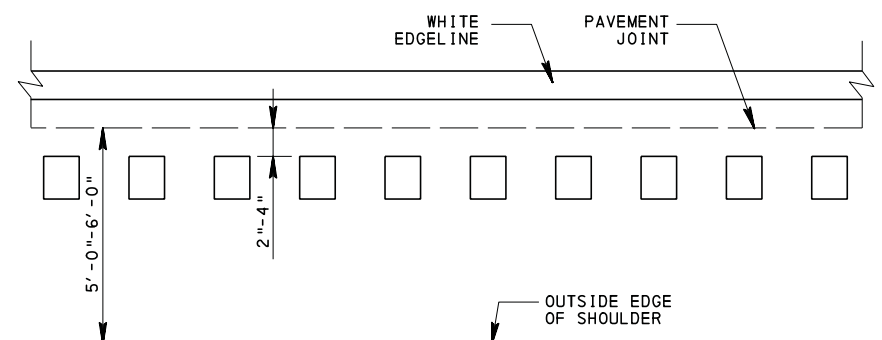
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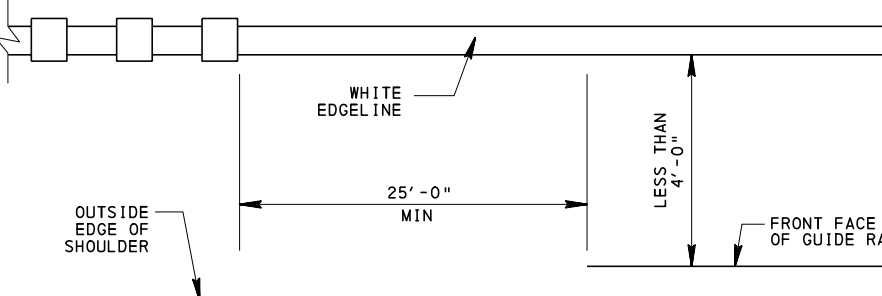
DETAIL "I"  
EDGE LINE RUMBLE STRIPS



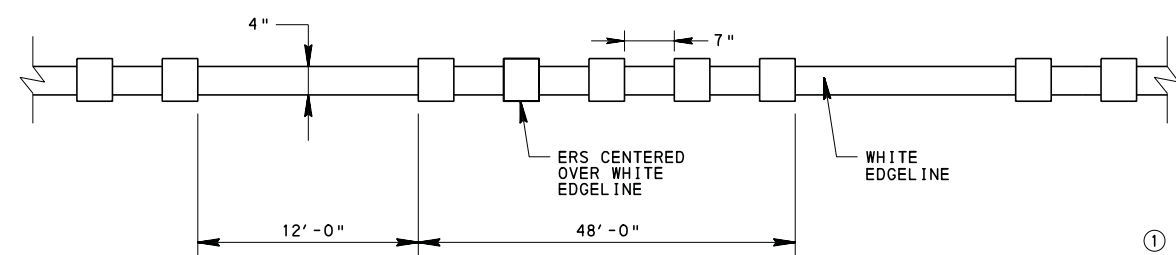
DETAIL "K"  
EDGE LINE RUMBLE STRIPS, LESS THAN 5'-0" SHOULDER  
SEE NOTE 4



DETAIL "J"  
EDGE LINE RUMBLE STRIPS, 5'-0" TO 6'-0" SHOULDER  
SEE NOTE 3

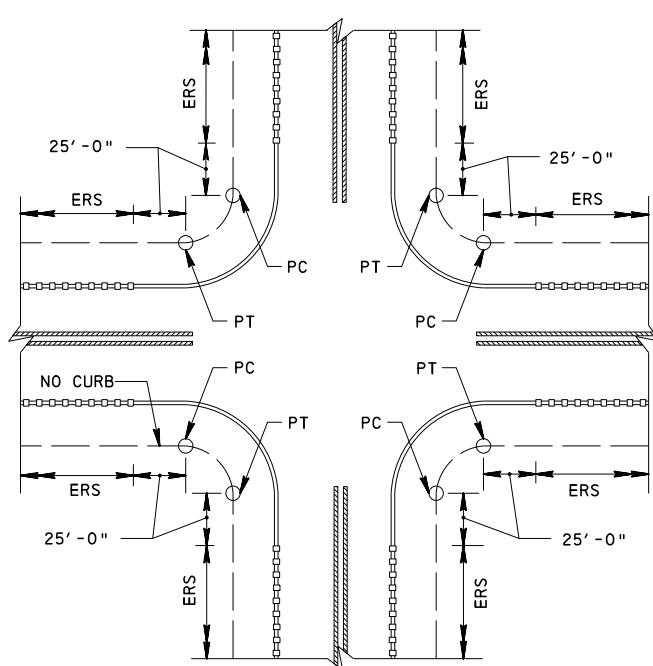


DETAIL "L"  
SEE NOTE 5

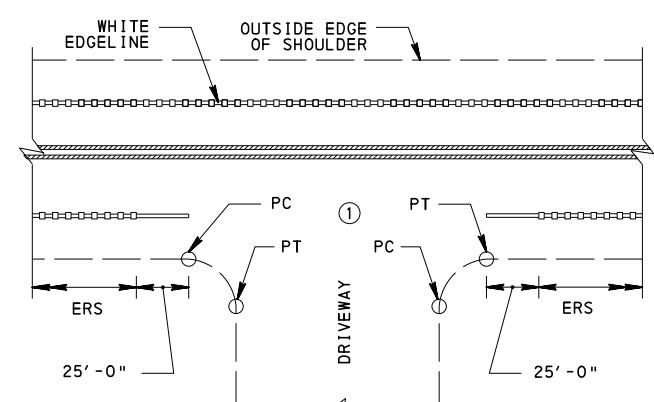


DETAIL "M"  
GAP SPACING FOR ERS  
SEE NOTE 2

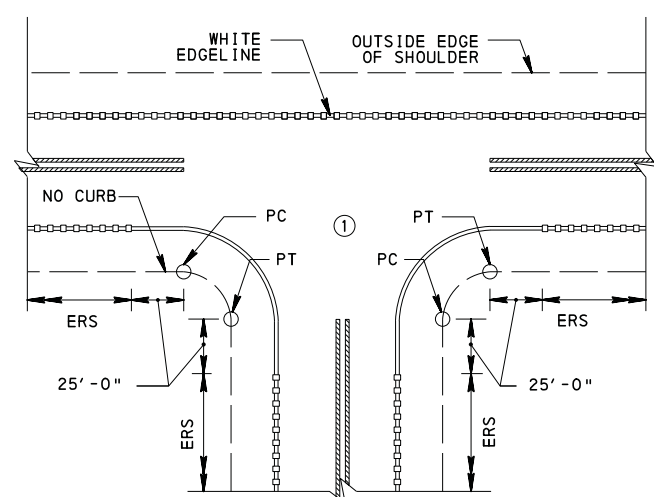
① DO NOT PROVIDE BREAK IN ERS FOR RESIDENTIAL/MINIMUM USE DRIVEWAYS.



DETAIL "N"  
EDGE LINE RUMBLE STRIP  
TYPICAL INTERSECTION  
SEE NOTE 10



DETAIL "O"  
EDGE LINE RUMBLE STRIP  
TYPICAL COMMERCIAL/INDUSTRIAL DRIVEWAY  
SEE NOTE 10



DETAIL "P"  
EDGE LINE RUMBLE STRIP  
TYPICAL T-INTERSECTION  
SEE NOTE 10

## NOTES

1. USE EDGE LINE RUMBLE STRIPS (ERS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS.
2. PROVIDE GAP SPACING FOR ALL ERS, EXCEPT ON CURVES WITH WARNING SIGNS, AND WHEN CRASH HISTORY SUPPORTS ELIMINATION OF GAPS.
3. IF SHOULDER WIDTH IS 5'-0" TO 6'-0" AND THERE IS CONCERN WITH THE PAVEMENT JOINT BETWEEN THE ROADWAY AND SHOULDER, OFFSET ERS 2" TO 4" FROM THE JOINT INTO THE SHOULDER SURFACE ERS (SEE DETAIL "J").
4. IF SHOULDER WIDTH IS LESS THAN 5'-0" AND THERE IS CONCERN WITH THE PAVEMENT JOINT BETWEEN THE ROADWAY AND SHOULDER, OFFSET ERS 2" TO 4" FROM THE JOINT INTO THE TRAVEL LANE SURFACE ERS (SEE DETAIL "K").
5. DISCONTINUE ERS 25'-0" BEFORE AND AFTER ADJACENT GUIDE RAIL, WHERE THE FACE OF THE GUIDE RAIL IS LOCATED LESS THAN 4'-0" FROM THE EDGE LINE OF THE ROADWAY (SEE DETAIL "L").
6. THE PAVED SHOULDER SHOULD BE TYPE 1-SP, OR 6-SP SHOULDER OR WITH BETTER PAVEMENT STRUCTURE.
7. INSTALLING ERS ON BITUMINOUS PAVEMENT REQUIRES A BITUMINOUS WEARING COURSE WITH SUPERPAVE BASE COURSE OR BETTER.
8. IF ERS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT AND SHOULDER SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING OR DETERIORATING THE PAVEMENT. OTHERWISE, BOTH THE PAVEMENT AND SHOULDER NEED TO BE UPGRADED PRIOR TO MILLING ERS.
9. DO NOT INSTALL ERS ON BRIDGE DECKS.
10. ERS ARE TO BE BROKEN FOR INTERSECTIONS (SEE DETAILS "N" & "P"). BREAK ERS FOR COMMERCIAL/INDUSTRIAL DRIVEWAYS (SEE DETAIL "O").
11. COORDINATE THE MILLING OF ERS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE ERS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
12. COORDINATE THE MILLING OF ERS WITH TRAFFIC LINE PAINTING OPERATIONS TO AVOID MILLING NEWLY APPLIED TRAFFIC LINES. INSTALL NEW WHITE EDGELINES WITHIN 2 WEEKS OF ERS COMPLETION.
13. CONSTRUCT ERS WITH PATTERNS AND LIMITS OF PLACEMENT AS INDICATED ON THE CONTRACT DOCUMENTS.

LEGEND:  
ERS - EDGE LINE RUMBLE STRIPS

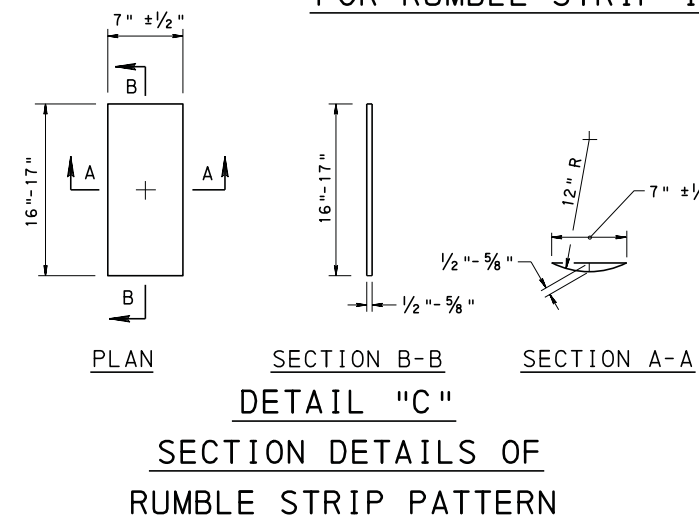
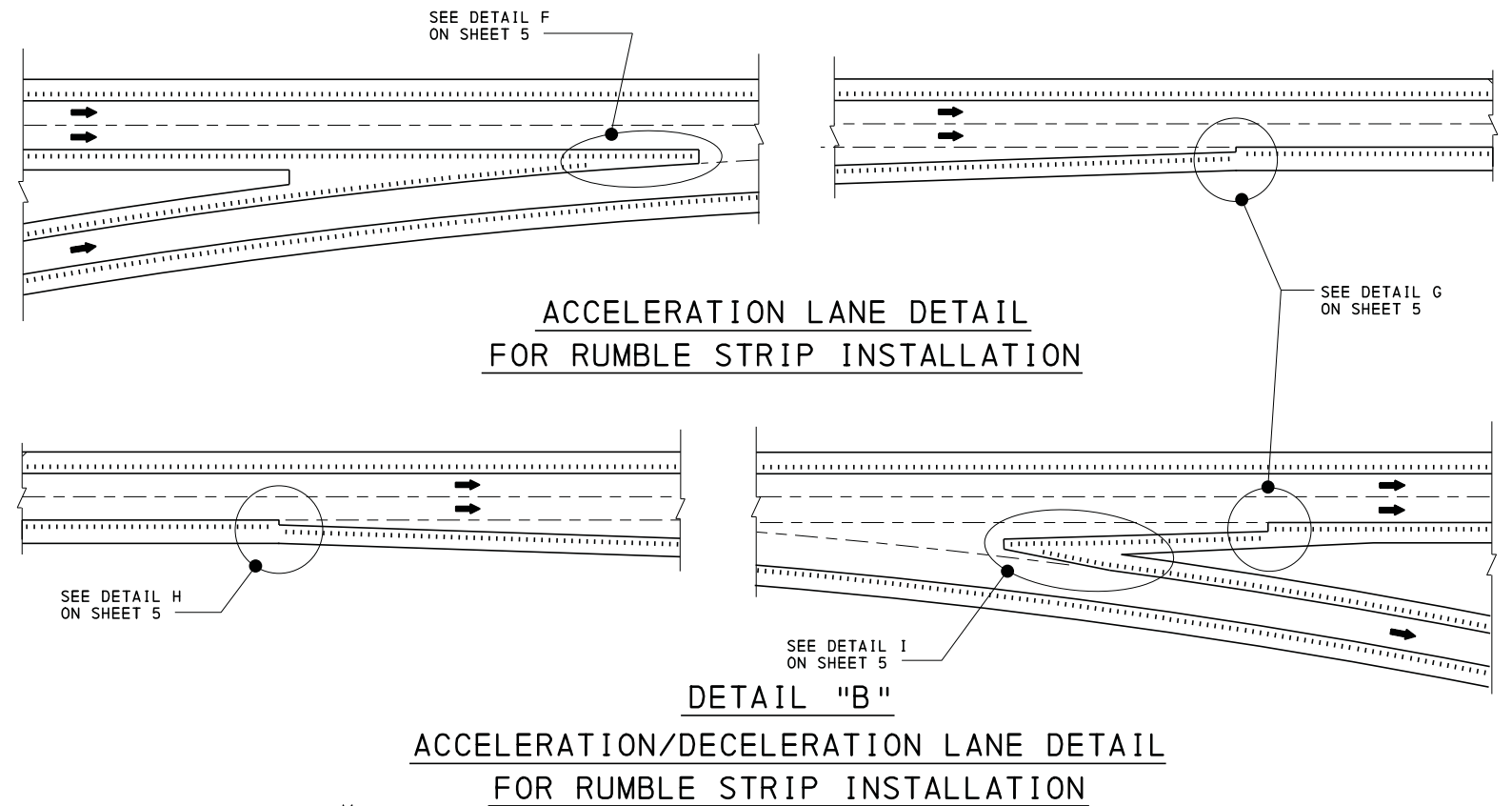
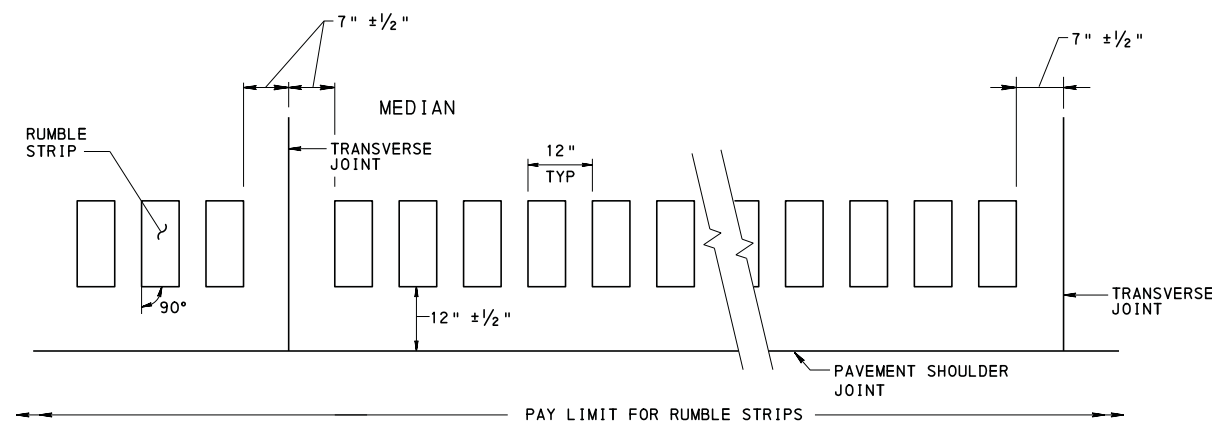
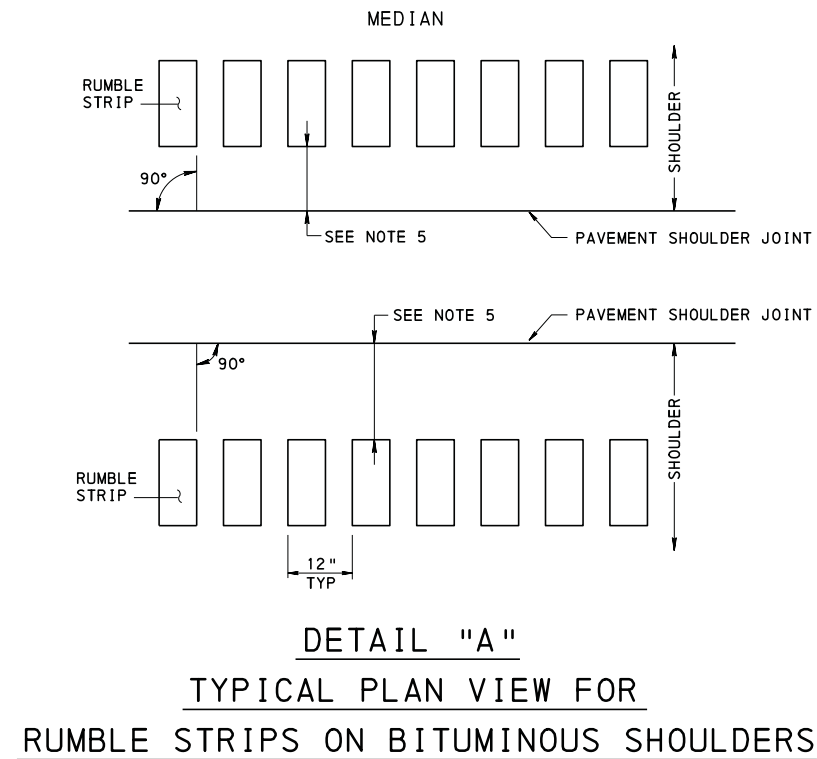
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MILLED RUMBLE STRIPS  
EDGE LINE RUMBLE STRIPS FOR  
NON-INTERSTATES AND  
NON-EXPRESSWAYS

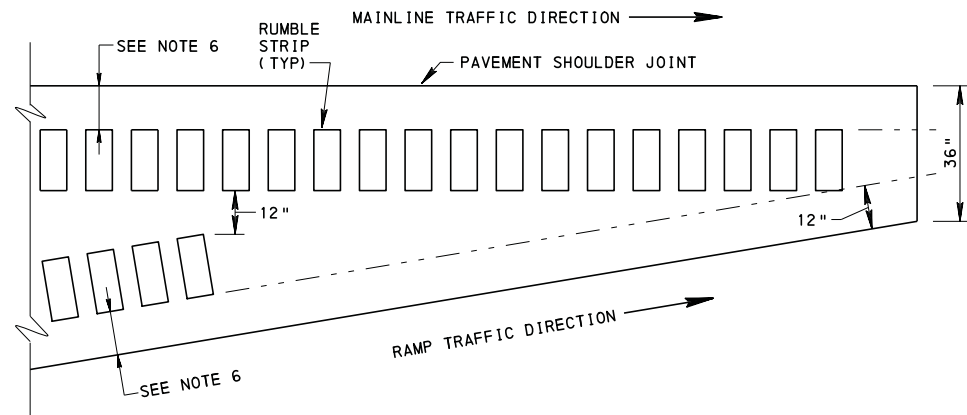
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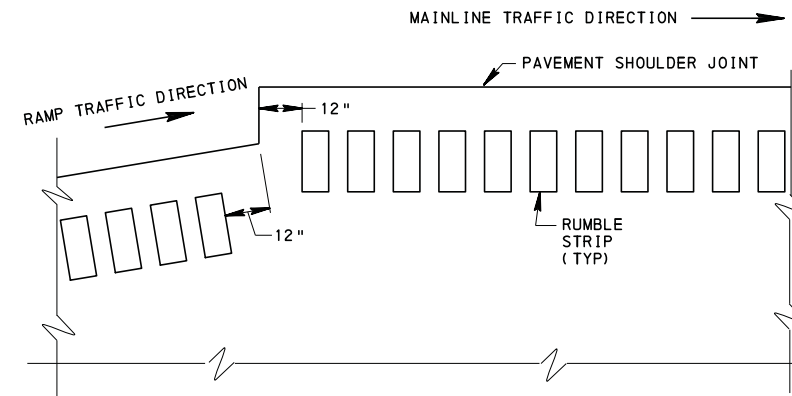
SHT 3 OF 6  
RC-22M



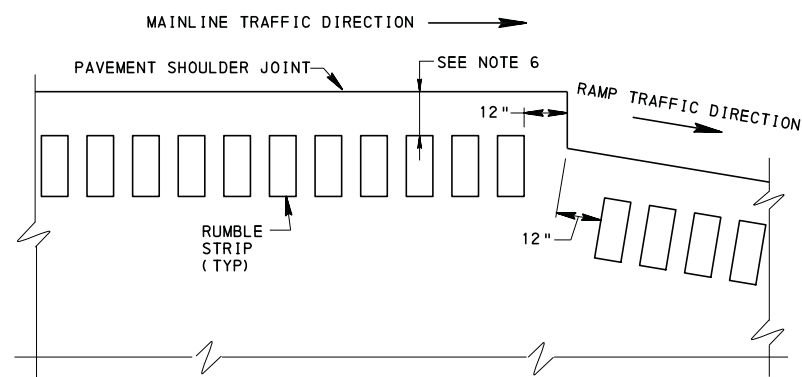
- NOTES**
1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
  2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
  3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
  4. 18"  $\pm 1/2$ " EXCEPT FOR CONCRETE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



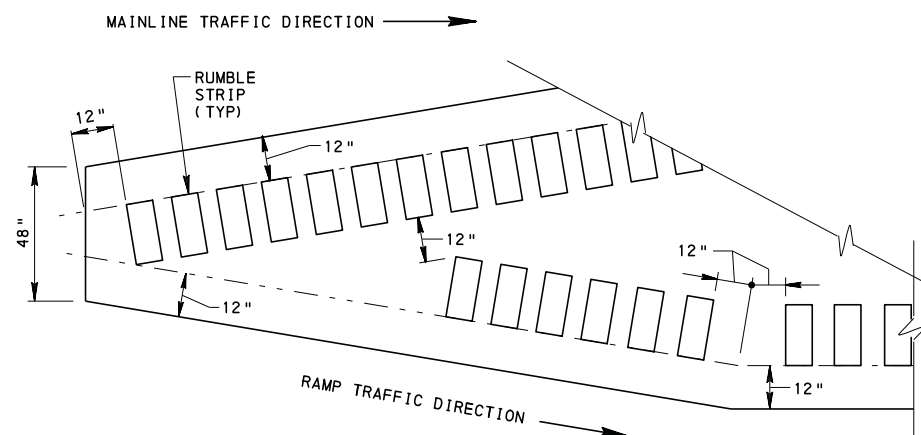
DETAIL "F"  
ACCELERATION LANE  
GORE AREA RUMBLE STRIPS



DETAIL "G"  
ACCELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL "H"  
DECELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL "I"  
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.
6. 12"  $\pm$  1/2" FOR LEFT (MEDIAN) SHOULDERS.  
18"  $\pm$  1/2" FOR RIGHT SHOULDERS  $>$  8'-0" WIDE.  
FOR RIGHT SHOULDERS LESS THAN 8'-0" WIDE.  
SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.

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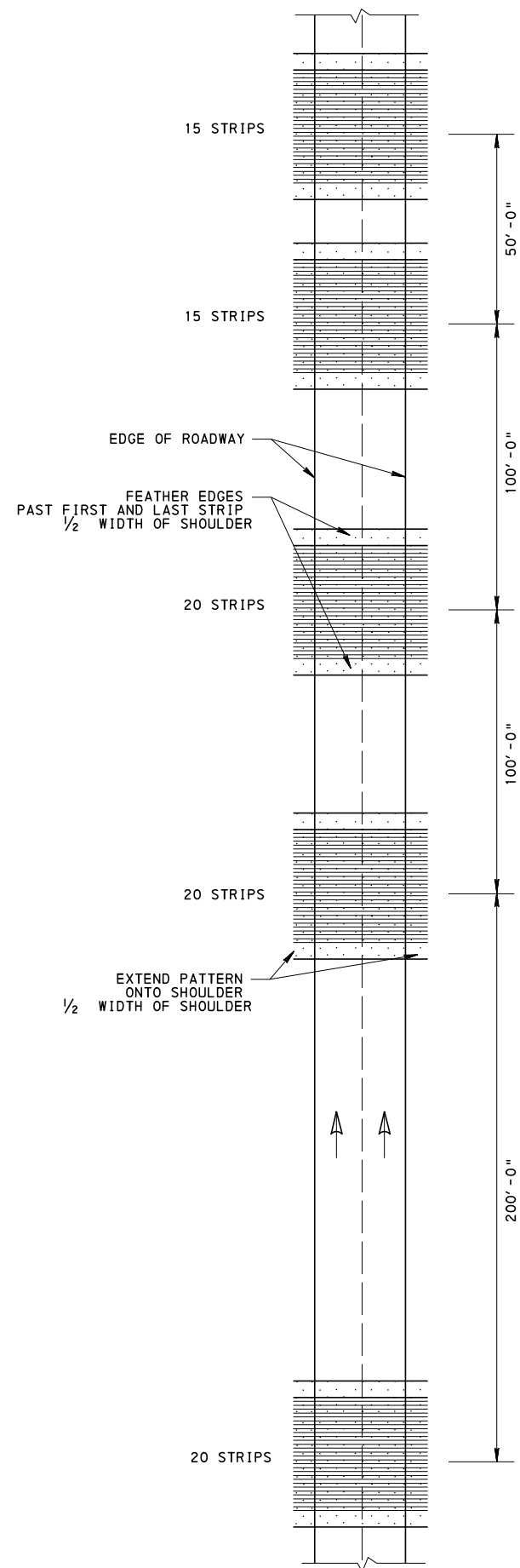
MILLED RUMBLE STRIPS  
SHOULDER RUMBLE STRIPS  
GORE AREAS

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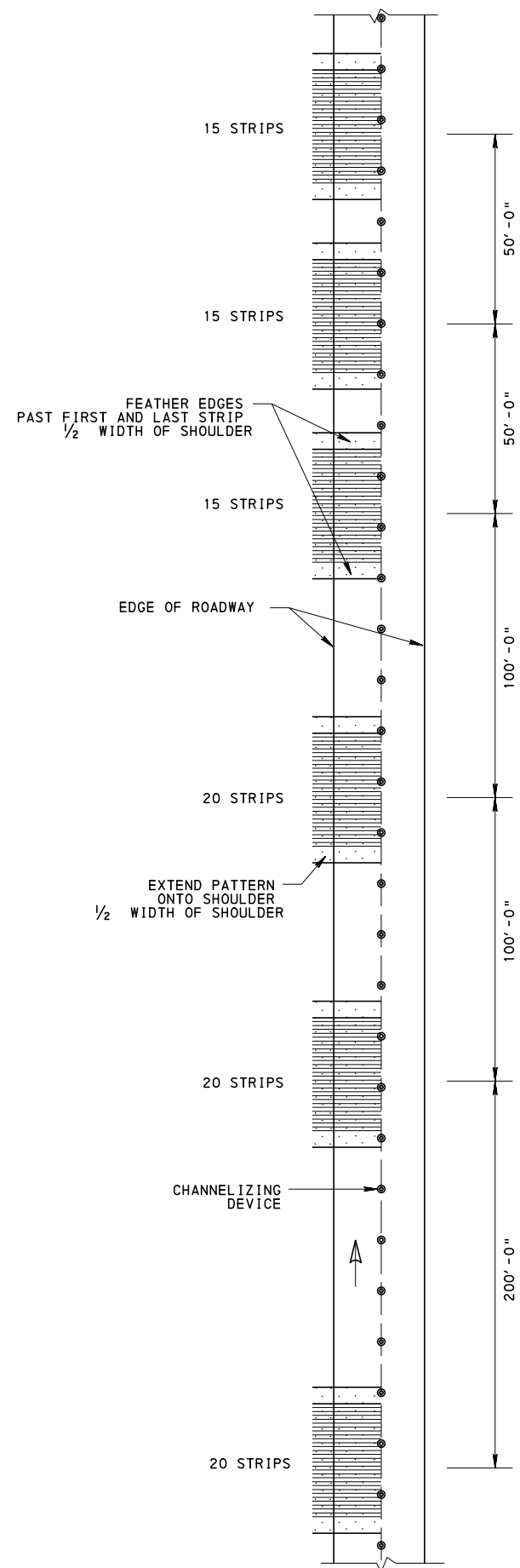
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SHT 5 OF 6  
RC-22M





RUMBLE STRIP PATTERN A



RUMBLE STRIP PATTERN B

## NOTES

1. NAIL 1/2" x 4" PLYWOOD STRIPS IN PLACE AT 12" SPACING TO FORM GROOVES. APPLY 4.75 MM SUPERPAVE BITUMINOUS OVERLAY, THEN REMOVE PLYWOOD STRIPS (SEE FIGURE 1).
2. DO NOT FEATHER EDGES WHEN BITUMINOUS RUMBLE STRIPS WILL BE PERMANENT.

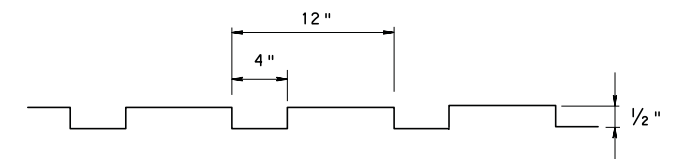


FIGURE 1  
LONGITUDINAL CROSS SECTION  
SEE NOTE 1

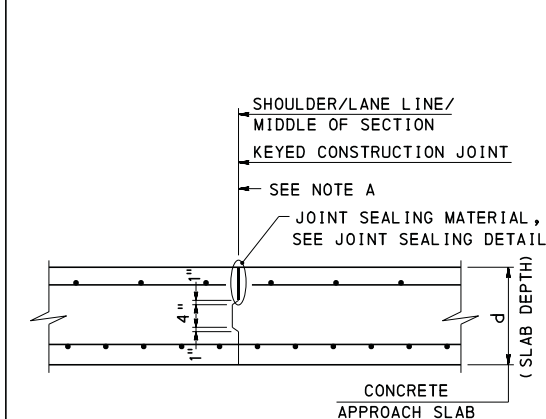
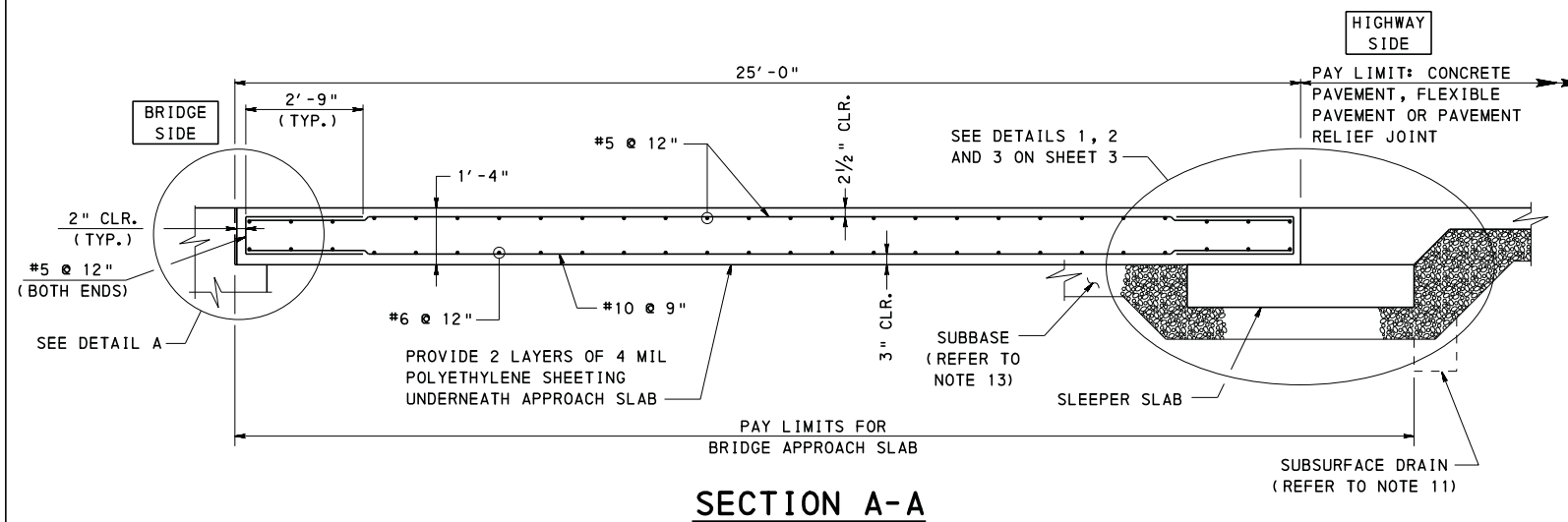
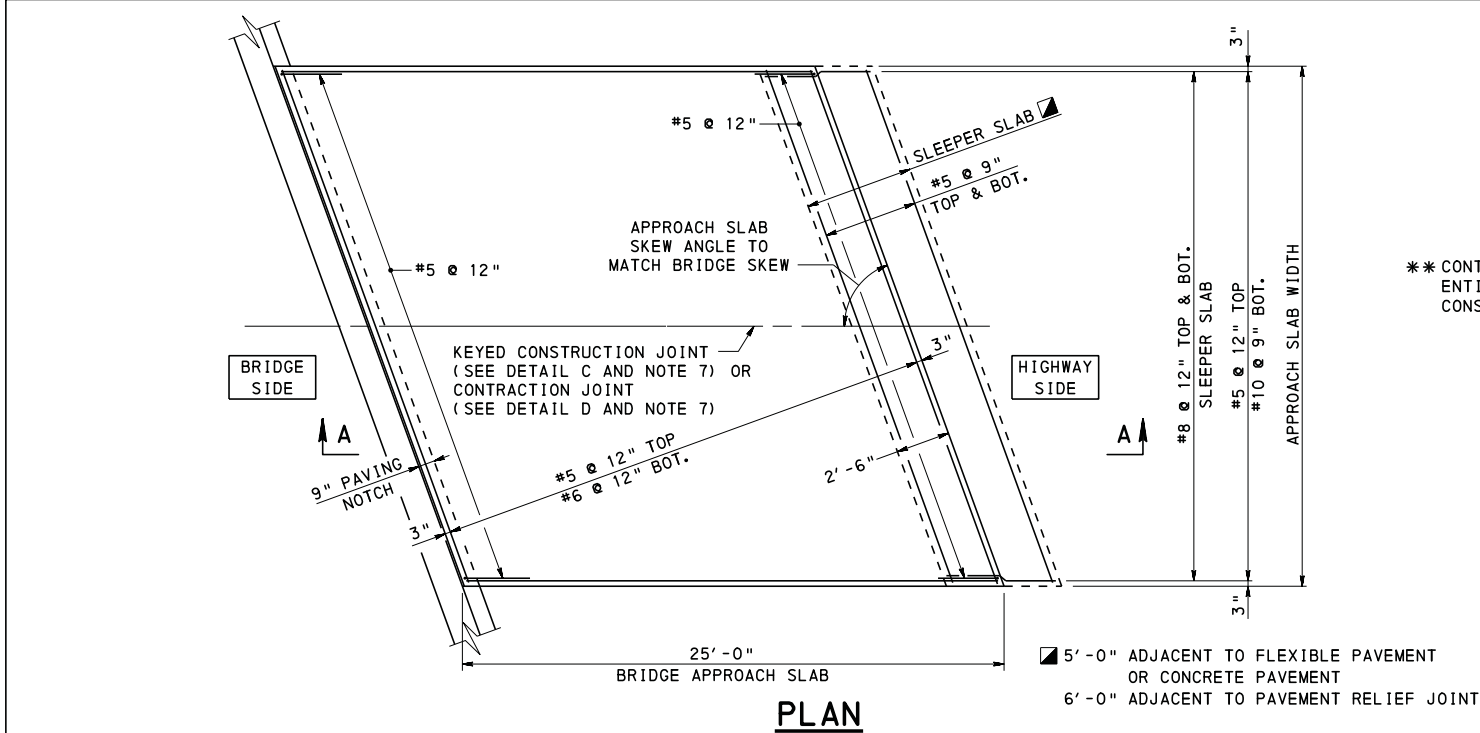
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## TEMPORARY BITUMINOUS RUMBLE STRIP PATTERNS

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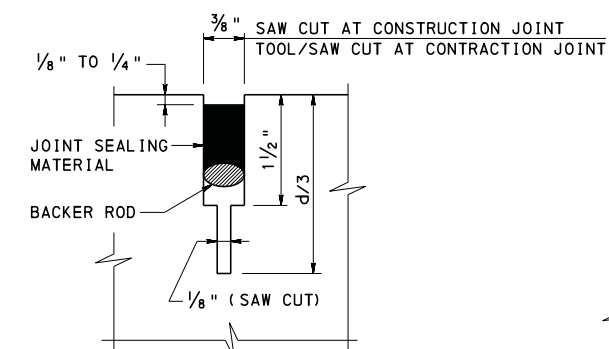
SHT 6 OF 6  
RC-22M



WITH/WITHOUT ASPHALT OVERLAY

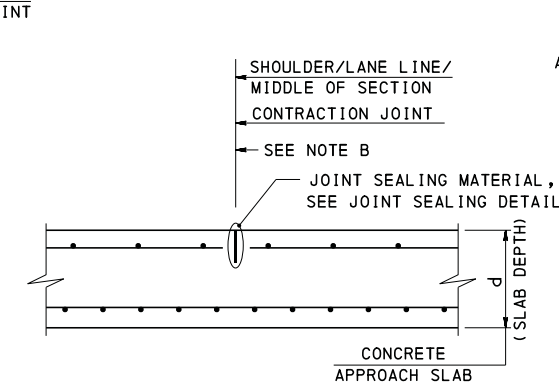
DETAIL C  
CONSTRUCTION JOINT

## CONSTRUCTION JOINT



**NOTE A:**  
TOP REINFORCEMENT NOT CONTINUOUS THRU JOINT.  
BOTTOM REINFORCEMENT CONTINUOUS THRU JOINT.  
MECHANICAL SPLICES ARE PERMITTED AS AN OPTION  
FOR BOTTOM REINFORCEMENT.

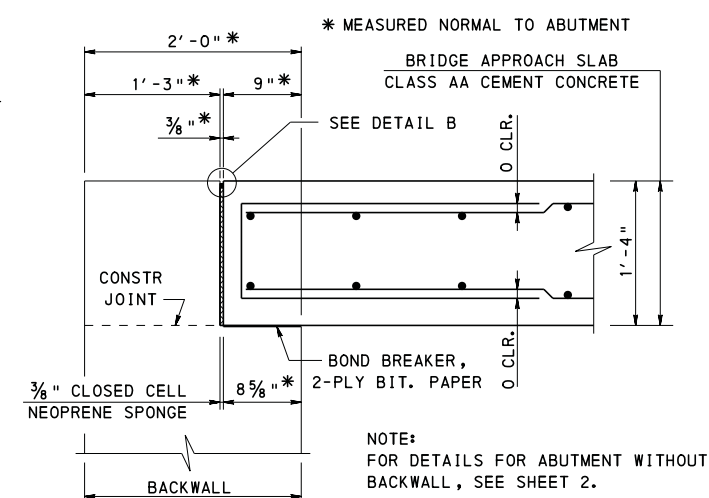
NOTE B:  
TOP REINFORCEMENT NOT CONTINUOUS THRU JOINT.  
BOTTOM REINFORCEMENT CONTINUOUS THRU JOINT.



WITH/WITHOUT ASPHALT OVERLAY

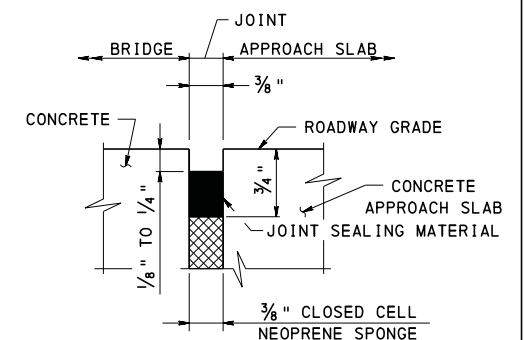
DETAIL D  
CONTRACTION JOINT

## CONTRACTION JOINT



DETAIL A

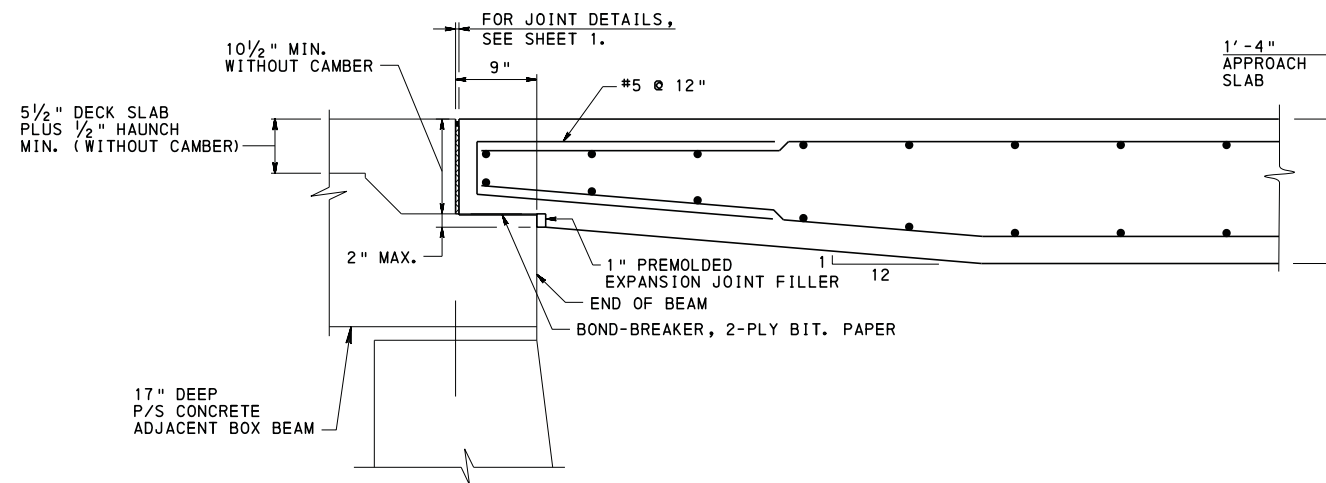
APPROACH SLAB SUPPORTED ON  
ABUTMENT BACKWALL



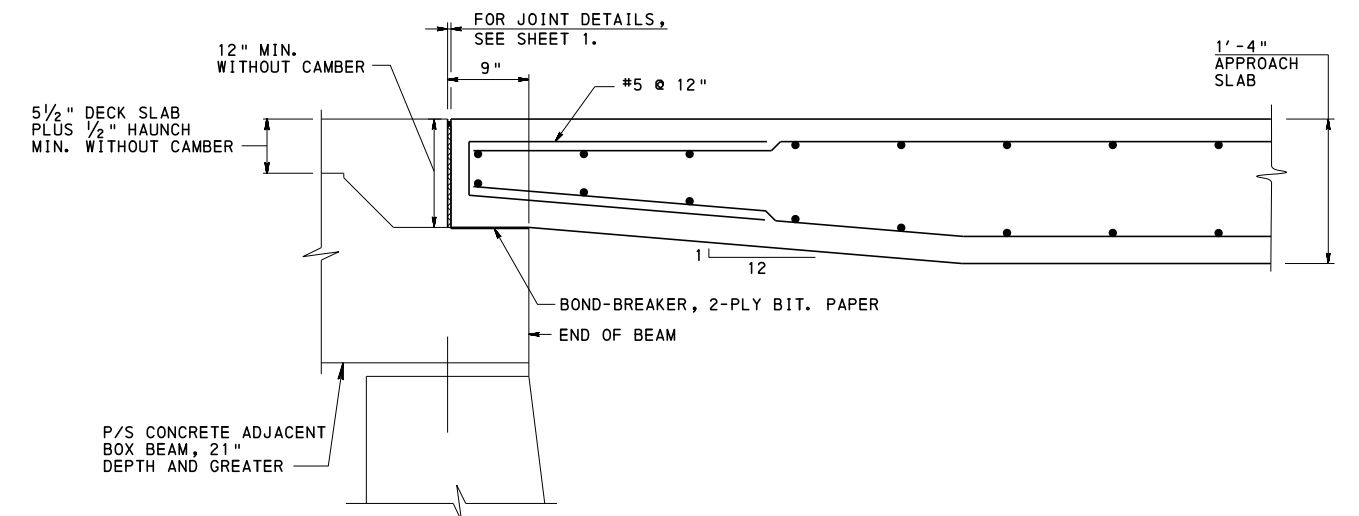
DETAIL B

- ## NOTES
1. APPROACH SLAB SKEW ANGLE TO MATCH BRIDGE SKEW ANGLE. BRIDGE SKEW ANGLE MUST BE GREATER THAN OR EQUAL TO 45 DEGREES. IF THE BRIDGE SKEW ANGLE IS LESS THAN 45 DEGREES DETAILS MUST BE SHOWN ON THE STRUCTURE DRAWINGS.
  2. CONSTRUCT APPROACH SLAB AND SLEEPER SLAB IN ACCORDANCE WITH THIS STANDARD OR AS INDICATED ON THE STRUCTURE DRAWINGS.
  3. SLEEPER SLAB AND REINFORCEMENT BARS ARE INCIDENTAL TO THE BRIDGE APPROACH SLAB PAY ITEM.
  4. CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
  5. PLACE CONCRETE IN ONE CONTINUOUS OPERATION, UNLESS OTHERWISE INDICATED OR DIRECTED.
  6. TRANSVERSE CONSTRUCTION JOINTS ARE NOT PERMITTED IN THE CONCRETE APPROACH SLAB OR SLEEPER SLAB.
  7. CONSTRUCTION/CONTRACTION JOINT REQUIREMENTS: \*\*
    - NOT REQUIRED IF APPROACH SLAB WIDTH IS  $< 30'$ .
    - MINIMUM ONE JOINT IF APPROACH SLAB WIDTH IS  $> 30'$  AND  $\leq 60'$ .
    - MINIMUM TWO JOINTS IF APPROACH SLAB WIDTH IS  $> 60'$ .
    - MAXIMUM JOINT SPACING IS LIMITED TO 24' IF SKEW ANGLE IS  $< 60$  DEGREES.
    - MAXIMUM JOINT SPACING IS LIMITED TO 30' IF APPROACH SLAB SKEW ANGLE IS  $\geq 60$  DEGREES.
- INSTALL CONSTRUCTION AND CONTRACTION JOINTS AT LOCATIONS THAT DIVIDE THE WIDTH AS EQUALLY AS POSSIBLE, PREFERABLY AT THE BREAK LINE BETWEEN LANES AND/OR THE BREAK LINE BETWEEN LANES AND SHOULDERS. AVOID WHEEL PATHS.
- CONNECT JOINTS USING DETAIL C OR D.
8. PROVIDE CLASS AA CEMENT CONCRETE IN THE APPROACH SLAB AND SLEEPER SLAB.
  9. PROVIDE GRADE 60 DEFORMED EPOXY COATED REINFORCEMENT BARS IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1(d)1 AND SECTION 709.1(c).
  10. PROVIDE MINIMUM LAP SPLICES IN ACCORDANCE WITH BC-736M.
  11. PROVIDE A SUBGRADE DRAIN (SEE RC-30M) ON THE LOW SIDE OF THE SLEEPER SLAB. MEASURE AND PAY FOR AS SPECIFIED IN PUBLICATION 408, SECTION 612.
  12. BURN OFF, TO TOP OF BEAM, REINFORCEMENT AND/OR LIFTING DEVICES PROTRUDING INTO THE APPROACH SLAB.
  13. SUBBASE THICKNESS BENEATH APPROACH SLAB AND SLEEPER SLAB TO MATCH THE ROADWAY SUBBASE THICKNESS.

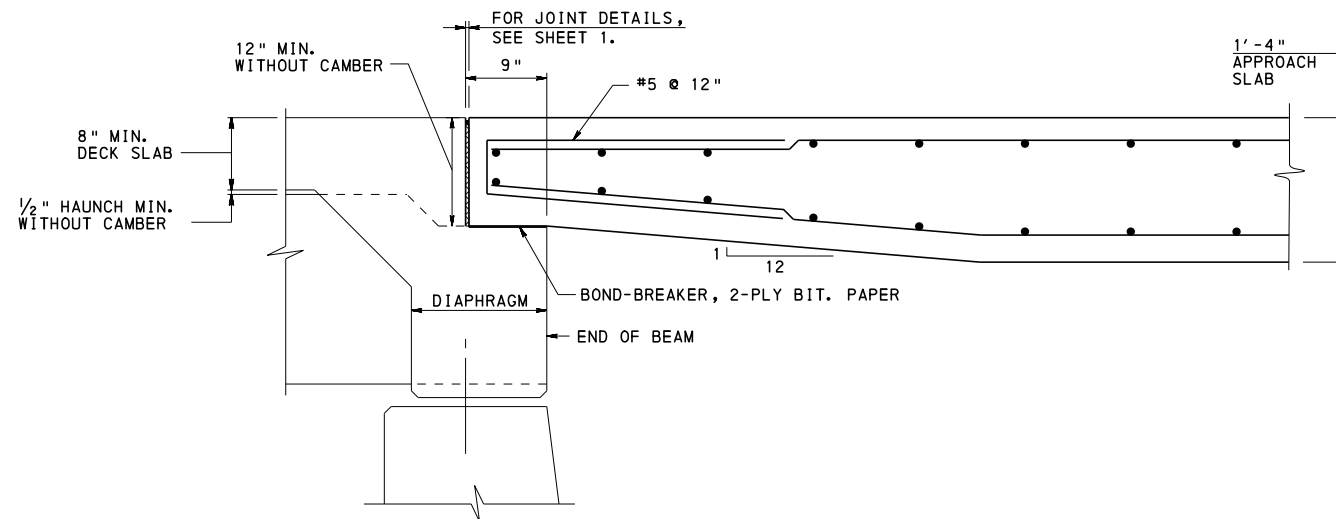




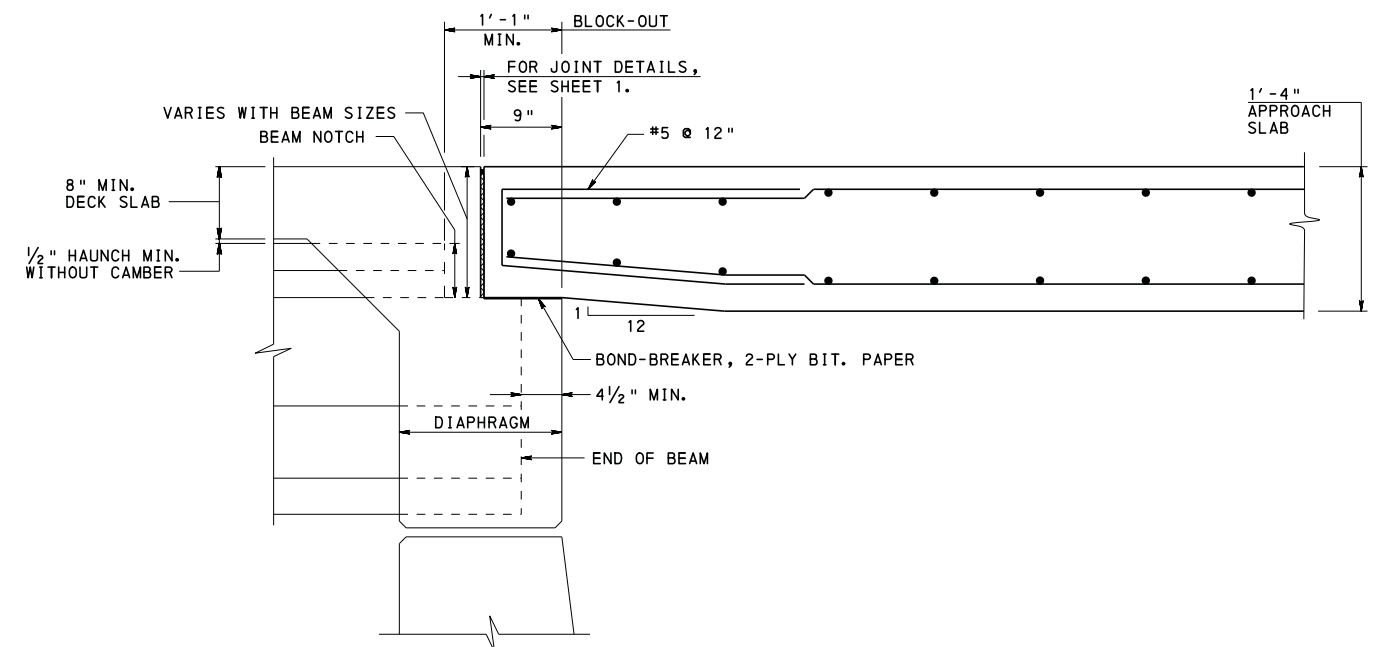
**17" DEEP P/S CONCRETE  
ADJACENT COMPOSITE BOX BEAMS**



**21" TO 66" DEEP P/S CONCRETE  
ADJACENT COMPOSITE BOX BEAMS**



**P/S CONCRETE SPREAD BOX BEAMS**



**P/S CONCRETE I-BEAMS**

**ABUTMENTS WITHOUT BACKWALL DETAILS**

**NOTE**  
FOR NOTES, SEE SHEET 1.

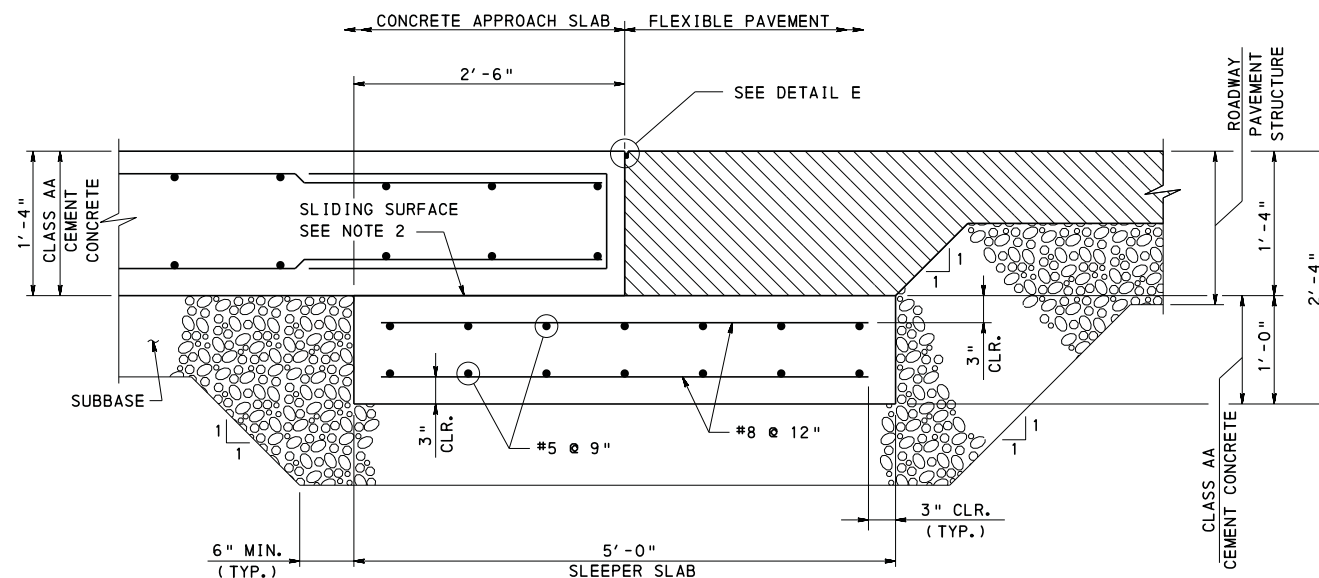
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BRIDGE APPROACH SLABS

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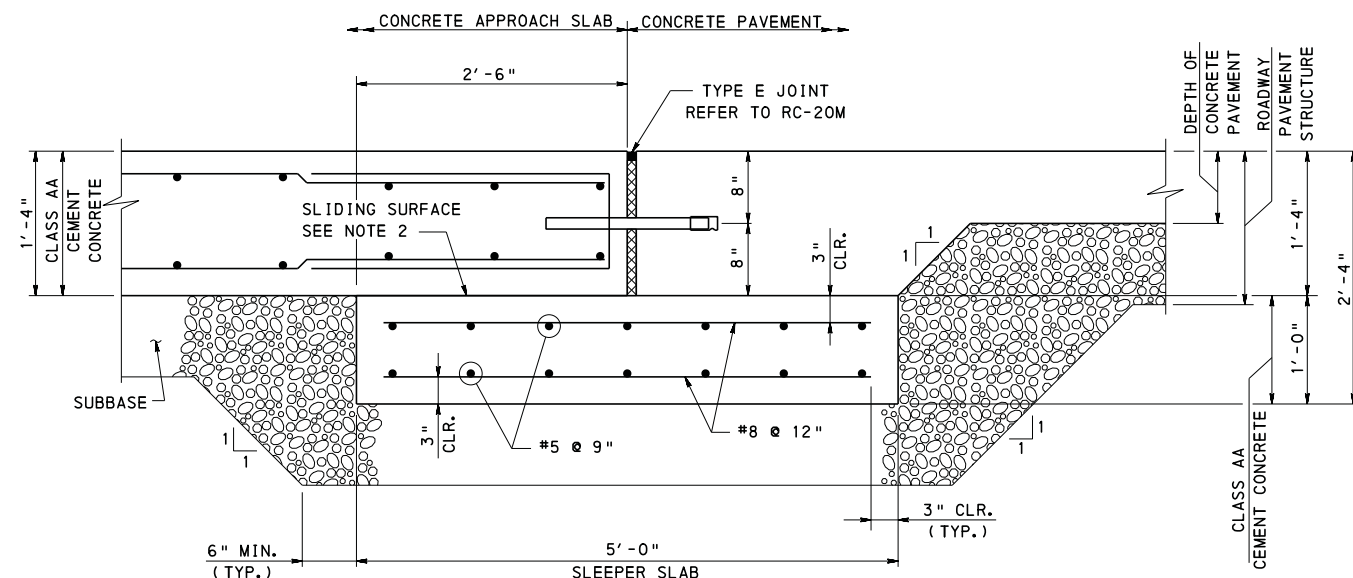
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SHT 2 OF 3  
RC-23M



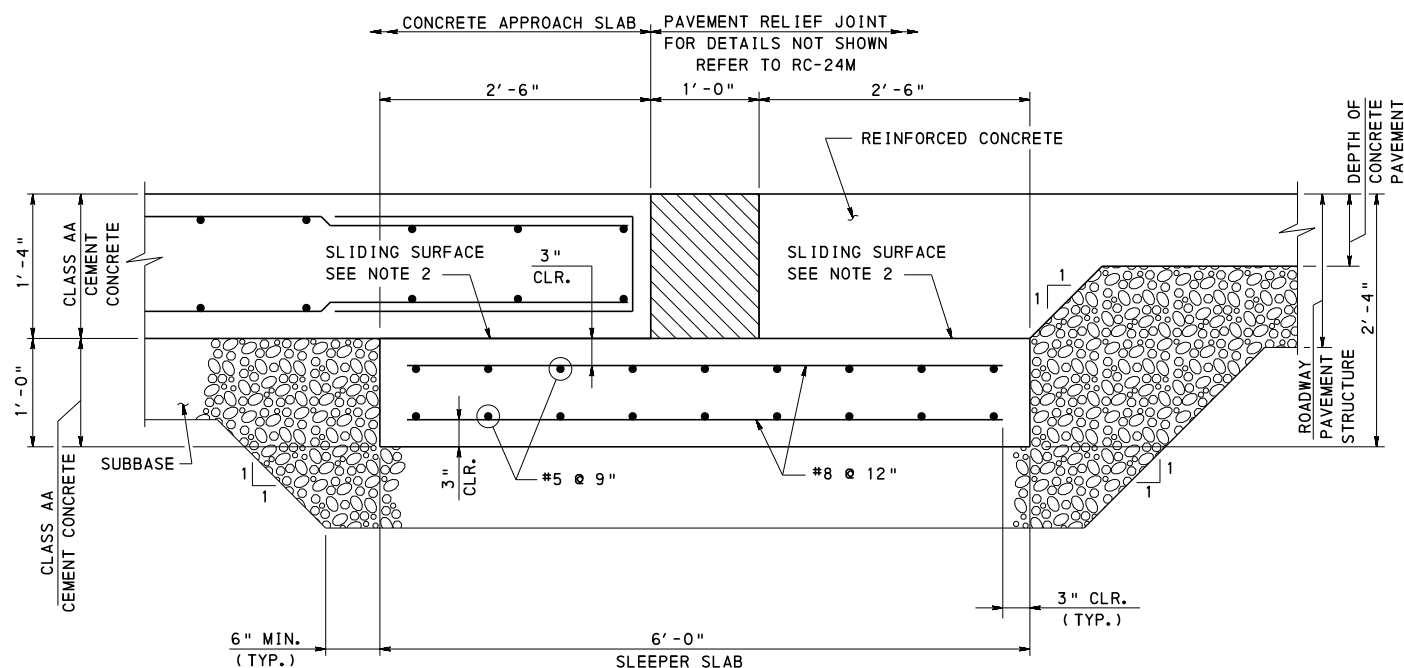
**APPROACH SLAB - DETAIL 1**

END OF APPROACH SLAB ADJACENT  
TO FLEXIBLE PAVEMENT



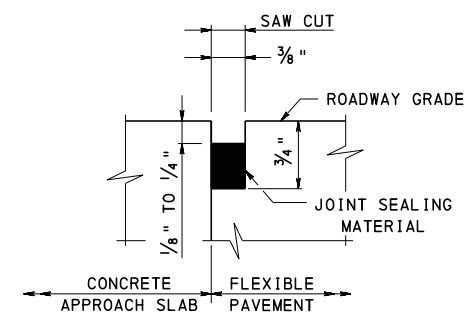
**APPROACH SLAB - DETAIL 2**

END OF APPROACH SLAB ADJACENT  
TO CONCRETE PAVEMENT



**APPROACH SLAB - DETAIL 3**

END OF APPROACH SLAB ADJACENT TO  
PAVEMENT RELIEF JOINT



**DETAIL E**

**NOTES**

1. FOR NOTES, SEE SHEET 1.
2. TROWEL SMOOTH AND PLACE 2 LAYERS OF 4 MIL POLYETHYLENE SHEETING AS BOND BREAKER.

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**BRIDGE APPROACH SLABS**

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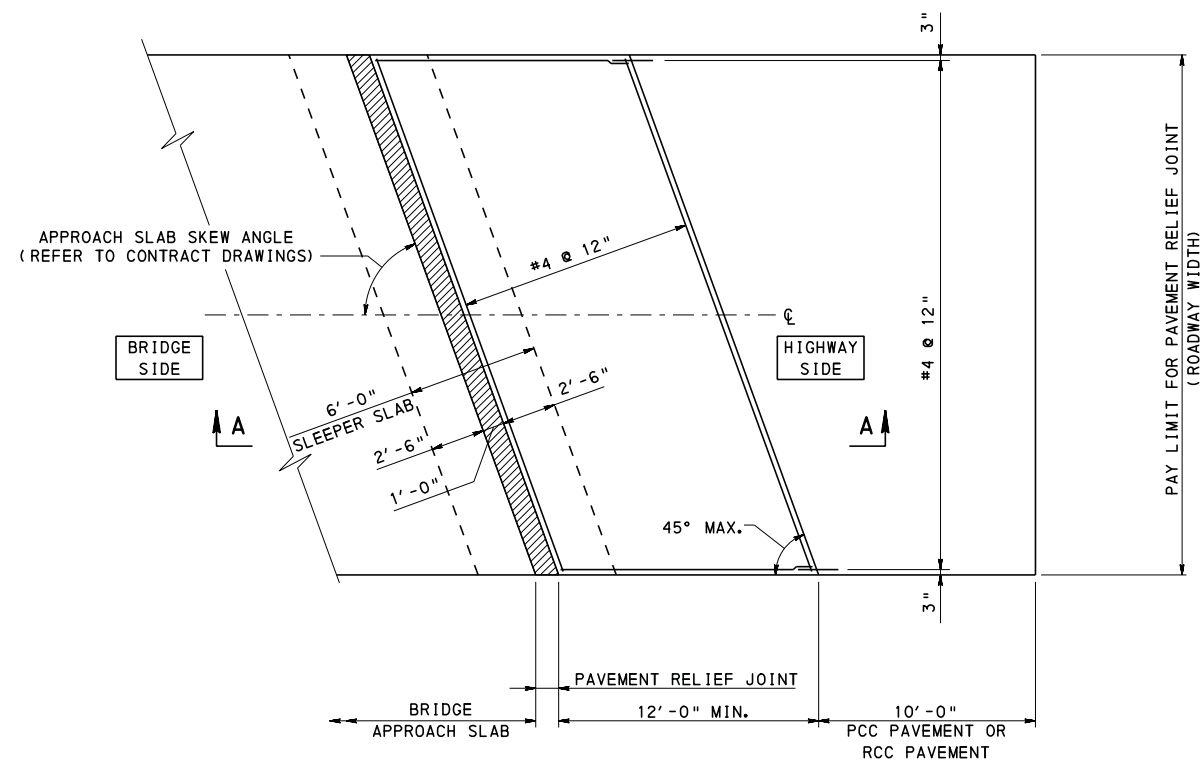
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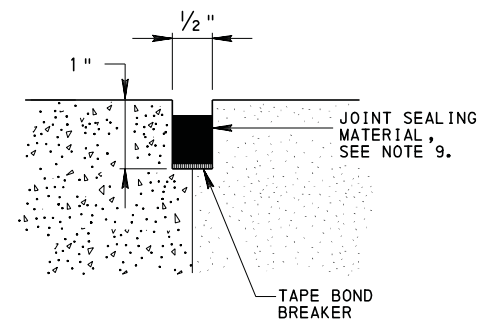
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SHT 3 OF 3

RC-23M



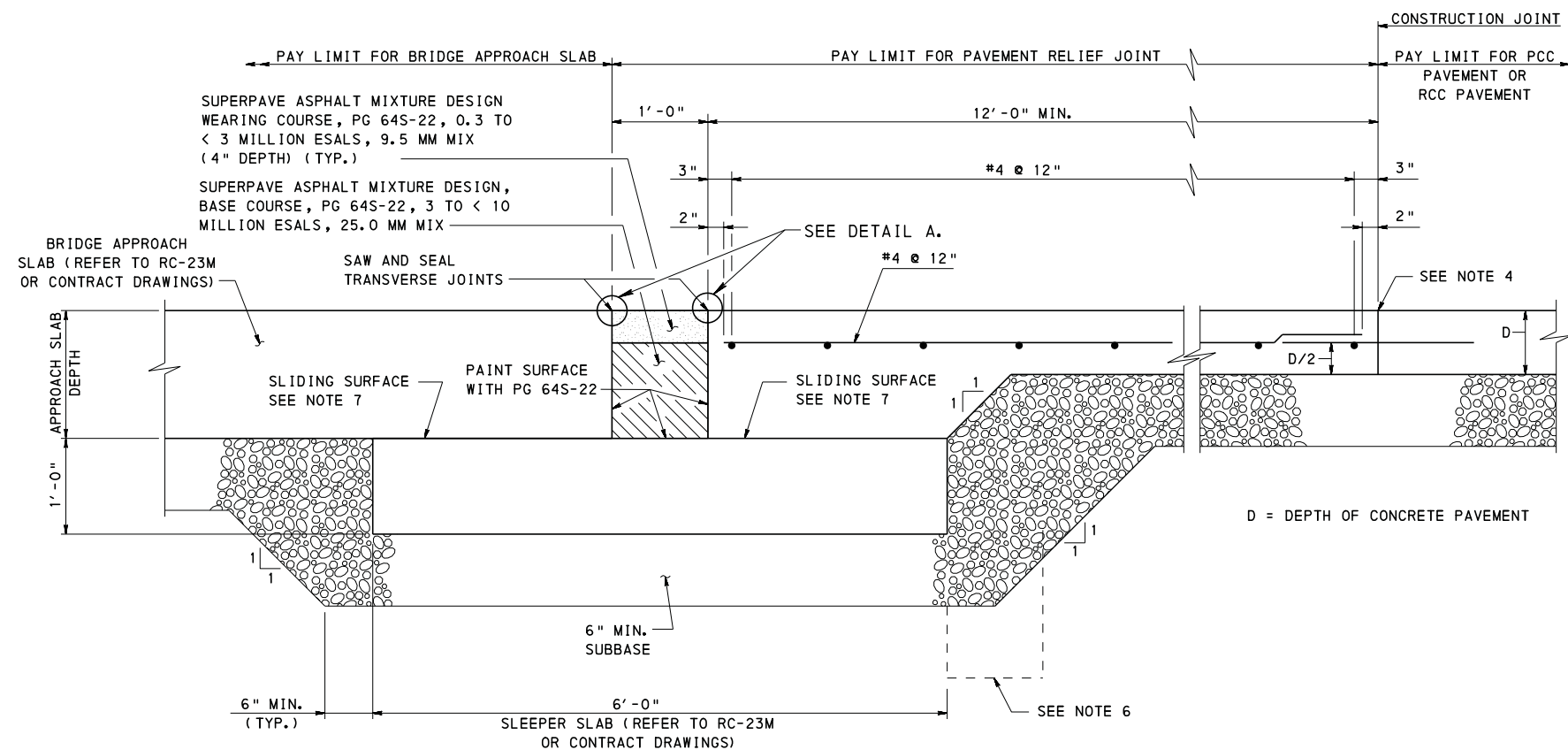
**PLAN**  
WIDTH TO MATCH ROADWAY WIDTH



**DETAIL A**

## NOTES

- PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
- WHERE BRIDGES ARE LOCATED LESS THAN 900' APART, AS MEASURED FROM THE FACE OF THE NEAREST ABUTMENTS, DO NOT USE A RELIEF JOINT BETWEEN THE BRIDGES.
- WHERE BRIDGES ARE LOCATED BETWEEN 900' AND 1350' APART, AND THE PAVEMENT STRUCTURE IS CEMENT CONCRETE, PLACE ONE RELIEF JOINT MIDWAY BETWEEN THE BRIDGES PERPENDICULAR TO THE PAVEMENT. SEE SHEET 3 FOR DETAILS AND NOTES.
- FOR JOINT DETAILS ON NEW CONSTRUCTION, SEE RC-20M. FOR JOINT DETAILS ON RECONSTRUCTION, SEE RC-26M. IF THE DISTANCE TO THE NEAREST JOINT IS LESS THAN 10', REMOVE THE EXISTING PAVEMENT TO THE JOINT.
- INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LIMITS IN BID PRICE FOR PAVEMENT RELIEF JOINT.
- PROVIDE A SUBGRADE DRAIN (SEE RC-30M) ON THE LOW SIDE OF THE SLEEPER SLAB. MEASURE AND PAY FOR AS SPECIFIED IN PUBLICATION 408, SECTION 612.
- TROWEL SMOOTH AND PLACE 2 LAYERS OF 4 MIL. POLYETHYLENE SHEETING AS BOND BREAKER.
- EPOXY COAT ALL REINFORCEMENT BARS.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/8" TO 1/4" BELOW THE SURFACE OF THE PAVEMENT.
- PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 504.



**SECTION A-A**

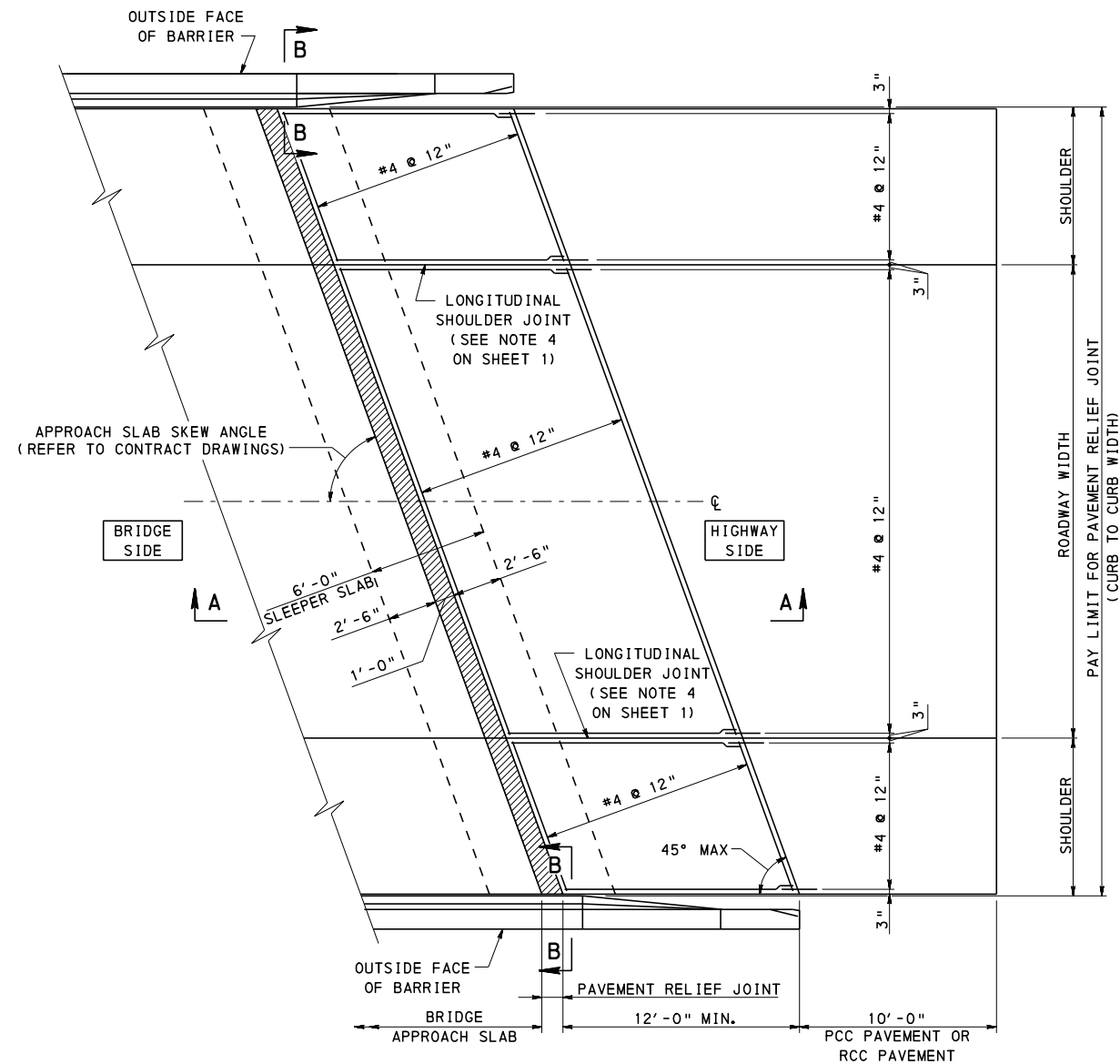
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## PAVEMENT RELIEF JOINT

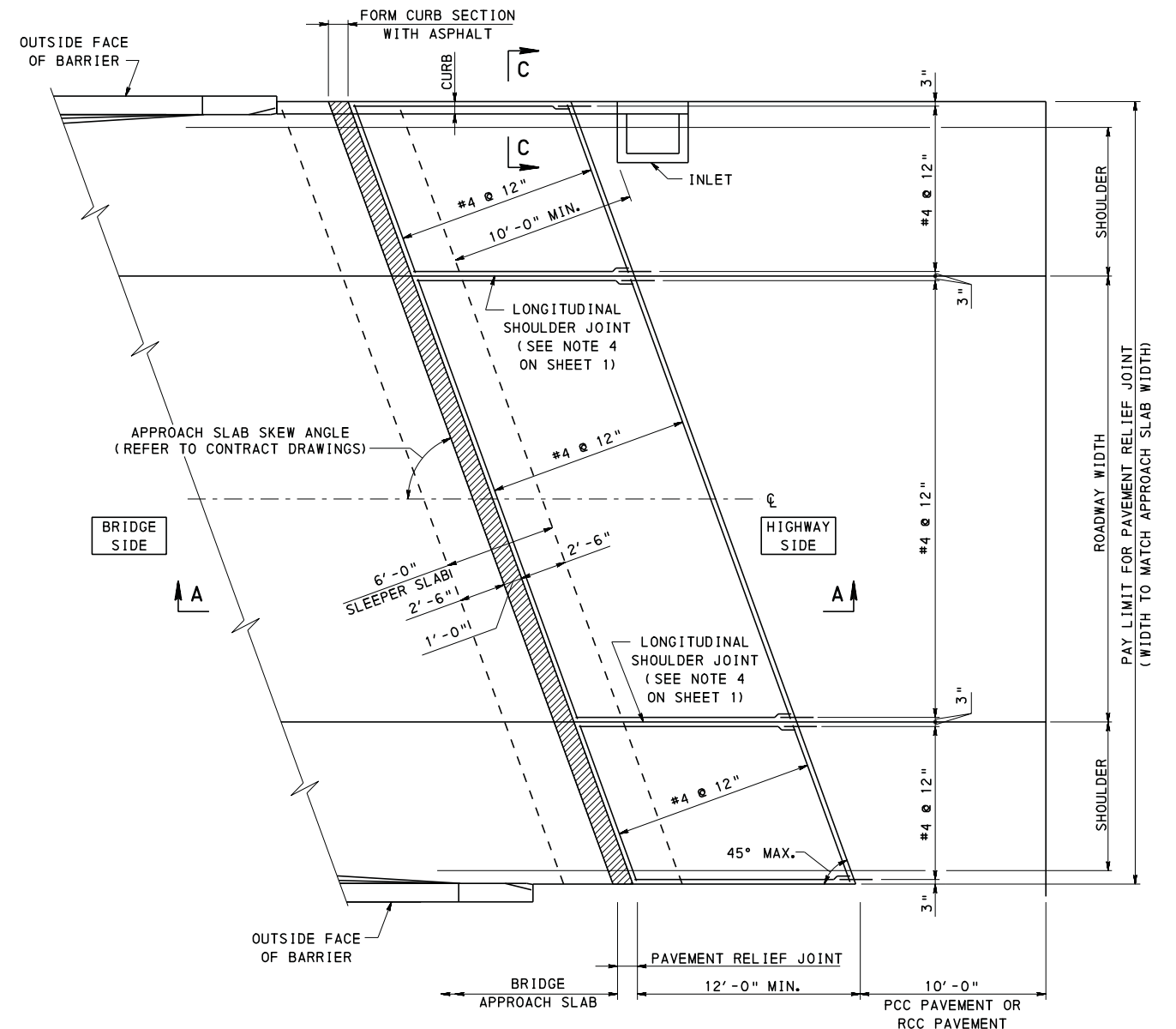
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*Brian Thompson*  
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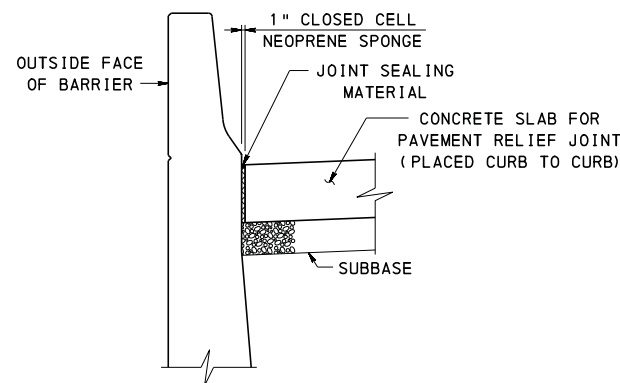
SHT 1 OF 3  
RC-24M



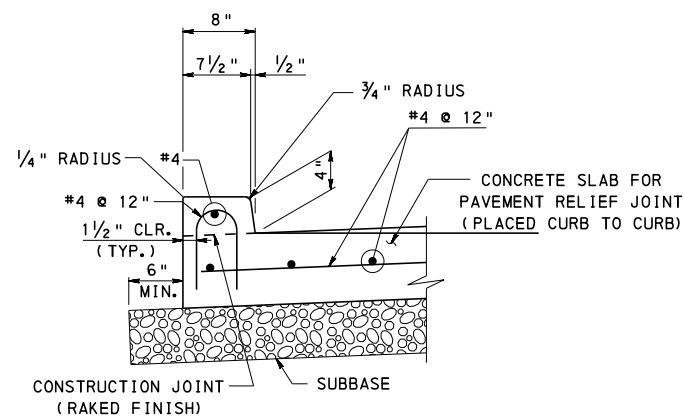
**PLAN**  
WIDTH EXTENDING TO GUTTER LINE



**PLAN**  
WIDTH EXTENDING TO END OF BARRIER  
(WITH CURB-TOP, WITHOUT CURB-BOTTOM)



**SECTION B-B**



**SECTION C-C**

**NOTES**

1. FOR NOTES, SEE SHEET 1.
2. FOR SECTION A-A, SEE SHEET 1.

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**PAVEMENT RELIEF JOINT**

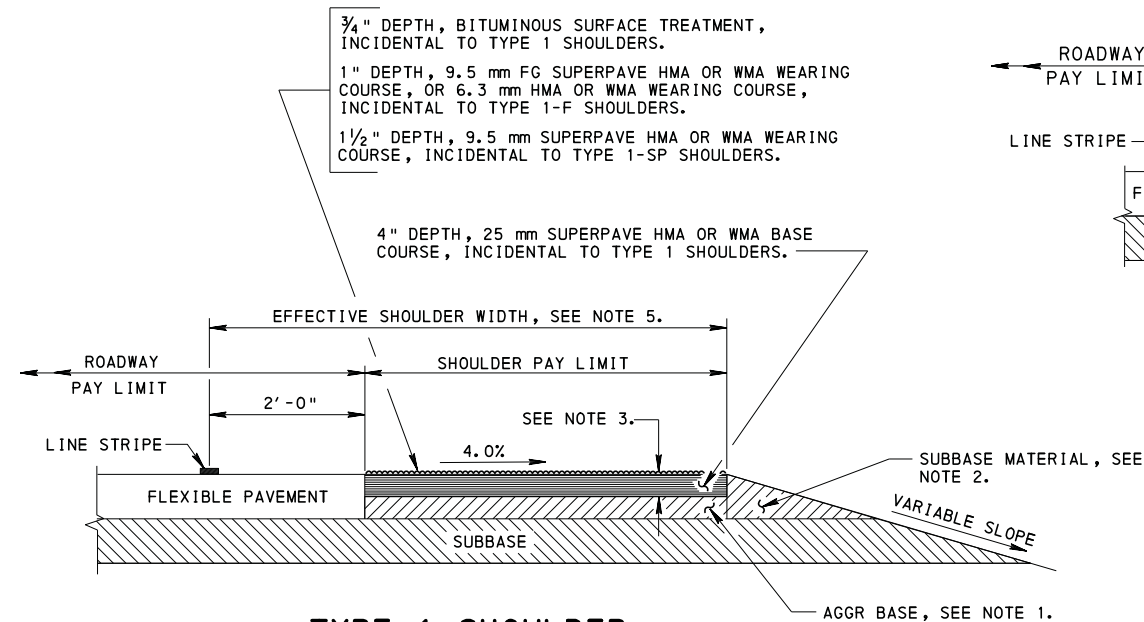
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*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

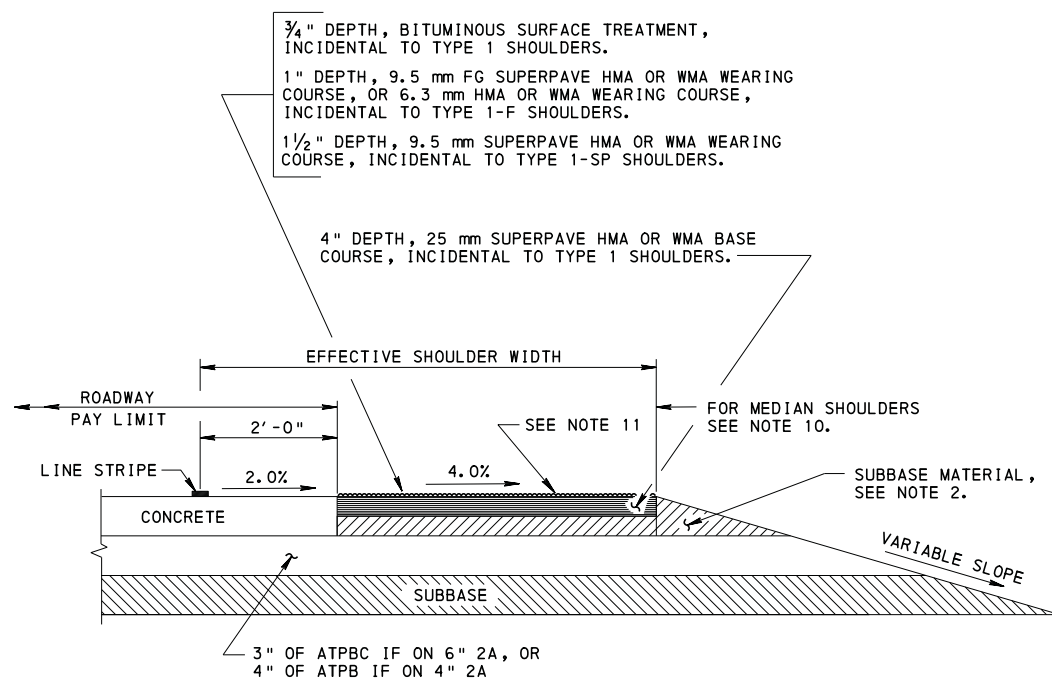
SHT 2 OF 3  
RC-24M

RC-24M



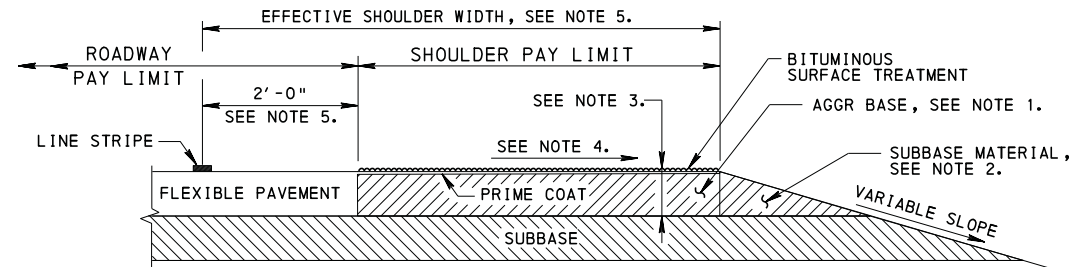


**TYPE 1 SHOULDER**  
**TYPE 1-F SHOULDER**  
**TYPE 1-S SHOULDER**  
**TYPE 1-SP SHOULDER**

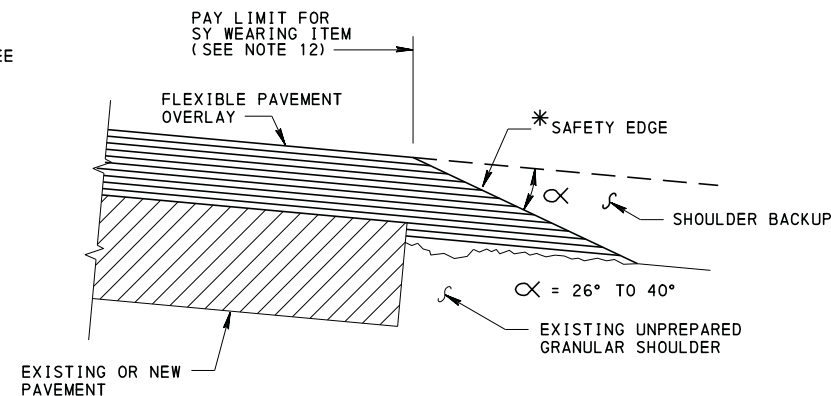


**CONCRETE WIDENED LANE**

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

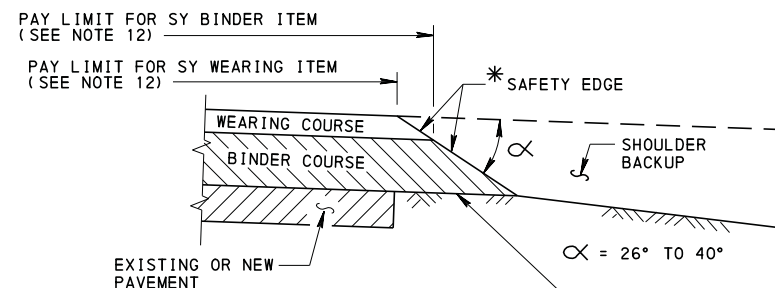


**TYPE 3 SHOULDER**



**SAFETY EDGE-WEARING COURSE**

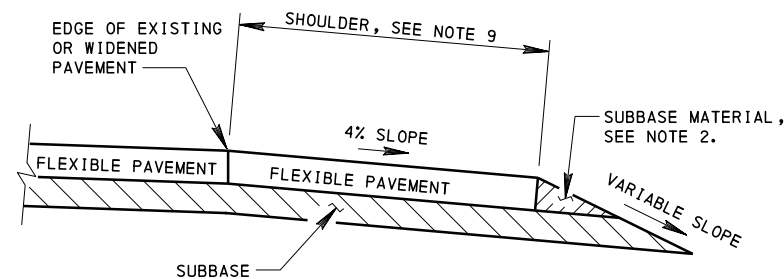
\* NOTE: DO NOT USE SAFETY EDGE ON COURSES LESS THAN 1 1/2" DEPTH.



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.

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

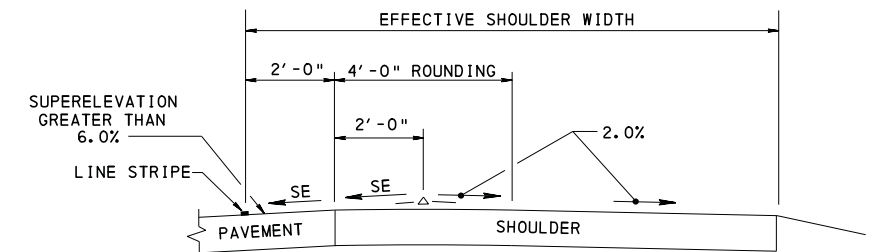
\* NOTE: DO NOT USE SAFETY EDGE ON COURSES LESS THAN 1 1/2" DEPTH.



**FULL DEPTH FLEXIBLE PAVEMENT SHOULDERS**

## 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 STRIP INSTALLATIONS, USE ONLY BITUMINOUS WEARING COURSE SUPERPAVE, 9.5 mm OR 12.5 mm, HMA OR WMA WEARING COURSE, 1 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 RC-22M, SHEET 4 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.



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

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

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## SHOULDERS

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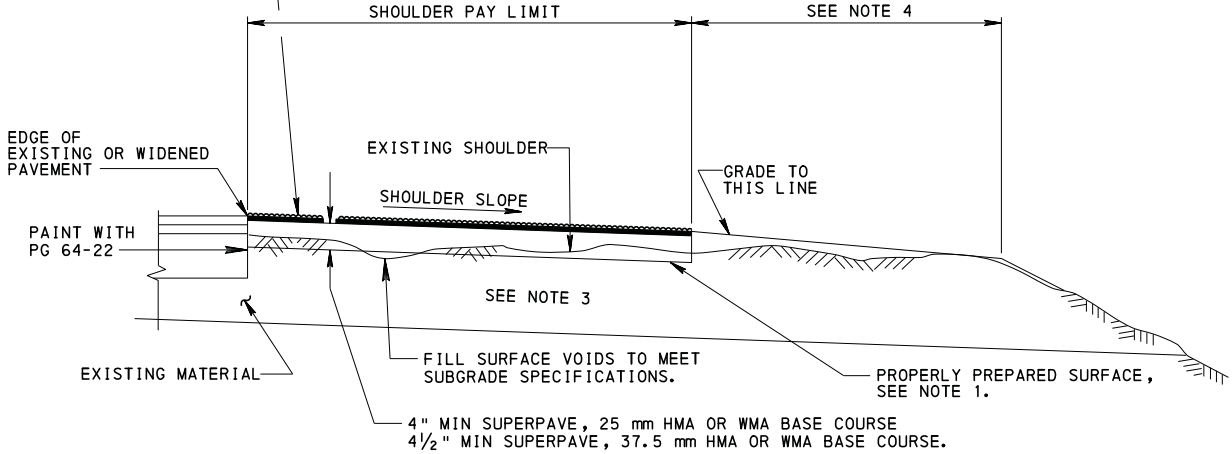
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SHT 1 OF 4

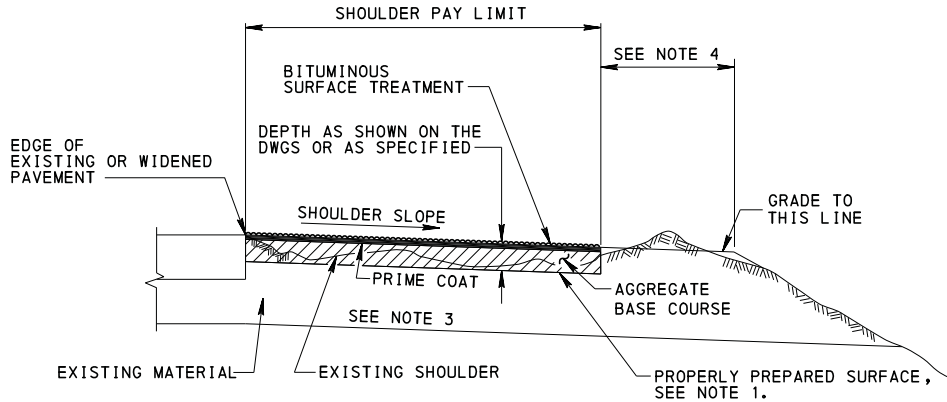
RC-25M



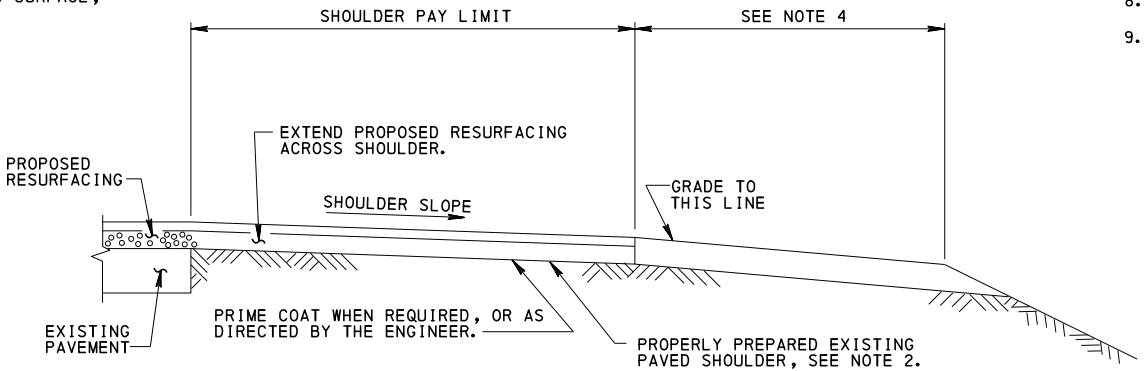
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 6 SHOULDERS, 3/4" DEPTH  
SUPERPAVE, 4.75 mm HMA OR WMA WEARING COURSE, 9.5 mm SUPERPAVE FG HMA OR WMA WEARING COURSE, OR 6.3 mm HMA OR WMA WEARING COURSE, INCIDENTAL TO TYPE 6-F SHOULDERS, 1" DEPTH.  
DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 6-S SHOULDERS, 3/4" DEPTH  
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



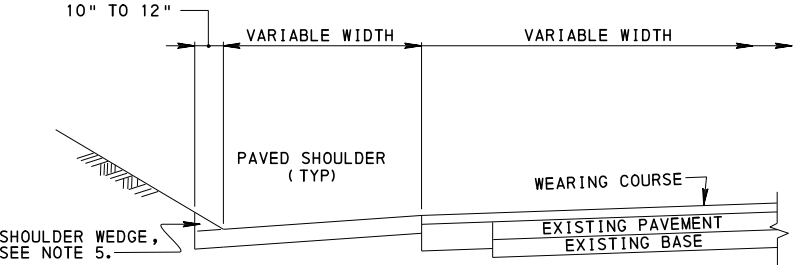
**TYPE 6 SHOULDER**  
**TYPE 6-F SHOULDER**  
**TYPE 6-S SHOULDER**  
**TYPE 6-SP SHOULDER**



**TYPE 4 SHOULDER**



**TYPE 7 SHOULDER**



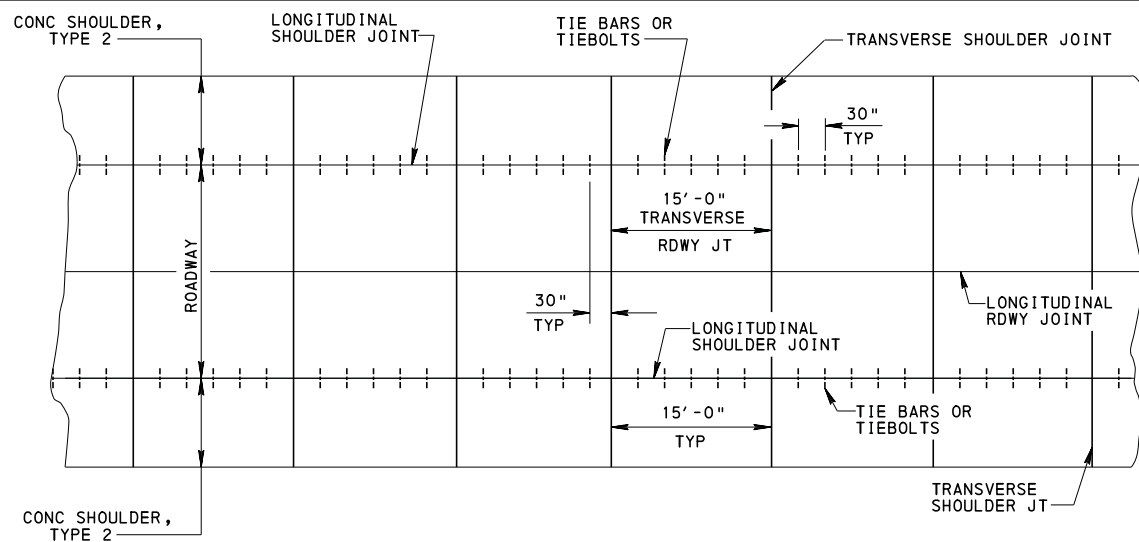
**TYPICAL SHOULDER DETAIL**  
**WITH BITUMINOUS TAPER SHOULDER WEDGE**

**NOTES**

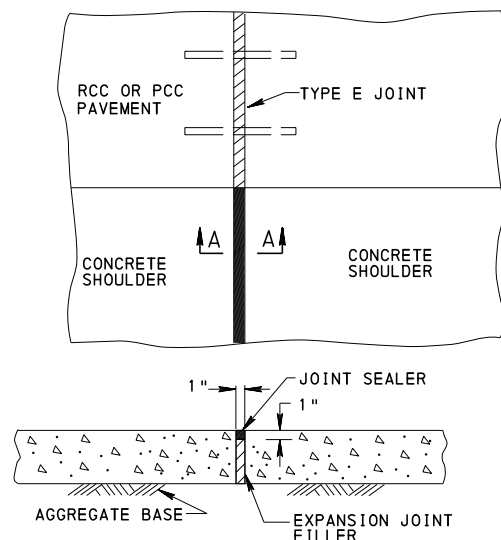
1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM 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 RC-22M, SHEET 4 FOR DETAILS OF MILLED RUMBLE STRIPS.
9. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL FREE OF ORGANIC MATERIALS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**SHOULDERS**  
**(RECONSTRUCTED)**

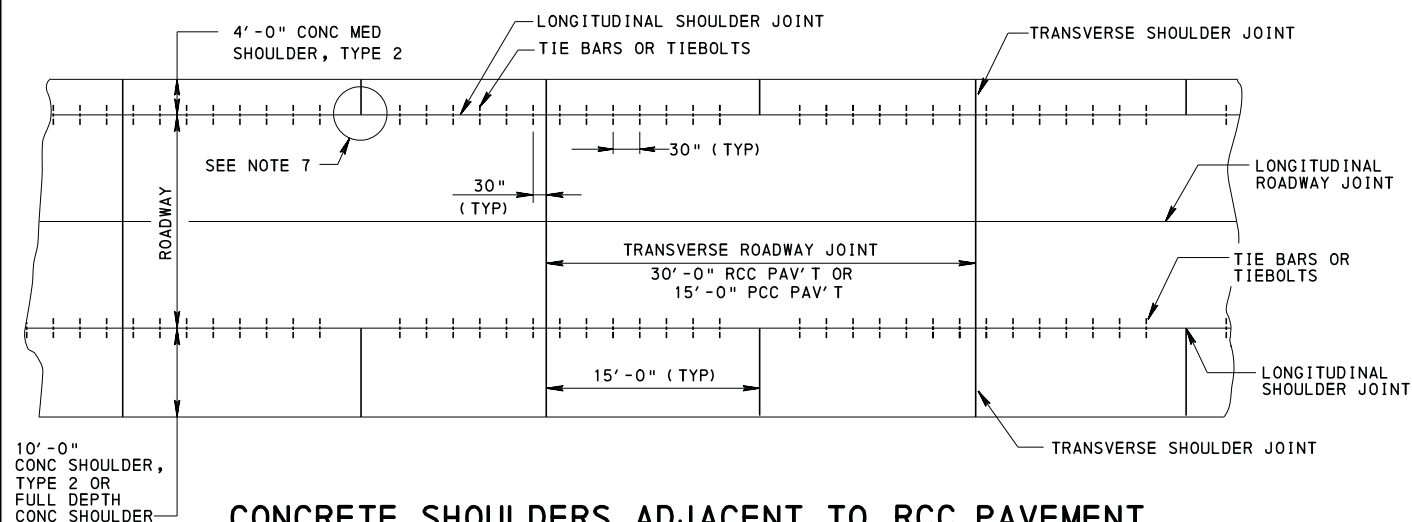


### CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

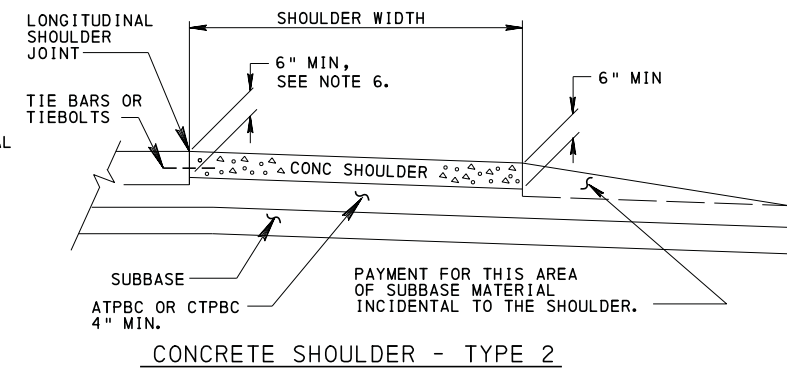
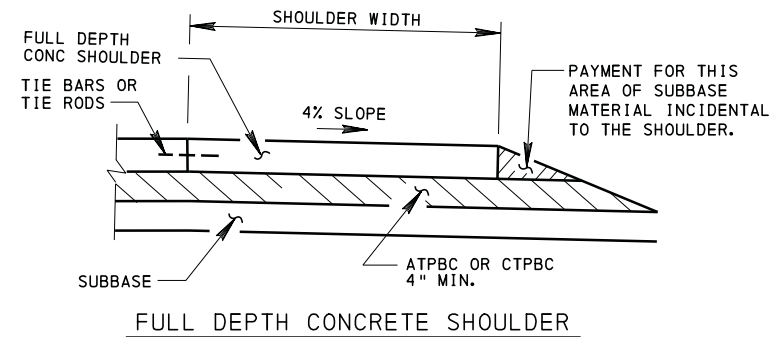


SECTION A-A

### CONCRETE SHOULDER EXPANSION JOINTS



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

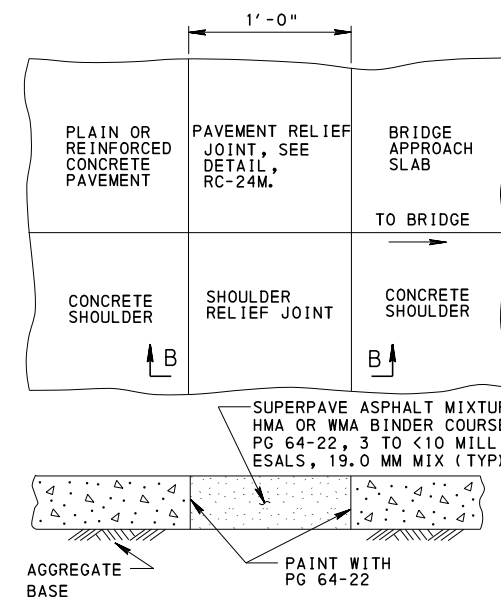
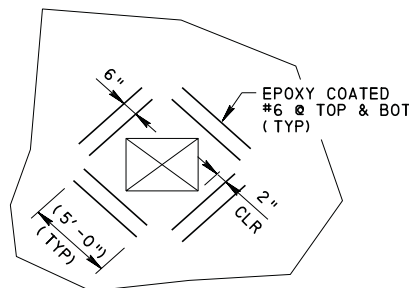


### TYPICAL SECTIONS

#### 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 RC-22M, SHEET 4 FOR DETAILS OF MILLED RUMBLE STRIPS.
- FOR USE ON FULL DEPTH CONCRETE SHOULDERS. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTIONS 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.

### REINFORCEMENT AT OPENINGS



SECTION B-B

### SHOULDER RELIEF JOINTS

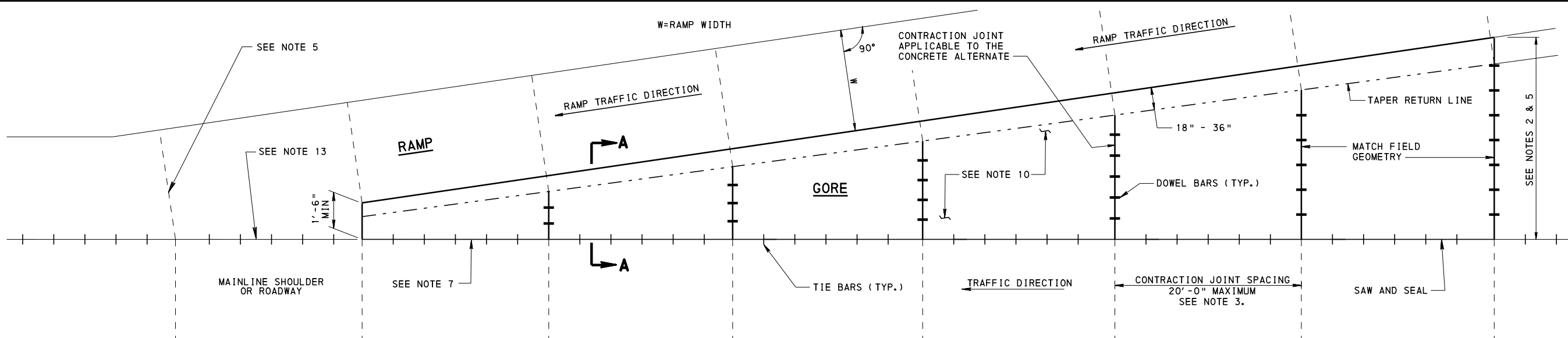
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SHOULDERS  
(CONCRETE)

RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

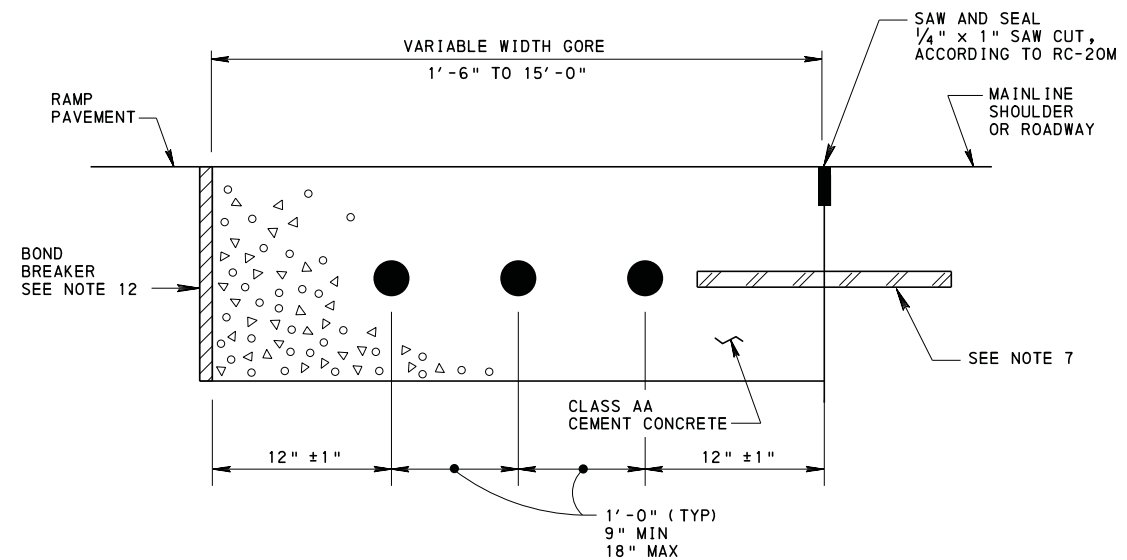
SHT 3 OF 4  
RC-25M



# RAMP GORE AREA

## NOTES

- USE MATERIALS AND CONSTRUCTION METHODS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 501 OR 658.
- BEGIN AND END PAVEMENT AT MAINLINE TRANSVERSE JOINTS WITH A MINIMUM PAVEMENT WIDTH OF 1'-6" AND A MAXIMUM WIDTH OF 15'-0".
- SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS. SEE RC-20M FOR JOINT LAYOUT.
- 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.
- WHEN RAMP, LANE OR GORE WIDTH EXCEEDS 15'-0", A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
- CONSTRUCT GORE PAVEMENT THE SAME DEPTH AS MAINLINE SHOULDER DEPTH.
- TIE GORE TO MAINLINE SHOULDER OR ROADWAY PAVEMENT IN ACCORDANCE WITH THE DETAILS ON THIS SHEET.
- CONSTRUCT GORE UTILIZING PUBLICATION 408, SECTIONS 501 OR 658 (WHICHEVER ITEM NUMBER THE MAINLINE SHOULDER IS CONSTRUCTED OF). MEASUREMENT AND PAYMENT WILL BE USING SAME ITEM NUMBER.
- DO NOT USE LONGITUDINAL TIE BARS TO TIE GORE TO RAMP/SHOULDER PAVEMENT.
- INSTALL MILLED RUMBLE STRIPS IN ACCORDANCE WITH RC-22M, SHEET 4.
- USE LOAD TRANSFER UNITS IF MAINLINE SHOULDER IS CONSTRUCTED USING LOAD TRANSFER UNITS. INSTALL IN ACCORDANCE WITH RC-27M.
- PLACE A 1/4", FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER.
- WHERE RAMP AND MAINLINE MEET, CONSTRUCT SO THAT NO SLAB DIMENSION IS LESS THAN 1'-6" OR MORE THAN 15'-0".



## SECTION A-A

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## SHOULDERS ( RAMP GORE AREA)

PLAN VIEW

SECTION A-A

### TYPICAL PAVEMENT PATCHING JOINT

TYPICAL SECTION  
CONCRETE PAVEMENT PATCHING

SEE NOTE 1.

DETAIL A

### DETAIL B

DETAIL C

## PATCHING JOINT DETAILS

PLAN VIEW

† 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 THE 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

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'	¾"	1"
	< 20'	⅜"	¾"

## NOTES

1. 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  $\frac{3}{4}$ " 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.
2. USE MINIMUM  $1\frac{1}{4}$ "  $\phi$   $\times$  18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM  $\frac{1}{2}$ "  $\phi$   $\times$  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.
3. 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  $\frac{1}{4}$ ".
4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM  $\frac{1}{8}$ " TO  $\frac{1}{4}$ " BELOW THE SURFACE OF THE PAVEMENT.
5. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.
6. SAW & SEAL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.
7. 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.
8. IF SUBBASE IS REMOVED FOR PATCHING GREATER THAN 20' IN LENGTH AND A MINIMUM OF 8' IN WIDTH, INSTALL CLASS 4, TYPE A GEOTEXTILE AS SPECIFIED IN PUBLICATION 408, SECTION 210.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## CONCRETE PAVEMENT REHABILITATION

( PATCHING)

RECOMMENDED DEC. 17, 2019

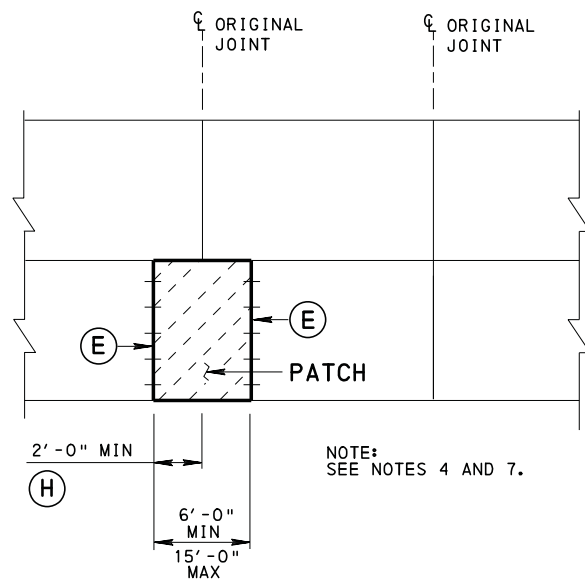
RECOMMENDED 9219 Chappell  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED	<u>DEC. 17, 2019</u>	S
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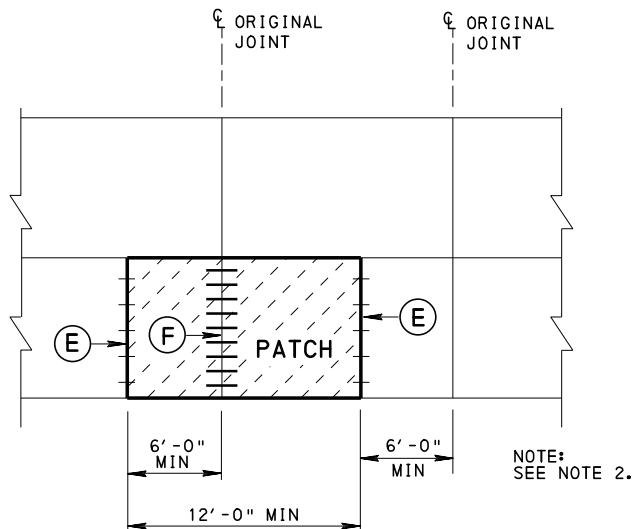
RECOMMENDED \_\_\_\_\_  
*Melrose J. Betah*  
 DIRECTOR, BUREAU OF PROJECT DELIVERY

Page 1 OF 13

RC-26M



NOTE:  
SEE NOTES 4 AND 7.

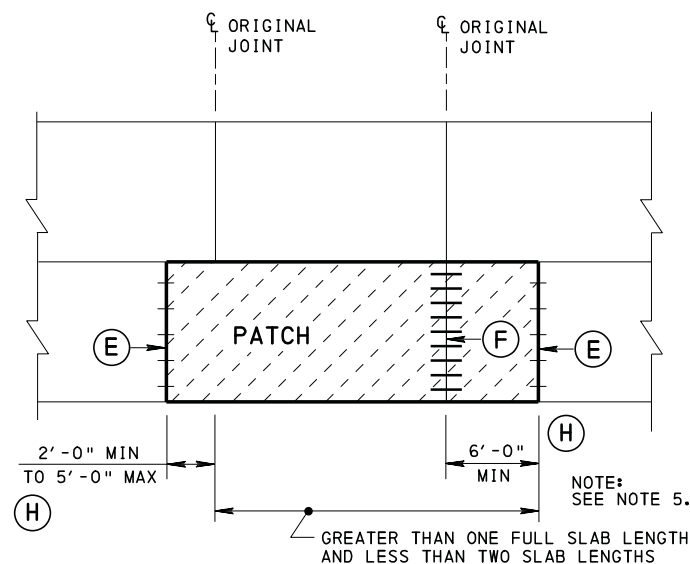


NOTE:  
SEE NOTE 2.

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

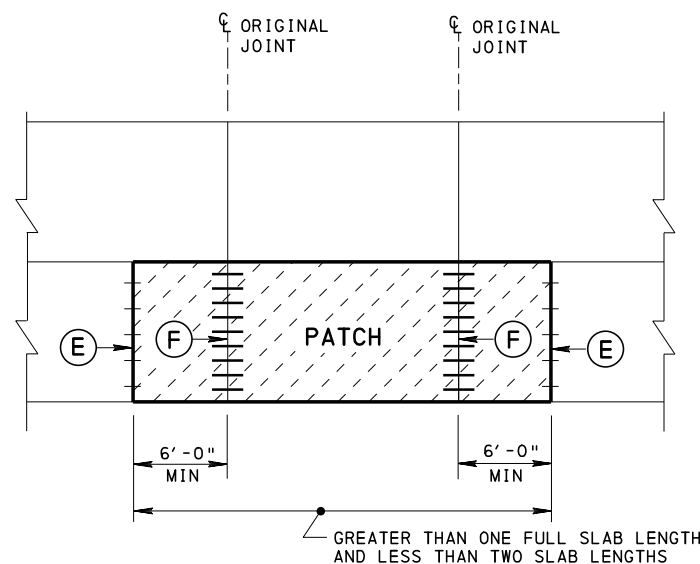
### NOTES

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.

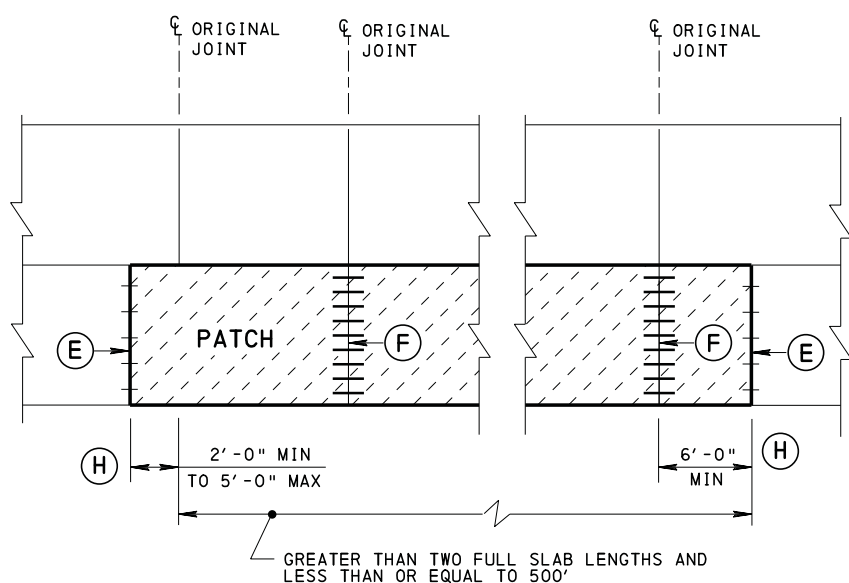


NOTE:  
SEE NOTE 5.

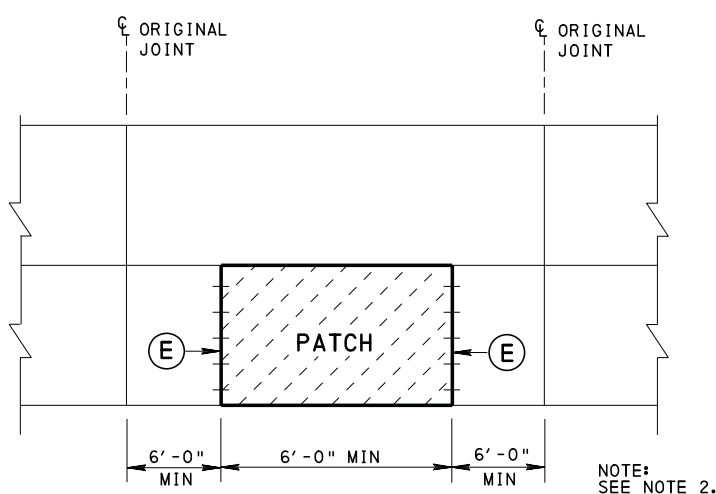
GREATER THAN ONE FULL SLAB LENGTH  
AND LESS THAN TWO SLAB LENGTHS



GREATER THAN ONE FULL SLAB LENGTH  
AND LESS THAN TWO SLAB LENGTHS



GREATER THAN TWO FULL SLAB LENGTHS AND  
LESS THAN OR EQUAL TO 500'



NOTE:  
SEE NOTE 2.

### SINGLE LANE PAVEMENT PATCHING

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BUREAU OF PROJECT DELIVERY

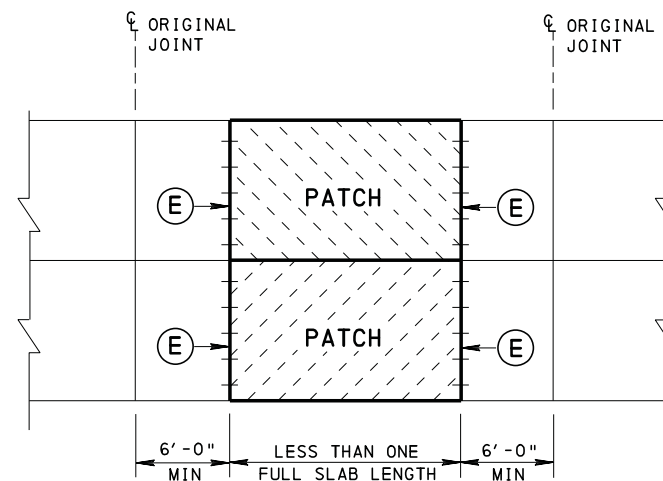
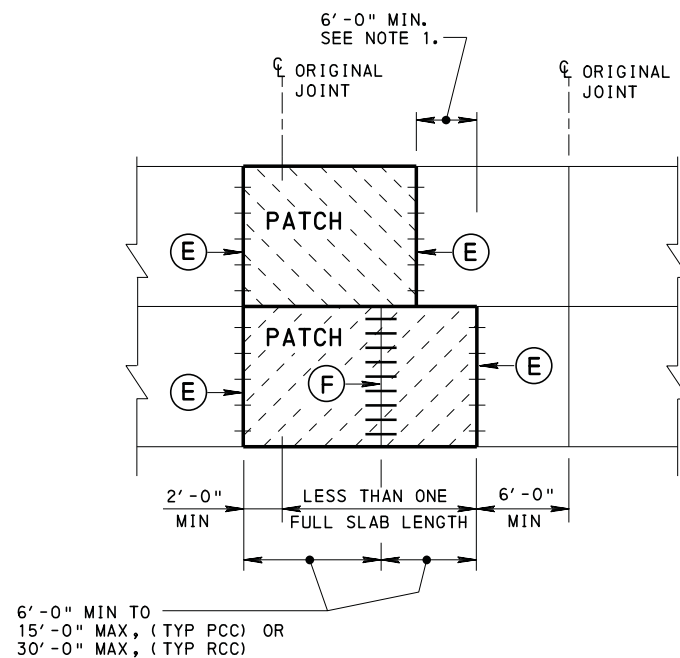
CONCRETE PAVEMENT  
REHABILITATION  
(SINGLE LANE PATCHING)

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

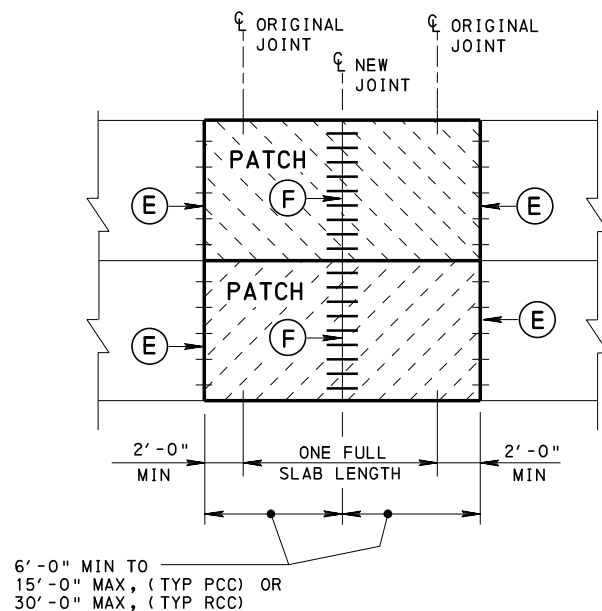
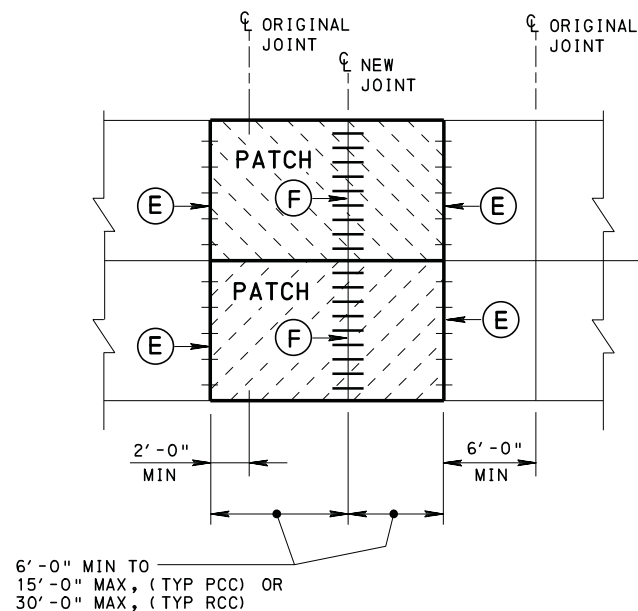
RECOMMENDED DEC. 17, 2019  
*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 13  
RC-26M

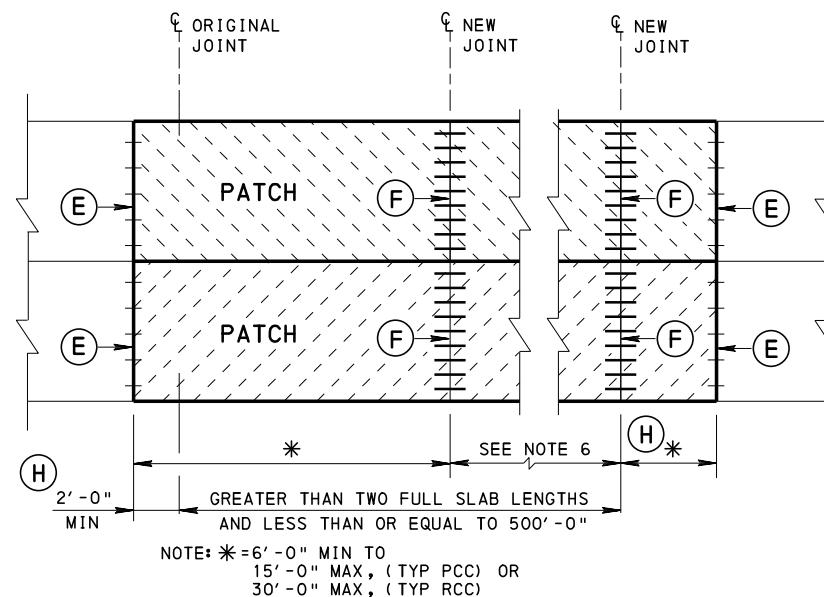
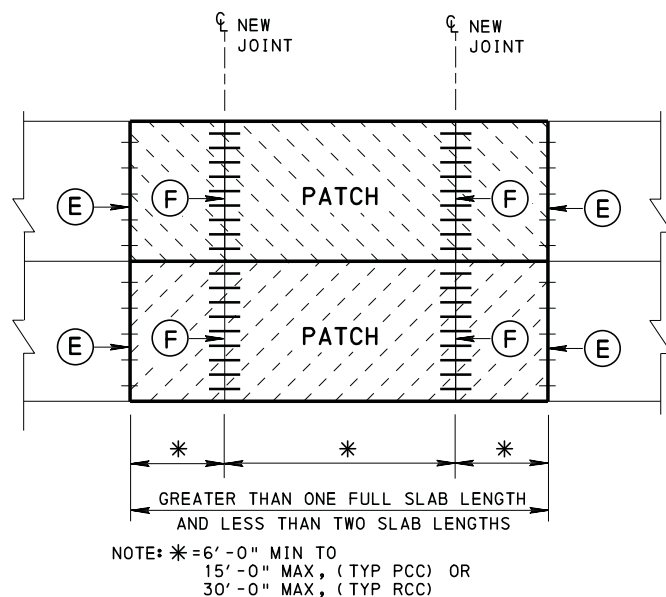




- LEGEND**
- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.
- (H) DETAILS APPLY TO EITHER END OF PATCH.



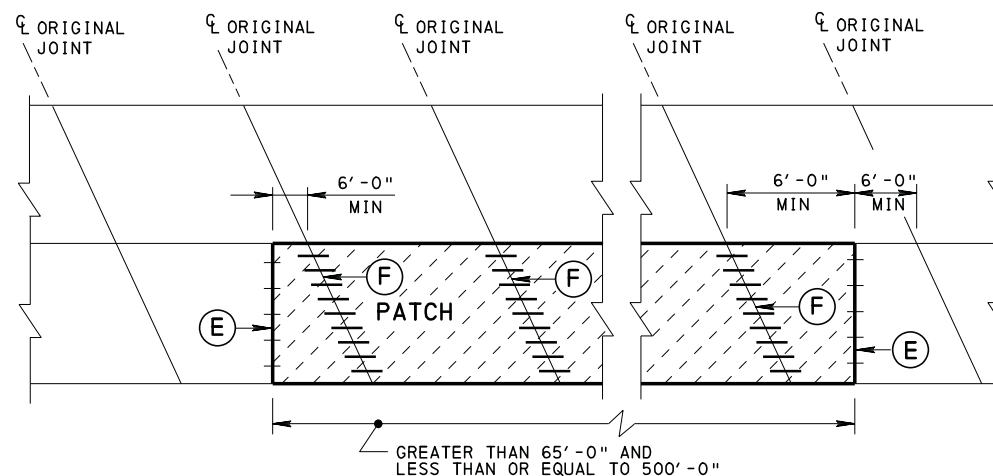
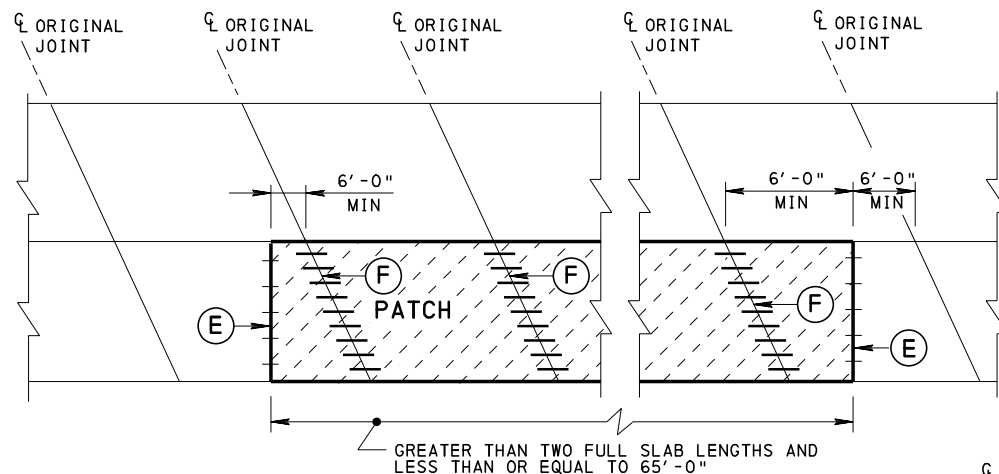
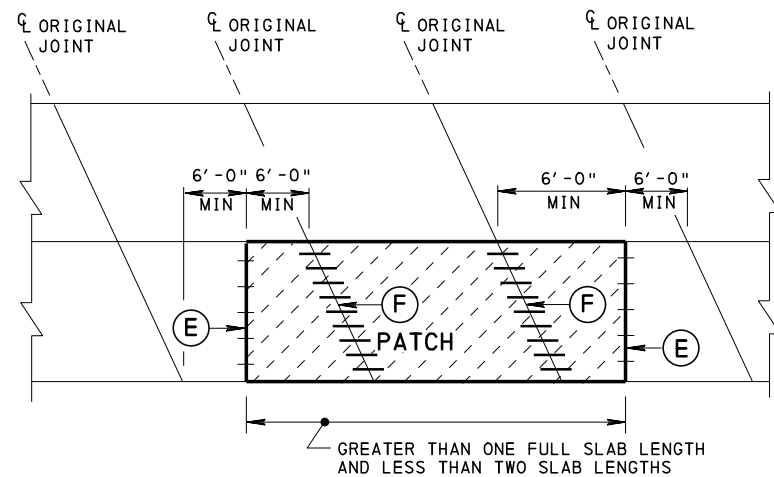
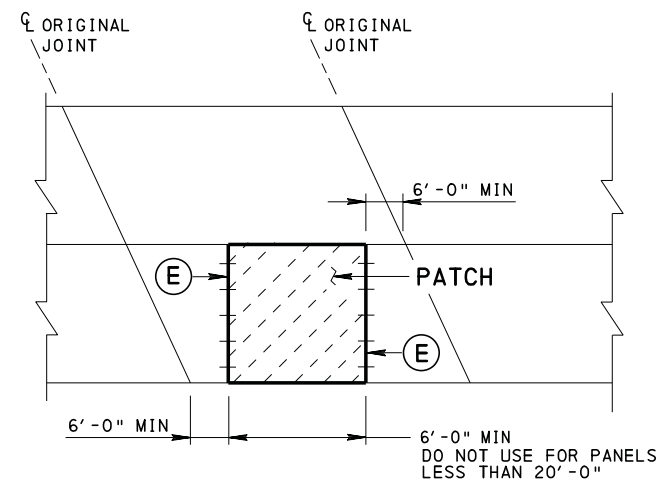
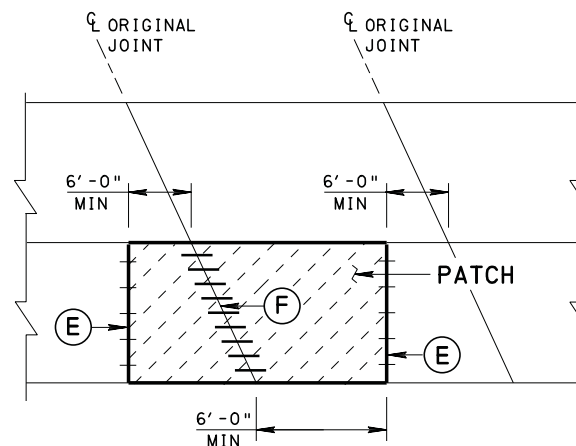
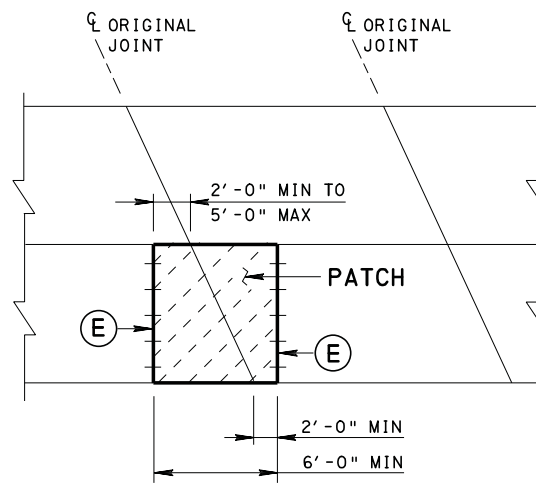
- NOTES**
- CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
  - DO NOT LEAVE LESS THAN 6'-0" OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
  - 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.
  - 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.
  - 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.
  - 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).
  - THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
  - WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
(MULTI-LANE PATCHING)





### 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.

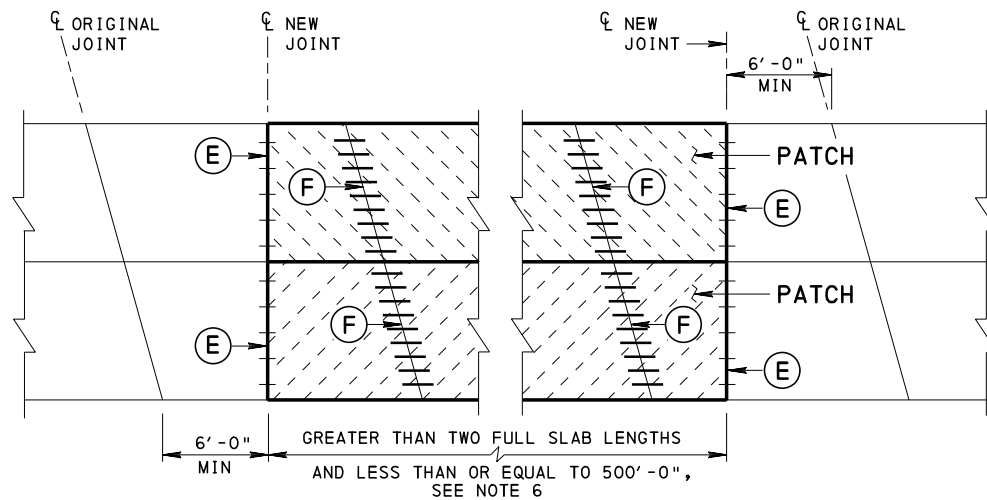
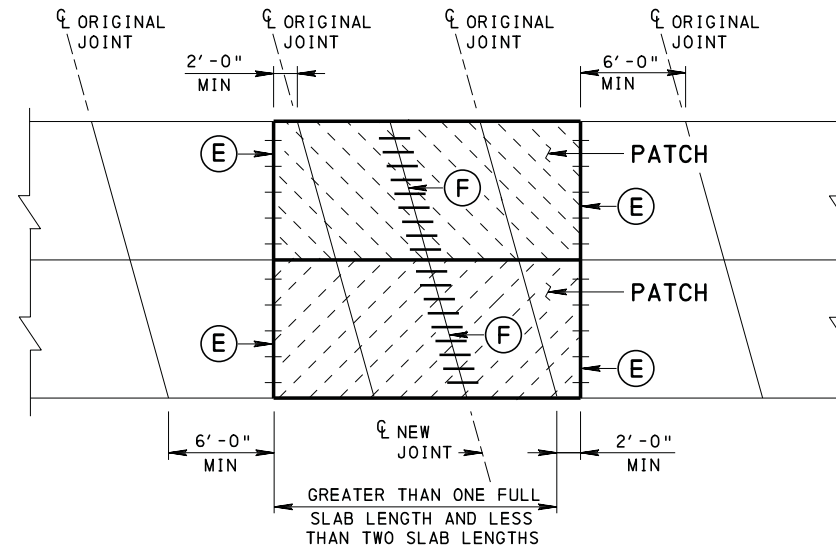
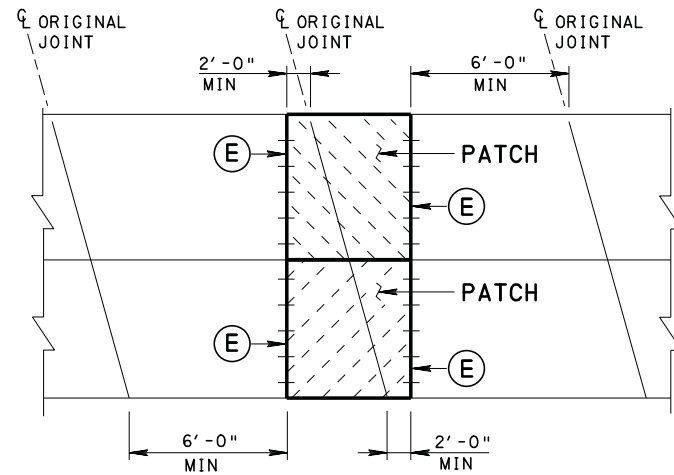
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
( SINGLE LANE PATCHING )  
SKEWED JOINTS

RECOMMENDED DEC. 17, 2019  
*John J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

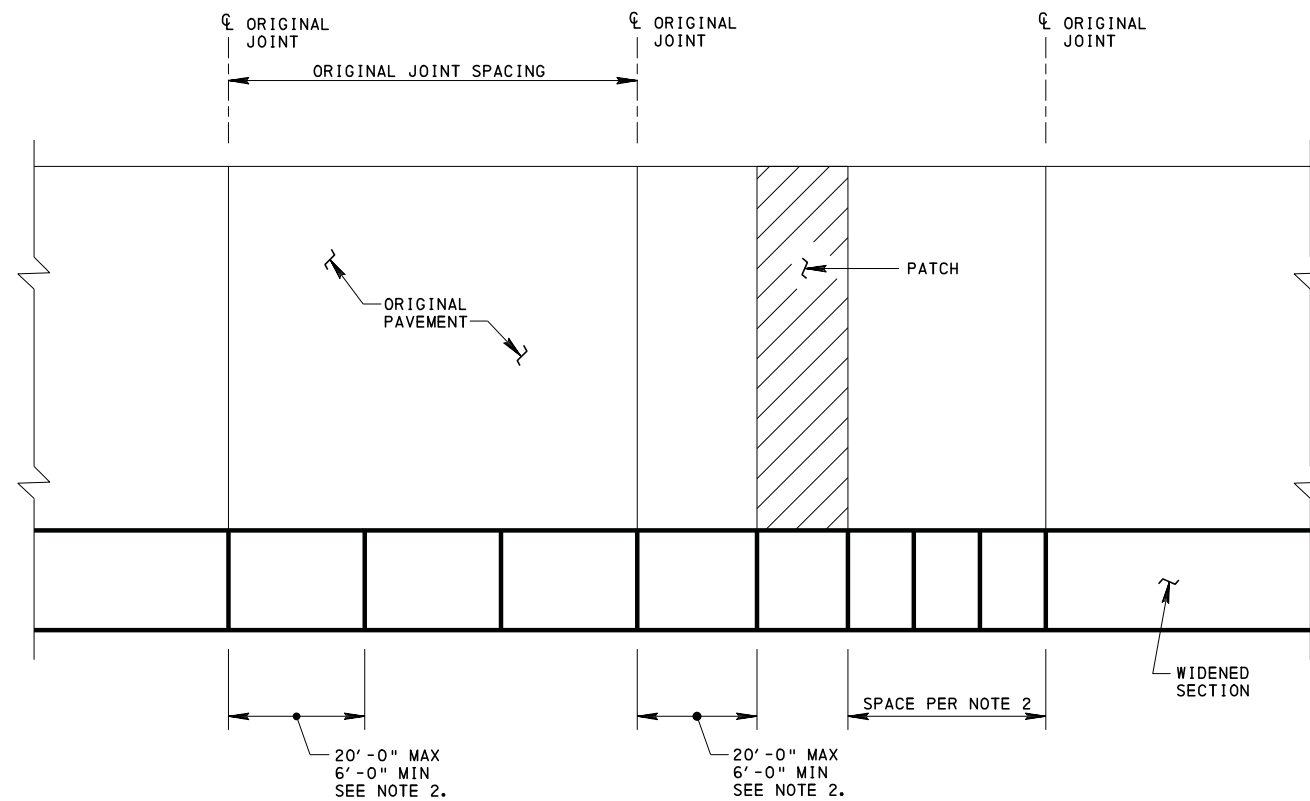
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DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-26M

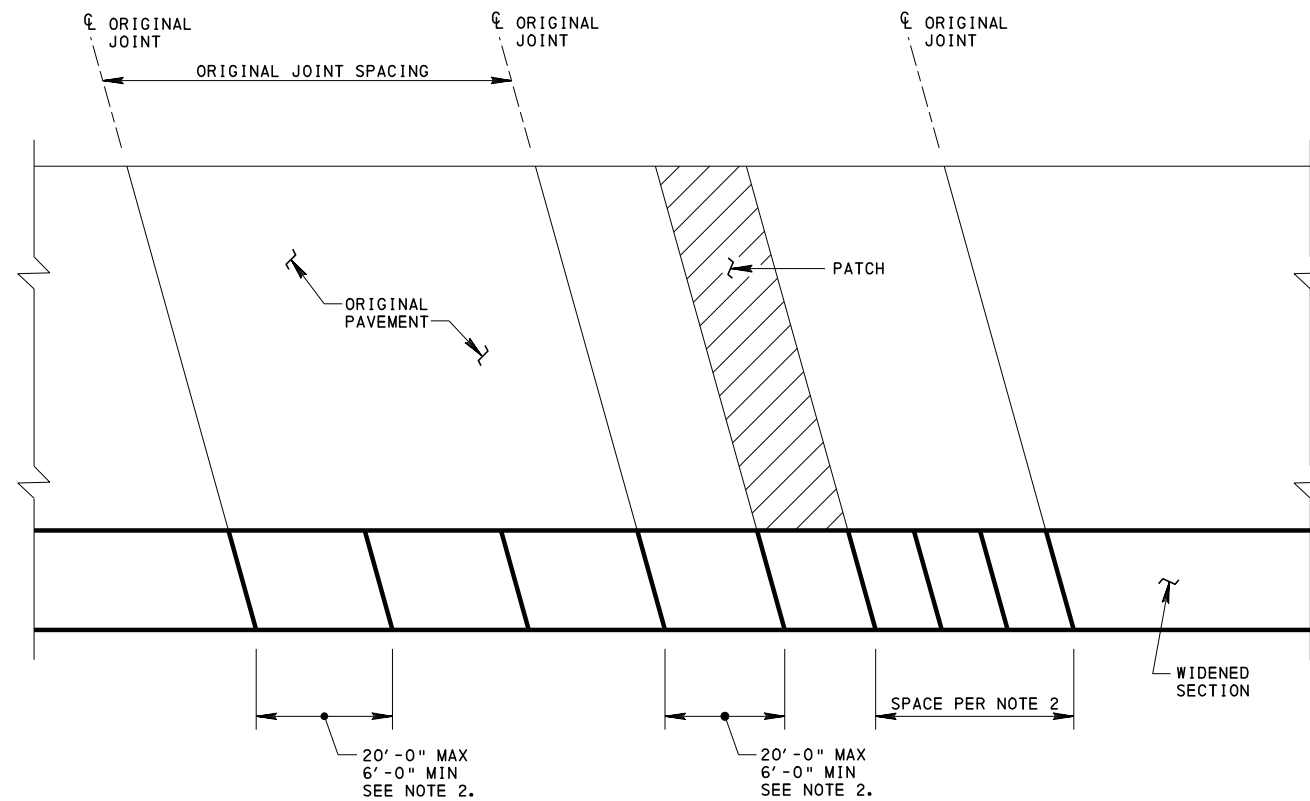


- LEGEND**
- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
  - (F) NEW PAVEMENT JOINT, SEE RC-20M.

- 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 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.



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 DEC. 17, 2019

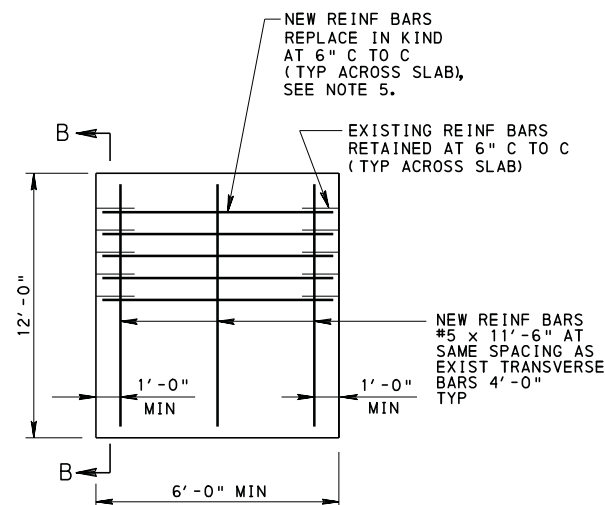
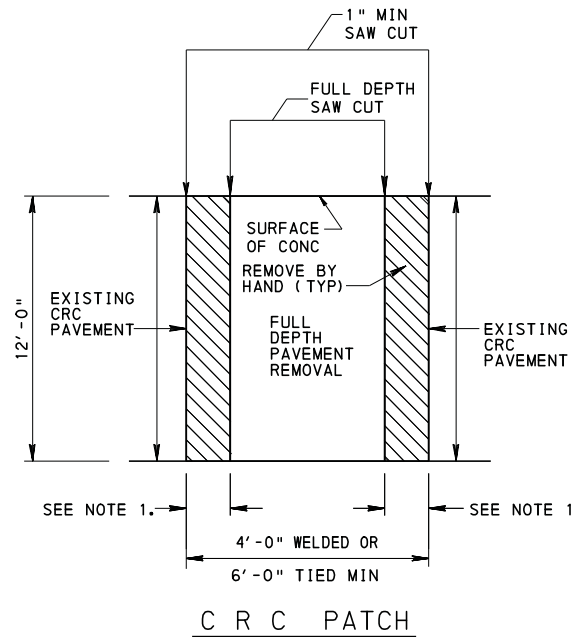
*9219 Chapell*  
CHIEF, HWY. DELIVERY DIVISION

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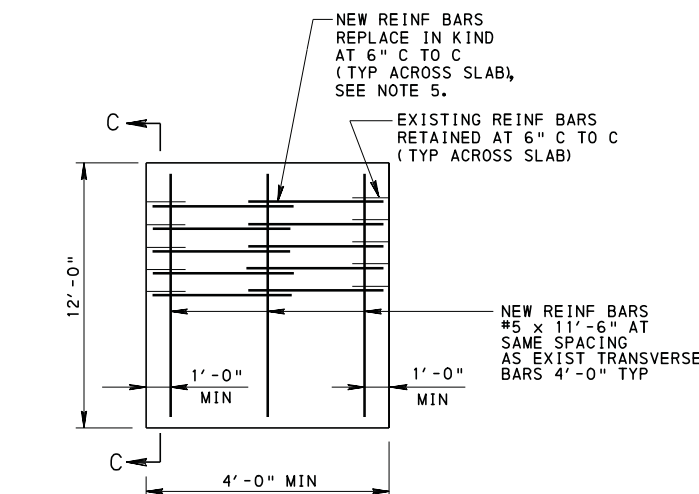
*Melvin J. Batah*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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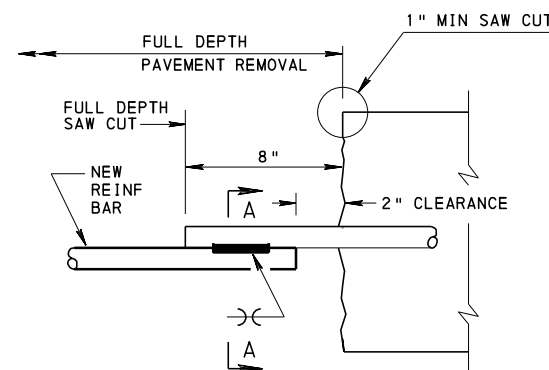
RC-26M



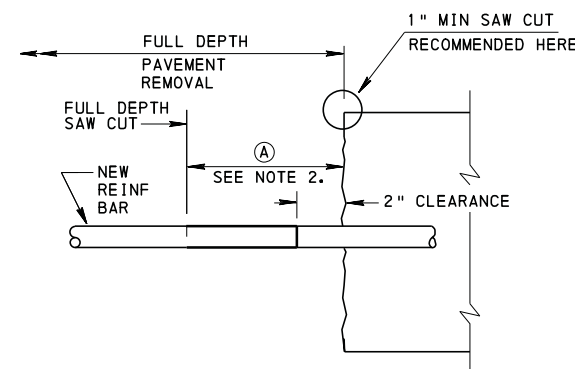
TIED SPLICE  
REINFORCEMENT BAR DETAIL



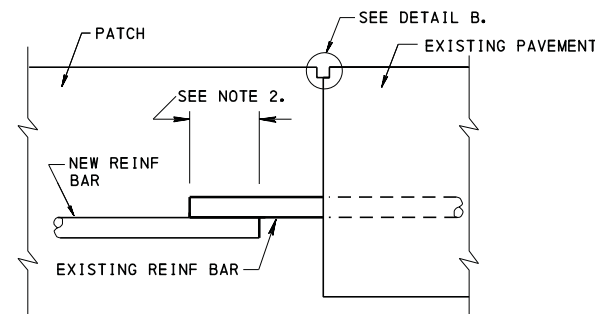
WELDED SPLICE  
REINFORCEMENT BAR DETAIL



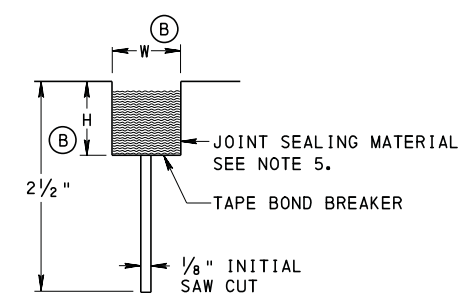
WELDED SPLICE  
TYPICAL SECTION



TIED SPLICE  
TYPICAL SECTION



DETAIL A



DETAIL B

PATCHING JOINT DETAILS

LEGEND

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

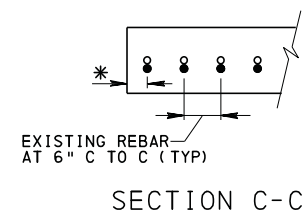
(A) USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:

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

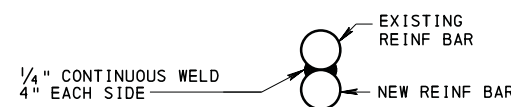
PATCH LENGTH	W	H
≥50'-0"	1"	1 1/4"
≥20'-0" & <50'-0"	3/4"	1"
<20'-0"	3/8"	3/4"

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.



SECTION C-C



SECTION A-A

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION

(C R C PATCHING)

RECOMMENDED DEC. 17, 2019

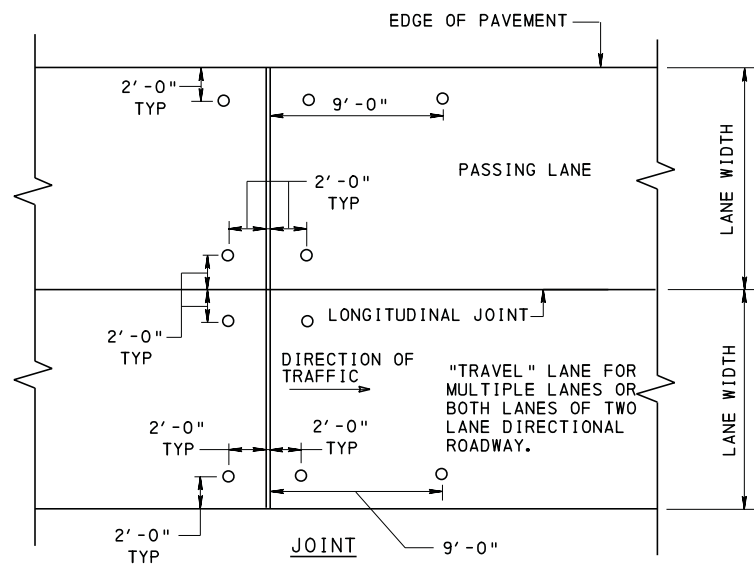
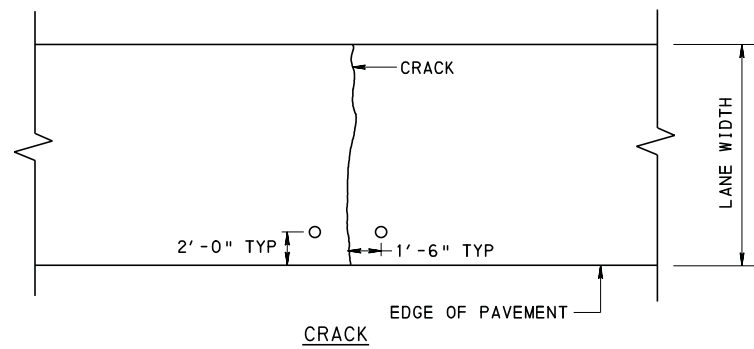
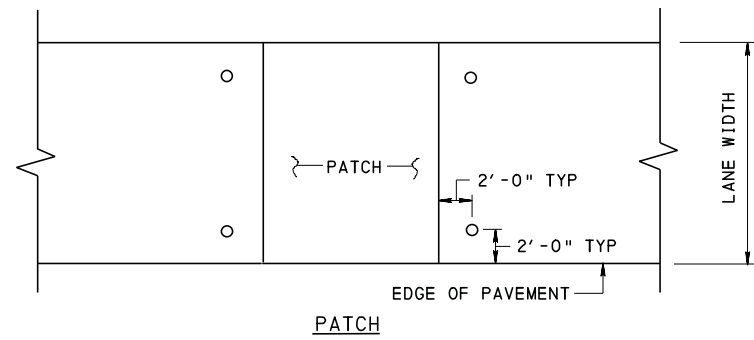
*9219*  
CHIEF, HWY. DELIVERY DIVISION

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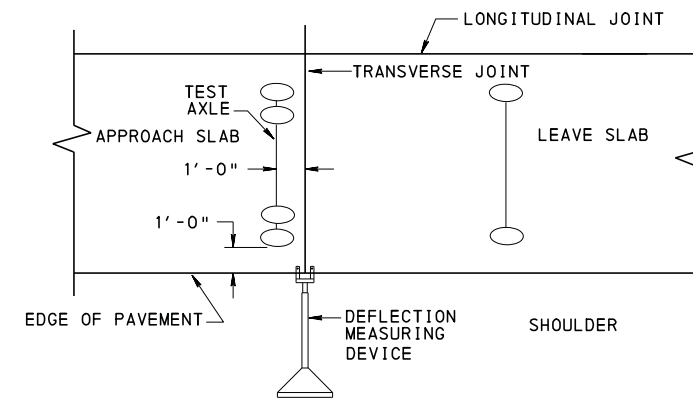
*Melvin J. Bata*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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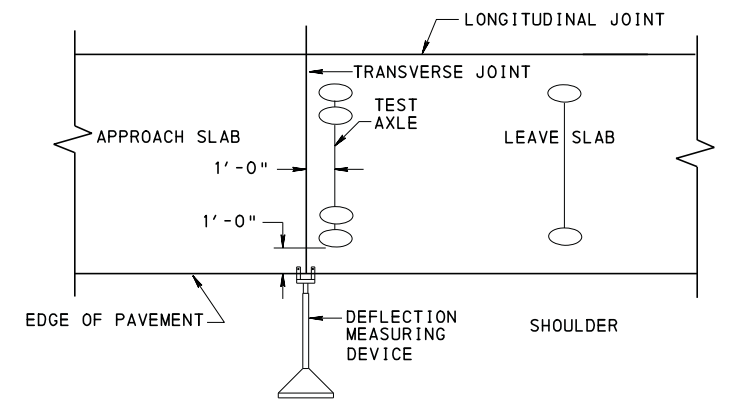
RC-26M



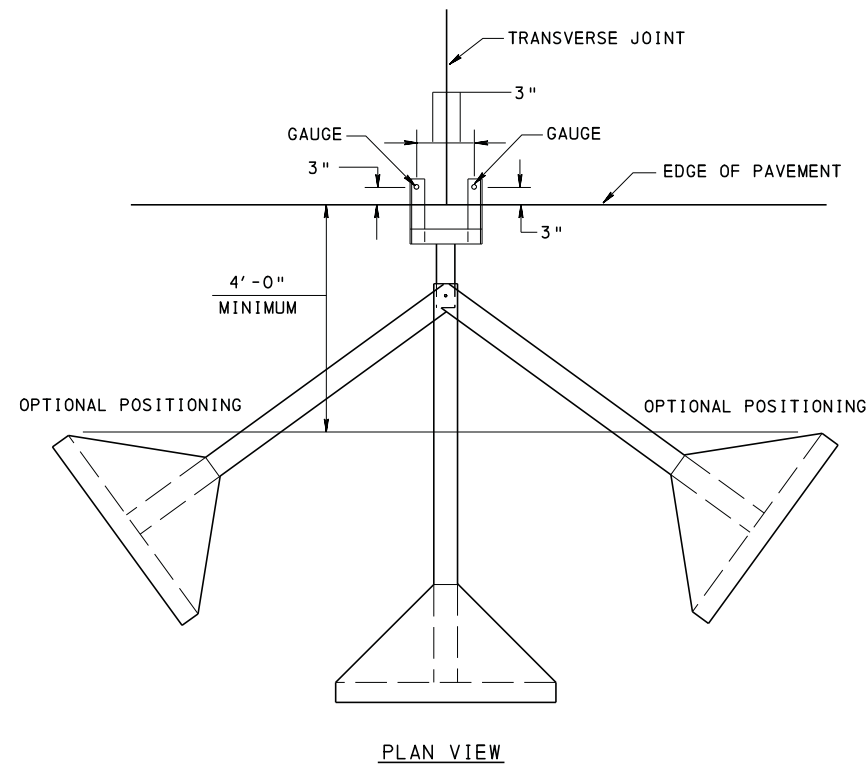
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



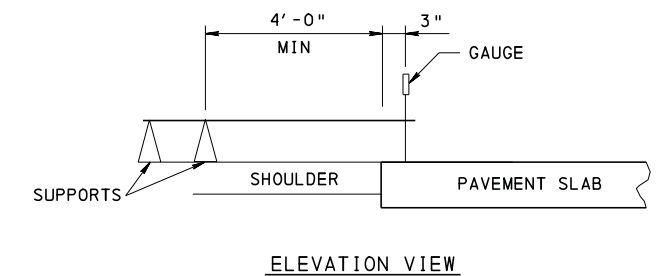
POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB



POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED LEAVE SLAB



TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT



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)

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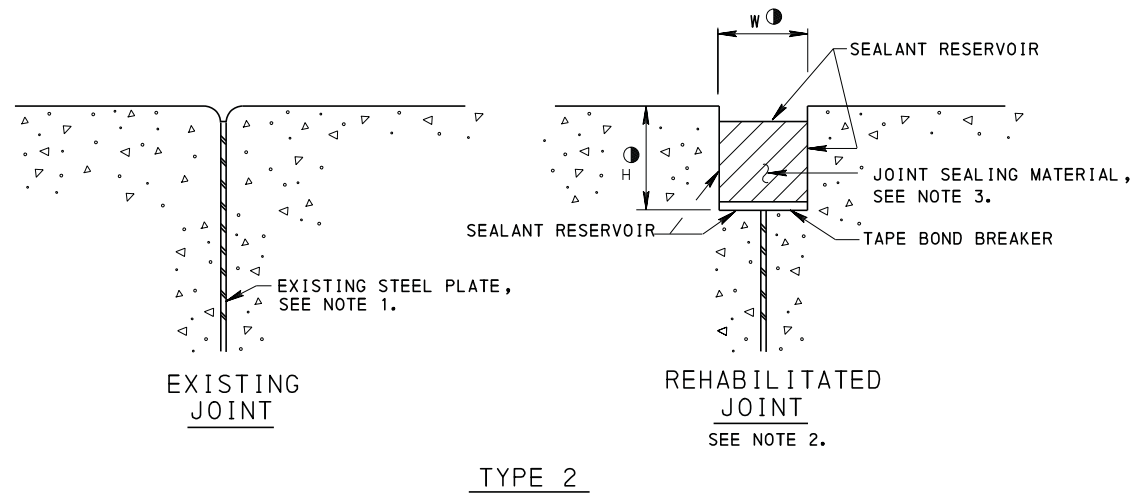
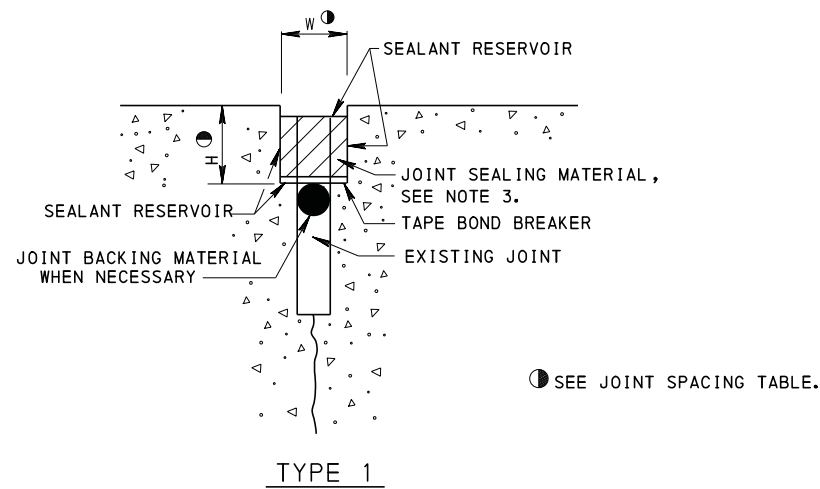
*9219 Chapel*  
CHIEF, HWY. DELIVERY DIVISION

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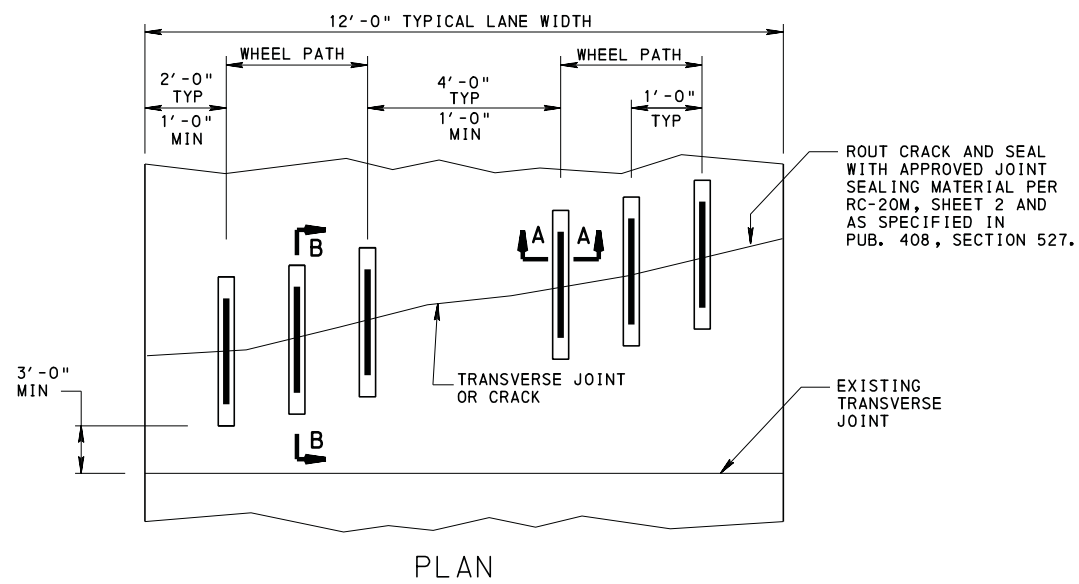
*Malcolm J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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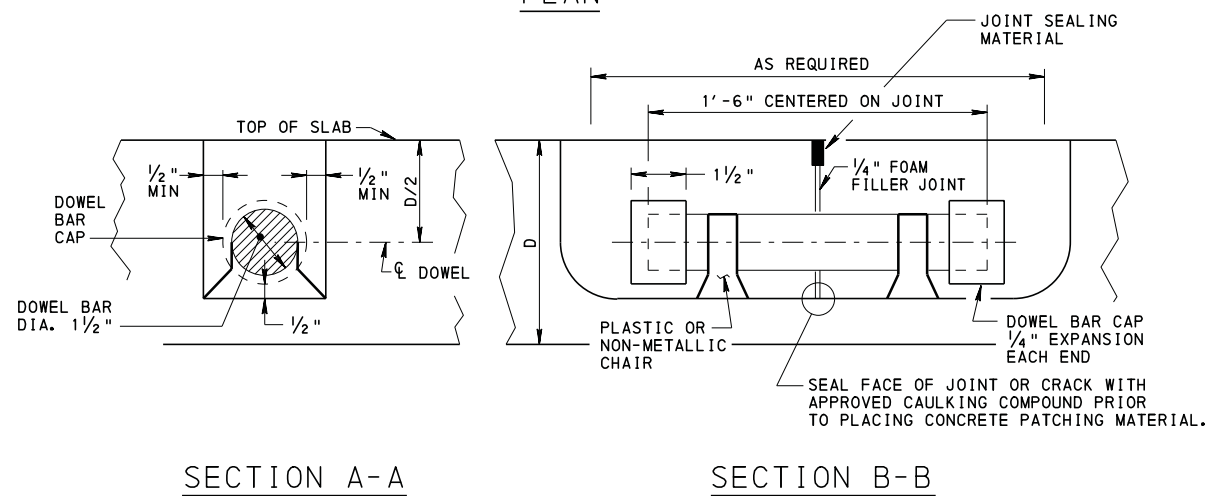
## JOINT REHABILITATION



JOINT SPACING	W	H
$\geq 50' - 0''$	1"	1 1/4"
$\geq 20' - 0''$ 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.
  - PLACE DOWEL BAR AT THE MID-DEPTH OF THE THINNER PAVEMENT SLAB WHEN REPAIR AREA SPANS DIFFERENT PAVEMENT SLABS.
  - FOR PAVEMENT DEPTHS  $< 10''$ , A 1 1/4" DIAMETER DOWEL BAR MAY BE USED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
( JOINTS )

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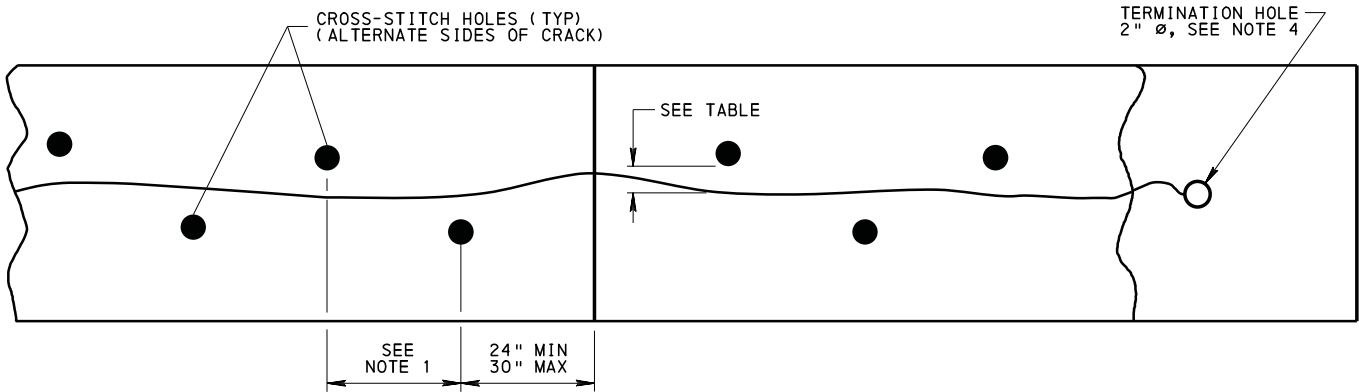
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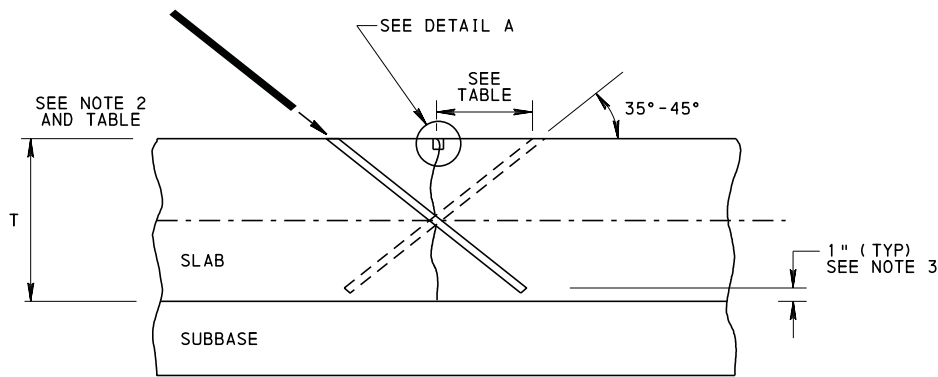
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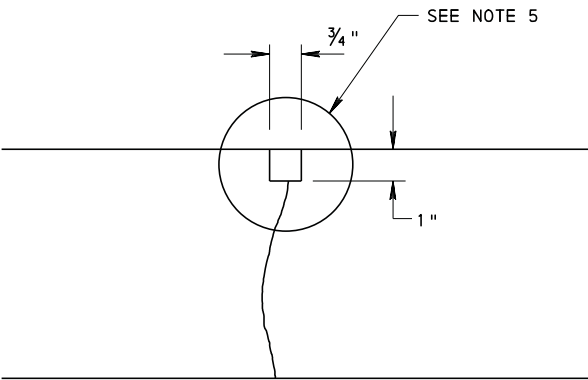




TOP VIEW



CROSS-SECTIONAL VIEW



DETAIL A

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							
	9 1/2 "	11 "	12 1/2 "	14 1/2 "	16 "			
				12 1/2 "	14 "	16 "	18 1/2 "	
	DIAMETER OF BAR							
	3/4 "	3/4 "	3/4 "	3/4 "	3/4 "	1 "	1 "	1 "

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.

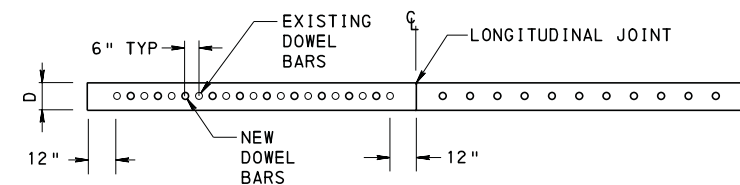
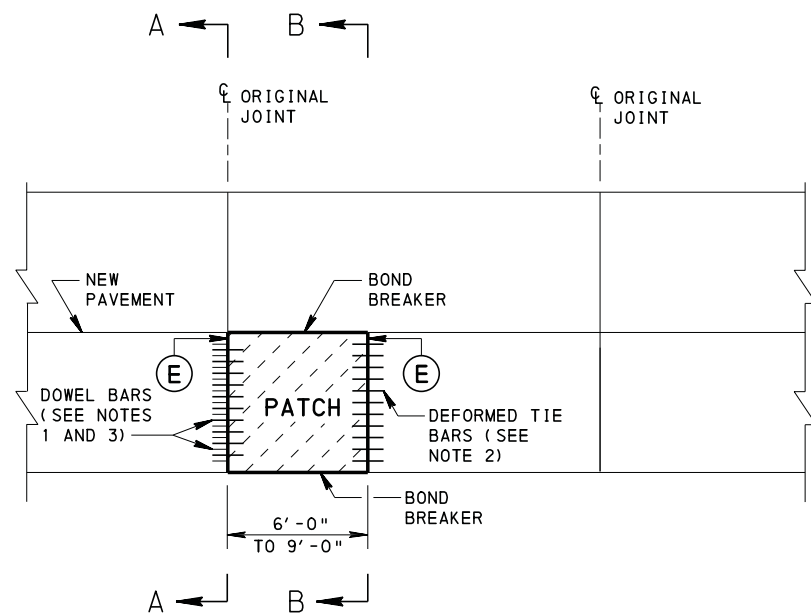
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
REHABILITATION  
( CROSS-STITCHING)

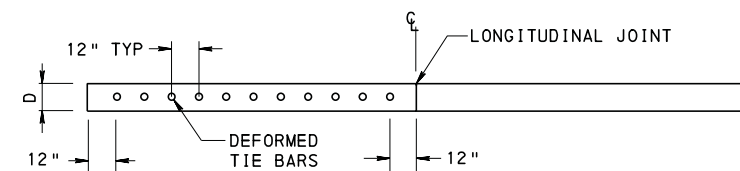
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SECTION A-A



SECTION B-B

TYPICAL NEW PAVEMENT REPAIR DETAILS

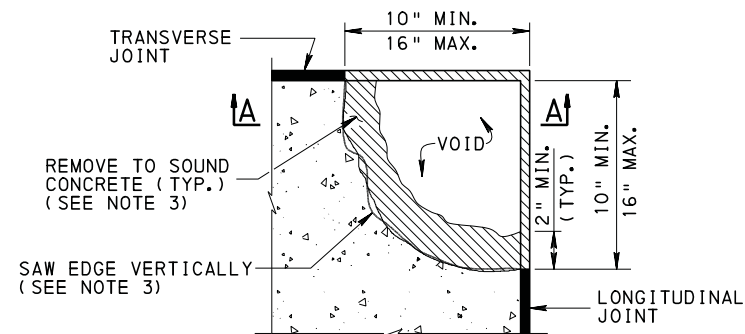
**LEGEND**  
 (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

- 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.

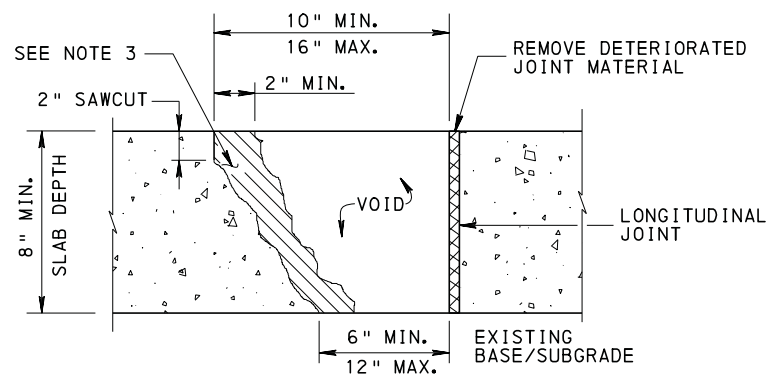
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT  
 REHABILITATION  
 (NEW PAVEMENT REPAIR DETAIL)

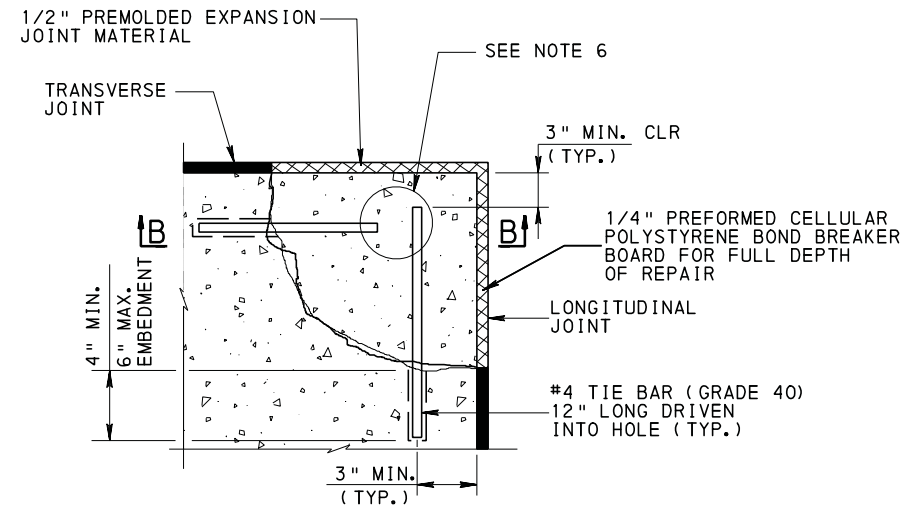
RECOMMENDED DEC. 17, 2019 <i>9219 Chappell</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED DEC. 17, 2019 <i>Melvin J. Batah</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 11 OF 13 RC-26M
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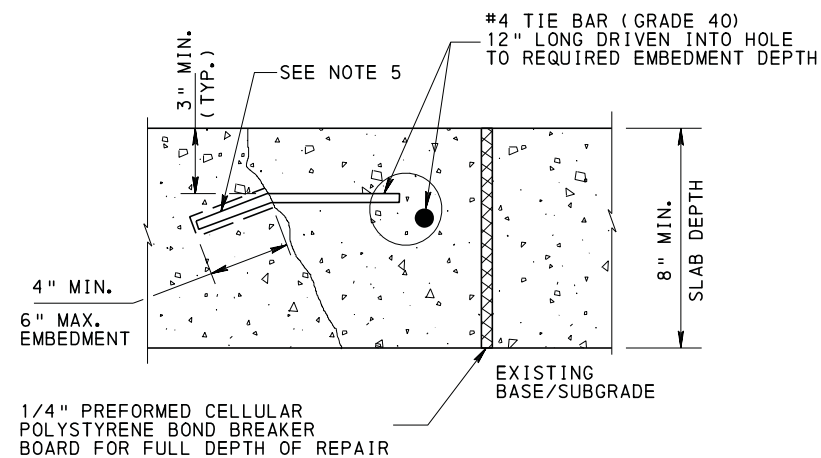
**PLAN  
EXISTING CONDITION**



**SECTION A-A**



**PLAN  
PROPOSED REPAIR**



**SECTION B-B**

# **NOTES**

1. THE MAXIMUM LENGTH ALONG THE LONGITUDINAL AND TRANSVERSE JOINT FOR THIS REPAIR IS 16" FROM THE CORNER OF SLAB.
2. THIS REPAIR METHOD IS APPLICABLE FOR RECONSTRUCTING A SINGLE CORNER OR MULTIPLE CORNERS AT INTERSECTING JOINTS. IF REPAIRING MULTIPLE CORNERS AT THE SAME TIME, REESTABLISH ORIGINAL JOINTS USING 1/4" PREFORMED CELLULAR POLYSTYRENE BOND BREAKER BOARD FOR LONGITUDINAL JOINTS AND 1/2" PREMOLDED EXPANSION JOINT MATERIAL FOR TRANSVERSE JOINTS.
3. A 2" VERTICAL SAW CUT SHALL BE MADE INTO SOUND CONCRETE TO ESTABLISH THE BOUNDARY OF THE REPAIR. THEN TAPER USING 35 LB. (MAX) JACKHAMMER TO REMOVE THE DETERIORATED MATERIAL. ROUGHEN FINAL REPAIR SURFACES FOR BONDING OF REPAIR MATERIAL.
4. IF DOWEL BARS OR REBAR ARE EXPOSED, REMOVE OR CUT OFF FLUSH WITH THE CONCRETE REMAINING IN PLACE. CLEAN EXPOSED METAL AND APPLY EPOXY COATING.
5. DRILL 5/8" DIAMETER HOLE AT ANGLE AS NECESSARY TO ACCOMMODATE DRILL CLEARANCE. DRIVE #4 GRADE 40 TIE BAR INTO HOLE. BEND THE BAR AS NECESSARY TO MAINTAIN PROPER CLEARANCE.
6. FOR TIE BARS THAT RUN PERPENDICULAR TOWARDS INTERSECTION, PROVIDE A MINIMUM 2" CLEARANCE BETWEEN OR TIE BARS TOGETHER.
7. THE JOINT OR JOINTS MUST BE REESTABLISHED AS SPECIFIED IN NOTE 2 TO FULL WIDTH AND DEPTH, BEFORE FILLING THE VOID(S) WITH PATCH MATERIAL. SAWING AND SEALING A JOINT IS PROHIBITED.
8. IMMEDIATELY PRIOR TO PLACING PATCHING MATERIAL, APPLY APPROVED EPOXY BONDING COMPOUND TO ALL EXPOSED SURFACES.
9. THE SAW CUT GROOVE THAT EXTENDS INTO GOOD CONCRETE AT THE EDGES OF THE PATCH SHOULD BE FILLED WITH THE GROUT PORTION OF THE PATCH MATERIAL. FINISH THE PATCHING MATERIAL OUTWARD FROM THE PATCH TOWARD THE EXISTING CONCRETE EDGE.

COMMONWEALTH OF PENNSYLVANIA  
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CONCRETE PAVEMENT  
REHABILITATION  
(FULL-DEPTH CORNER REPAIR)

RECOMMENDED DEC. 17, 2019

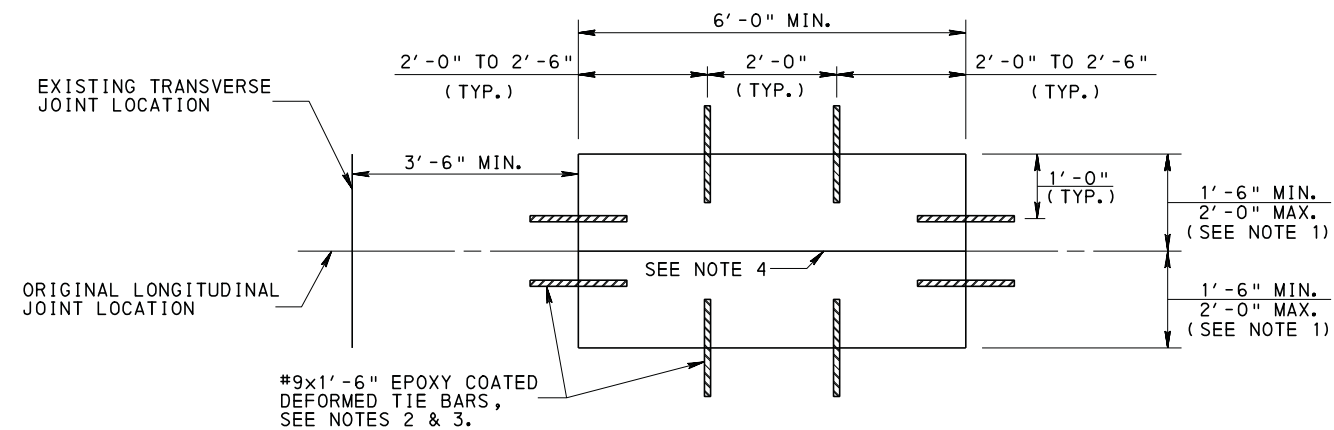
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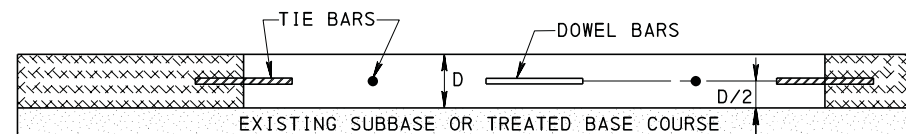
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DIRECTOR, BUREAU OF PROJECT DELIVERY

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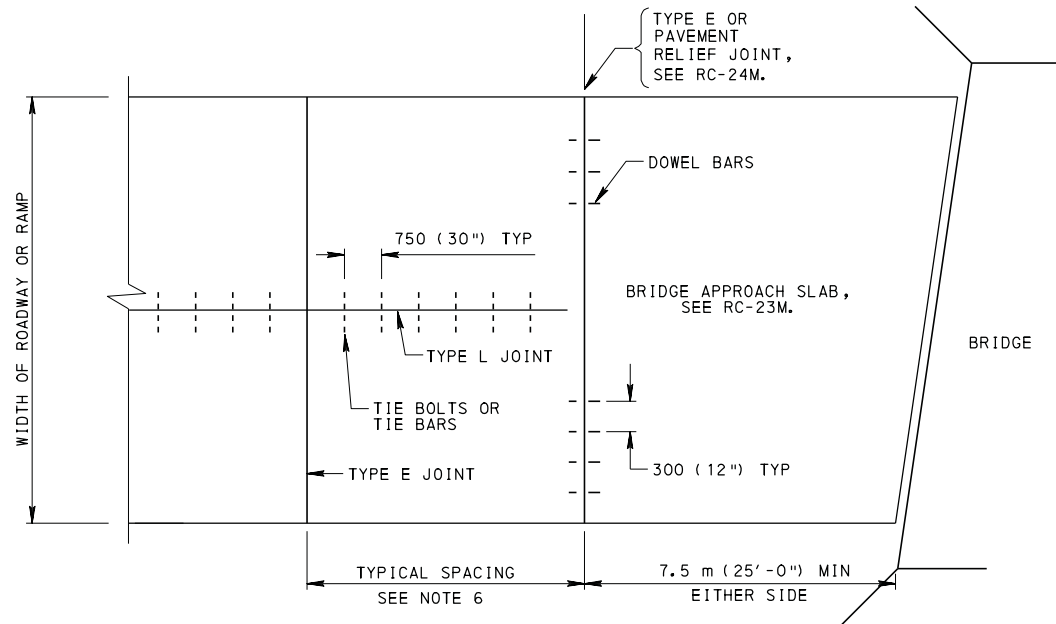
RC-26M



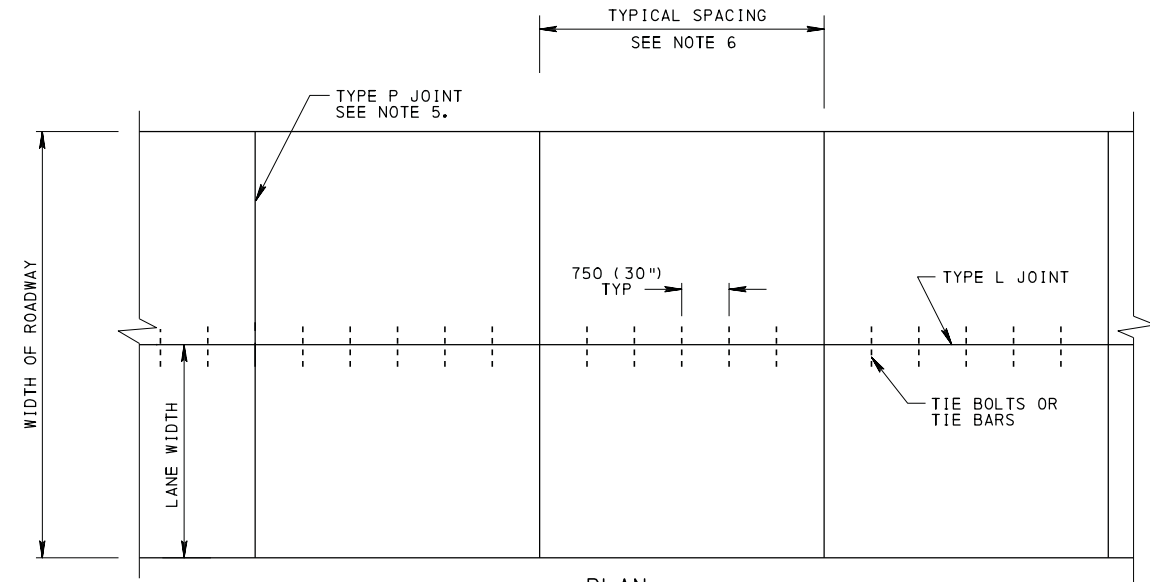
FULL-DEPTH PARTIAL-WIDTH LONGITUDINAL  
JOINT REPAIR WITH NO TRANSVERSE JOINT



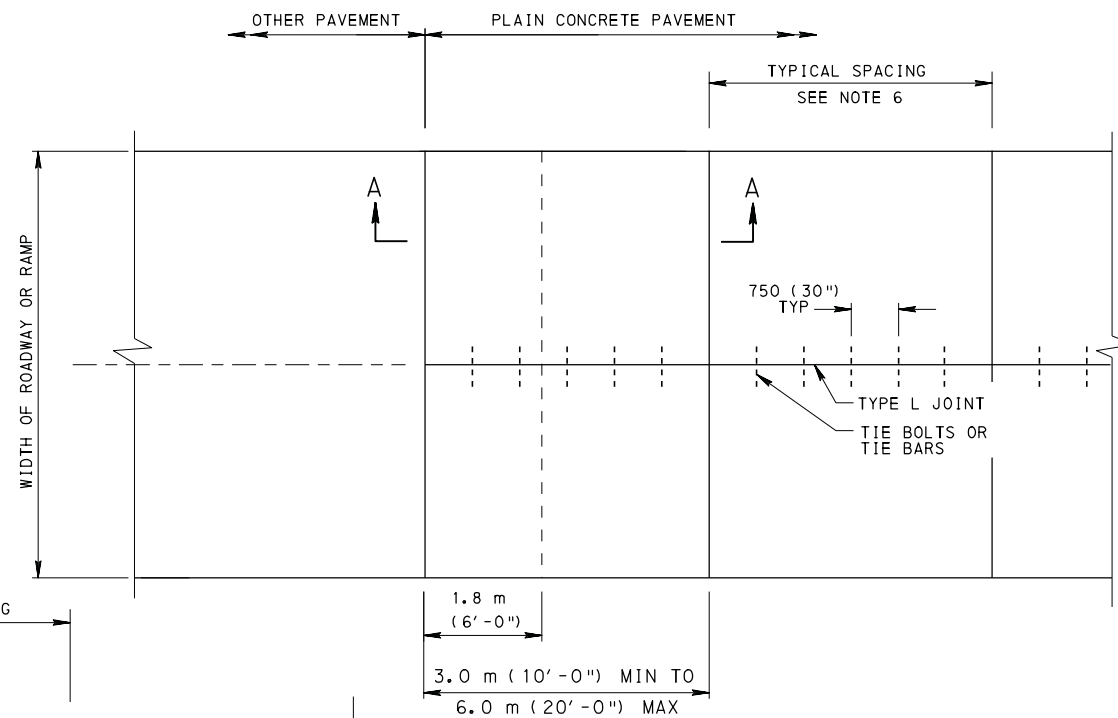
## FULL-DEPTH PARTIAL-WIDTH LONGITUDINAL JOINT REPAIR WITH TRANSVERSE JOINT



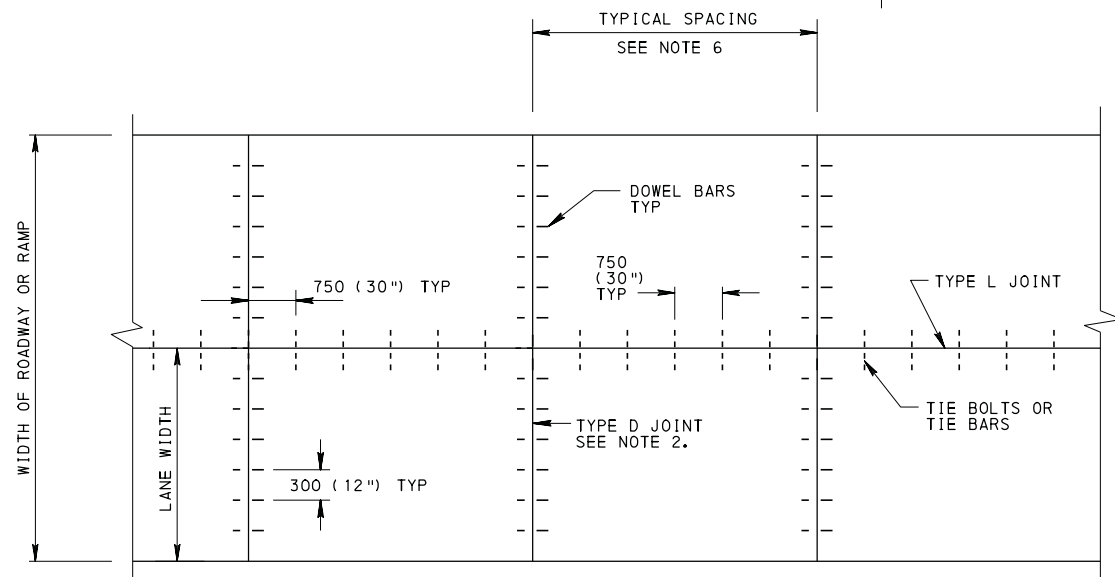
PLAN  
BRIDGE APPROACHES



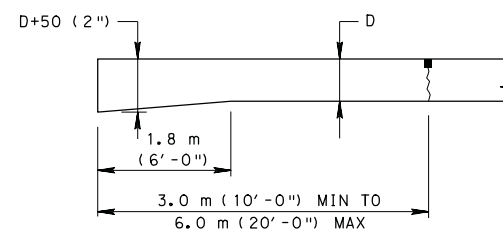
PLAN  
COLLECTORS AND LOCAL ROADS



PLAN  
TERMINAL SLAB



PLAN  
INTERSTATE AND OTHER LIMITED ACCESS  
FREEWAYS, ARTERIALS AND RAMPS



SECTION A-A

#### NOTES

- FOR JOINT DETAILS, SEE RC-20M.
- CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS.
- WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
- CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
- CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
- USE A 4.5 m (15'-0") JOINT SPACING ON ALL PAVEMENTS.
- ON CURVES, THE JOINT SHALL BE CONSTRUCTED PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

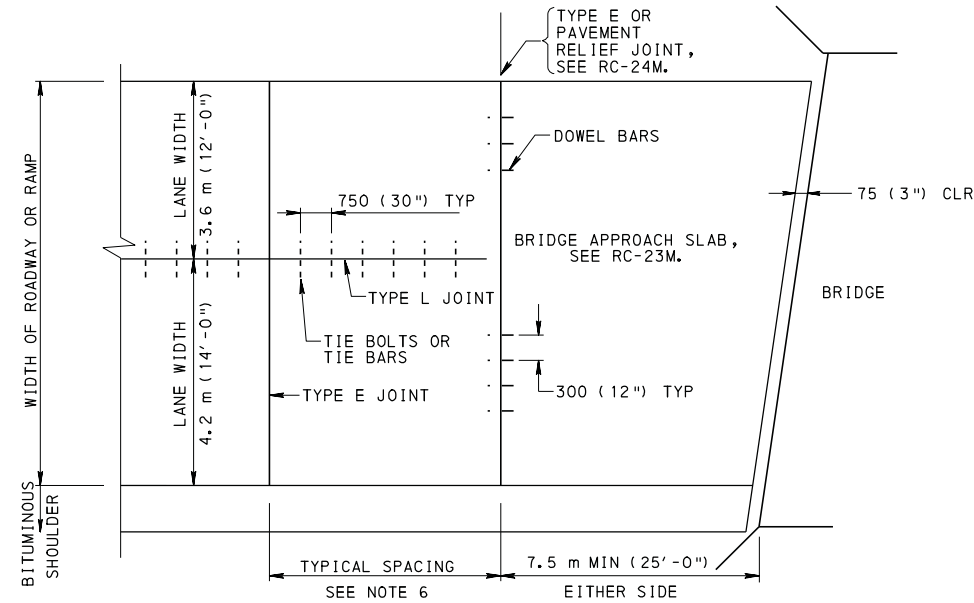
COMMONWEALTH OF PENNSYLVANIA  
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PLAIN CONCRETE PAVEMENT

RECOMMENDED JUN. 1, 2010  
R. W. Wiley  
CHIEF, HWY. QA DIVISION

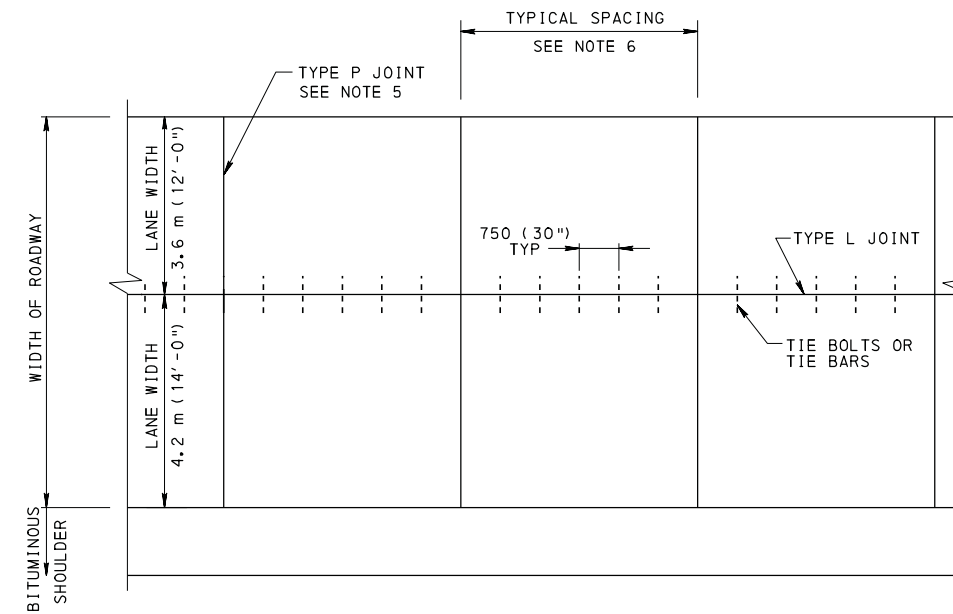
RECOMMENDED JUN. 1, 2010  
B. B. Thompson  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 2  
RC-27M



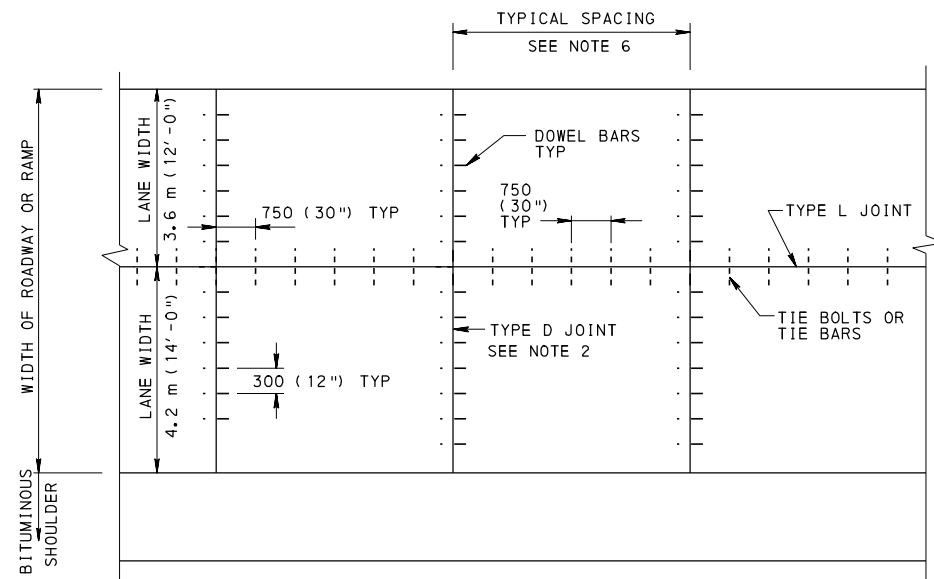
PLAN

## BRIDGE APPROACHES WITH WIDENED CONCRETE PAVING



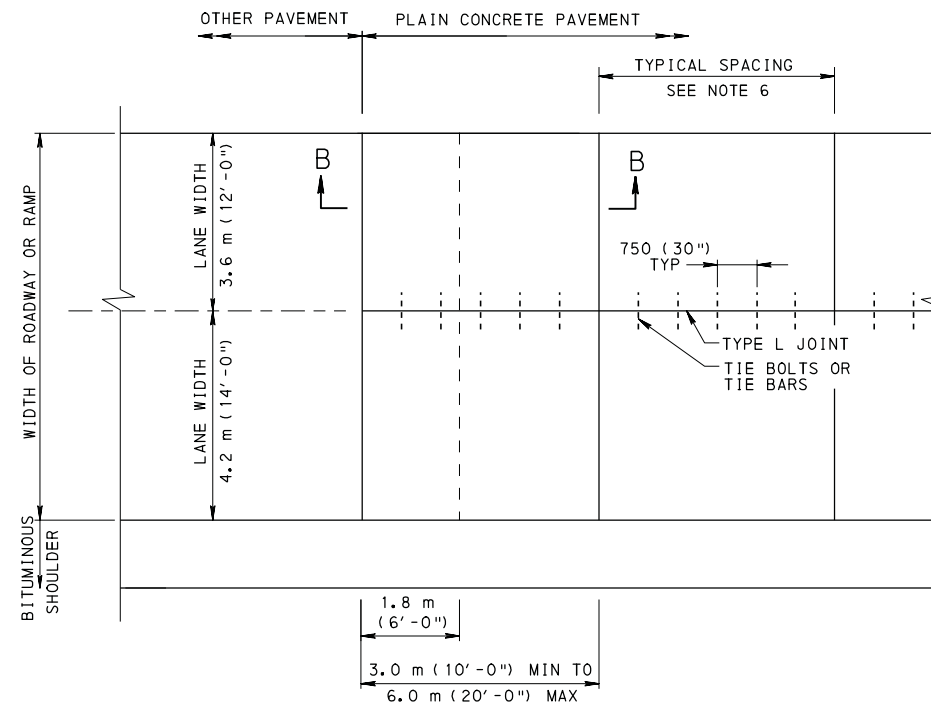
PLAN

## COLLECTORS AND LOCAL ROADS



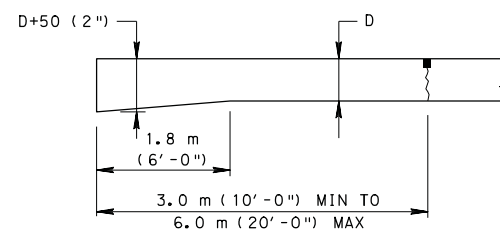
PLAN

## INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMP WITH WIDENED CONCRETE PAVING



PLAN

## TERMINAL SLAB WITH WIDENED CONCRETE LANE PAVING



## TERMINAL SLAB SECTION B-B WITH WIDENED CONCRETE PAVING

### NOTES

1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS. PLACE DOWELS AT 300 (12'') TYPICAL SPACING ACROSS TRANSVERSE JOINT.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'-0''), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMP WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
5. CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
6. USE A 4.5 m (15'-0'') JOINT SPACING ON ALL PAVEMENTS.
7. ON CURVES, CONSTRUCT JOINTS PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
8. FOR WIDENED CONCRETE PAVING SHOULDER DETAILS, SEE RC-25M, SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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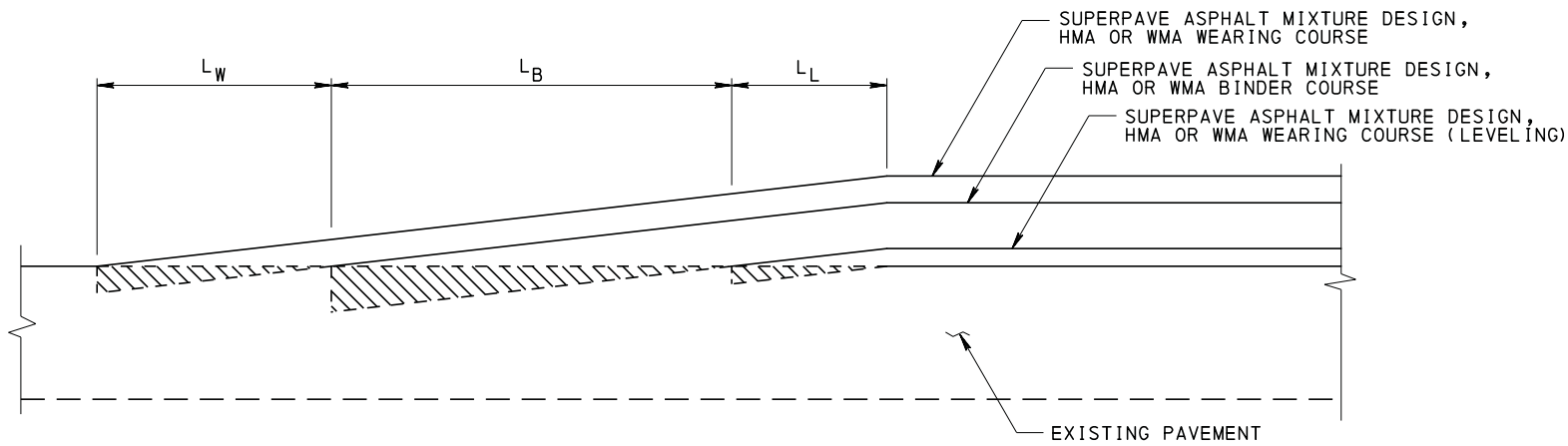
PLAIN CONCRETE PAVEMENT  
WIDENED PAVING

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SHT 2 OF 2  
RC-27M





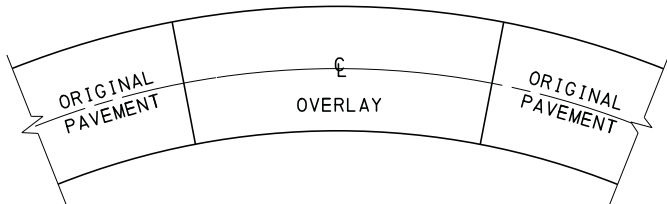
TYPICAL PAVING NOTCH DETAIL

LEGEND

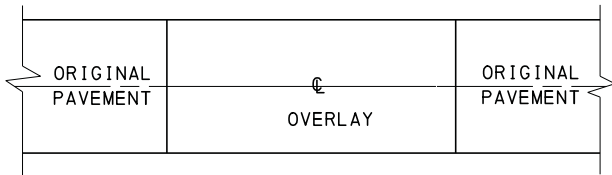


DENOTES AN AREA OF THE EXISTING PAVEMENT TO BE MILLED TO PROVIDE PROPER TRANSITION FOR THE NEW PAVEMENT COURSE. THE DEPTH SHOULD EQUAL THE NOMINAL DEPTH OF THE NEW PAVEMENT COURSE AND GRADUALLY TAPER TO NOTHING OVER A LENGTH ( $L_W$ ,  $L_B$ , OR  $L_L$ ) SHOWN IN TABLE A. THE VARIABLE DEPTH MILLING 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.

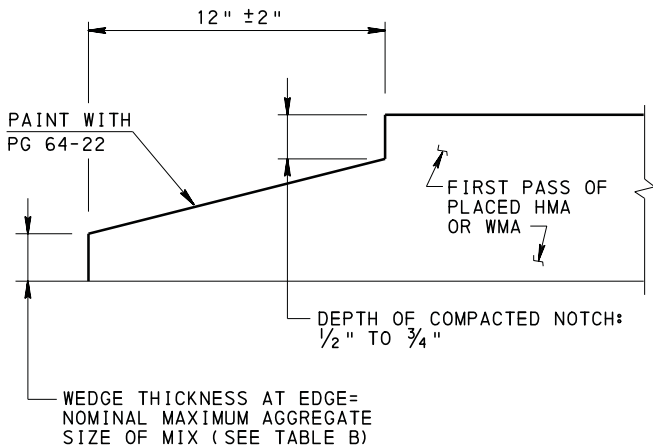


PLAN VIEW  
SUPERELEVATION SECTION

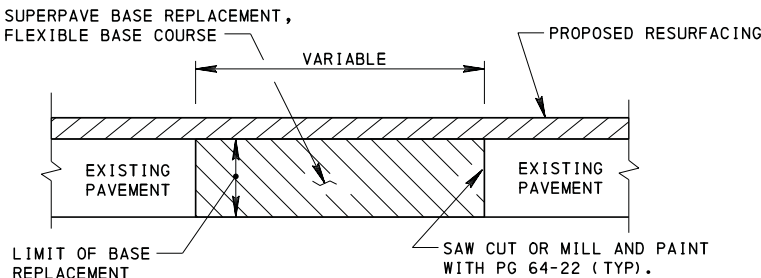


PLAN VIEW  
TANGENT SECTION  
TWO-LANE, TWO-WAY TRAFFIC AND  
TWO-LANE DIRECTIONAL

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'

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 1½" 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.

TABLE B

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

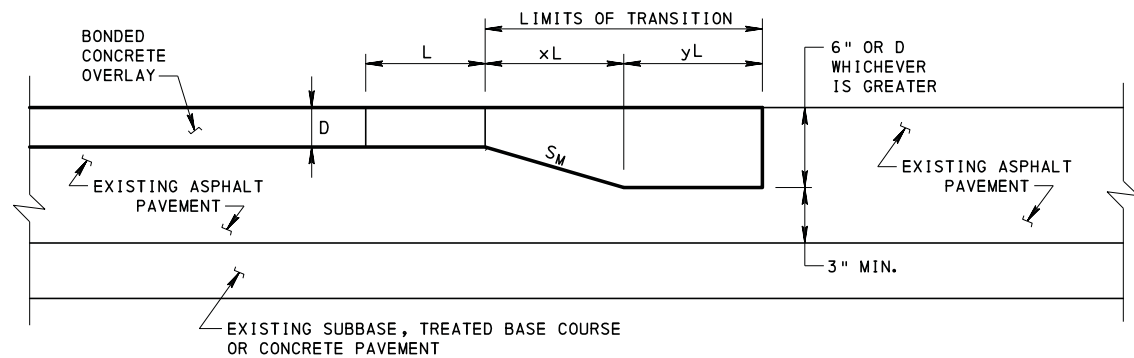
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BUREAU OF PROJECT DELIVERY

OVERLAY TRANSITIONS  
AND  
PAVING NOTCHES

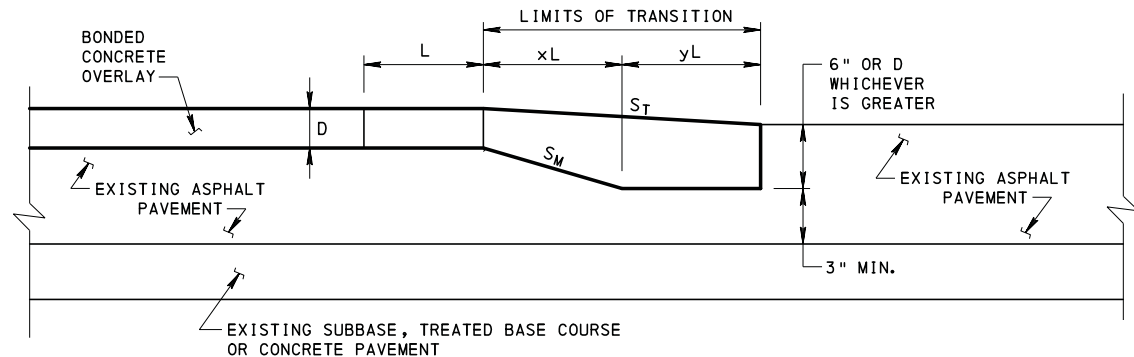
RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

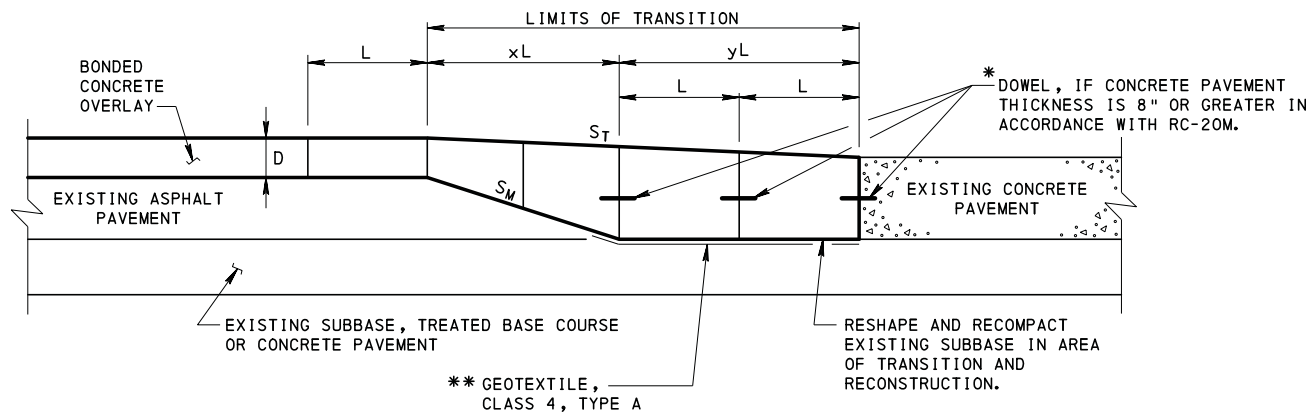
SHT 1 OF 2  
RC-28M



**OVER AN EXISTING ASPHALT-SURFACED TO AN EXISTING ASPHALT-SURFACED PAVEMENT  
WHERE THE DEPTH OF THE OVERLAY EQUALS THE DEPTH OF THE MILLING**



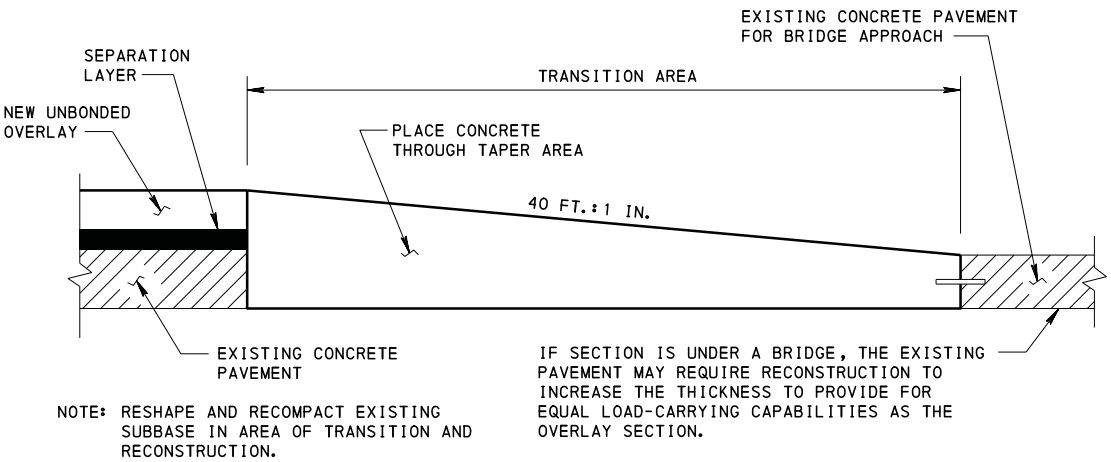
**OVER AN EXISTING ASPHALT-SURFACED TO AN EXISTING ASPHALT-SURFACED PAVEMENT  
WHERE THE DEPTH OF THE OVERLAY EXCEEDS THE DEPTH OF THE MILLING**  
SEE TABLE 1



**OVER AN EXISTING ASPHALT-SURFACED TO AN EXISTING CONCRETE PAVEMENT**  
SEE TABLE 1

**MILL AND FILL TRANSITION FOR BONDED CONCRETE OVERLAYS**

- LEGEND:**
- D = NOMINAL DEPTH OF CONCRETE OVERLAY.
  - L = NOMINAL SLAB LENGTH OF CONCRETE OVERLAY.
  - x = NUMBER OF SLAB PANELS IN THE LONGITUDINAL DIRECTION OF THE SLOPED PORTION OF THE TRANSITION AREA, IF ADDITIONAL MILLING IS REQUIRED TO INCREASE THE THICKNESS OF THE CONCRETE OVERLAY PAVEMENT FROM THE NOMINAL DEPTH, D, TO THE FINAL TRANSITION DEPTH. FOR NOMINAL 3' BY 3' PANELS,  $x \geq 2$ ; FOR LARGER PANELS,  $x \geq 1$ .
  - y = NUMBER OF SLAB PANELS IN THE LONGITUDINAL DIRECTION AT THE FINAL TRANSITION DEPTH IN THE TRANSITION AREA, IF ADDITIONAL MILLING IS REQUIRED TO INCREASE THE THICKNESS OF THE CONCRETE OVERLAY PAVEMENT FROM THE NOMINAL DEPTH, D, TO THE FINAL TRANSITION DEPTH. FOR NOMINAL 3' BY 3' PANELS,  $y \geq 2$ ; FOR LARGER PANELS,  $y \geq 1$ .
  - $S_T$  = SLOPE OF THE TRANSITION FROM THE OVERLAY TO THE EXISTING CONCRETE PAVEMENT (SEE TABLE 1).
  - $S_M$  = SLOPE OF THE SLOPED PORTION OF THE MILLED ASPHALT PAVEMENT IN THE TRANSITION AREA SO THAT THE THICKNESS OF THE CONCRETE OVERLAY PAVEMENT IN THE TRANSITION REMAINS CONSTANT OR INCREASES TO THE FINAL TRANSITION THICKNESS. IF MILLING IS REQUIRED TO MEET THE FINAL TRANSITION DEPTH, THE SLOPE SHOULD BE MILLED AT A UNIFORM RATE BEGINNING AND ENDING AT PLANNED TRANSVERSE JOINT LOCATIONS.
  - \* IF DOWELS ARE REQUIRED, PLACE ALL DOWELS AT A UNIFORM ELEVATION THAT IS EQUAL TO MID-DEPTH OF THE EXISTING CONCRETE PAVEMENT. DOWELS ARE TO BE PLACED AT ALL TRANSVERSE JOINTS FROM (AND INCLUDING) THE END OF THE SLOPED PORTION OF THE MILLED TRANSITION TO (AND INCLUDING) THE FACE OF THE EXISTING CONCRETE PAVEMENT.
  - \*\* PLACE GEOTEXTILE, CLASS 4, TYPE A AS A DEBONDING LAYER IN THE TRANSITION AREA WHERE AN EXISTING TREATED BASE COURSE OR CONCRETE PAVEMENT IS DIRECTLY BELOW THE CONCRETE OVERLAY PAVEMENT. PLACE TIE BARS IN LONGITUDINAL JOINTS OF UNBONDED OVERLAY AREAS > 6 INCHES IN DEPTH IN ACCORDANCE WITH RC-20M.



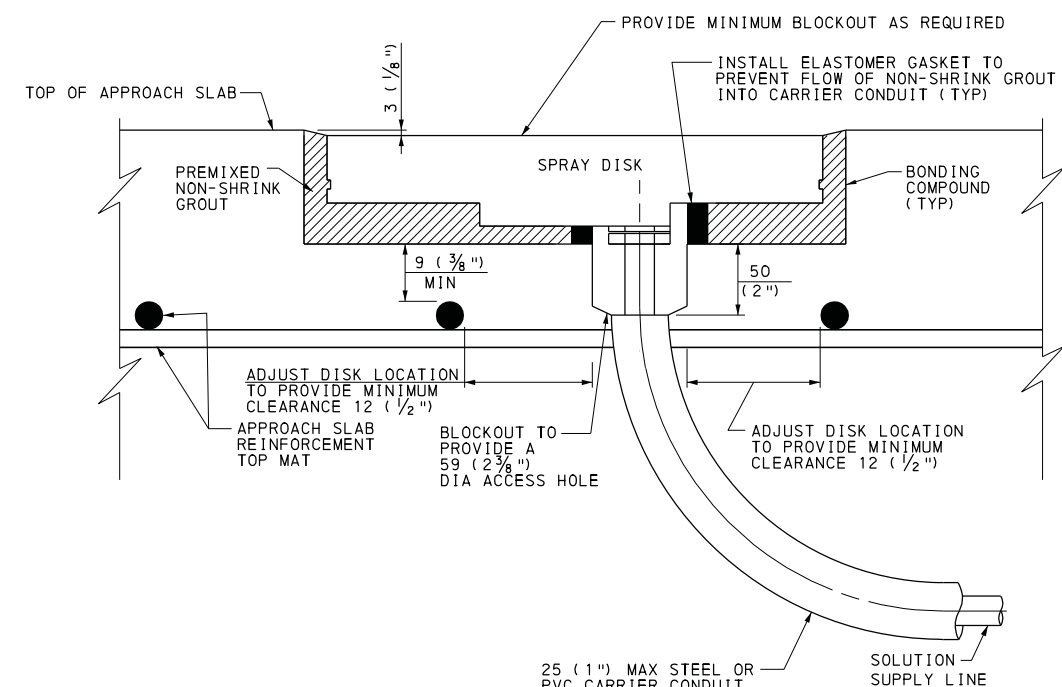
**OVERLAY TRANSITION FOR UNBONDED  
CONCRETE OVERLAYS TO MEET BRIDGE APPROACH  
SLABS OR MAINTAIN CLEARANCE UNDER BRIDGES**

TABLE 1 REQUIRED TRANSITION SLOPE	
DESIGN SPEED (MPH)	MAXIMUM TRANSITION SLOPE, $S_T$
$\leq 45$	25 FT. $\pm 1$ IN.
$> 45$	50 FT. $\pm 1$ IN.

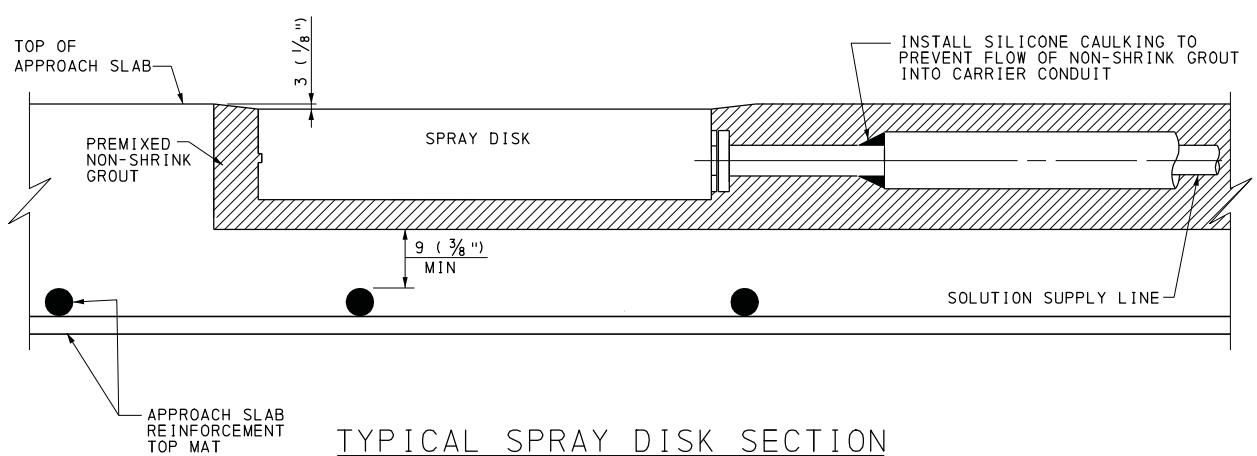
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**OVERLAY TRANSITIONS  
AND  
PAVING NOTCHES**

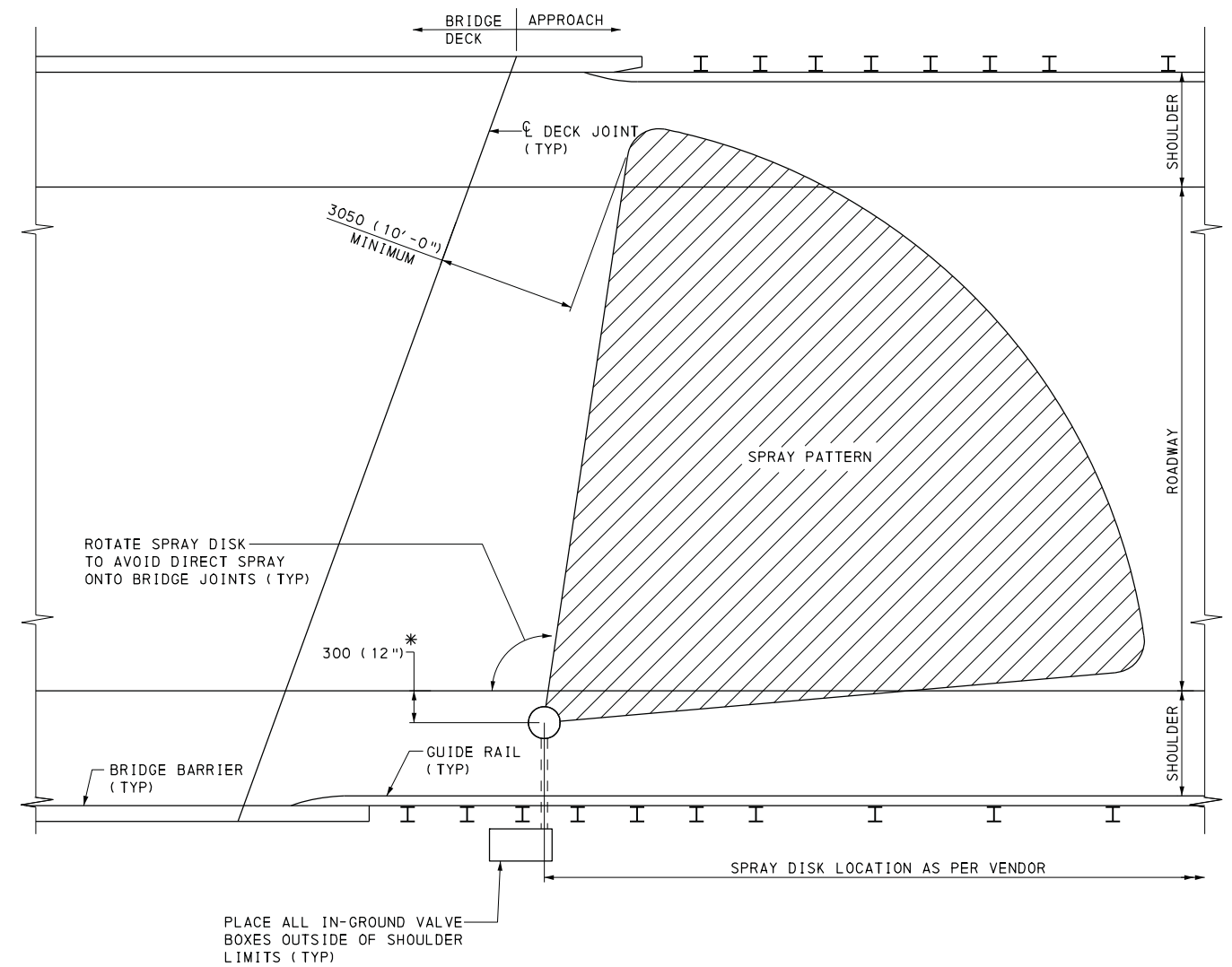
RECOMMENDED FEB. 8, 2019 <i>Mark J. Chappell</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 2 OF 2 <b>RC-28M</b>
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TYPICAL SPRAY DISK SECTION  
(NEW CONSTRUCTION)



TYPICAL SPRAY DISK SECTION  
(EXISTING APPROACH SLAB)



APPROACH PLAN

\* PREFERRED LOCATION FOR SPRAY DISKS IS AS SHOWN ON SHOULDER, WHICH MINIMIZES TRAFFIC DISRUPTIONS WHEN SPRAY DISKS REQUIRE MAINTENANCE. THE ADE OF MAINTENANCE MUST APPROVE ALL OTHER LOCATIONS. OTHER ACCEPTABLE LOCATIONS INCLUDE THE CENTER OF THE TRAVEL LANE.

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
- THESE STANDARDS ARE PRESENTED TO FACILITATE THE INSTALLATION OF SPRAY DISKS FOR AN ANTI-ICING SYSTEM. SEE BC-723M FOR ADDITIONAL INFORMATION, INSTALLATION METHODS, AND FOR AN ANTI-ICING SYSTEM INSTALLATION ON A BRIDGE STRUCTURE.
- CONSTRUCT SPRAY DISKS USING STAINLESS STEEL OR OTHER DURABLE MATERIALS THAT ARE UV RESISTANT. PROVIDE SPRAY DISKS THAT WILL ACCOMMODATE ADJUSTMENTS TO THE SPRAY PATTERN AFTER INSTALLATION. ADJUSTMENT CHOICES INCLUDE NOZZLE ROTATION AND NOZZLE REPLACEMENT.
- ENCLOSE ALL BURIED OR CONCRETE ENCASED SOLUTION SUPPLY LINES AND ELECTRICAL WIRING IN STEEL OR PVC CONDUIT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1101.09(b).
- WHEN INSTALLING ANTI-ICING SYSTEM IN AN EXISTING CONCRETE APPROACH SLAB, DRILL HOLE AND CUT KERF, PLACE CONDUIT AND SUPPLY LINE IN THE KERF AND THROUGH THE HOLE, AND FILL WITH PREMIXED NON-SHRINK GROUT AS INDICATED.

GENERAL NOTES (CONT'D):

- USE A PREMIXED FLOWABLE NONSHRINK GROUT AS PER PUBLICATION 408, SECTION 1080.2(c), FOR EMBEDDING ANTI-ICING HARDWARE IN CONCRETE.
- TO AVOID DAMAGING OR CONFLICTING WITH REINFORCING STEEL IN EXISTING CONCRETE APPROACH SLABS, LIMIT MAXIMUM CORING AND SAW CUTTING FOR SPRAY DISKS AND CONDUITS TO DEPTH OF 60 (2 1/2 inch).
- NO CONDUIT JOINTS ARE PERMITTED FOR INSTALLATION IN EXISTING CONCRETE. FIELD BENDS ARE PERMITTED WHEN INTERNAL DIAMETER IS MAINTAINED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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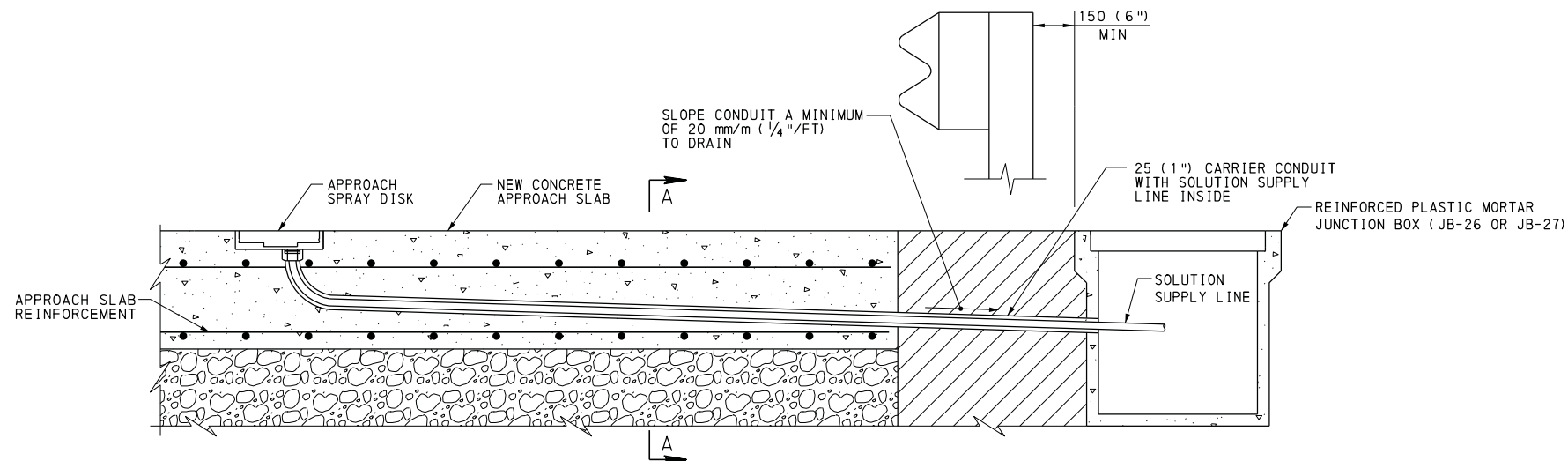
STANDARD  
BRIDGE ANTI-ICING SYSTEM  
APPROACH INSTALLATION

RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

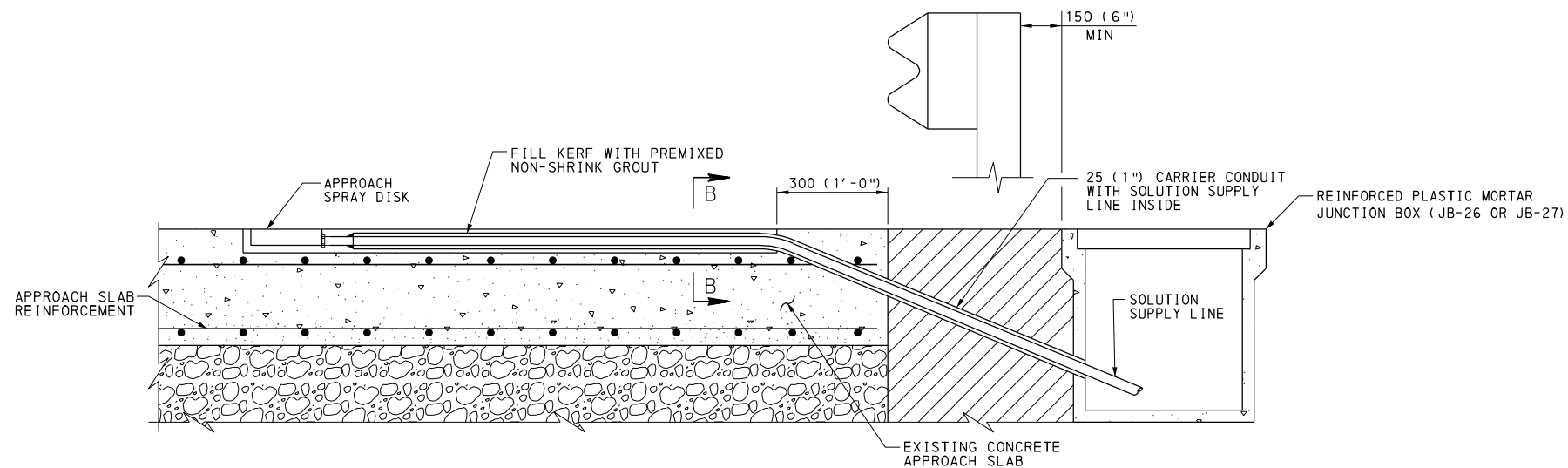
RECOMMENDED JUN. 1, 2010  
*R. N. Willy*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*Sam B. Thomas*  
DIRECTOR, BUREAU OF DESIGN

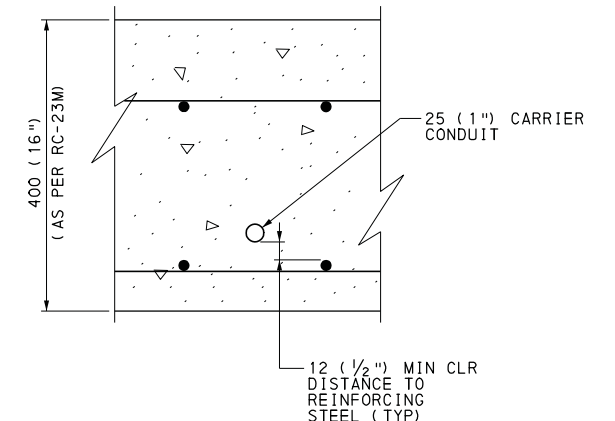
SHT 1 OF 3  
RC-29M



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(NEW APPROACH CONCRETE PAVEMENT)



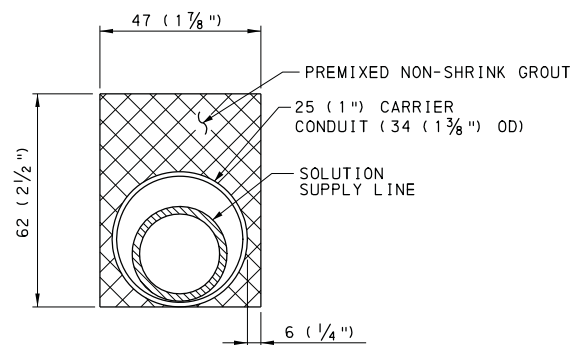
INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(EXISTING APPROACH CONCRETE PAVEMENT)



SECTION A-A

NOTE

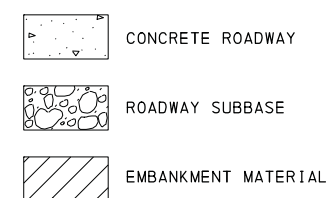
1. FOR GENERAL NOTES, SEE SHEET 1.



SECTION B-B

(SAW KERF DETAIL FOR CONCRETE PAVEMENT)

LEGEND:



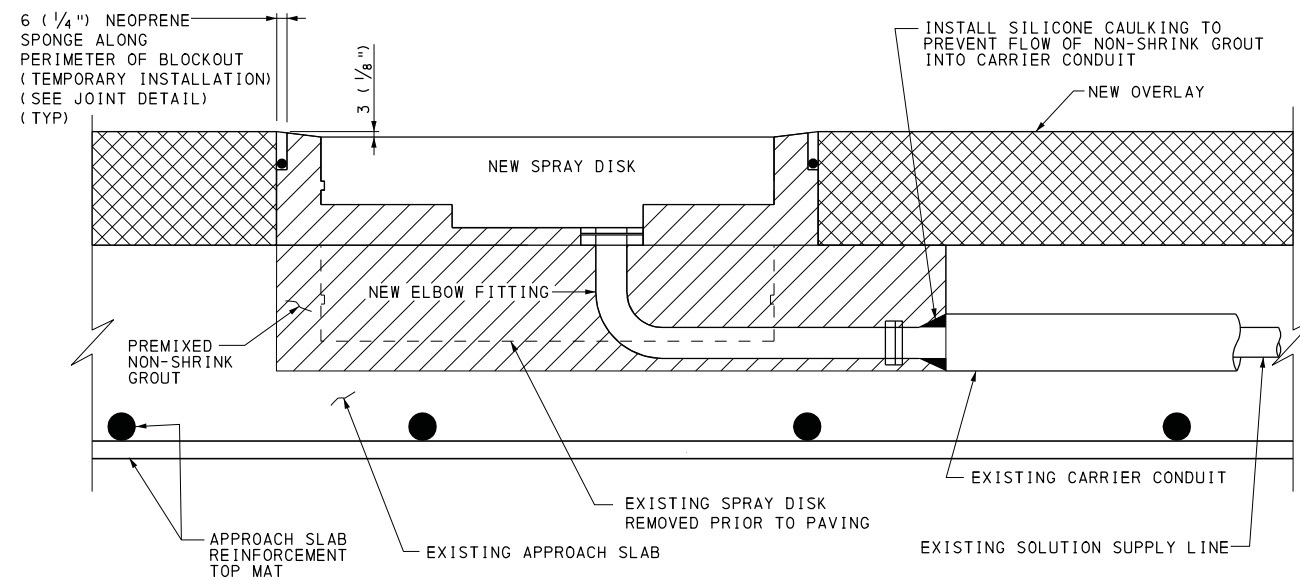
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
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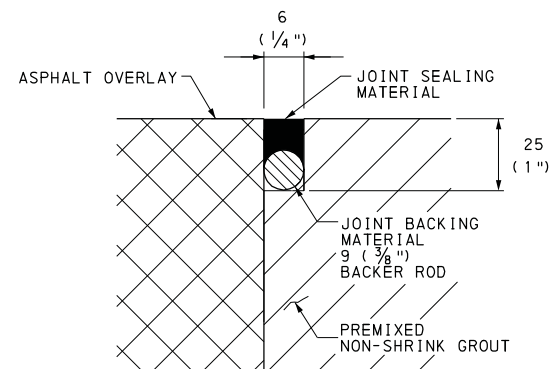
STANDARD  
BRIDGE ANTI-ICING SYSTEM  
APPROACH INSTALLATION

RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

RECOMMENDED JUN. 1, 2010 <i>R. N. Willey</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>Sam B. Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 3 RC-29M
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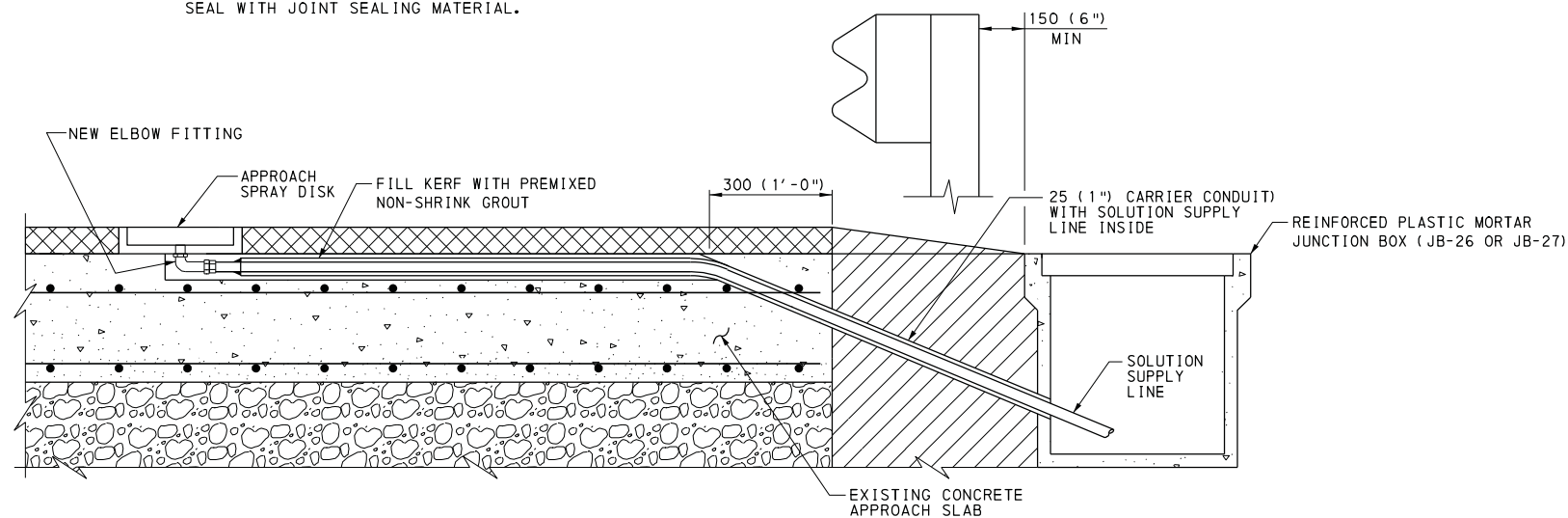


SPRAY DISK ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY  
(ORIGINAL SPRAY DISK INSTALLED AFTER CONSTRUCTION OF APPROACH SLAB)



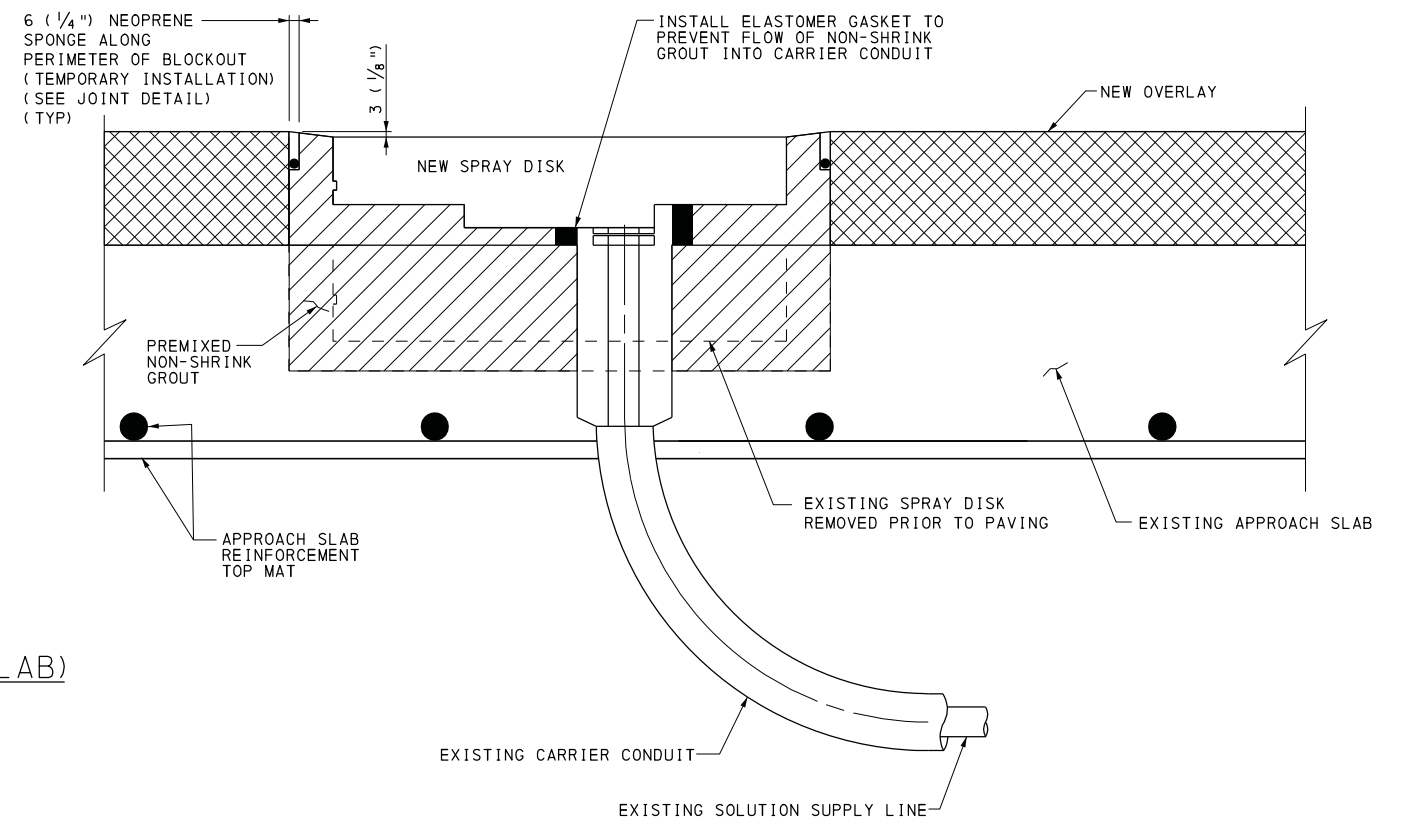
JOINT DETAIL

NOTE: INSTALL JOINT MATERIAL GROUT WITH 6 (1/4\") NEOPRENE SPONGE AROUND PERIMETER OF BLOCKOUT/CUTOUT IN THE OVERLAY LAYER ONLY. AFTER GROUT HARDENS, REMOVE SPONGE AND INSTALL 9 (3/8\") BACKER ROD AND SEAL WITH JOINT SEALING MATERIAL.



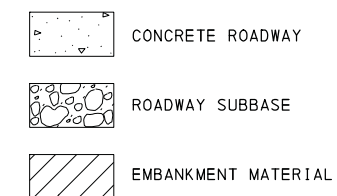
INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(SPRAY DISK INSTALLED CONCURRENTLY WITH NEW BITUMINOUS OVERLAY)

NOTE: DETAIL SIMILAR FOR SPRAY DISK INSTALLED WITH EXISTING OVERLAY. EMBED CARRIER CONDUIT IN CONCRETE.



SPRAY DISK ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY  
(ORIGINAL SPRAY DISK INSTALLED CONCURRENTLY WITH APPROACH SLAB)

# LEGEND:



## NOTES

1. FOR GENERAL NOTES, SEE SHEET 1.
2. FOR KERF DETAILS, SEE SHEET 2.

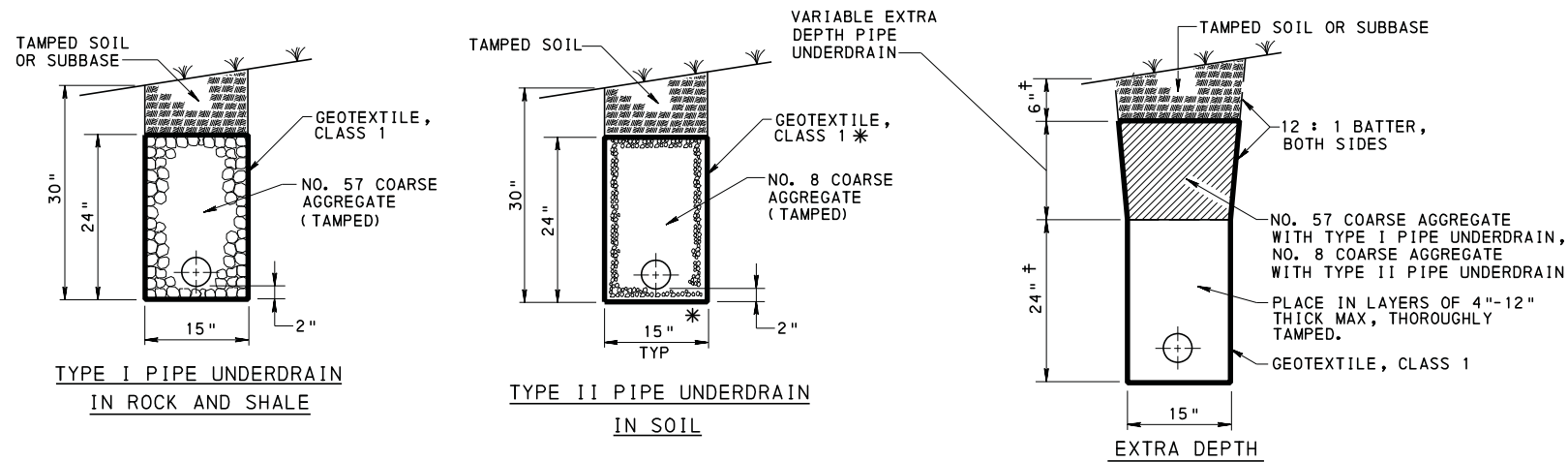
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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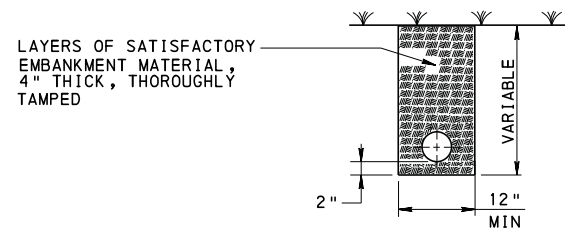
STANDARD  
BRIDGE ANTI-ICING SYSTEM  
SPRAY DISK ADJUSTMENT  
FOR APPROACH OVERLAY

RC-23M	BRIDGE APPROACH SLAB	RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 3
RC-81M	JUNCTION BOXES - LIGHT DUTY	<i>R. N. Wiley</i> CHIEF, HWY. QA DIVISION	<i>Samuel D. Thompson</i> DIRECTOR, BUREAU OF DESIGN	RC-29M
REFERENCE DRAWINGS				





### PIPE UNDERDRAIN



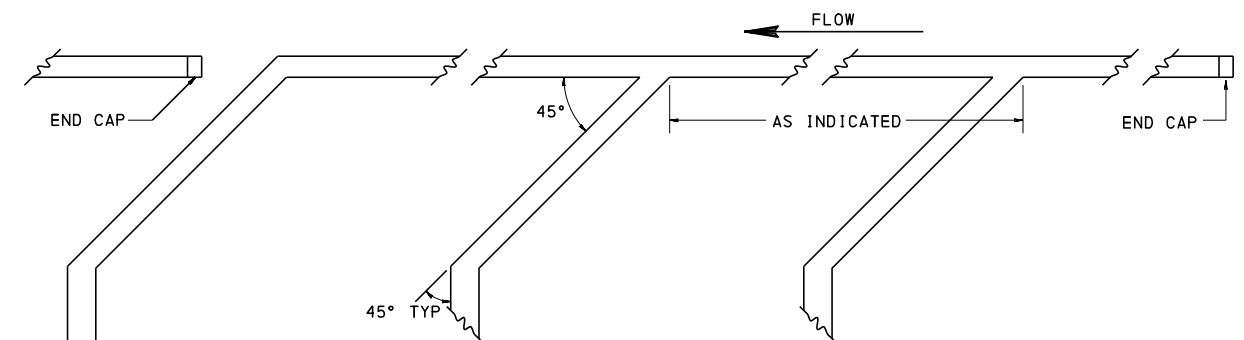
EXCAVATION OVER 36" IN DEPTH AND FOR A MAXIMUM WIDTH OF 24" IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

CRIMP AROUND OUTLET END OF PIPE AND SECURE TO PIPE WITH GALVANIZED STEEL WIRE OR OTHER ACCEPTABLE FASTENING METHODS. SEE NOTE 4

3/4" x 3/4" WIRE MESH SCREENING, 17 GAGE MINIMUM, GALVANIZED AFTER WEAVING.

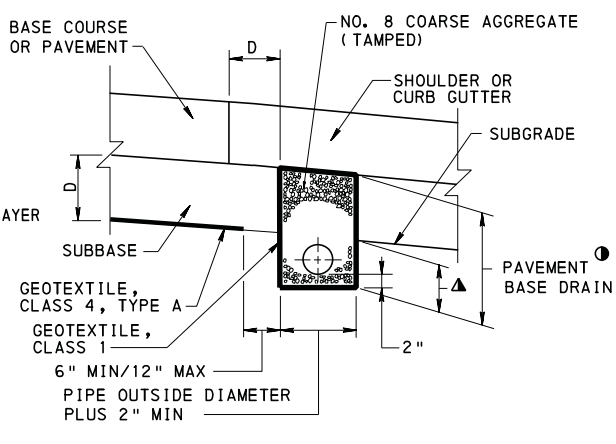
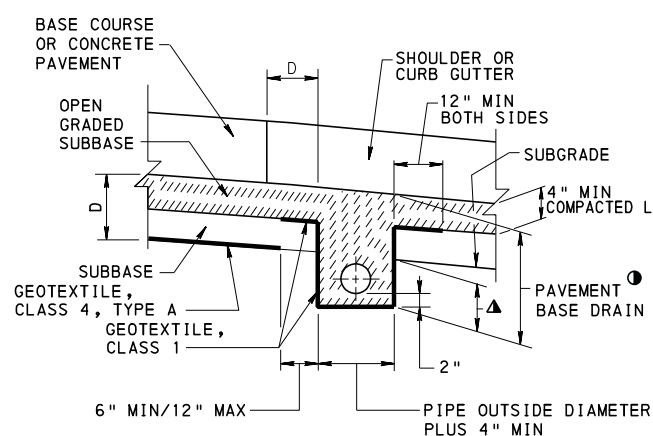
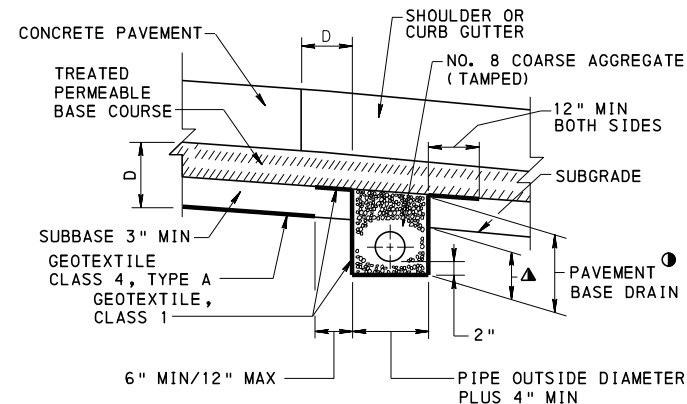
### DETAIL A WIRE MESH SHIELD

CONSTRUCT THE OUTLET INVERT 4" (MINIMUM) HIGHER THAN THE SWALE LINE ELEVATION.

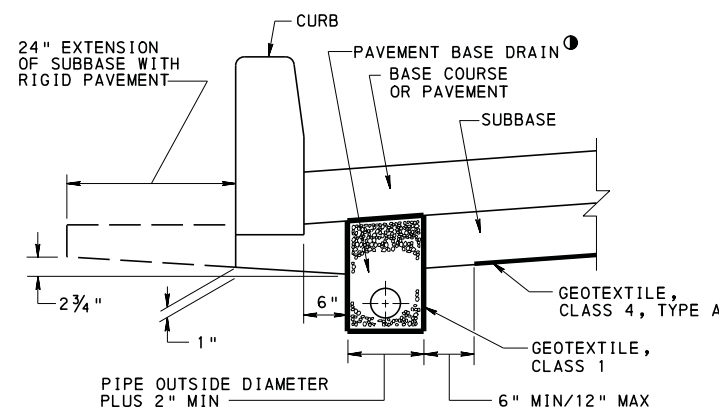


### LEGEND

- ▲ DEPTH BELOW SUBBASE OR SUBGRADE TREATMENT EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2".
- WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.
- \* WHEN GEOTEXTILE MATERIAL IS USED FOR TYPE II PIPE UNDERDRAIN, REPLACE FINE AGGREGATE FILTER BLANKET WITH EQUIVALENT DEPTH OF NO. 8 COARSE AGGREGATE. WHERE ACCESS BY TRENCH EQUIPMENT IS FEASIBLE, PROVIDE TRENCH WIDTH EQUAL TO PIPE OUTSIDE DIAMETER PLUS 2", BUT NOT LESS THAN 6", WHEN GEOTEXTILE MATERIAL IS INDICATED.
- ‡ TYPE I OR TYPE II BACKFILL
- D= SUBBASE DEPTH



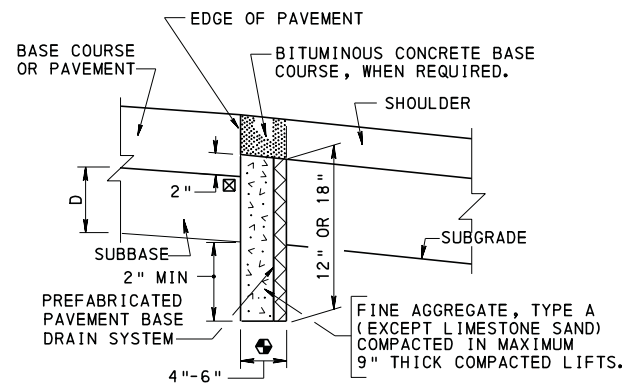
### PAVEMENT BASE DRAIN



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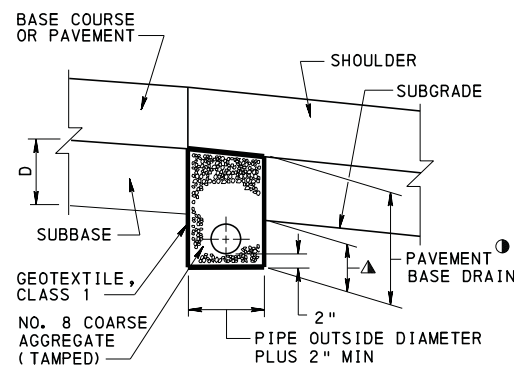
### SUBSURFACE DRAINS



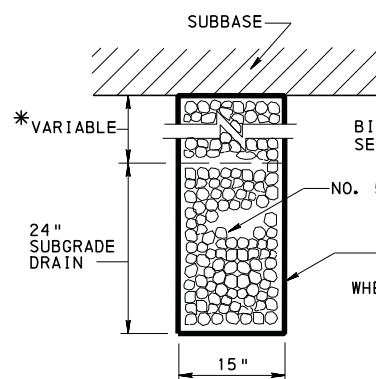


**PREFABRICATED  
PAVEMENT BASE DRAIN  
(REHABILITATION)**

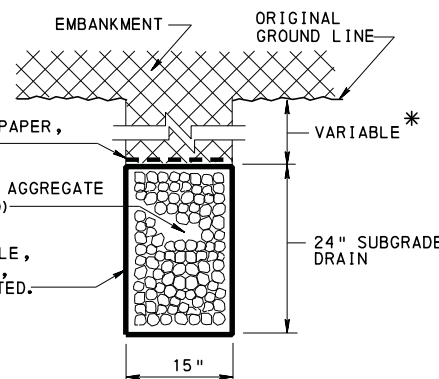
SEE NOTE 3.



**PAVEMENT BASE DRAIN  
(REHABILITATION)**

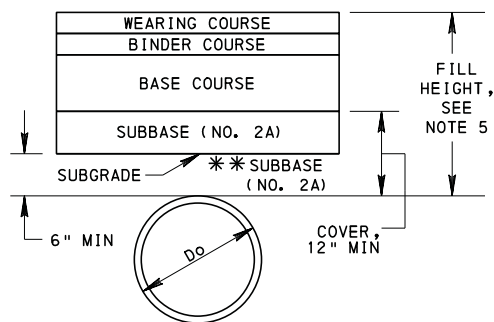


**TREATMENT UNDER SUBBASE**

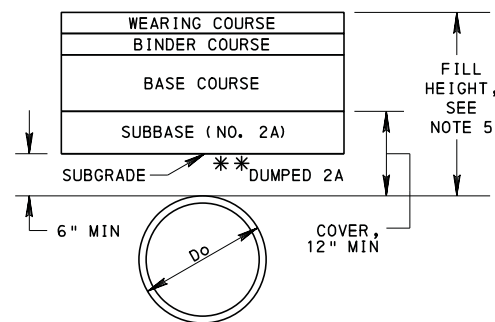


**TREATMENT UNDER EMBANKMENT**

**SUBGRADE DRAIN**

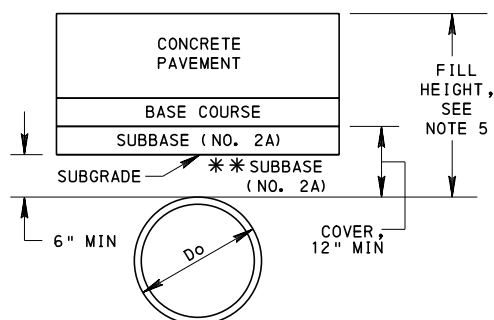


**CONCRETE PIPE (TYP)**

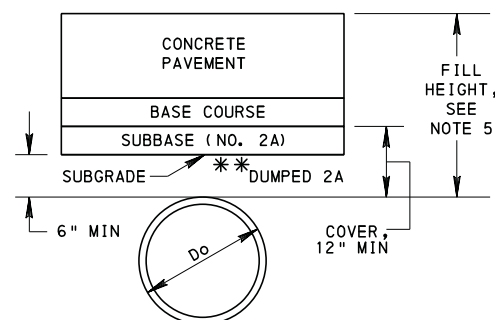


**METAL PIPE OR  
THERMOPLASTIC PIPE (TYP)**

**MINIMUM COVER OVER PIPE UNDER BITUMINOUS PAVEMENTS**

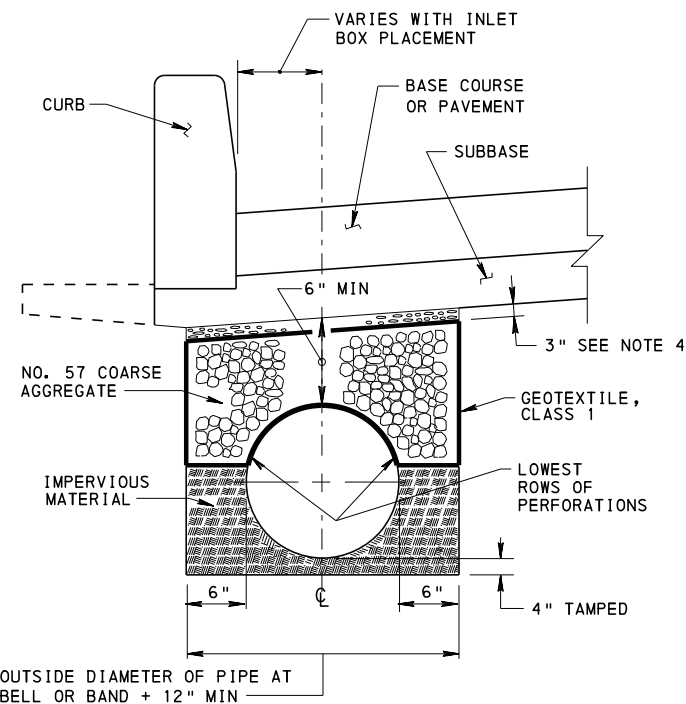


**CONCRETE PIPE (TYP)**



**METAL PIPE OR  
THERMOPLASTIC PIPE (TYP)**

**MINIMUM COVER OVER PIPE UNDER CONCRETE PAVEMENTS**



**COMBINATION  
STORM SEWER AND UNDERDRAIN**

NOTE: PLACE NO. 57 COARSE AGGREGATE, TAMPED IN LAYERS 6" THICK, STARTING AT THE LOWEST ROWS OF PERFORATIONS OR THE START OF THE OPEN JOINT. PLACE GROUPS OF PERFORATIONS OR THE OPEN JOINT (1/3 PIPE CIRCUMFERENCE) SYMMETRICALLY ABOUT THE VERTICAL CENTER LINE.

## NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 610 FOR PAVEMENT BASE DRAIN, SECTION 612 FOR SUBGRADE DRAINS, SECTION 604 FOR COMBINATION STORM SEWER AND UNDERDRAIN AND SECTION 601 FOR PIPE CULVERTS.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. PREFABRICATED PAVEMENT BASE DRAIN IS NOT RECOMMENDED UNDER CURBED SECTIONS AND ADJACENT TO WIDENED PAVEMENT.
4. PLACE 2A AGGREGATE MATERIAL, IN A LIFT 3" THICK, COMPACT TO NON-MOVEMENT AS SPECIFIED IN PUBLICATION 408, SECTION 206.3(b) 1.c.
5. FOR MAXIMUM AND MINIMUM ALLOWABLE FILL HEIGHTS, REFER TO PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 10, APPENDIX B (FILL HEIGHT TABLES FOR PIPES AND PIPE ARCHES).

## LEGEND

- ▲ DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2".
- WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.
- D= SUBBASE DEPTH.
- ☒ IF SLOUGHING OF THE SUBBASE MATERIAL FROM UNDER THE PAVEMENT IS OBSERVED DURING TRENCH EXCAVATION, COMPACT BACKFILL HYDRAULICALLY, AS DIRECTED BY THE ENGINEER.
- ⊕ WIDTH IS EQUAL TO 3"-5" OF BACKFILL AGGREGATE PLUS 1" FOR THE PREFABRICATED BASE DRAIN.
- \* VARY TO MAINTAIN THE NECESSARY SUBGRADE SLOPE. CONSIDER ADDITIONAL AGGREGATE INCIDENTAL TO THE SUBGRADE DRAIN PAY ITEM.
- \*\* REFER TO SHEET 4 FOR PIPE INSTALLATION PROCEDURES, INCLUDING PLACEMENT AND COMPACTION REQUIREMENTS.

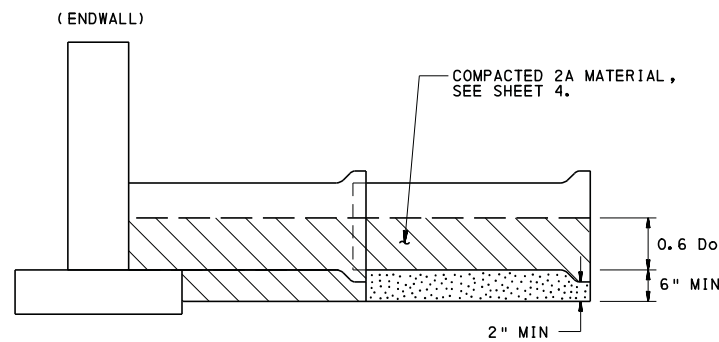
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## SUBSURFACE DRAINS PIPE PLACEMENT

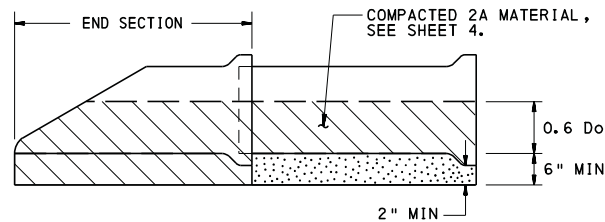
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CHIEF, HWY. DELIVERY DIVISION

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*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

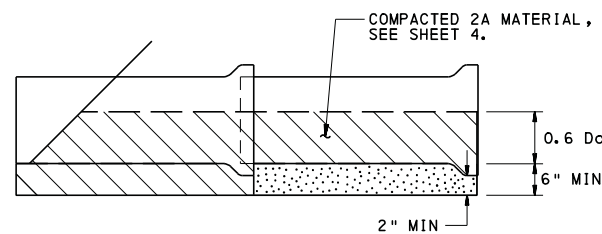
SHT 2 OF 5  
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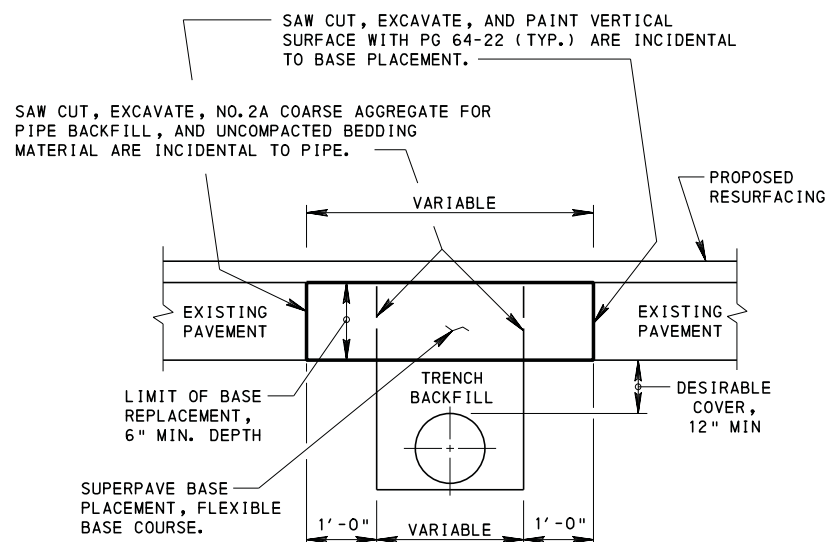
**BACKFILL DETAIL AT ENDWALL**  
(FOR CONCRETE PIPE)



**BACKFILL DETAIL AT END SECTION**  
(FOR CONCRETE PIPE)

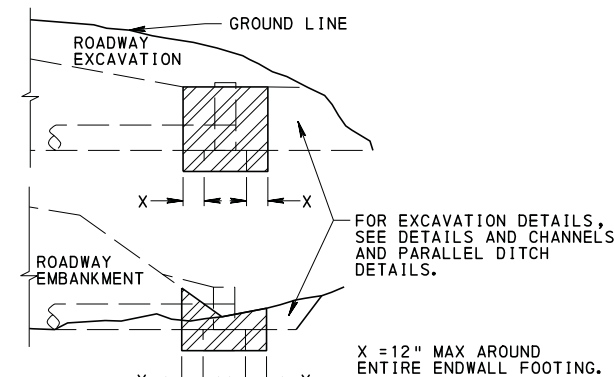


**BACKFILL DETAIL AT LAST SECTION OF PIPE**  
(FOR CONCRETE PIPE)

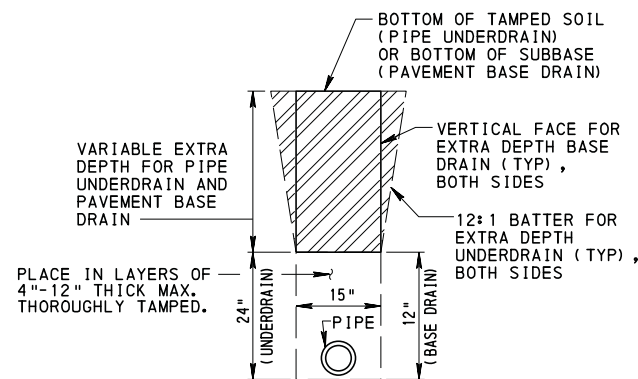


**ELEVATION**

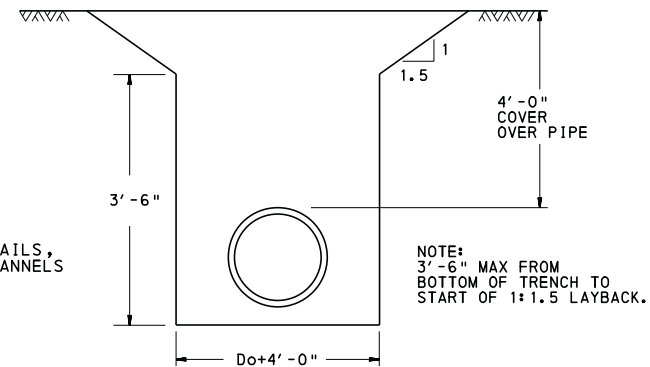
**RESTORATION OF PAVEMENT OVER PIPE**  
SEE NOTES 6, 7, 8, 9, 10 AND 11 THIS SHEET.



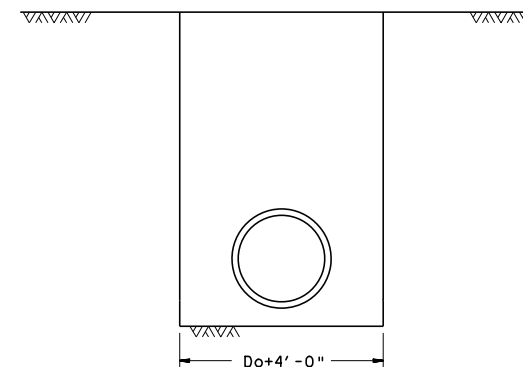
**EXCAVATION FOR ENDWALLS**



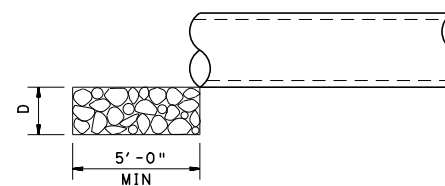
**EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN**



ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 3'-6" OR MORE ABOVE THE BOTTOM OF THE TRENCH.



**PIPE EXCAVATION**



**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

## NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 FOR CORRUGATED METAL PIPE-ARCH CULVERTS AND SECTION 603 FOR METAL PLATE CULVERTS.
2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE IS NOT NORMALLY USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.3(g).
3. IN ALL EXCAVATION AREAS FOLLOW OSHA SAFETY REQUIREMENTS.
4. DO NOT COMPACT NO. 8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.
6. CONSTRUCT FLEXIBLE BASE REPLACEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 316.
7. PREPARE EXPOSED VERTICAL AND HORIZONTAL SURFACES AS PER PUBLICATION 408, SECTION 409.3(k).
8. FOR NON-OVERLAY APPLICATIONS, THE TOP 1½" OF BASE REPLACEMENT WILL BE SUPERPAVE WEARING COURSE.
9. FOR RESTORATION OF RIGID PAVEMENT, REFER TO PUBLICATION 408, SECTION 516 AND RC-26M.
10. FOR SUPERPAVE BASE REPLACEMENT, SAW CUTTING, EXCAVATION, HAULING AND DISPOSAL, BITUMINOUS TACK COAT, BITUMINOUS MATERIAL, AND SEALING OF THE JOINTS ARE CONSIDERED AS INCIDENTAL.
11. PERFORM AND COMPLETE PIPE RESTORATION WORK PRIOR TO THE FLEXIBLE SUPERPAVE BASE REPLACEMENT.

## LEGEND

	CLASS 4 EXCAVATION
	AGGREGATE FOR BEDDING (AASHTO NO. 8)
	COARSE AGGREGATE (2A)

Do = OUTSIDE DIAMETER OF PIPE.

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SUBSURFACE DRAINS  
PIPE PLACEMENT  
EXCAVATION - BEDDING - BACKFILL

RECOMMENDED DEC. 17, 2019 	RECOMMENDED DEC. 17, 2019 	SHT 3 OF 5
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# PIPE INSTALLATION PROCEDURES

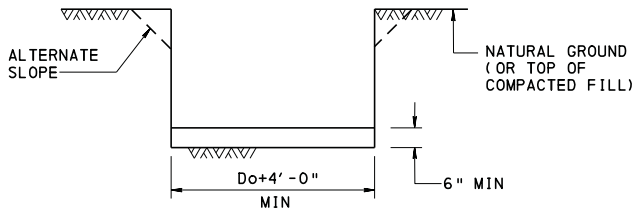
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

- (A) PIPE LYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED (97% SPD) FILL.
- (B) THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.
- (C) THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL (TO MINIMUM 97% SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE NATURAL GROUND.

STEP 1 : REMOVE TOPSOIL (COMPRESSIBLE LAYER OF ORGANIC MATERIAL) TO A WIDTH EQUAL TO 5 OUTSIDE DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS ABOVE (A), (B) & (C). ALSO IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MAKE MIN WIDTH 5 DIAMETERS OF PIPE). PAY AS CLASS 1 EXCAVATION.

STEP 2 : CONSTRUCT THE EMBANKMENT TO 4'-0" ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 72" OR GREATER SEE NOTE 1.

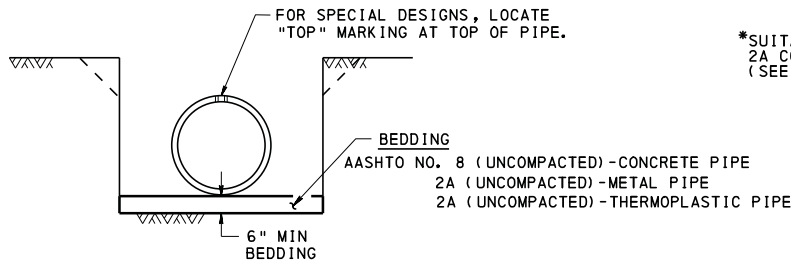
STEP 3 : EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 4'-0" AND CREATE AN APPROPRIATE BEDDING 6" DEEP.



STEP 4 : FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 6"+1/2" INCH/FT OF Do+4'-0", BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE, 16" MAX.

NOTE: IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF BEDDING ELEVATION. (UNLESS OTHERWISE SPECIFIED.)

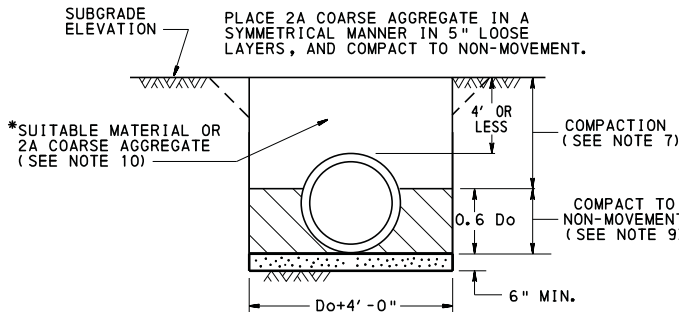
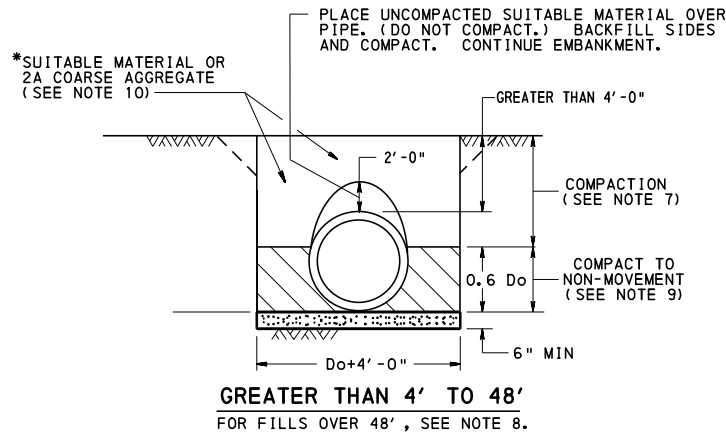
STEP 5 : LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



STEP 6 : FOR CONCRETE PIPE, SEE STEP 6A.  
: FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.  
: FOR THERMOPLASTIC PIPE, SEE STEP 6C.  
: FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

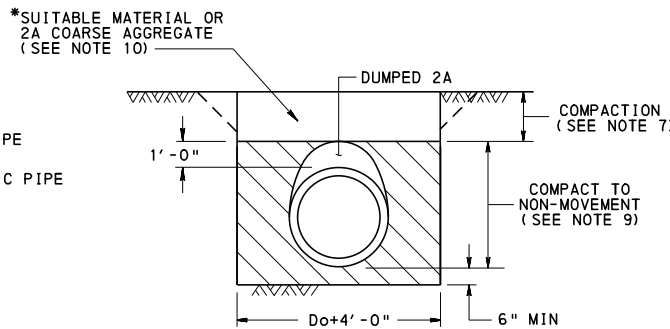
## STEP 6A : CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN 5" LOOSE LAYERS, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 0.6 Do. COMPACT TO NON-MOVEMENT. TEST THE SIDE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



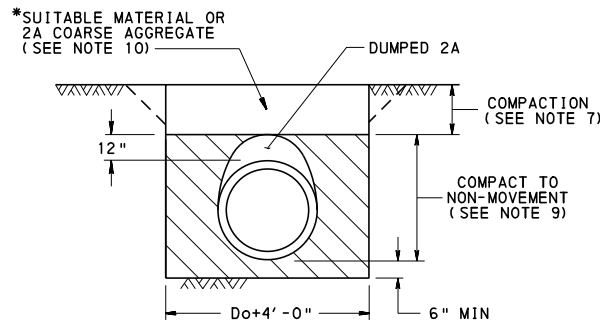
## STEP 6B : METAL PIPE AND METAL PLATE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN 5" LOOSE LAYERS, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 12" ABOVE TOP OF PIPE. COMPACT TO NON-MOVEMENT. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



## STEP 6C: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN 5" LOOSE LAYERS, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 12" ABOVE TOP OF PIPE. COMPACT TO NON-MOVEMENT. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

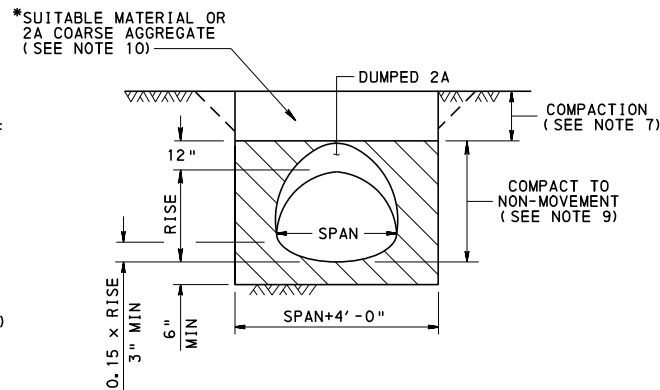


## STEP 6D : METAL PIPE ARCH AND METAL PLATE PIPE ARCH

(1) PLACE 2A COARSE AGGREGATE MATERIAL (0.15 x RISE) ON TOP OF THE BEDDING AND FORM THE CRADLE.

(2) LAY THE PIPE ON THE PREPARED CRADLE.

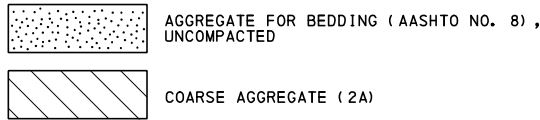
(3) PLACE 2A COARSE AGGREGATE MATERIAL, IN 5" LOOSE LAYERS, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 12" ABOVE TOP OF PIPE. COMPACT TO NON-MOVEMENT. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



## NOTES

1. THE INSTALLATION OF PIPES 72" OR GREATER INSIDE DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE OUTSIDE DIAMETER OR SPAN OF THE PIPE. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO NO. 8) REMAINS AT Do + 4'-0". PAYMENT FOR THE 2A MATERIAL IS AS PER NOTE 3.
2. A HIGHER STRENGTH PIPE THAN SPECIFIED MAY BE SUPPLIED AT NO ADDITIONAL COST TO THE DEPARTMENT.
3. PAYMENT FOR THE BACKFILL ENVELOPE INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 12" ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO NO. 8 BEDDING MATERIAL.
5. FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408, SECTION 601.
6. PERMIT PLACEMENT OF BACKFILL MATERIAL IN 10" LOOSE LAYERS, WHEN USING VIBRATORY COMPACTION EQUIPMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.3(f)3.
7. COMPACT TOP 3'-0" OF SUBGRADE TO 100% IN ACCORDANCE WITH PUBLICATION 408, SECTION 206.3. COMPACT 2A COARSE AGGREGATE TO NON-MOVEMENT AS PER NOTE 9. COMPACT SUITABLE MATERIAL TO MINIMUM 97% SPD.
8. FOR REINFORCED CONCRETE PIPES INSTALLED WITH GREATER THAN 48' OF FILL, PROVIDE 12" BEDDING MINIMUM AND 16" WHEN ROCK IS PRESENT.
9. COMPACT TO NON-MOVEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 206.3(b)1.c.
10. USE 2A COARSE AGGREGATE OR SUITABLE MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.3(f)3.

## LEGEND



Do = OUTSIDE DIAMETER OF PIPE, INCHES

SPD = STANDARD PROCTOR DENSITY

ID = INSIDE DIAMETER

\* SUITABLE = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN 2" IN SIZE. SUITABLE MATERIAL CAN ONLY BE USED AS SPECIFIED IN PUBLICATION 408, SECTION 601.3(f)3.

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SUBSURFACE DRAINS  
PIPE PLACEMENT  
EXCAVATION - BEDDING - BACKFILL

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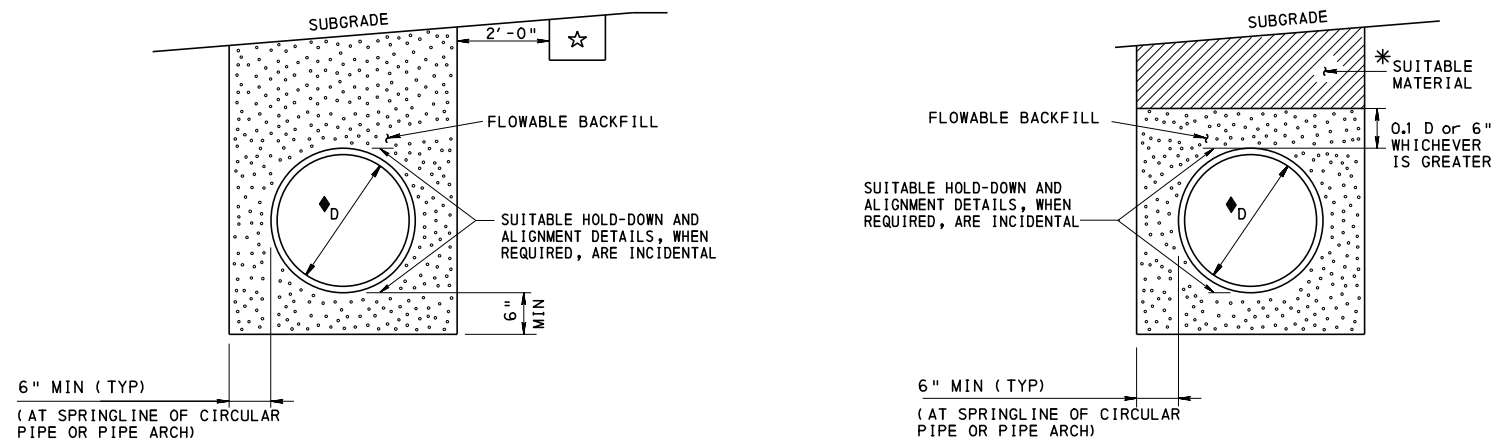
CHIEF, HWY. DELIVERY DIVISION

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DIRECTOR, BUREAU OF PROJECT DELIVERY

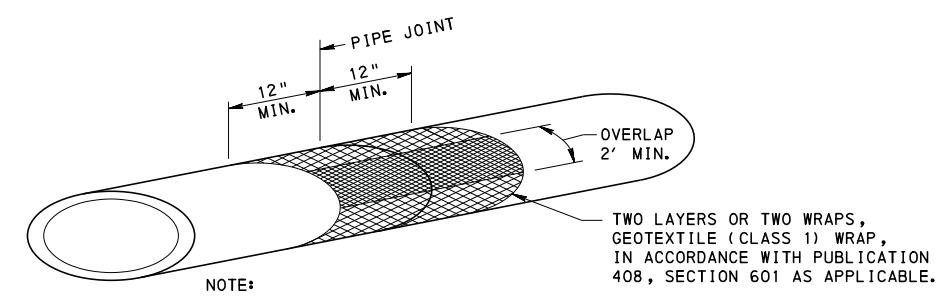
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◆ D = NOMINAL DIAMETER OR RISE IN DESCRIPTION OF PIPE ITEM.  
3'-0" MAXIMUM DIAMETER OR RISE.

**FLOWABLE BACKFILL DETAIL**  
(SEE NOTE 4)



NOTE:  
WHERE USED, THE COST OF THE GEOTEXTILE WRAP WILL BE INCIDENTAL TO THE PIPE ITEM.

**METAL PIPE**  
UNLESS A DIMPLE OF THE METAL PIPE COUPLER FILLS EACH CORRUGATION VALLEY, GEOTEXTILE (CLASS 1) WRAP IS REQUIRED AS SHOWN, IN ACCORDANCE WITH PUBLICATION 408, SECTION 601 AS APPLICABLE.

**ELLIPTICAL PIPE  
GEOTEXTILE WRAP**  
FOR ALL PIPE TYPES

**NOTES**

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 601 AND 220.
2. FLOWABLE BACKFILL WILL ENVELOP THE LAST SECTION OF PIPE OR END SECTION. CONSTRUCT DIKE OF FLOWABLE BACKFILL MATERIAL AS SPECIFIED IN SPECIAL PROVISION OR PROVIDE FORMWORK TO CONTAIN FLOWABLE BACKFILL.
3. PAYMENT FOR THE BACKFILL ENVELOPE (AGGREGATE, BEDDING AND BACKFILL OR FLOWABLE BACKFILL MATERIAL) AND SUITABLE MATERIAL UP TO 12" ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. THE FLOWABLE BACKFILL DETAIL REPLACES STEPS 6A, 6B, 6C AND 6D ON SHEET 4 WHEN FLOWABLE BACKFILL IS SPECIFIED.

☆ IF DRAINAGE IS REQUIRED TO MAINTAIN POSITIVE FLOW OF WATER AWAY FROM THE TRENCH, IT MUST BE PROVIDED BY USE OF PROPERLY DESIGNED GRANULAR OR SYNTHETIC DRAINS.

\* SUITABLE= MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN 2" IN SIZE. SUITABLE MATERIAL CAN ONLY BE USED AS SPECIFIED IN PUBLICATION 408, SECTION 601.3(f)3.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
SUBSURFACE DRAINS  FLOWABLE BACKFILL AND GEOTEXTILE JOINT WRAP		
RECOMMENDED DEC. 17, 2019 <i>[Signature]</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED DEC. 17, 2019 <i>[Signature]</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 5 OF 5  RC-30M

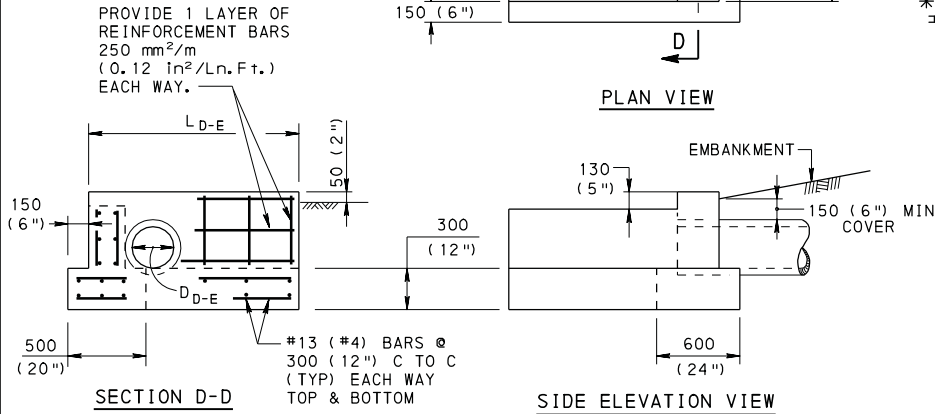


NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. THIS STANDARD DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. USE CLASS A CONCRETE OR BETTER & CHAMFER EXPOSED EDGES AT 25 (1").
4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST 50 (2") BUT NOT MORE THAN 100 (4") LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE. FOR TYPE D-E AND E-S ENDWALLS PROVIDE MIN. 200 (8") WALL HEIGHT OVER THE PIPE.
5. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION OF PRECAST ENDWALLS. GALVANIZE METAL DEVICES AS SPECIFIED IN PUB 408, SECTION 1105.
6. PROVIDE NON-SHRINK EPOXY GROUT THROUGHOUT THE CONTACT SURFACE WHEN CONNECTING WING AND HEADWALL SECTION TO BASE SECTION. PROVIDE JOINT SEALANT MATERIAL ALONG INTERFACE BETWEEN WING AND HEADWALL SECTION AND BASE SECTION.
7. PROVIDE MORTAR BED OF 25 (1") PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.
8. PROVIDE REINFORCEMENT, 250 mm<sup>2</sup>/m, (0.12 in<sup>2</sup>/Ln.Ft.) IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.
9. THE SLOPED SUBSURFACE DRAIN OUTLET ENDWALL IS DESIGNATED FOR INSTALLATION ALONG INTERSTATES AND EXPRESSWAYS WHERE THE SUBSURFACE DRAIN WILL OUTLET ON MEDIAN AND/OR OUTSIDE SLOPES THAT ARE SUBJECT TO MOWING.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

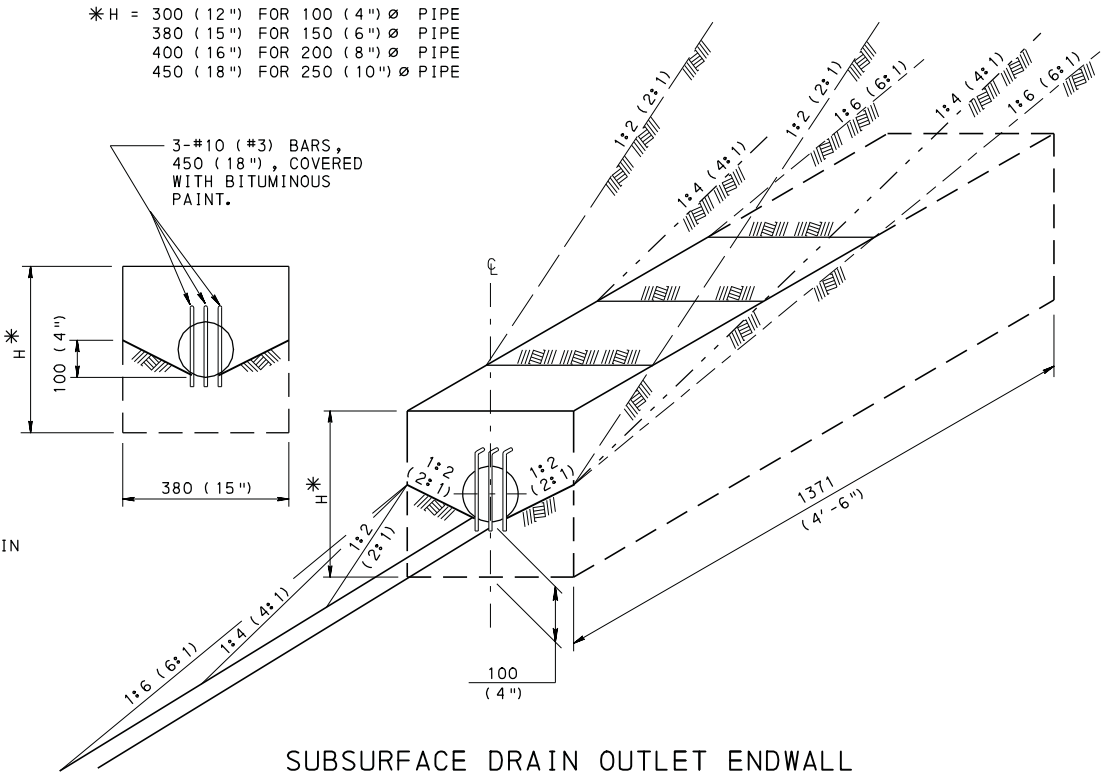
NOTES:

- LOCAL CONDITIONS WILL GOVERN DIMENSION A<sub>D-E</sub>.
- L<sub>D-E</sub> = 2.5D<sub>D-E</sub> + 300 (12")



TYPE D-E ENDWALL

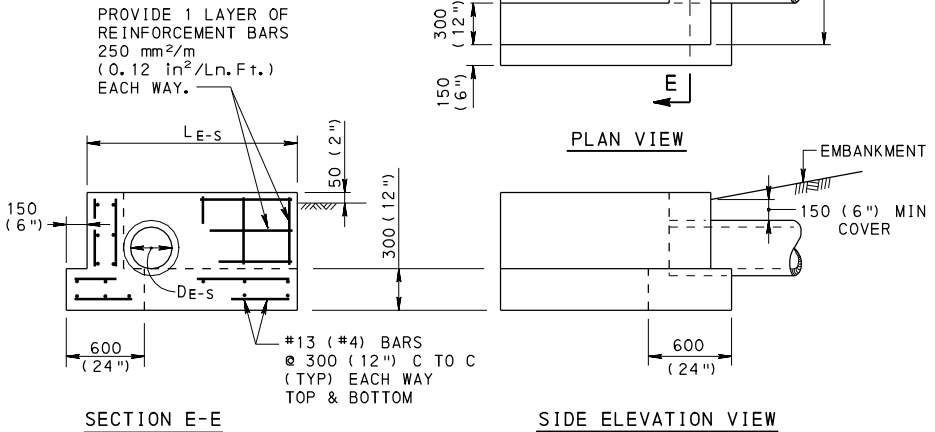
\* H = 300 (12") FOR 100 (4") Ø PIPE  
380 (15") FOR 150 (6") Ø PIPE  
400 (16") FOR 200 (8") Ø PIPE  
450 (18") FOR 250 (10") Ø PIPE



SUBSURFACE DRAIN OUTLET ENDWALL  
FOR SLOPED SUBSURFACE DRAIN OUTLET ENDWALL SEE SHEET 2.

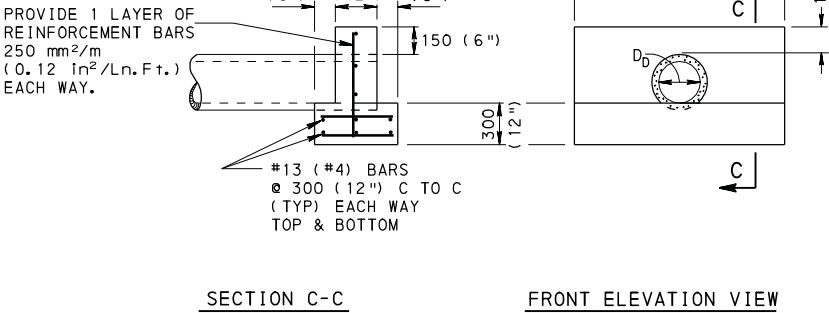
NOTES:

- THE WALL WHICH THE PIPE IS CONNECTED TO SHOULD BE PARALLEL TO THE ROADWAY.
- L<sub>E-S</sub> = 2.5D<sub>E-S</sub> + 300 (12")

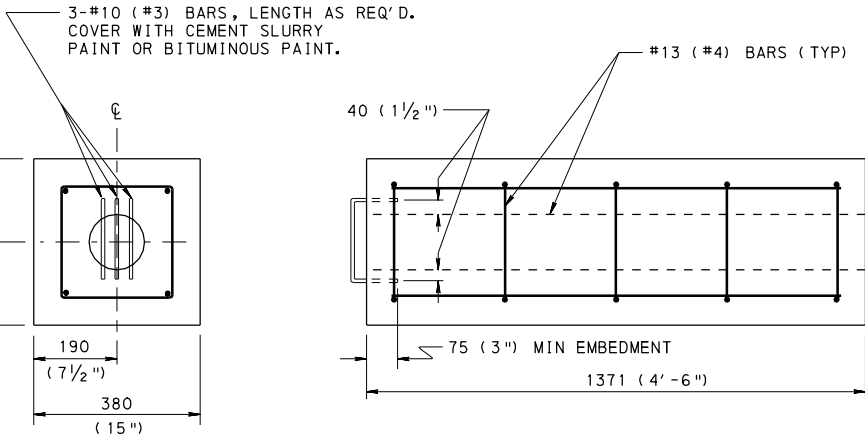


TYPE E-S ENDWALL

PIPE DIAMETER	L <sub>D</sub>
450 AND 525 (18" AND 21")	1500 (5')
600 AND 675 (24" AND 27")	2100 (7')
750 AND 825 (30" AND 33")	2700 (9')
900 AND 975 (36" AND 39")	3000 (10')
1050 AND 1125 (42" AND 45")	3300 (11')
1200 AND 1275 (48" AND 51")	3600 (12')



TYPE D ENDWALL

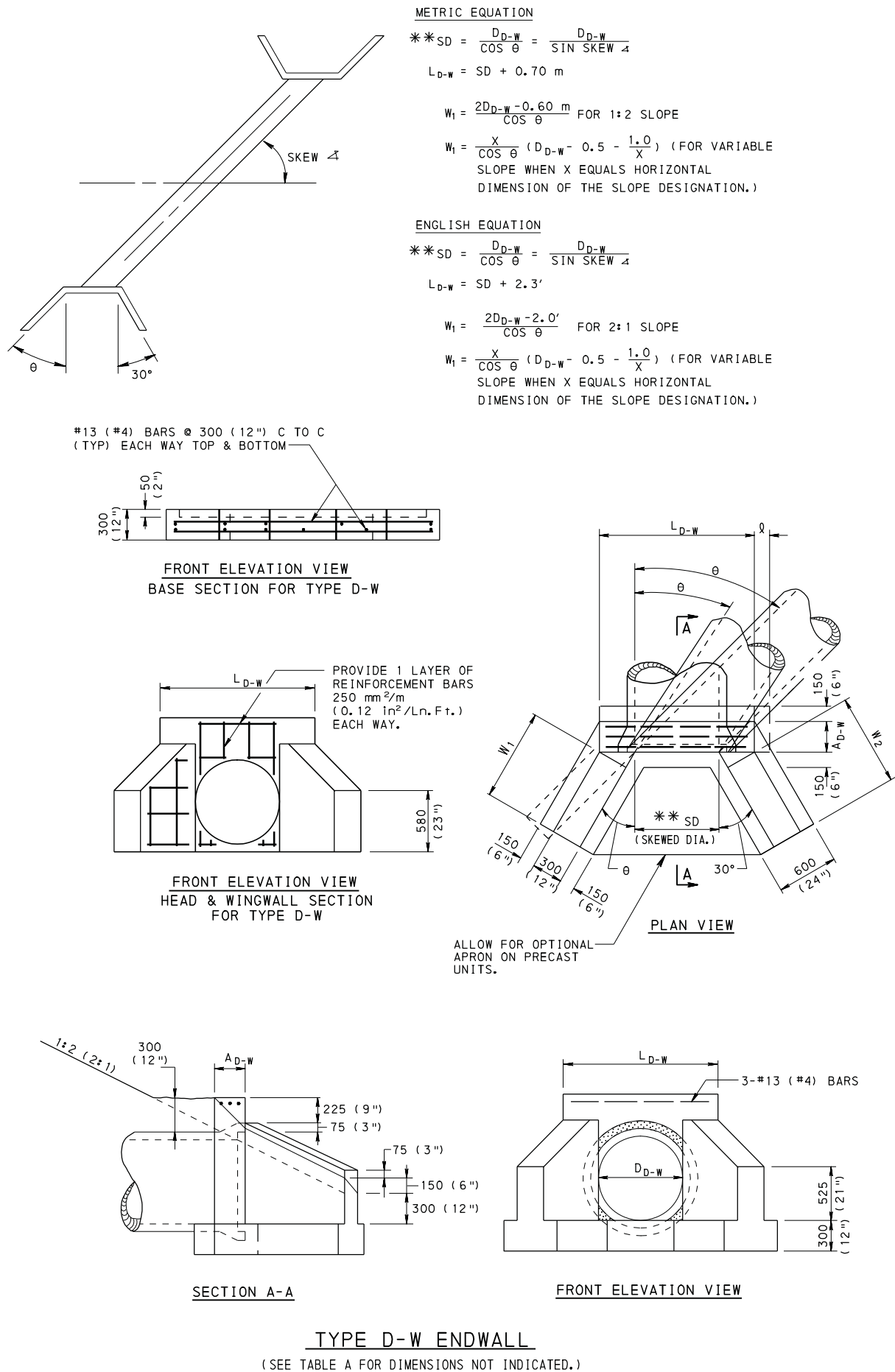


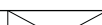
(PRECAST) SUBSURFACE DRAIN OUTLET ENDWALL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

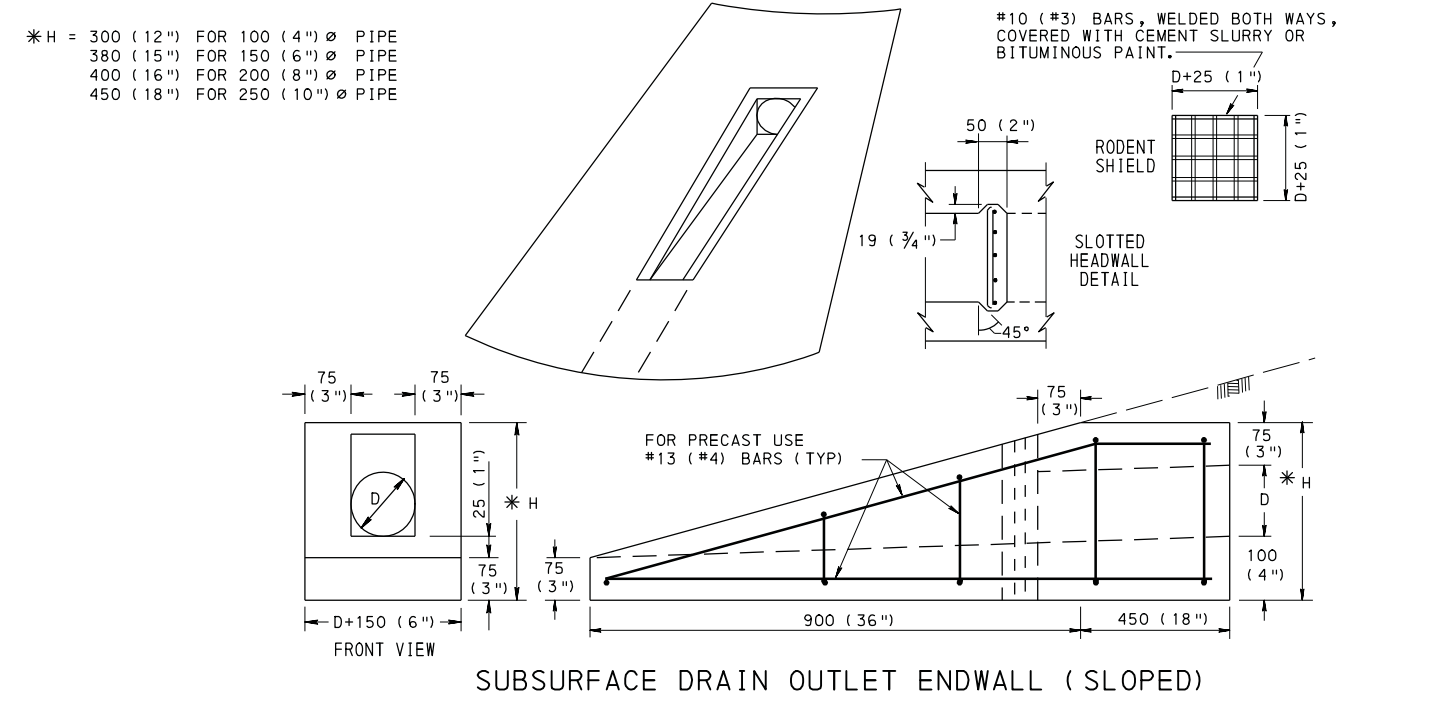
COMMONWEALTH OF PENNSYLVANIA  
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ENDWALLS  
CAST-IN-PLACE & PRECAST



PIPE DIAMETER	SKEW $\Delta$ = 90° TO 60° $\theta$ = 30°			SKEW $\Delta$ = 55° $\theta$ = 35°			SKEW $\Delta$ = 50° $\theta$ = 40°			SKEW $\Delta$ = 45° $\theta$ = 45°			SKEW $\Delta$ = 40° $\theta$ = 50°			SKEW $\Delta$ = 30° $\theta$ = 60°			SKEW $\Delta$ = 20° $\theta$ = 70°			SKEW $\Delta$ = 10° $\theta$ = 80°				
D <sub>D-W</sub> (mm)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	L <sub>D-W</sub> (m)	ℓ (m)	W <sub>1</sub> (m)	W <sub>2</sub> (m)	A <sub>D-W</sub> (mm)
900	1.74	0	1.39	1.80	0.10	1.46	1.87	0.15	1.57	1.97	0.20	1.70	2.10	0.23	1.87	2.50	0.41	2.40	3.33	0.53	3.51	5.88	1.52	6.91	1.39	300
1050	1.91	0	1.73	1.98	0.10	1.83	2.07	0.15	1.96	2.18	0.20	2.12	2.33	0.23	2.33	2.80	0.41	3.00	3.77	0.53	4.39	6.75	1.52	8.64	1.73	300
1200	2.09	0	2.08	2.16	0.10	2.20	2.27	0.15	2.35	2.40	0.20	2.55	2.57	0.23	2.80	3.10	0.41	3.60	4.21	0.53	5.26	7.61	1.52	10.37	2.08	300
1350	2.26	0	2.42	2.35	0.10	2.56	2.46	0.15	2.74	2.61	0.20	2.97	2.80	0.23	3.27	3.40	0.41	4.20	4.65	0.53	6.14	8.47	1.52	12.09	2.42	300
1500	2.43	0	2.77	2.53	0.10	2.93	2.66	0.15	3.13	2.82	0.20	3.39	3.03	0.23	3.73	3.70	0.41	4.80	5.09	0.53	7.02	9.34	1.52	13.82	2.77	375
1800	2.78	0	3.46	2.90	0.10	3.66	3.05	0.15	3.92	3.25	0.20	4.24	3.50	0.23	4.67	4.30	0.41	6.00	5.96	0.53	8.77	11.07	1.52	17.28	3.46	375

PIPE DIAMETER	SKEW Δ = 90° TO 60° θ = 30°			SKEW Δ = 55° θ = 35°			SKEW Δ = 50° θ = 40°			SKEW Δ = 45° θ = 45°			SKEW Δ = 40° θ = 50°			SKEW Δ = 30° θ = 60°			SKEW Δ = 20° θ = 70°			SKEW Δ = 10° θ = 80°			<div></div>	
	D <sub>D-W</sub> (IN.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)	W <sub>1</sub> (FT.)	L <sub>D-W</sub> (FT.)	ℓ (FT.)		
36	5.8	0	4.6	6.0	0.33	4.9	6.2	0.5	5.2	6.5	0.67	5.7	7.0	0.75	6.2	8.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
42	6.3	0	5.8	6.6	0.33	6.1	6.9	0.5	6.5	7.3	0.67	7.1	7.8	0.75	7.8	9.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
48	6.9	0	6.9	7.2	0.33	7.3	7.5	0.5	7.8	8.0	0.67	8.5	8.5	0.75	9.4	10.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
54	7.5	0	8.0	7.8	0.33	8.5	8.2	0.5	9.1	8.7	0.67	9.9	9.3	0.75	10.9	11.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
60	8.1	0	9.2	8.4	0.33	9.8	8.8	0.5	10.4	9.4	0.67	11.3	10.1	0.75	12.5	12.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
72	9.2	0	11.5	9.6	0.33	12.2	10.1	0.5	13.0	10.8	0.67	14.1	11.7	0.75	15.6	14.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15



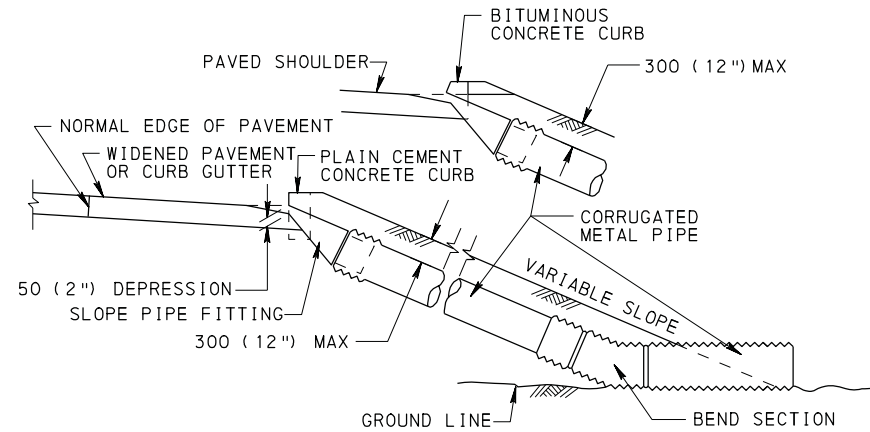
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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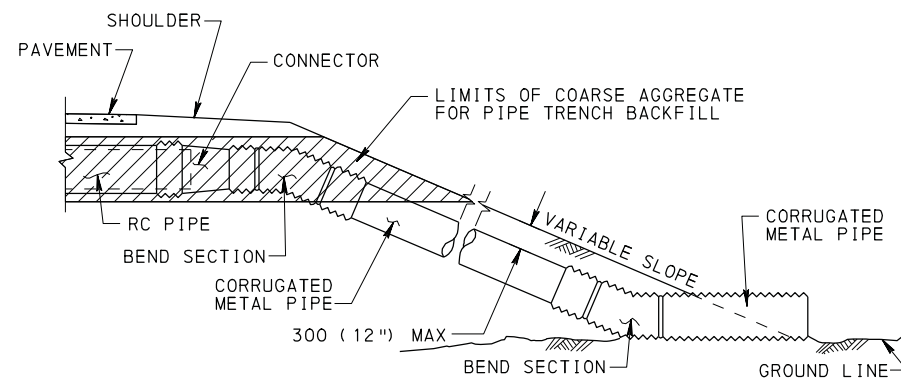
**ENDWALLS**  
**CAST-IN-PLACE & PRECAST**

RECOMMENDED JUN. 1, 2010 <i>R. N. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>Sam B. Thomas</i> DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 2 <b>RC-31M</b>
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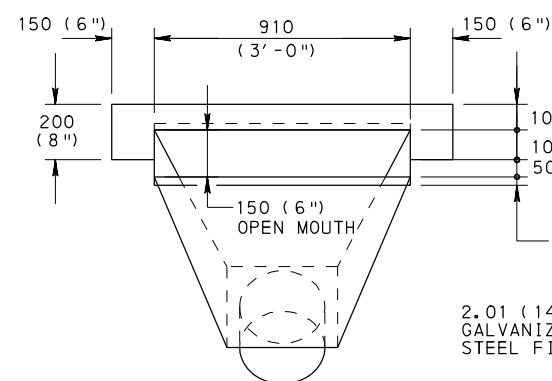




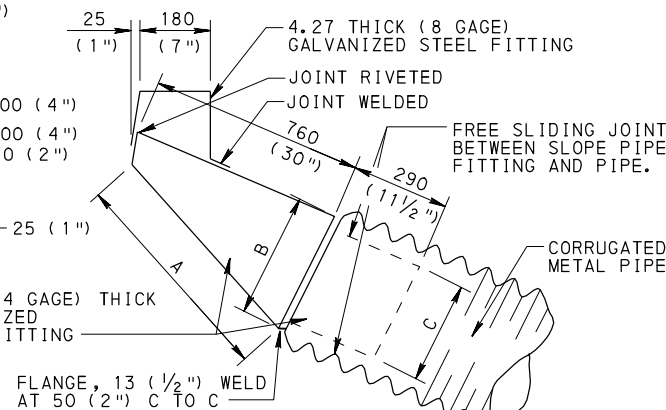
ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



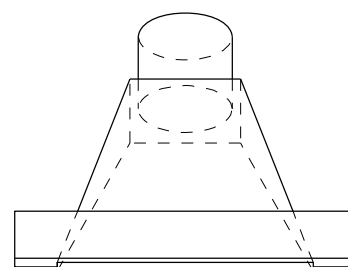
OUTLET PIPE THRU EMBANKMENT SLOPE



FRONT ELEVATION



SIDE ELEVATION

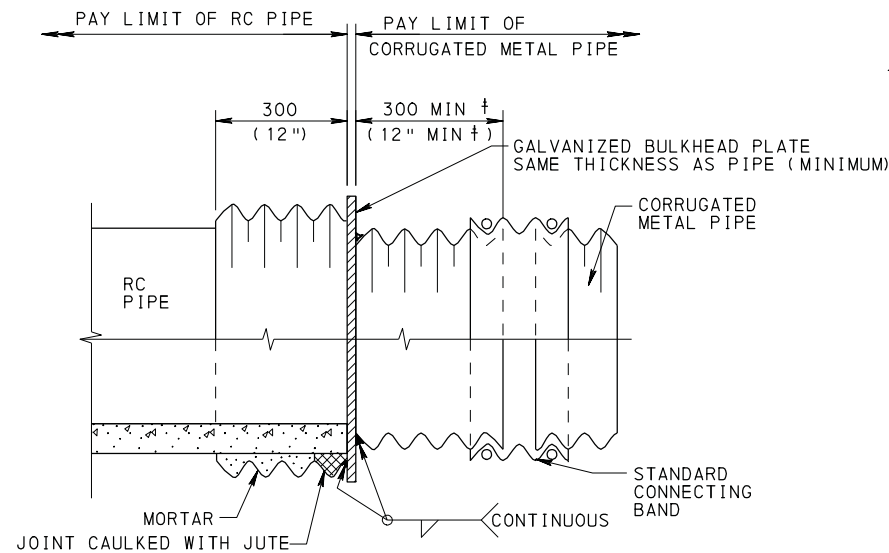


PLAN

SLOPE PIPE FITTING

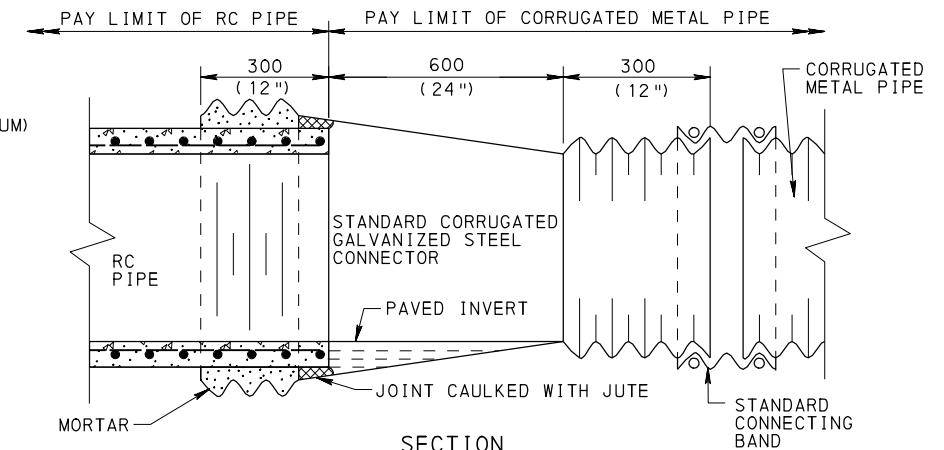
NOMINAL DIAMETER OF PIPE	DIMENSIONS FOR 1:2 (2:1) SLOPES		
	A	B	C
300 (12")	735 (28 15/16")	325 (13")	275 (11")
375 (15")	760 (29 13/16")	400 (16")	350 (14")
450 (18")	795 (31 15/16")	475 (19")	425 (17")

\* RESTRICT SLOPE PIPES DRAINING ONLY SHOULDER AREAS IN EMBANKMENTS, OTHER THAN THOSE ADJACENT TO STRUCTURES, TO 300 (12") MINIMUM DIAMETER.

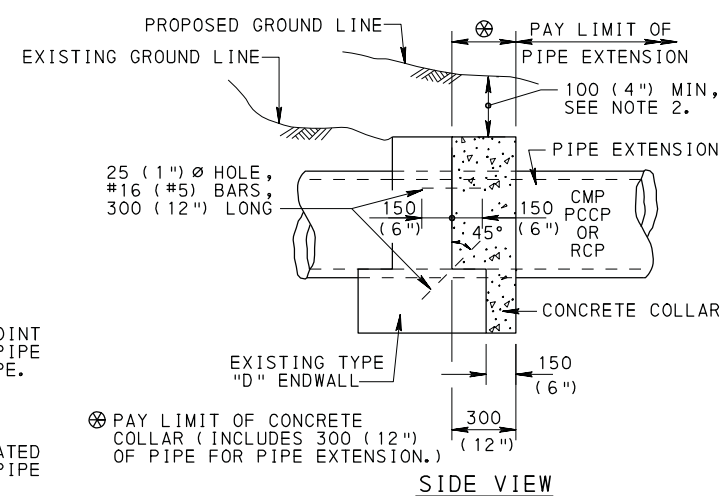


ALTERNATE PIPE CONNECTOR

† ADJUST LENGTH TO OBTAIN EVEN LENGTHS OF 600 (24") OF CONNECTING PIPE.

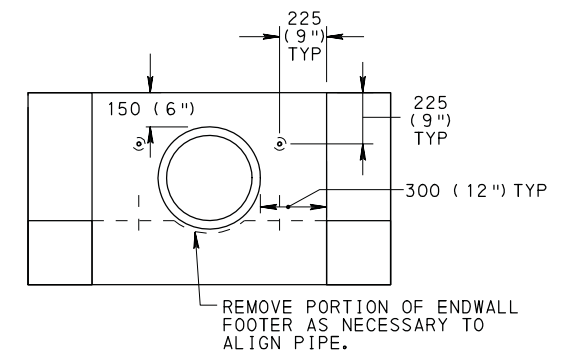


SECTION  
PIPE CONNECTOR



CONCRETE COLLAR FOR PIPE EXTENSION

FOR PIPES UP TO AND INCLUDING 825 (33") Ø, SEE NOTE 1.



END VIEW

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

#### NOTES

- FOR OTHER TYPES OF ENDWALLS AND FOR PIPES LARGER THAN 825 (33") Ø, A SPECIAL COLLAR DESIGN IS REQUIRED.
- REMOVE PORTIONS OF EXISTING ENDWALL IF REQUIRED TO MAINTAIN 100 (4") GROUND COVER.
- CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 616 FOR SLOPE PIPE FITTINGS AND SECTION 618 FOR CONCRETE COLLAR FOR PIPE EXTENSION.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

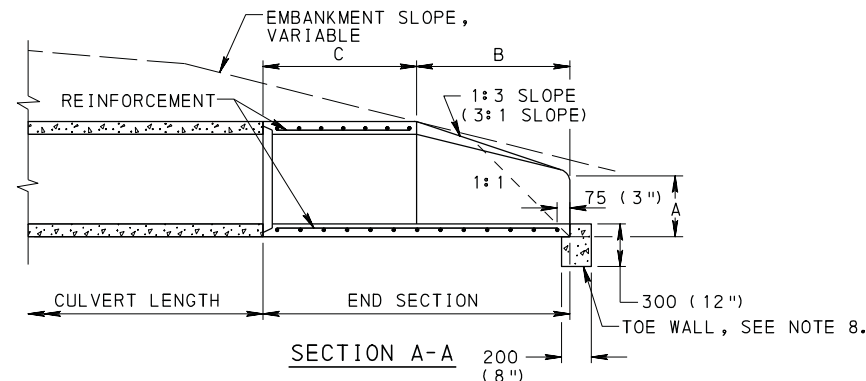
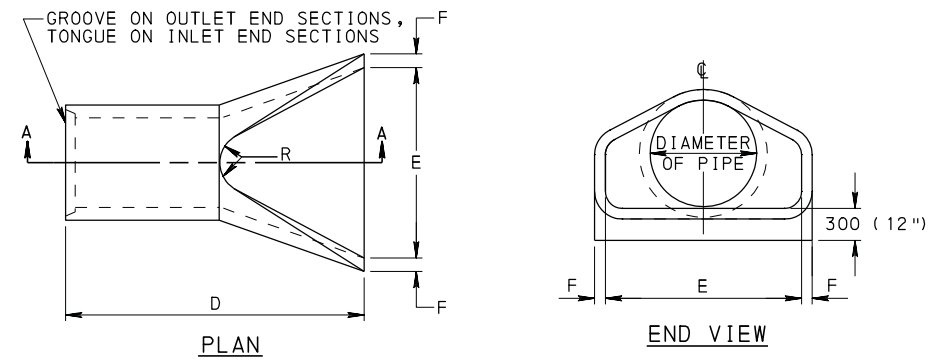
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SLOPE PIPE FITTINGS,  
PIPE CONNECTORS AND CONCRETE  
COLLAR FOR PIPE EXTENSION

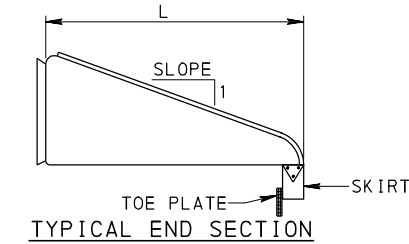
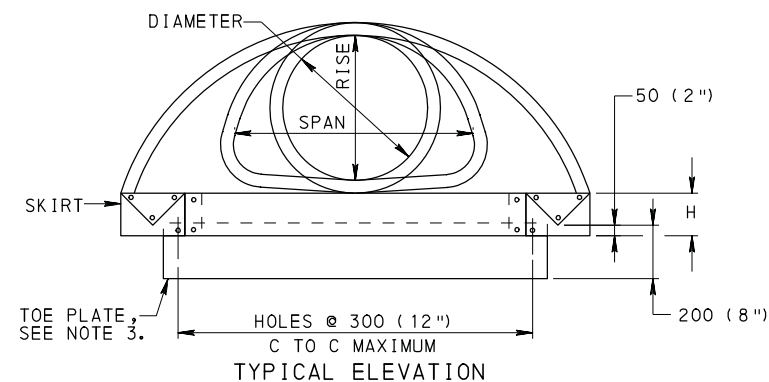
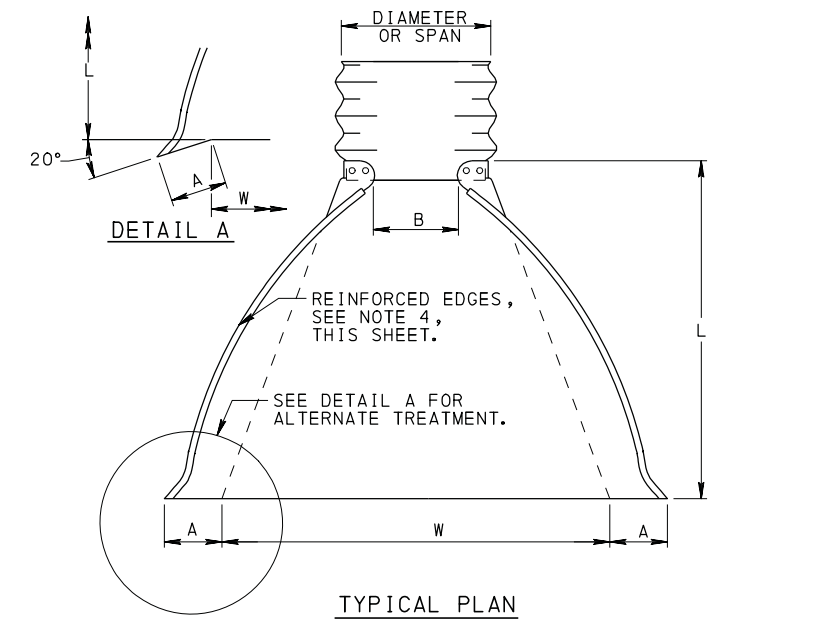
RECOMMENDED JUN. 1, 2010  
R. W. H. H. H.  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
B. B. B. B.  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1  
RC-32M



SLOPE DETAIL  
CONCRETE END SECTIONS



CORRUGATED METAL PIPE  
END SECTIONS

GENERAL NOTES

1. PROVIDE END SECTIONS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 616. PROVIDE GALVANIZED STEEL END SECTIONS WHEN SECTIONS ARE REQUIRED WITH ALUMINIZED STEEL PIPE OR PRECOATED GALVANIZED STEEL PIPE.
2. PROVIDE 2.77 THICK (12 GAGE) SIDES AND 3.50 THICK (10 GAGE) CENTER PANELS FOR 3 PIECE UNITS. PROVIDE CENTER PANEL WIDTH GREATER THAN 20% OF PIPE PERIPHERY. PROVIDE 50 (2") LAP JOINT TIGHTLY FASTENED BY 10 (3/8") Ø GALVANIZED OR ALUMINIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM ALLOY RIVETS OR BOLTS FOR ALUMINUM UNITS, ON CENTERLINE, SPACED 150 (6") C TO C FOR MULTIPLE PANEL UNITS. CONSTRUCT SKIRTS OF THE SAME THICKNESS AND PIECES AS THE END SECTION.
3. PROVIDE TOE PLATES OF THE SAME MATERIAL AS THE END SECTION. LOCATE PUNCHED HOLES IN PLATE TO MATCH HOLES IN SKIRT. PROVIDE 10 (3/8") Ø GALVANIZED OR ALUMINIZED BOLTS AND NUTS FOR STEEL UNITS AND ALUMINUM ALLOY BOLTS AND NUTS FOR ALUMINUM UNITS. PROVIDE TOE PLATE LENGTHS AS FOLLOWS:  
PIPE-ARCH CULVERT 1060 x 740, 1010 x 790 (42" x 29", 40" x 31") OR SMALLER-W+250 (+10")  
PIPE-ARCH CULVERT 1240 x 840, 1160 x 920 (49" x 33", 46" x 36") OR LARGER-W+500 (+20")  
PIPE 750 (30") DIAMETER OR SMALLER-W+250 (+10")  
PIPE 900 (36") DIAMETER OR LARGER-W+500 (+20")
4. SUPPLEMENT REINFORCED EDGES WITH GALVANIZED STEEL STIFFENER ANGLES WITH GALVANIZED OR ALUMINIZED BOLTS AND NUTS OR ALUMINUM ALLOY STIFFENER ANGLES WITH ALUMINUM ALLOY NUTS AND BOLTS OF THE FOLLOWING SIZES:  
• 50 (2") x 50 (2") x 6 (1/4") FOR, 1500 (60") TO 1800 (72") DIAMETER PIPE, 1950 x 1320, 1850 x 1400 (77" x 52", 73" x 55") AND 2100 x 1450, 2050 x 1500 (83" x 57", 81" x 59") PIPE-ARCH CULVERT.  
• 63 (2 1/2") x 63 (2 1/2") x 6 (1/4") FOR, 1950 TO 2100 (78" TO 84") DIAMETER PIPE.  
PLACE ANGLE REINFORCEMENT UNDER THE CENTER PANEL SEAMS FOR, 1950 x 1320, 1850 x 1400 (77" x 52", 73" x 55") AND 2100 x 1450, 2050 x 1500 (83" x 57", 81" x 59") PIPE-ARCH CULVERTS.
5. ANCHOR ALUMINUM OR STEEL END SECTIONS, THAT ARE USED ON THE INLET END OF PIPE LARGER THAN 1350 (54") DIAMETER, AS INDICATED ON THE PLAN.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
7. FOR DIMENSION TABLES SEE SHEET 2.
8. PROVIDE TOE WALL OF CLASS A CONCRETE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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END SECTIONS FOR  
PIPE CULVERTS

TABLE A (METRIC) DIMENSIONS FOR END SECTION FOR CONCRETE PIPE							
DIA	A	B	C	D	E	F	R
450	230	685	1170	1855	900	65	190
525	230	915	940	1855	1050	70	205
600	240	1105	760	1865	1200	75	205
675	265	1220	650	1865	1350	85	230
750	305	1370	500	1875	1500	90	205
825	345	1485	955	2440	1650	95	230
900	380	1600	840	2440	1800	100	255
1050	535	1600	840	2440	1950	115	280
1200	610	1830	610	2440	2100	125	305

TABLE B (METRIC) DIMENSIONS FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE									
DIA	THICKNESS	A (± 25)	B ( MAX)	H ( ± 25)	L ( ± 40)	W ( ± 50)	BODY	SLOPE	
450	1.63	205	255	150	785	900	1 PC	2.5	
525	1.63	230	305	150	915	1050	1 PC	2.5	
600	1.63	255	330	150	1040	1200	1 PC	2.5	
750	2.01	305	405	205	1295	1500	1 PC	2.5	
900	2.01	355	485	230	1525	1800	2 PC	2.5	
1050	2.77	405	560	280	1755	2100	2 PC	2.5	
1200	2.77	450	685	305	1980	2300	2 PC	2.25	
1350	2.77	450	760	305	2135	2600	2 PC	2	
1500	2.77	450	840	305	2210	2900	3 PC	1.75	
1650	2.77	450	915	305	2210	3050	3 PC	1.5	
1800	2.77	450	990	305	2210	3200	3 PC	1.33	
1950	2.77	450	1070	305	2210	3350	3 PC	1.25	
2100	2.77	450	1145	305	2210	3500	3 PC	1.17	

TABLE C (METRIC) DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH													
75x25 AND 125x25 CORRUGATIONS		68x13 CORRUGATIONS		THICKNESS	A ( ± 25)	B ( MAX)	H ( ± 25)	L ( ± 40)	W ( ± 50)	M	BODY	SLOPE	
SPAN	RISE	SPAN	RISE										
---	---	430	330	1.63	180 [115]	230	150	485	750	305	1 PC	2.5	
---	---	530	380	1.63	180 [135]	255	150	585	900	305	1 PC	2.5	
---	---	610	460	1.63	205 [160]	305 [290]	150	710	1050	305	1 PC	2.5	
---	---	710	510	1.63	230 [180]	355	150	815	1200	305	1 PC	2.5	
---	---	885	610	2.01	255 [220]	405	150	990	1500	305	1 PC	2.5	
1010	790	1060	740	2.01	305	455	205	1170	1900	305	1 PC	2.5	
1160	920	1240	840	2.77	330	535	230	1345	2150	305	2 PC	2.5	
1340	1050	1440	970	2.77	450	660	305	1600	2300	305	2 PC	2.5	
1520	1170	1620	1100	2.77	450	760	305	1780	2600	610	2 PC	2.25	
1670	1300	1800	1200	2.77	450	840	305	1955	2900	610	3 PC	2.25	
1850	1400	1950	1320	2.77	450	915	305	1955	3200	610	3 PC	2	
2050	1500	2100	1450	2.77	450	990	305	1955	3500	610	3 PC	2	

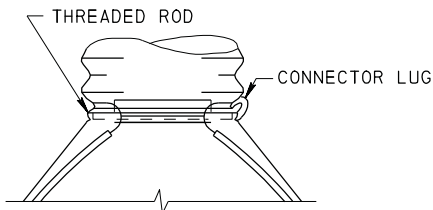
[ ] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.

TABLE A (ENGLISH) DIMENSIONS FOR END SECTION FOR CONCRETE PIPE							
DIA	A	B	C	D	E	F	R
18"	9"	2'- 3"	3'-10"	6'- 1"	3'- 0"	2 1/2"	7 1/2"
21"	9"	3'- 0"	3'- 1"	6'- 1"	3'- 6"	2 3/4"	8"
24"	9 1/2"	3'- 7 1/2"	2'- 6"	6'- 1 1/2"	4'- 0"	3"	8"
27"	10 1/2"	4'- 0"	2'- 1 1/2"	6'- 1 1/2"	4'- 6"	3 1/4"	9"
30"	12"	4'- 6"	1'- 7 3/4"	6'- 1 3/4"	5'- 0"	3 1/2"	8"
33"	13 1/2"	4'-10 1/2"	3'- 1 1/2"	8'- 0"	5'- 6"	3 3/4"	9"
36"	15"	5'- 3"	2'- 9"	8'- 0"	6'- 0"	4"	10"
42"	21"	5'- 3"	2'- 9"	8'- 0"	6'- 6"	4 1/2"	11"
48"	24"	6'- 0"	2'- 0"	8'- 0"	7'- 0"	5"	12"

TABLE B (ENGLISH) DIMENSIONS FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE								
DIA	GAGE	A ( ± 1")	B ( MAX.)	H ( ± 1")	L ( ± 1 1/2")	W ( ± 2")	BODY	SLOPE
18"	16	8"	10"	6"	31"	36"	1 PC.	2 1/2
21"	16	9"	12"	6"	36"	42"	1 PC.	2 1/2
24"	16	10"	13"	6"	41"	48"	1 PC.	2 1/2
30"	14	12"	16"	8"	51"	60"	1 PC.	2 1/2
36"	14	14"	19"	9"	60"	72"	2 PC.	2 1/2
42"	12	16"	22"	11"	69"	84"	2 PC.	2 1/2
48"	12	18"	27"	12"	78"	90"	2 PC.	2 1/4
54"	12	18"	30"	12"	84"	102"	2 PC.	2
60"	12	18"	33"	12"	87"	114"	3 PC.	1 3/4
66"	12	18"	36"	12"	87"	120"	3 PC.	1 1/2
72"	12	18"	39"	12"	87"	126"	3 PC.	1 1/3
78"	12	18"	42"	12"	87"	132"	3 PC.	1 1/4
84"	12	18"	45"	12"	87"	138"	3 PC.	1 1/6

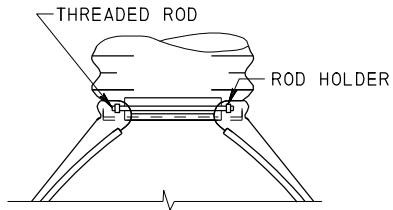
TABLE C (ENGLISH) DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH												
3"x1" AND 5"x1" CORRUGATIONS		2 2/3"x1/2" CORRUGATIONS		GAGE	A ( ± 1")	B ( MAX.)	H ( ± 1")	L ( ± 1 1/2")	W ( ± 2")	M	BODY	SLOPE
SPAN	RISE	SPAN	RISE									
---	---	17"	13"	16	7"[4.5"]	9"	6"	19"	30"	12"	1 PC.	2 1/2
---	---	21"	15"	16	7"[5.25"]	10"	6"	23"	36"	12"	1 PC.	2 1/2
---	---	24"	18"	16	8"[6.25"]	12"[11.5"]	6"	28"	42"	12"	1 PC.	2 1/2
---	---	28"	20"	16	9"[7"]	14"	6"	32"[31.5"]	48"	12"	1 PC.	2 1/2
---	---	35"	24"	14	10"[8.75"]	16"	6"	39"[38.5"]	60"	12"	1 PC.	2 1/2
40"	31"	42"	29"	14	12"	18"	8"	46"	75"	12"	1 PC.	2 1/2
46"	36"	49"	33"	12	13"	21"	9"	53"	85"	12"	2 PC.	2 1/2
53"	41"	57"	38"	12	18"	26"	12"	63"	90"	12"	2 PC.	2 1/2
60"	46"	64"	43"	12	18"	30"	12"	70"	102"	24"	2 PC.	2 1/4
66"	51"	71"	47"	12	18"	33"	12"	77"	114"	24"	3 PC.	2 1/4
73"	55"	77"	52"	12	18"	36"	12"	77"	126"	24"	3 PC.	2
81"	59"	83"	57"	12	18"	39"	12"	77"	138"	24"	3 PC.	2

[ ] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.



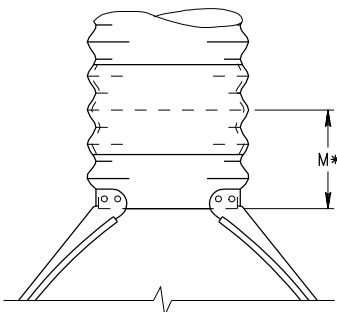
TYPE-1 CONNECTION

450Ø TO 600Ø  
(18"Ø x 24"Ø)  
CIRCULAR PIPE



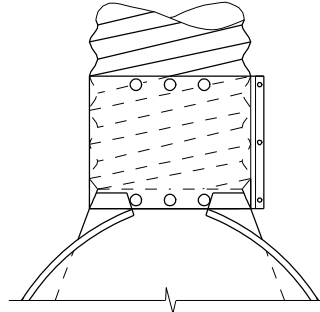
TYPE-2 CONNECTION

750Ø TO 900Ø (30"Ø TO 36"Ø)  
CIRCULAR PIPE AND  
1440 x 970, 1340 x 1050  
(57" x 38", 53" x 41") OR  
SMALLER PIPE-ARCH.



TYPE-3 CONNECTION

1050 (42") Ø OR  
LARGER CIRCULAR PIPE  
AND 1620 x 1100, 1520 x 1170  
(64" x 43", 60" x 46")  
OR LARGER PIPE-ARCH.



† TYPE-D CONNECTION

450Ø TO 900Ø (18"Ø TO 36"Ø)  
CIRCULAR PIPE AND  
1440 x 970, 1340 x 1050  
(57" x 38", 53" x 41") OR  
SMALLER PIPE-ARCH.

\* USE 300 (12") FOR CIRCULAR PIPE AND  
TABLE C DIMENSIONS FOR PIPE-ARCH.

† FOR CONNECTING END  
SECTIONS TO PIPE OR  
PIPE-ARCH HAVING  
OTHER THAN ANNULAR  
CORRUGATIONS. ACCEPT  
ALTERNATE DESIGNS  
PROVIDED NO LEAKAGE  
RESULTS.

### ALTERNATE TYPE CONNECTIONS FOR CORRUGATED METAL PIPE END SECTIONS

NOTE:  
FOR GENERAL NOTES SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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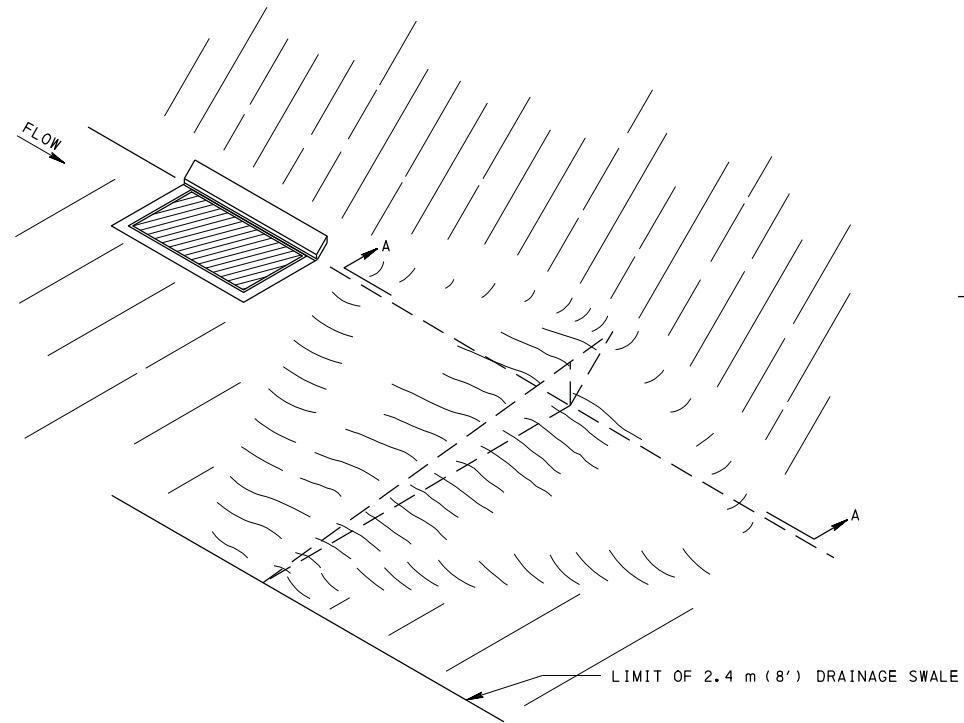
END SECTIONS FOR  
PIPE CULVERTS

RECOMMENDED JUN. 1, 2010  
*R. N. Wiley*  
CHIEF, HWY. QA DIVISION

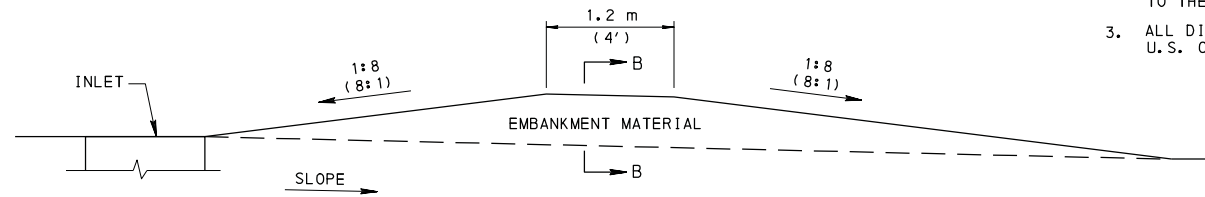
RECOMMENDED JUN. 1, 2010  
*Sam B. Ryan*  
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

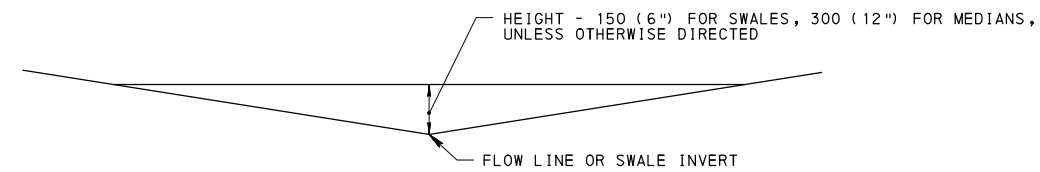
RC-33M



SWALE INSTALLATION  
DRAINAGE DIKE

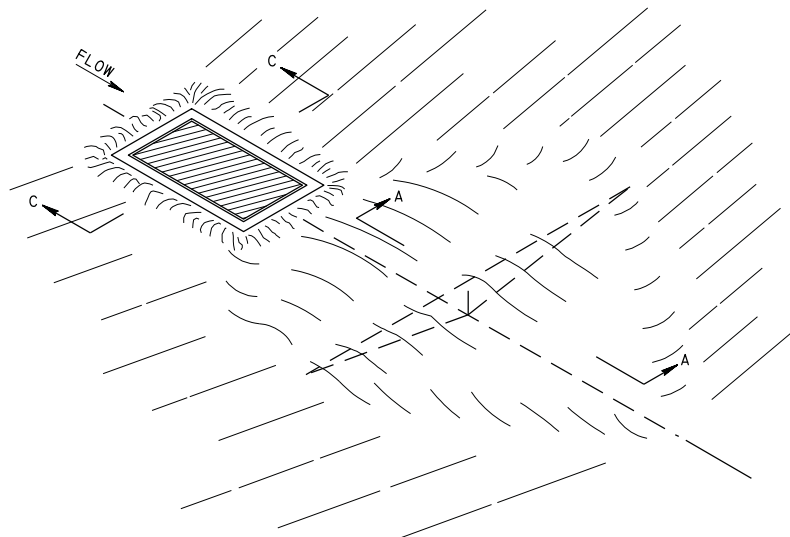


SECTION A-A

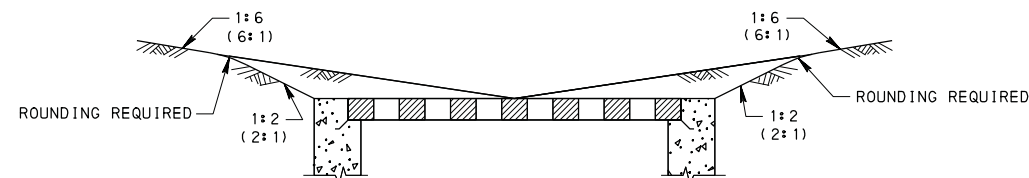


SECTION B-B

- NOTES**
1. DO NOT CONSTRUCT DRAINAGE DIKE TO A HEIGHT WHICH CAUSES FLOODING OF THE SUBBASE.
  2. CONSIDER CONSTRUCTION OF THE DRAINAGE DIKE INCIDENTAL TO THE CLASS 1 EXCAVATION.
  3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



MEDIAN INSTALLATION  
DRAINAGE DIKE



SECTION C-C

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

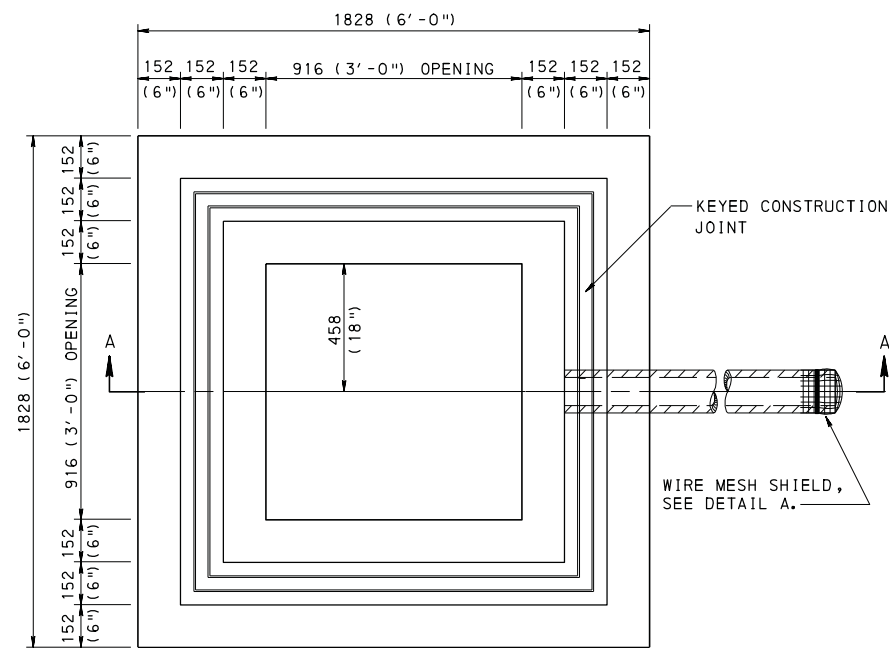
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

DRAINAGE DIKE

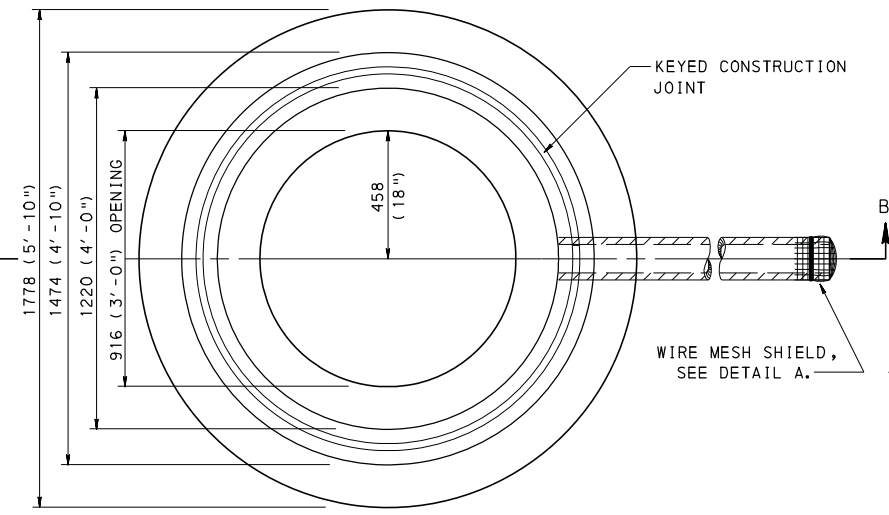
RECOMMENDED JUN. 1, 2010  
*R. W. Willey*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*David Thompson*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1  
RC-35M



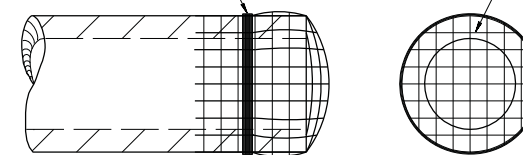
PLAN VIEW  
(WITHOUT COVER)



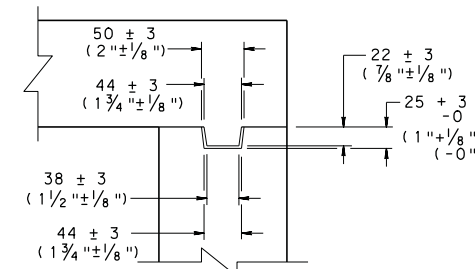
PLAN VIEW  
(WITHOUT COVER)

CRIMP AROUND OUTLET END OF PIPE AND SECURE TO PIPE WITH GALVANIZED STEEL WIRE OR OTHER ACCEPTABLE FASTENING METHODS.

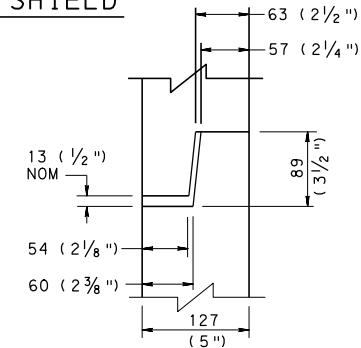
19 x 19 (3/4" x 3/4") WIRE MESH SCREENING, 1.37 (17 GAGE) THICK MINIMUM, GALVANIZED AFTER WEAVING.



DETAIL A  
WIRE MESH SHIELD



DETAIL B



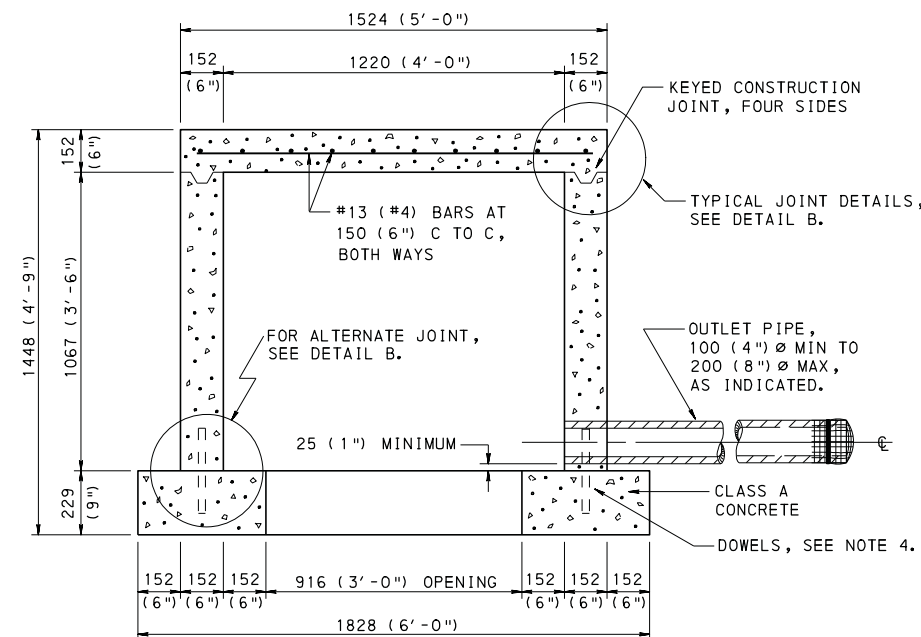
DETAIL C

TYPICAL JOINT DETAILS

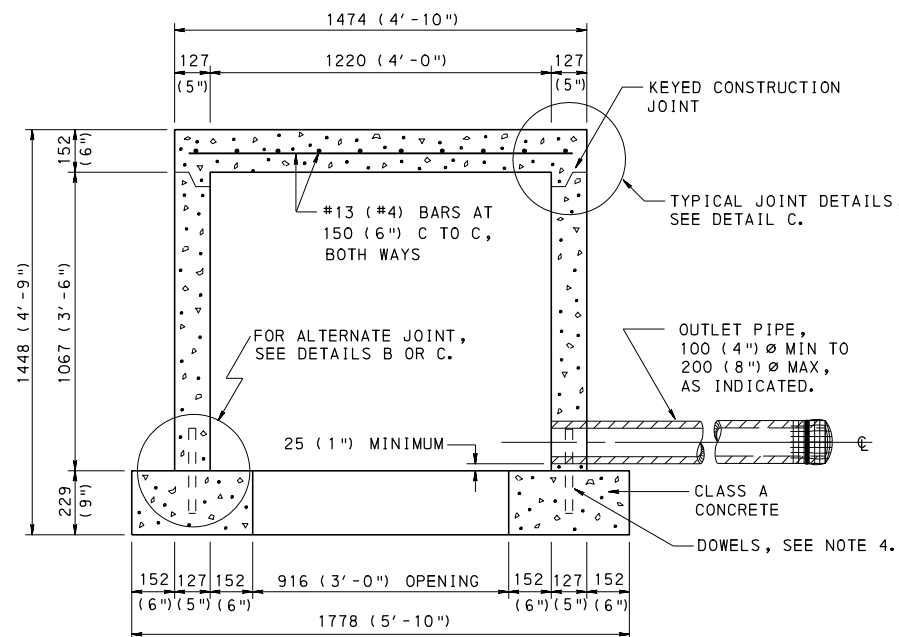
### NOTES

1. PROVIDE SPRING BOXES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PRECAST SPRING BOXES MAY BE USED IN LIEU OF CAST-IN-PLACE SPRING BOXES. PERMIT ONLY PRECAST BOXES SUPPLIED BY AN APPROVED MANUFACTURER LISTED IN BULLETIN 15.
3. LOCATE OUTLET PIPE AS REQUIRED TO SUIT FIELD CONDITIONS.
4. PLACE #13 (#4) REINFORCEMENT BARS, MINIMUM 305 (12") LONG, SPACED AT 300 (12") C TO C, AS DOWELS BETWEEN THE FOUNDATION AND WALLS WHEN THE CONSTRUCTION, EXCLUDING COVER, IS NOT MONOLITHIC. THE DOWELS MAY BE ELIMINATED IF THE ALTERNATE JOINTS SHOWN IN DETAILS B OR C ARE CONSTRUCTED.
5. PROVIDE REINFORCEMENT FOR WALLS AND FOUNDATIONS OF PRECAST BOXES MEETING THE REQUIREMENTS OF AASHTO-M199M.
6. WHEN FILL HEIGHT OVER TOP OF BOX EXCEEDS 3.0 m (10'), REQUIRE A SPECIAL DESIGN.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



SECTION A-A  
SQUARE SPRING BOX  
TYPE A



SECTION B-B  
CIRCULAR SPRING BOX  
TYPE B

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

SPRING BOXES

RECOMMENDED JUN. 1, 2010  
*R. W. [Signature]*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*[Signature]*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1  
RC-36M



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(c) 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(c) 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) 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(c) 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>Michael J. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian J. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _1 OF 3_  RC-38M
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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.

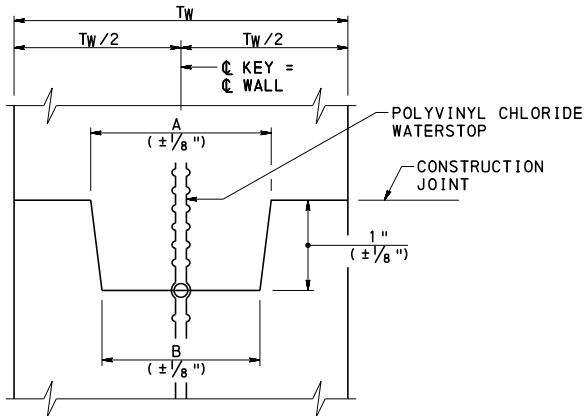
CAST-IN-PLACE CONCRETE MANHOLE NOTES:

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: 2½"
    - 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: 1½"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1½"
    - SIDE COVER: 1½"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1½"
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.

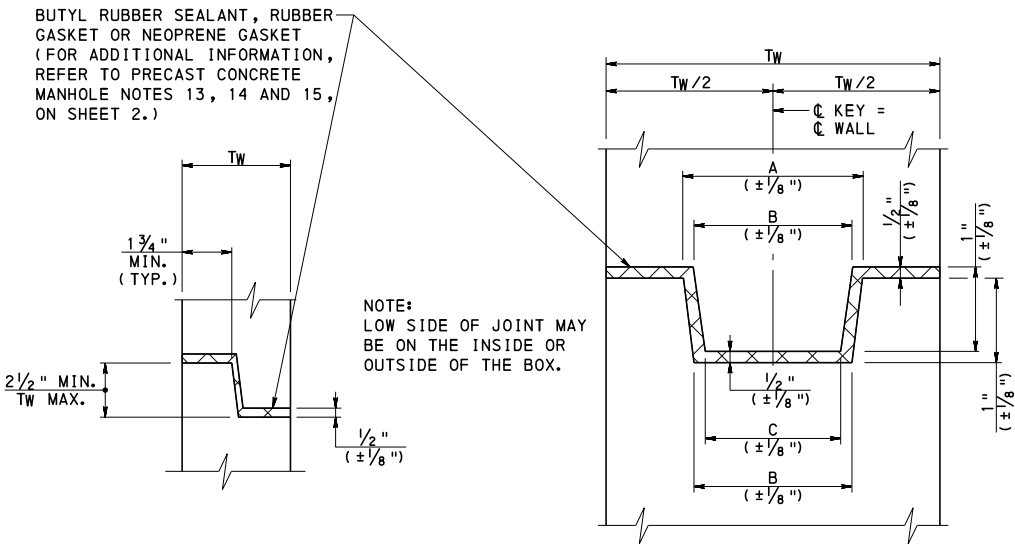
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
SANITARY SEWER MANHOLES GENERAL NOTES - 2		
RECOMMENDED SEPT. 15, 2016 <i>Melissa J. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED SEPT. 15, 2016 <i>Brian E. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _2 OF 3_  RC-38M



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

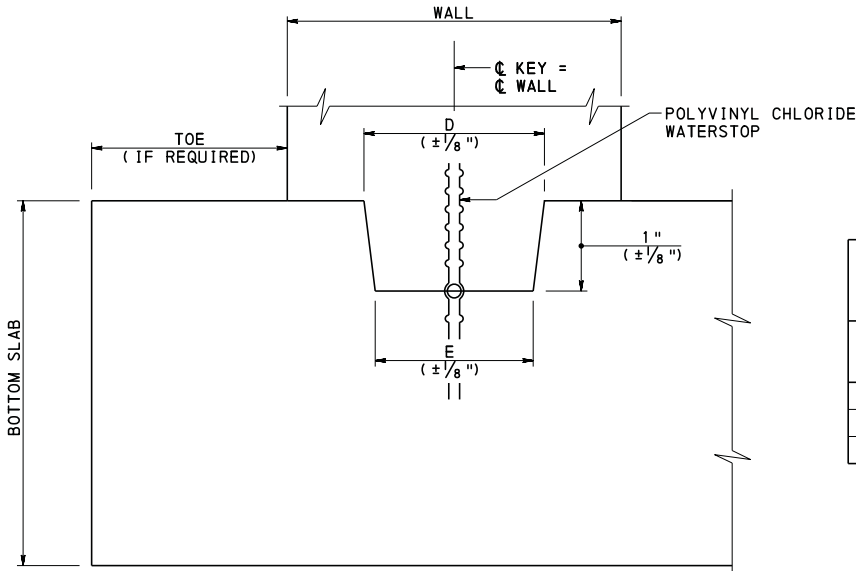
JOINT WIDTHS		
MANHOLE TYPE	A ( IN. )	B ( IN. )
TYPE 4	1 1/2	1 1/4
TYPE 5	2	1 3/4
TYPE 6	2	1 3/4

**CAST-IN-PLACE MANHOLES**



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

**JOINT DETAILS ( PRECAST )**



**JOINT 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  
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**SANITARY SEWER MANHOLES  
DETAILS**

GENERAL NOTES:

1. USE THIS STANDARD FOR STORM WATER MANHOLES.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. SHOW ORIENTATION OF PIPES ON THE CONSTRUCTION DRAWINGS.
10. TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT MANHOLE SECTIONS.
11. 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.
12. 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.
13. 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.
14. 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:

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 MORTAR OR 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. BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE, WITH ACCEPTABLE EMBANKMENT MATERIAL.
7. 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.
8. 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:

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 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 OR TRANSITION 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 AS SPECIFIED IN PUBLICATION 408, SECTION 1001.2(d).
7. EPOXY BONDING COMPOUND:
  - PROVIDE EPOXY BONDING COMPOUND AS SPECIFIED IN PUBLICATION 408, SECTION 706.1.
8. MORTAR:
  - PROVIDE MORTAR AS SPECIFIED IN PUBLICATION 408, SECTION 705.6(b).
9. CAULKING COMPOUND:
  - PROVIDE CAULKING COMPOUND AS SPECIFIED IN PUBLICATION 408, SECTION 705.7(d).
10. BUTYL RUBBER SEALANT:
  - PROVIDE BUTYL RUBBER SEALANT AS SPECIFIED IN PUBLICATION 408, SECTION 705.5(b)2.
11. GASKETS FOR JOINTS BETWEEN MANHOLE SECTIONS:
  - PROVIDE RUBBER GASKETS (ASTM C443) OR NEOPRENE GASKETS (ASTM C361) AS SPECIFIED IN PUBLICATION 408, SECTION 705.5(b)1.
12. GASKETS FOR PIPE OPENINGS:
  - PROVIDE GASKETS AS SPECIFIED IN PUBLICATION 408, SECTION 705.5(b)3.
13. MANHOLE STEPS:
  - PROVIDE MANHOLE STEPS AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(c).
14. SUBBASE MATERIAL AND PREPARATION:
  - PROVIDE NO. 2A COARSE AGGREGATE AS SPECIFIED IN PUBLICATION 408, SECTION 703.2 AND COMPACT AS SPECIFIED IN 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 AS SPECIFIED IN PUBLICATION 408, SECTION 713.2.

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24	PRECAST MANHOLES - 1
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26	PRECAST MANHOLES - 3
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29	DOGHOUSE MANHOLES - 1
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COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
GENERAL NOTES - 1

RECOMMENDED FEB. 19, 2021	RECOMMENDED FEB. 19, 2021	SHT _1 OF 30
 CHIEF, HWY. DELIVERY DIVISION	 DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-39M

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



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 1½" 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 AS SPECIFIED IN 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: 2½"
    - 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 AS SPECIFIED IN 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: 1½"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1½"
    - SIDE COVER: 1½"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1½"
- 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 FEB. 19, 2021  
*Chris L. Spill*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT \_2 OF 30  
RC-39M

DESIGN TABLE GENERAL NOTES:

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

CAST-IN-PLACE CONCRETE MANHOLE  
DESIGN TABLE NOTES:

1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON AN 8'-0" MAXIMUM HEIGHT.
2. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE CONCRETE MANHOLES.
3. 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.
4. RISER SECTION DESIGN REQUIREMENTS:
- GO TO THE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION.

PRECAST CONCRETE MANHOLE  
DESIGN TABLE NOTES:

1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON AN 8'-0" MAXIMUM HEIGHT.
2. 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.
3. WELDED WIRE FABRIC IS NOT PERMITTED FOR THE L-BARS.
4. 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.
5. RISER SECTION DESIGN REQUIREMENTS:
- GO TO THE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION.
6. PROVIDE MARKINGS ON EACH SECTION TO CLEARLY IDENTIFY THE MAXIMUM ALLOWABLE DEPTH.

DOGHOUSE MANHOLE NOTES:

1. DOGHOUSE MANHOLES ARE ONLY PERMITTED WHEN PLACING A NEW MANHOLE OVER AN EXISTING PIPE.
2. PROVIDE PRECAST CONCRETE MANHOLE BASE SECTIONS. CAST-IN-PLACE CONCRETE MANHOLE BASE SECTIONS ARE NOT PERMITTED FOR DOGHOUSE MANHOLES.
3. 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.
4. 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.
5. SET DOGHOUSE MANHOLE TRULY VERTICAL. ADJUST PIPE OPENING HEIGHTS AS REQUIRED TO ACCOMMODATE EXISTING PIPE SLOPE.
6. PROVIDE EITHER A TYPE A OR TYPE B DOGHOUSE MANHOLE. CONTRACTOR/FABRICATOR TO DETERMINE TYPE, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
7. 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.
8. 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 @ 9½ "	0.14
#3 @ 9 "	0.15
#3 @ 8 "	0.16
#3 @ 7½ "	0.18
#3 @ 7 "	0.19
#3 @ 6½ "	0.20
#3 @ 6¼ "	0.21
#3 @ 6 "	0.22
#3 @ 5½ "	0.24
#3 @ 5 "	0.26
#3 @ 4½ "	0.29
#3 @ 4 "	0.33
#4 @ 12 "	0.20
#4 @ 11½ "	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 @ 10¼ "	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

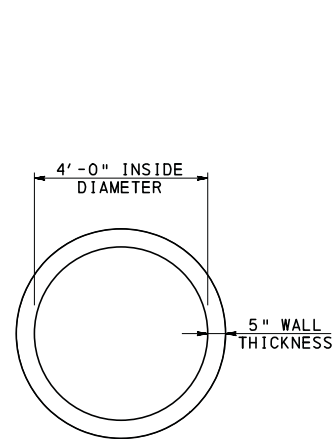
W = PLAIN WIRES  
D = DEFORMED WIRES

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'-10"	1'-7"
#4	2'-5"	2'-1"
#5	3'-0"	2'-7"
#6	3'-7"	3'-1"
#7	4'-2"	4'-1"
#8	4'-9"	5'-1"
#9	5'-10"	6'-4"
#10	7'-3"	7'-8"
#11	8'-8"	9'-2"

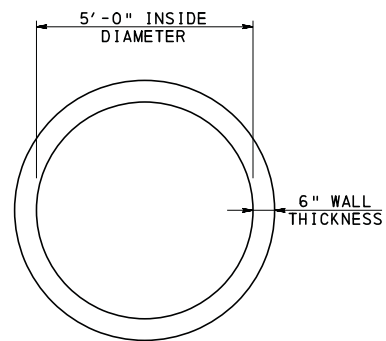
NOTES:

1. SPLICE LENGTHS BASED ON UNCOATED DEFORMED BARS.
2. SPLICE LENGTHS BASED ON HORIZONTAL BARS WITH A CLASS B SPLICE.

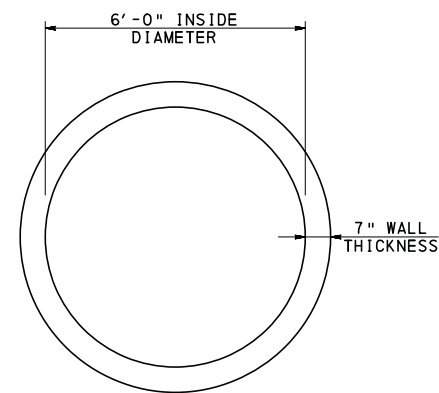
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
STORM WATER MANHOLES GENERAL NOTES - 3		
RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _3 OF 3Q RC-39M



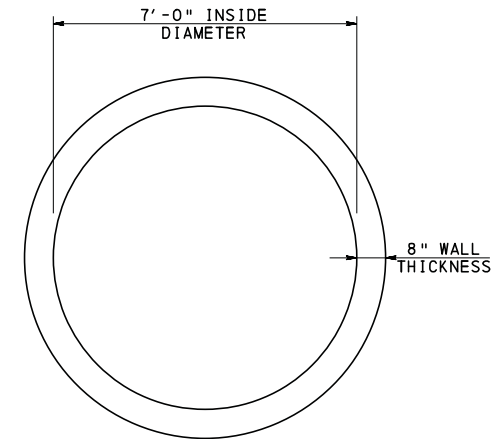
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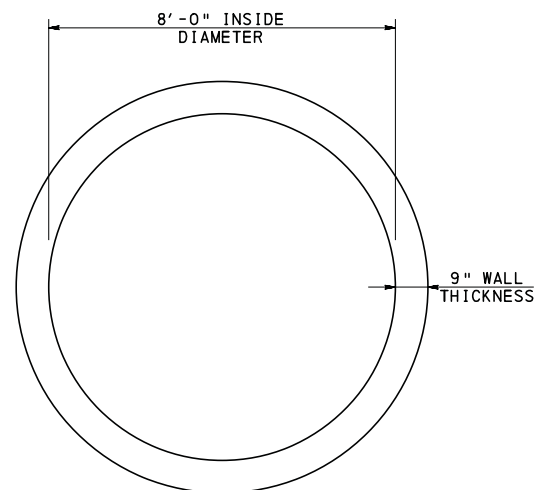
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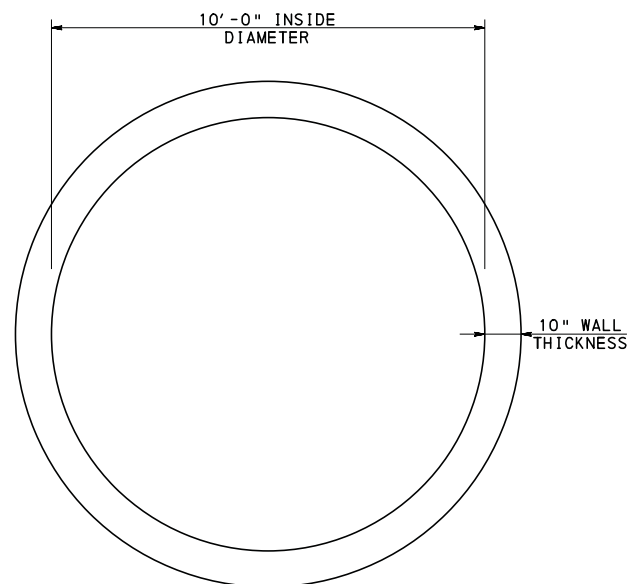
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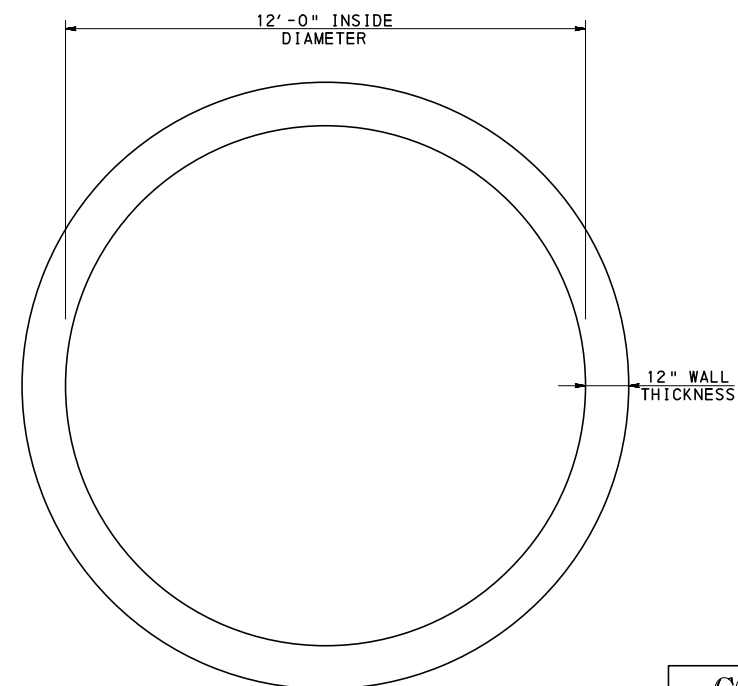
TYPE 7



TYPE 8



TYPE 10



TYPE 12

**NOTES:**

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

**PLAN - MANHOLES**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

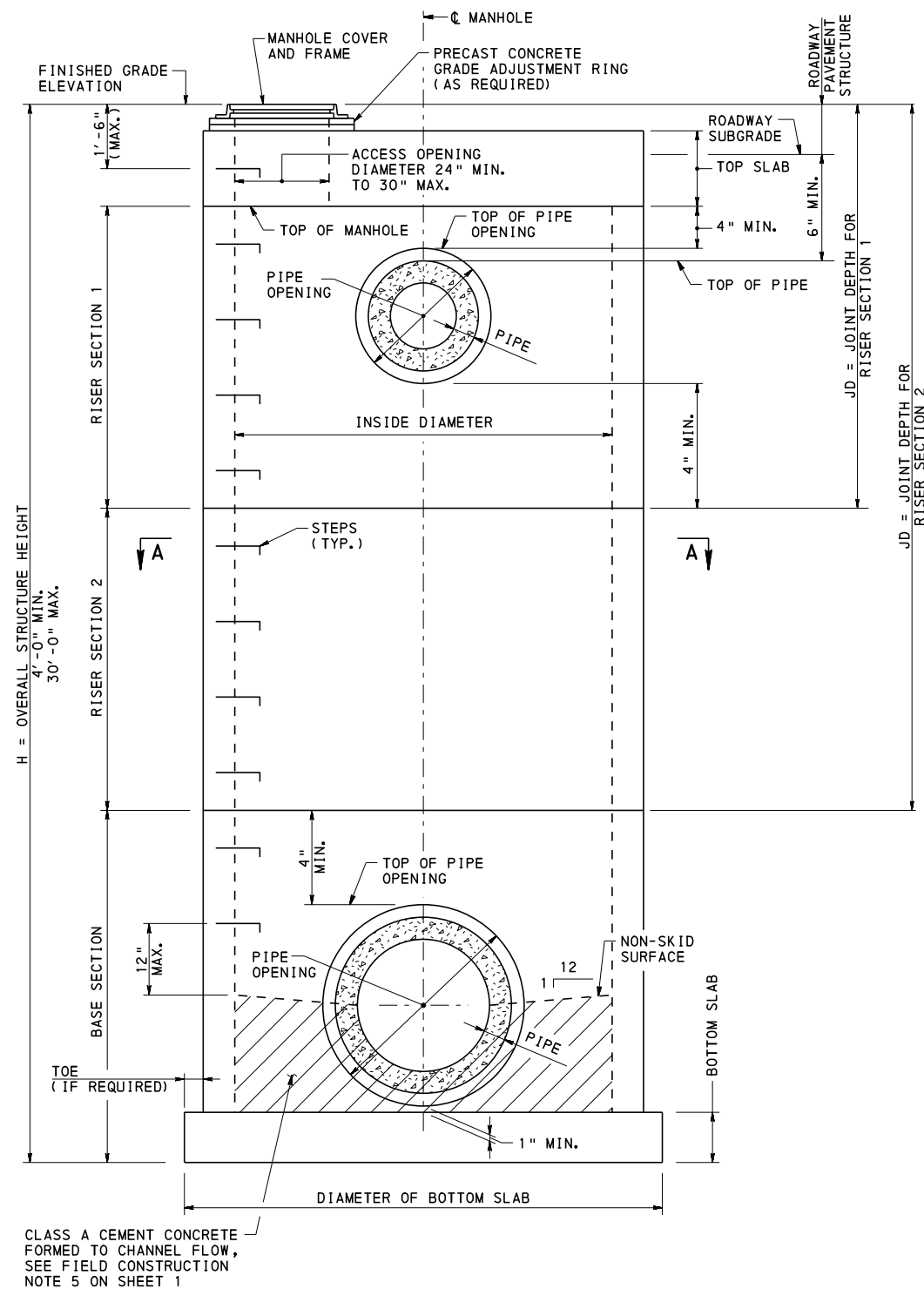
STORM WATER MANHOLES  
MANHOLE TYPES

RECOMMENDED FEB. 19, 2021  
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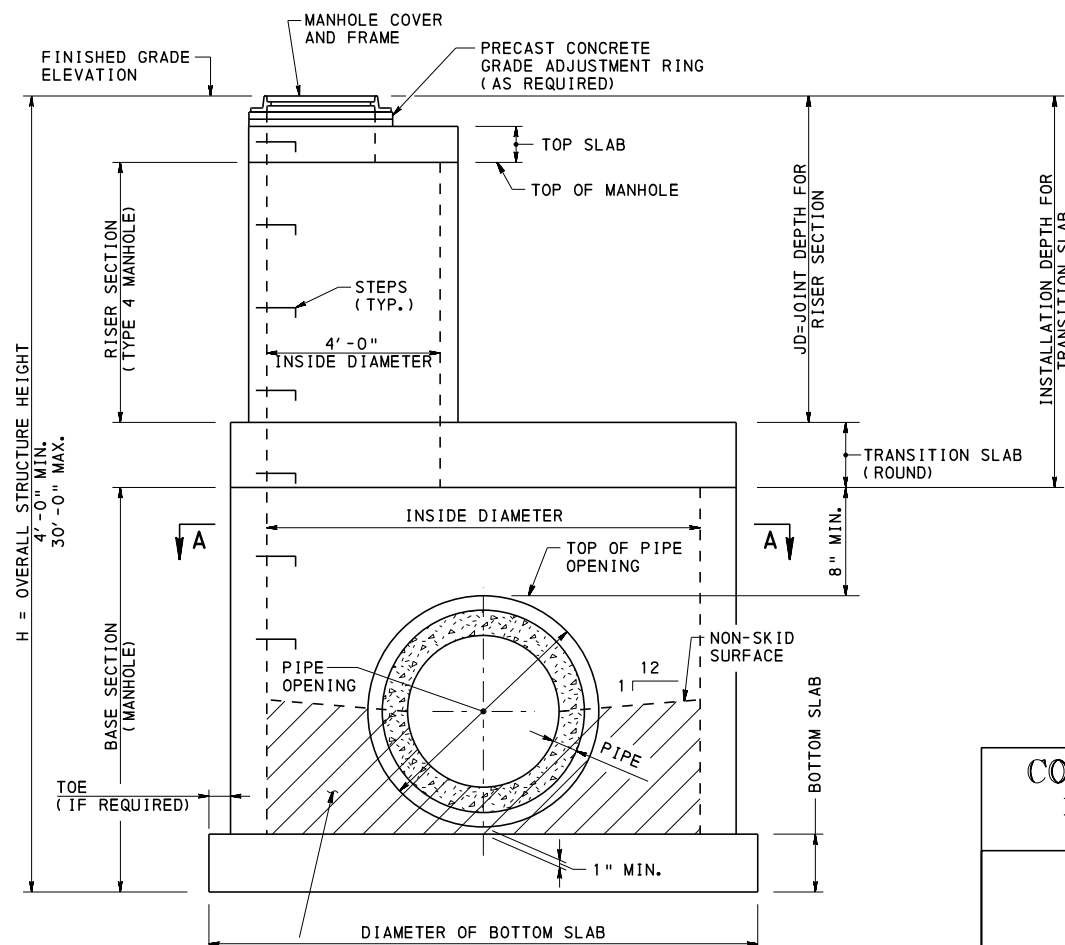
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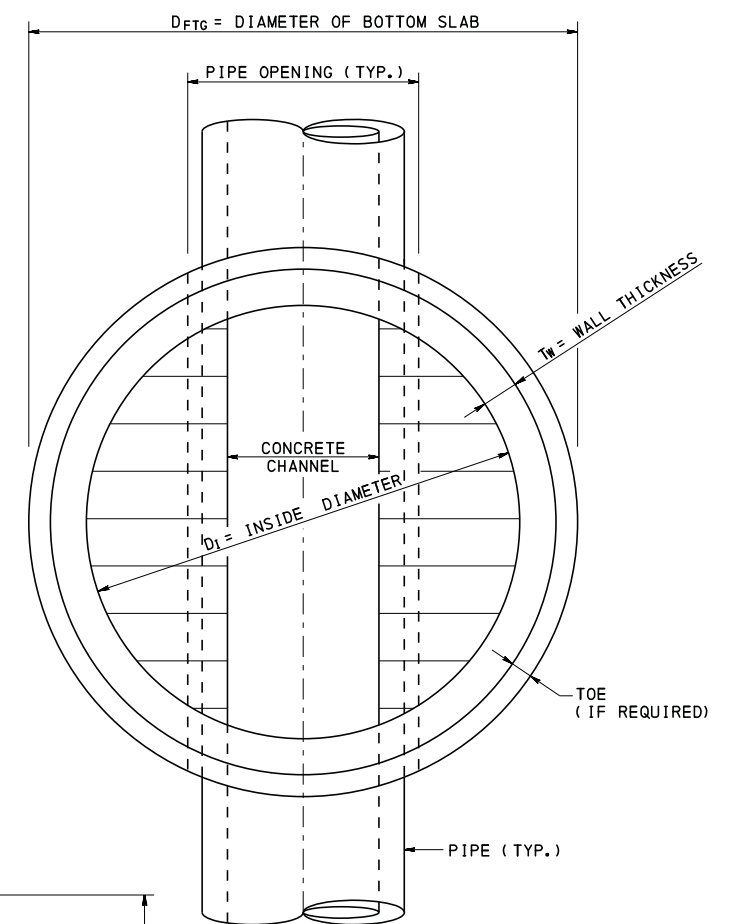




**MANHOLE ASSEMBLY**



**MANHOLE ASSEMBLY WITH TRANSITION SLAB**



**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.

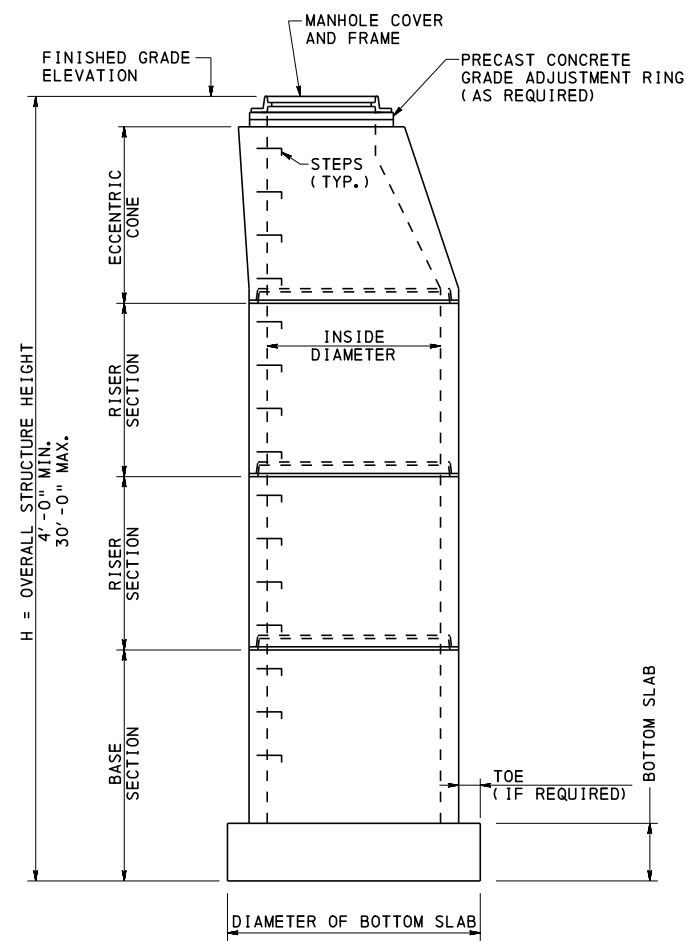
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BUREAU OF PROJECT DELIVERY

**STORM WATER MANHOLES  
MANHOLE ASSEMBLIES - 1**

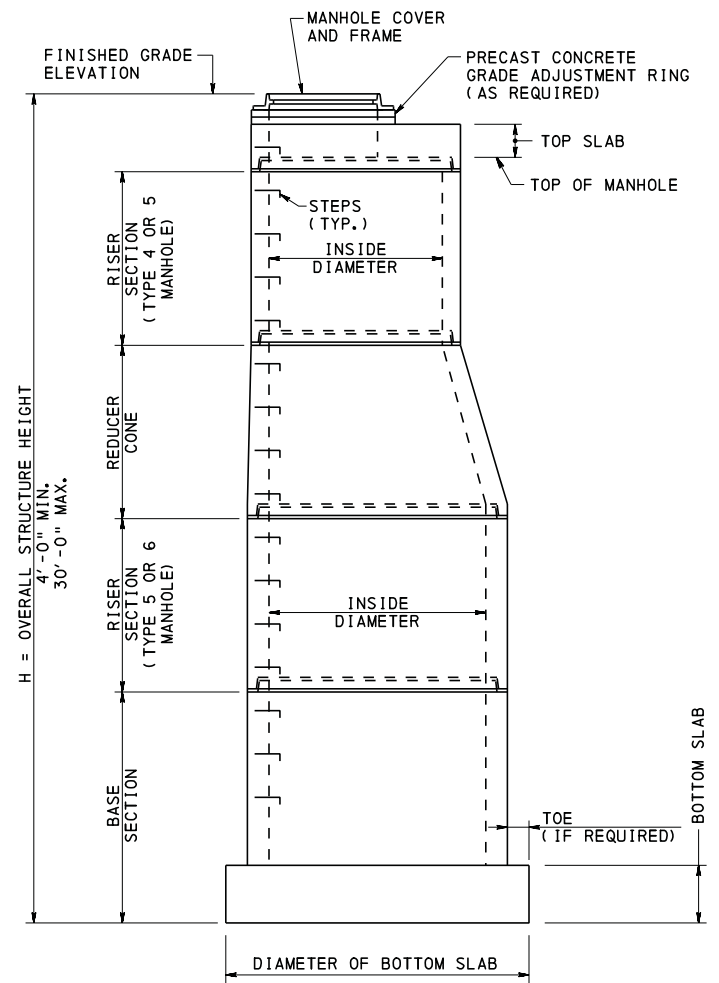
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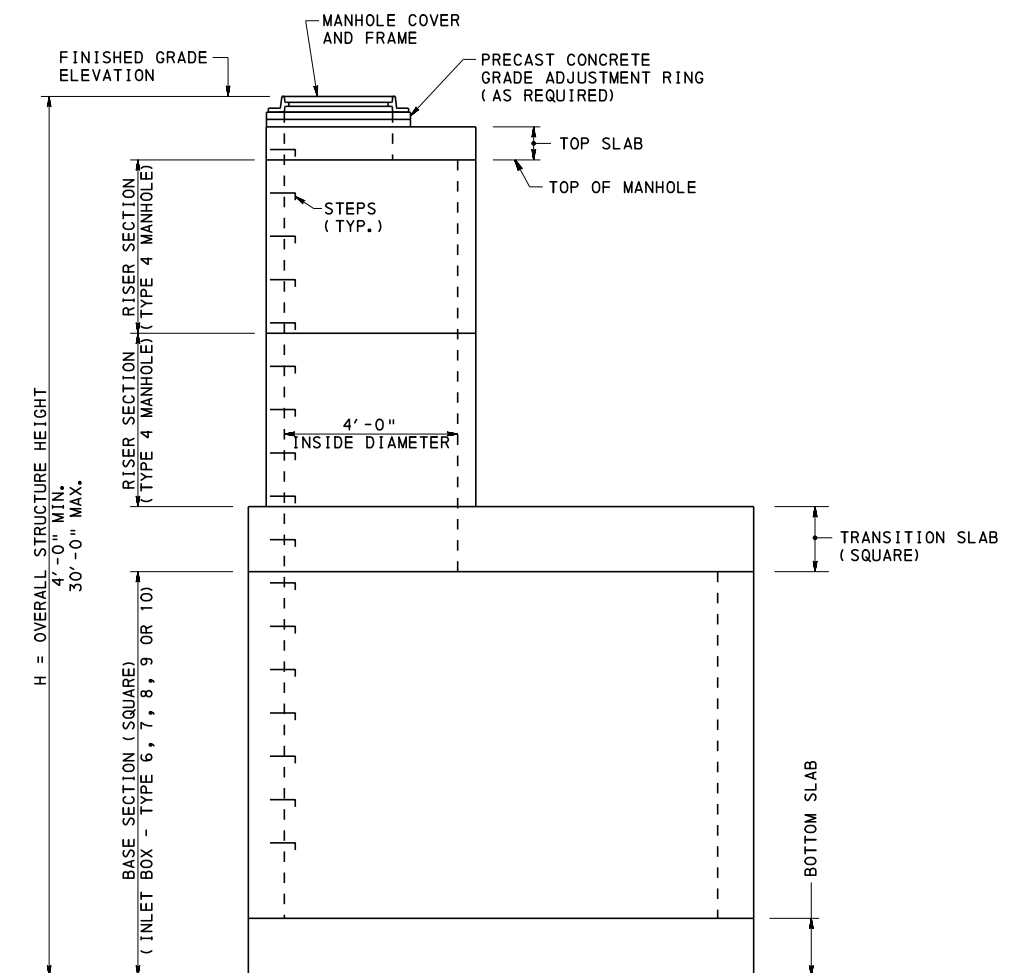
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**MANHOLE ASSEMBLY  
WITH ECCENTRIC CONE**  
(PRECAST ONLY)



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

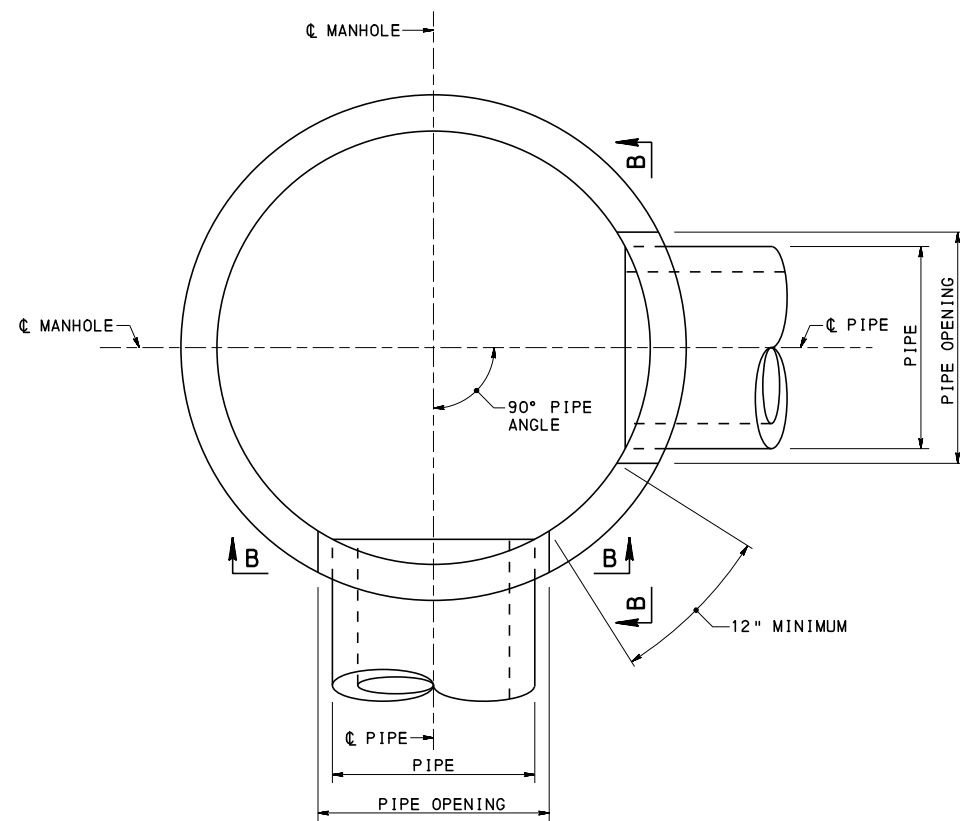


**MANHOLE ASSEMBLY WITH  
SQUARE INLET BOX (BOTTOM)  
AND TYPE 4 MANHOLE (TOP)**

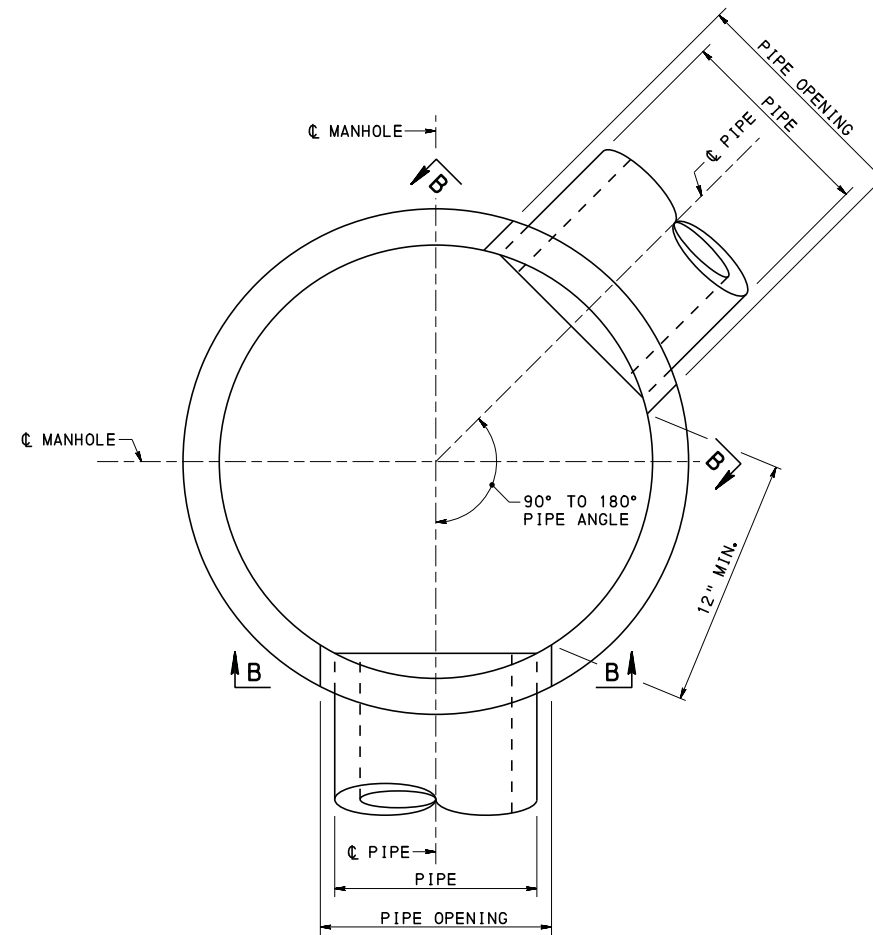
**NOTES:**

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.

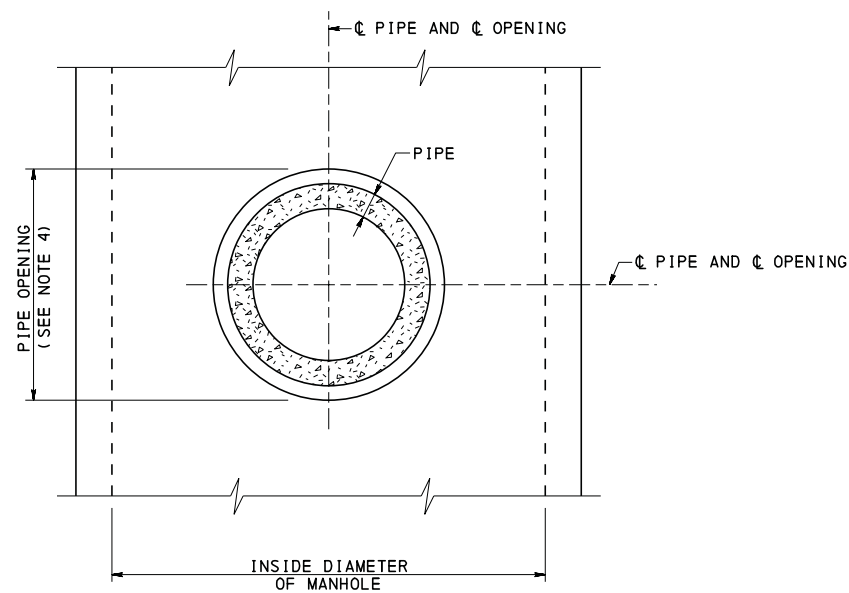
<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF PROJECT DELIVERY		
<b>STORM WATER MANHOLES</b> <b>MANHOLE ASSEMBLIES - 2</b>		
RECOMMENDED FEB. 19, 2021 <i>Chris L. Sp...</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _6 OF 30 <b>RC-39M</b>



**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**

**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.

**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

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STORM WATER MANHOLES  
SIZING RECOMMENDATIONS

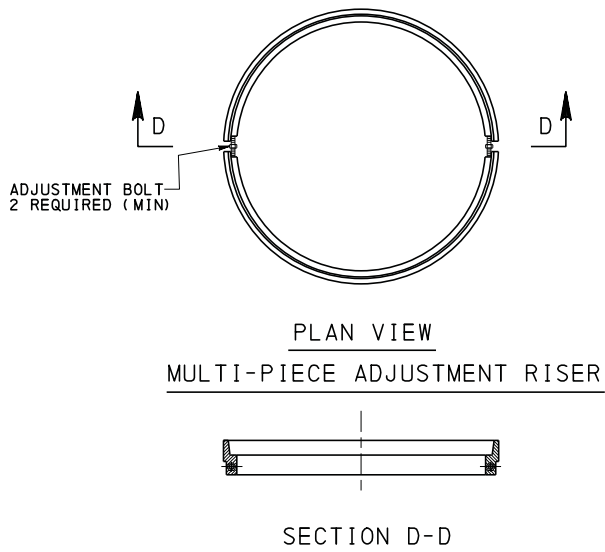
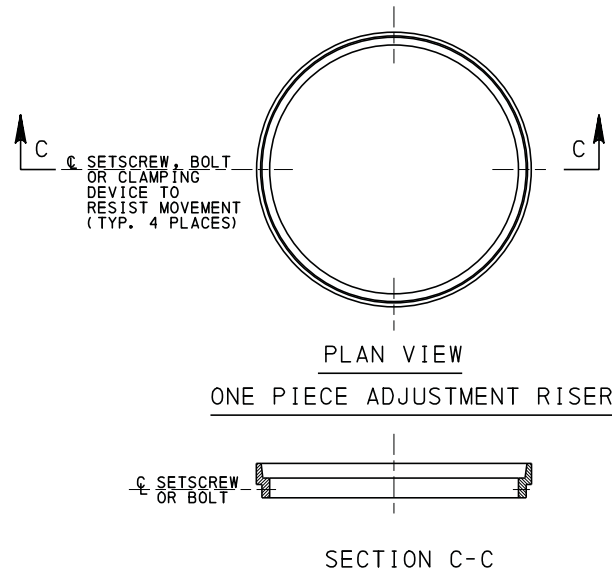
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GRADE ADJUSTMENT GENERAL NOTES:

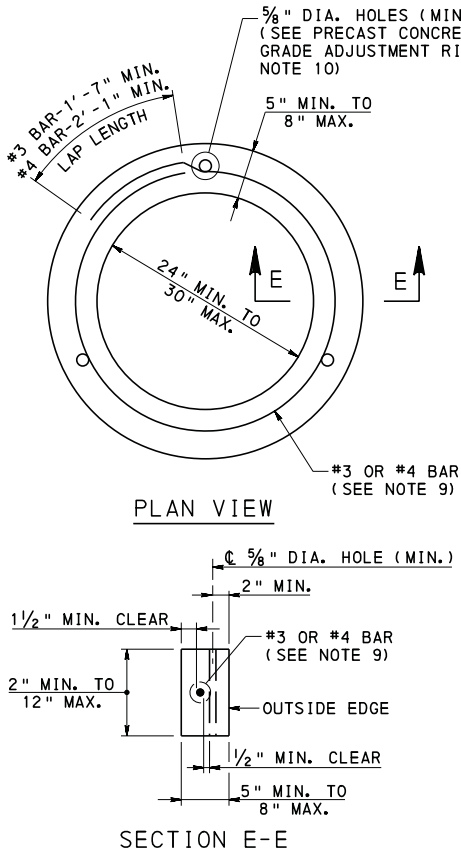
1. THE DETAILS ON THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE ADJUSTMENT RINGS/RISERS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND PERFORM WORK 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 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 AS SPECIFIED IN 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 ASPHALT PAINT AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO ASPHALT PAINT, GALVANIZE ADJUSTMENT RISERS AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).

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STORM WATER MANHOLES  
GRADE ADJUSTMENT RINGS

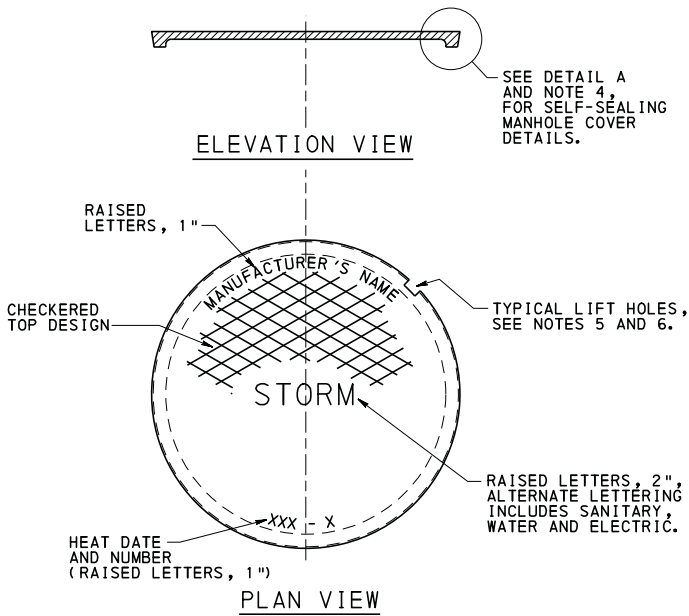
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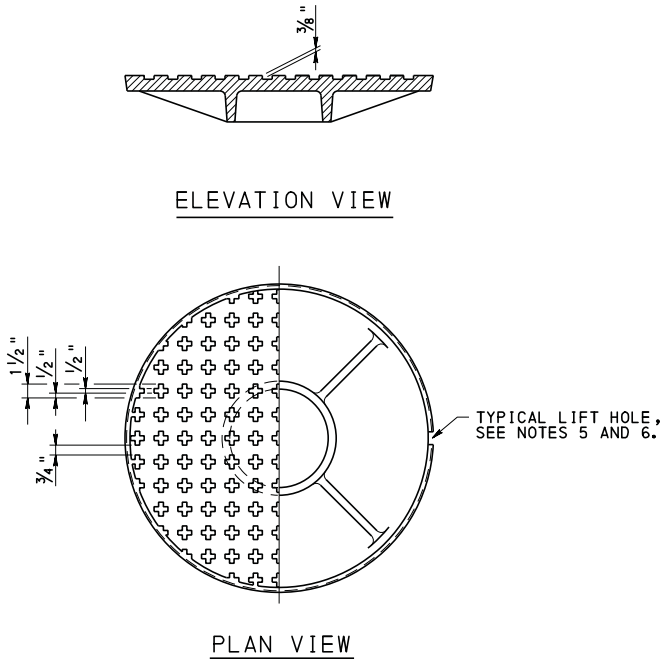
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MANHOLE COVER AND FRAME NOTES:

1. PROVIDE MANHOLE COVERS AND FRAMES AS SPECIFIED IN 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 AS SPECIFIED IN 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.

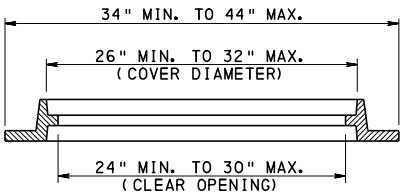


CAST IRON MANHOLE COVER  
(PLATEN COVER)

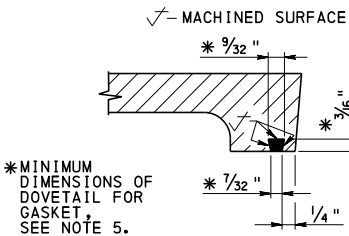


CAST IRON MANHOLE COVER  
(RIBBED COVER)

(PLAIN COVER SHOWN, SEE  
PLATEN COVER DETAIL FOR  
LETTERING REQUIREMENTS)



ELEVATION VIEW  
OF MANHOLE FRAME



DETAIL A  
GASKET SEALING SYSTEM

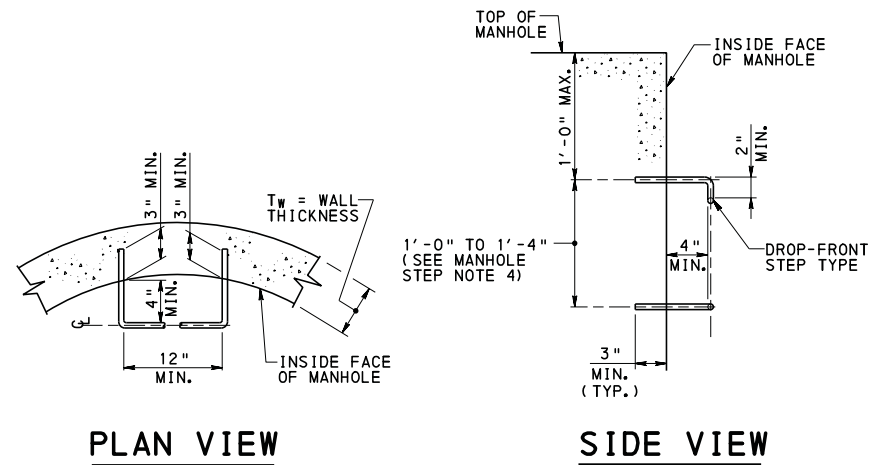
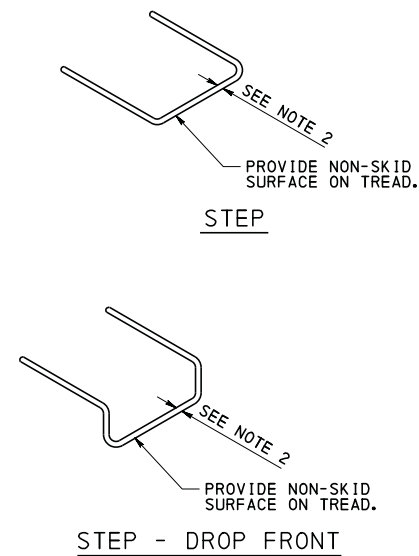
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES  
COVERS AND FRAMES

RECOMMENDED FEB. 19, 2021  
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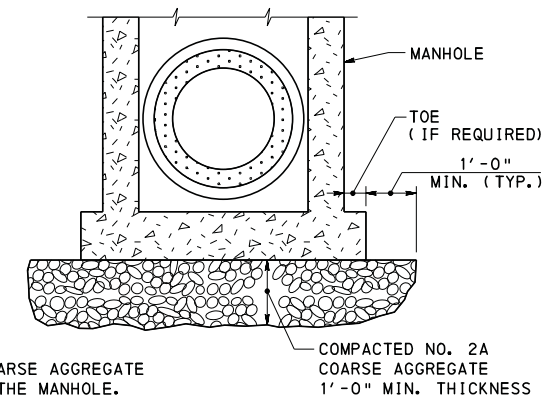
SHT 9 OF 30  
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**TYPICAL STEP CONFIGURATION  
MANHOLE STEPS**

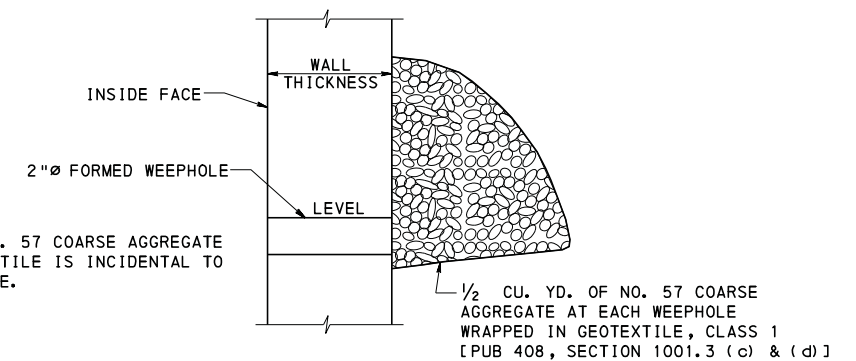
**MANHOLE STEP NOTES:**

1. PROVIDE MANHOLE STEPS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
2. PROVIDE MINIMUM 1" SECTION DIMENSION FOR METAL STEPS. PROVIDE  $\frac{3}{4}$ " 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.

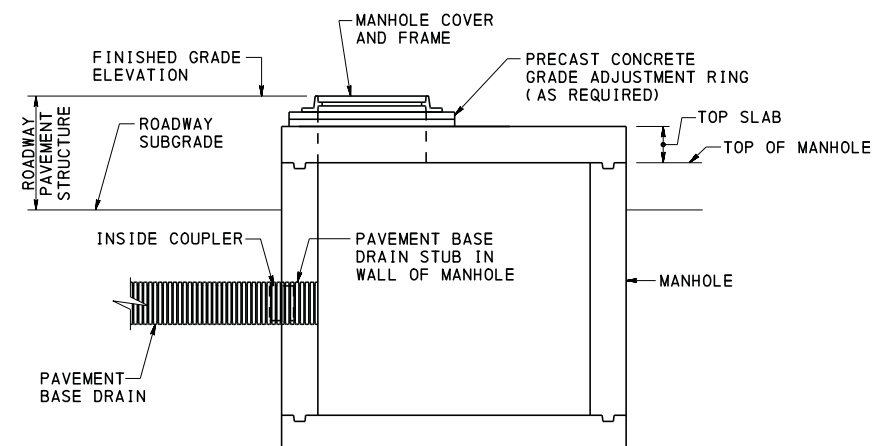
**MANHOLE SUBBASE PREPARATION DETAIL**  
(SEE FIELD CONSTRUCTION NOTES ON SHEET 1)



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

$\frac{1}{2}$  CU. YD. OF NO. 57 COARSE  
AGGREGATE AT EACH WEEPHOLE  
WRAPPED IN GEOTEXTILE, CLASS 1  
[PUB 408, SECTION 1001.3 (c) & (d)]

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



**OPTIONAL CONNECTION DETAIL  
FOR PAVEMENT BASE DRAIN**

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.

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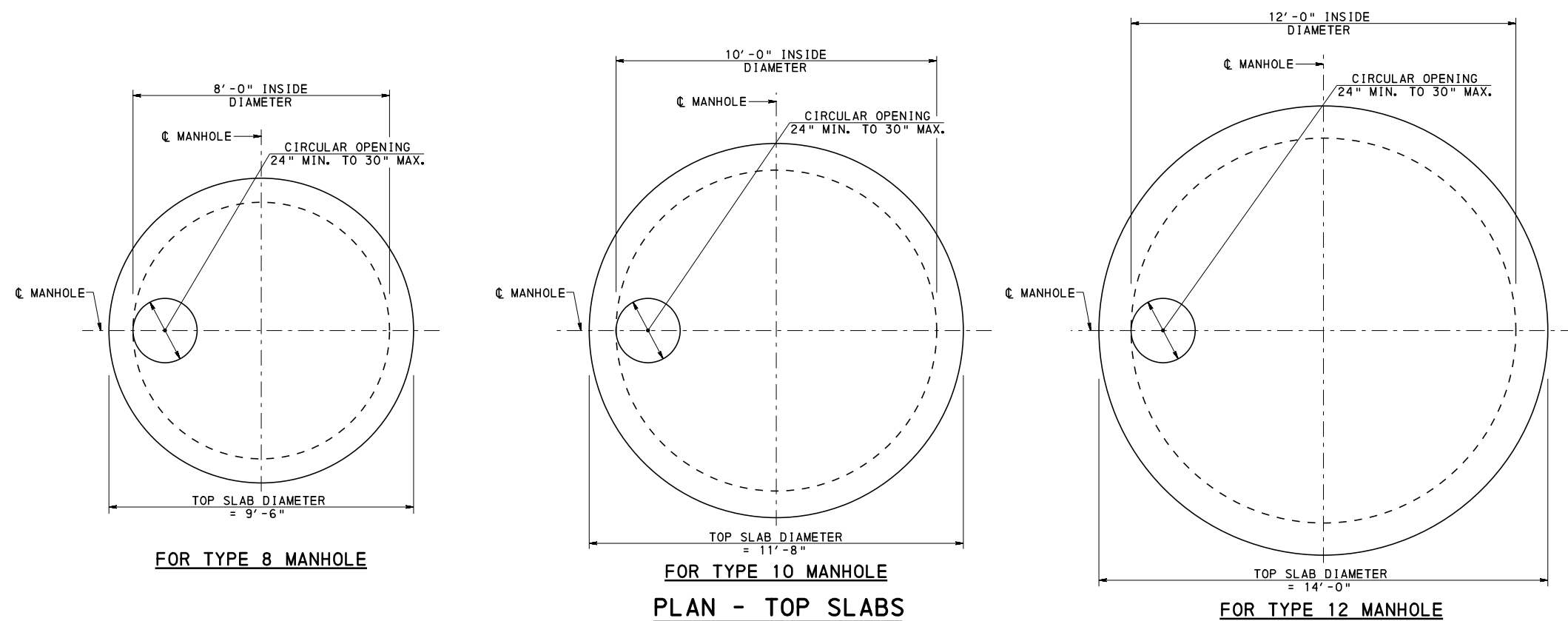
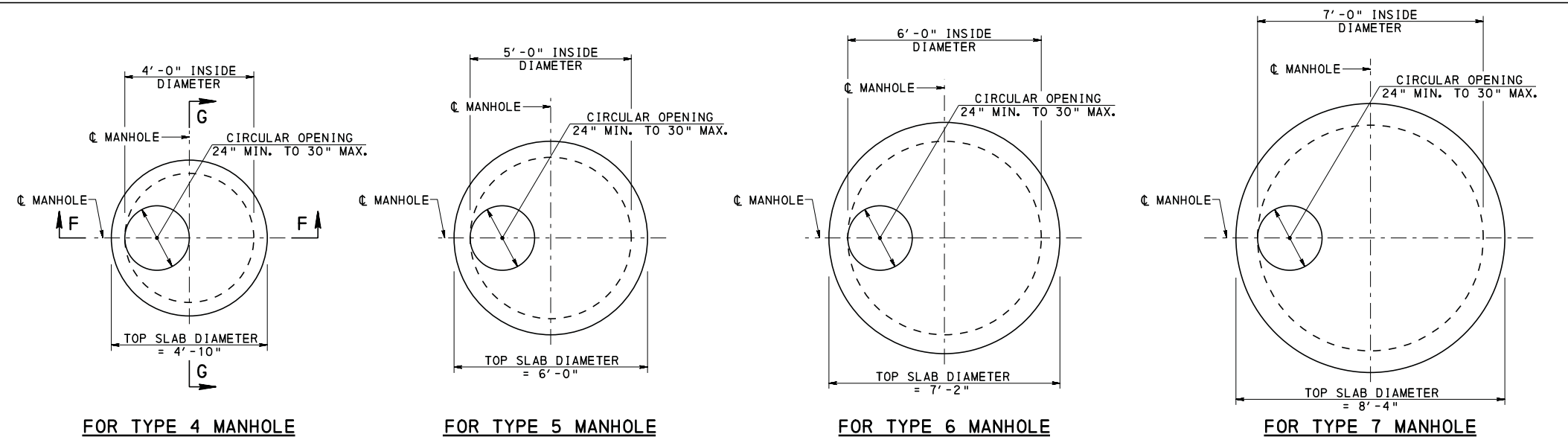
STORM WATER MANHOLES  
MISCELLANEOUS DETAILS

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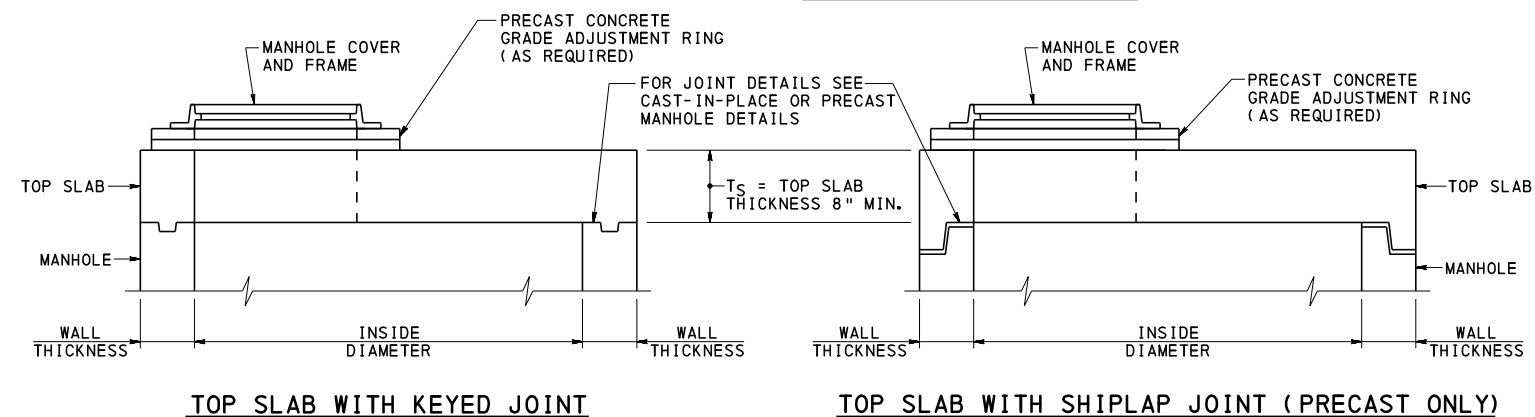
SHT 10 OF 30  
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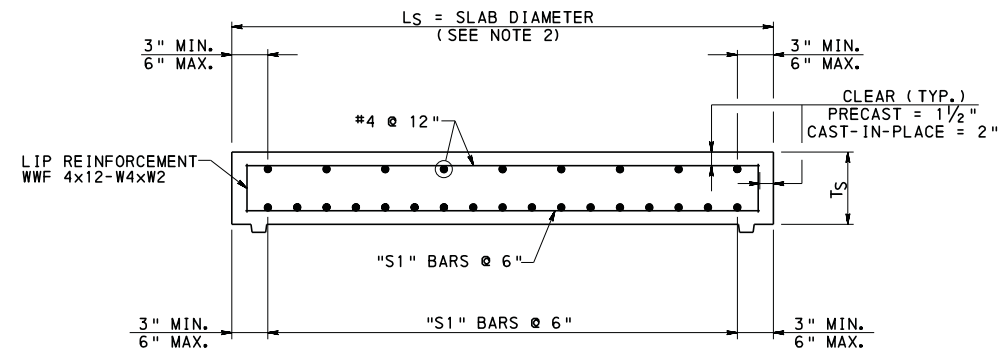
**NOTES:**

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.

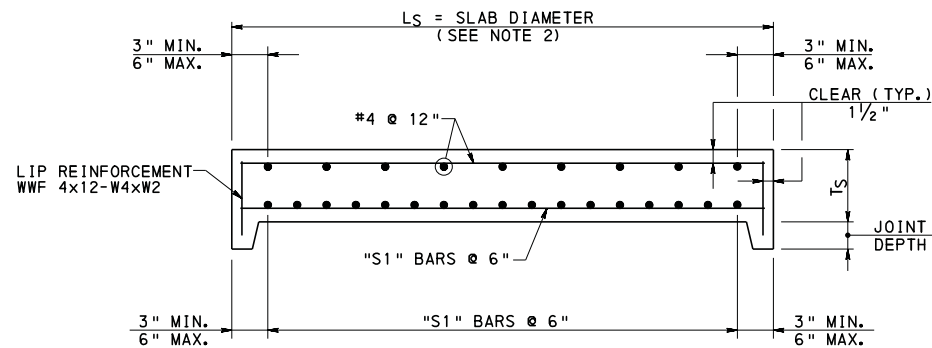


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STORM WATER MANHOLES  
TOP SLABS - 1



TOP SLAB WITH KEYED JOINT



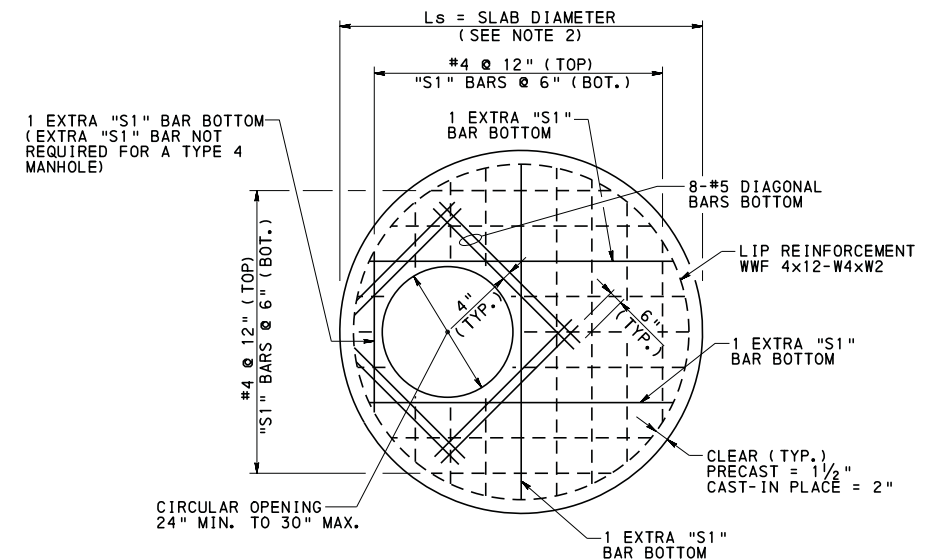
TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

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



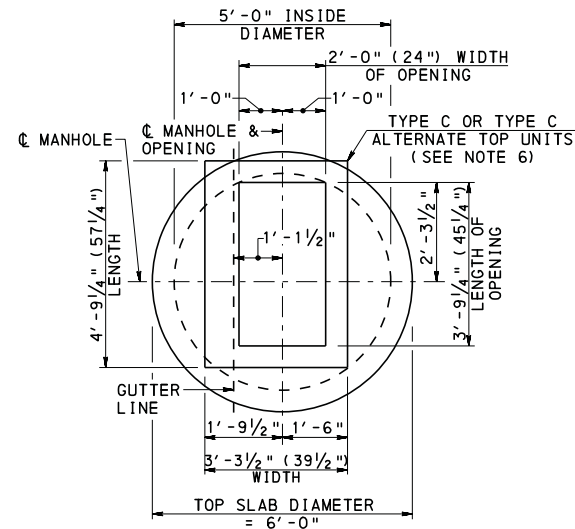
TOP SLAB REINFORCEMENT PLAN

NOTES:

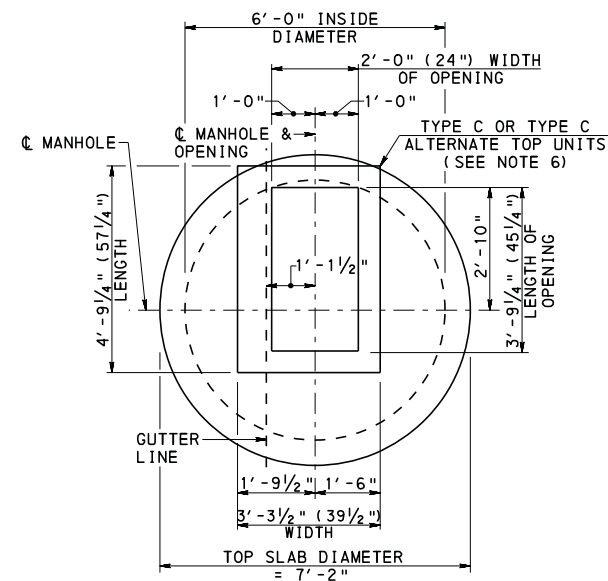
- FOR NOTES, SEE SHEETS 1 - 3.
- DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
- ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
- FOR JOINT DETAILS, SEE SHEETS 20 OR 24.
- ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
- SLAB THICKNESS "T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

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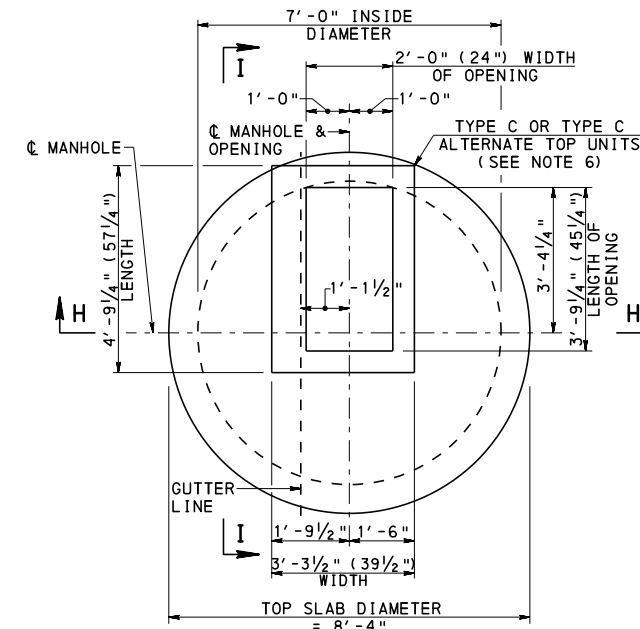
STORM WATER MANHOLES  
TOP SLABS - 2



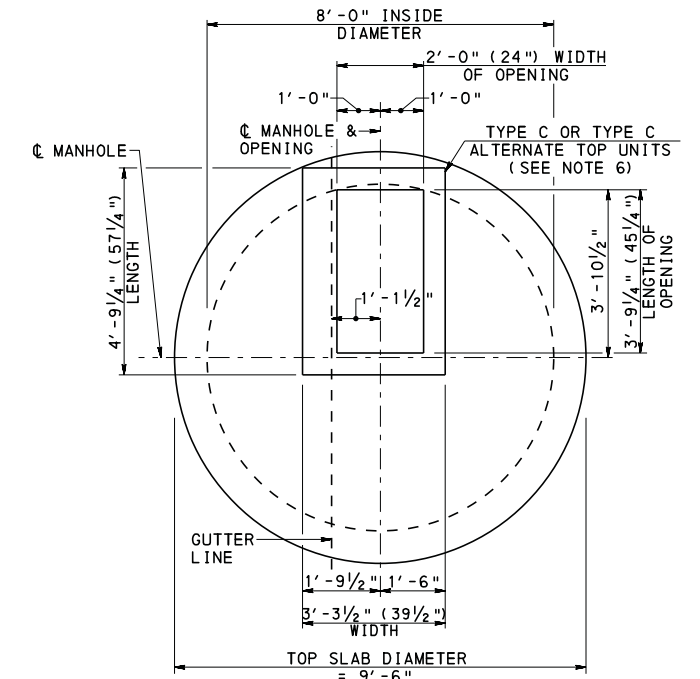
FOR TYPE 5 MANHOLE



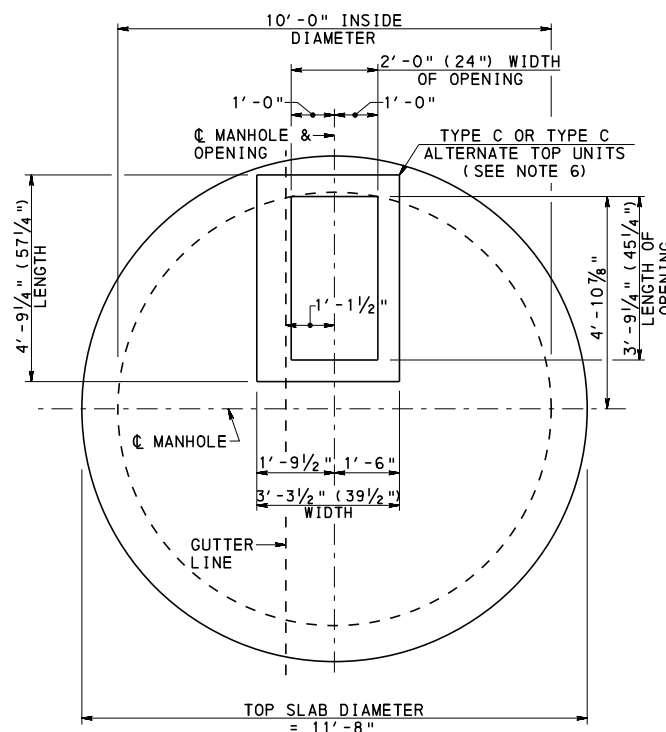
FOR TYPE 6 MANHOLE



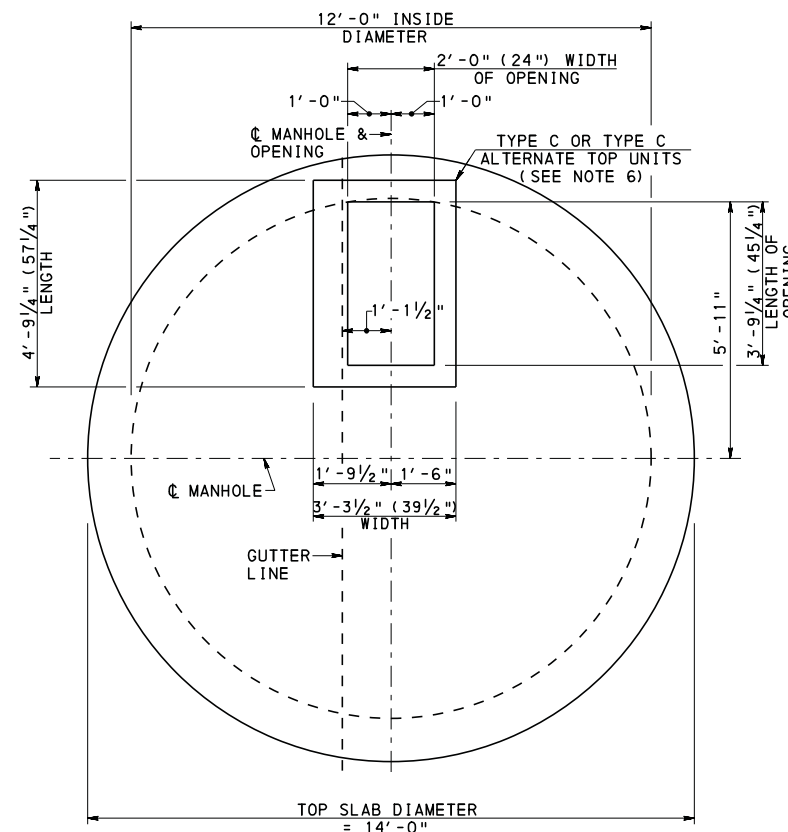
FOR TYPE 7 MANHOLE



FOR TYPE 8 MANHOLE

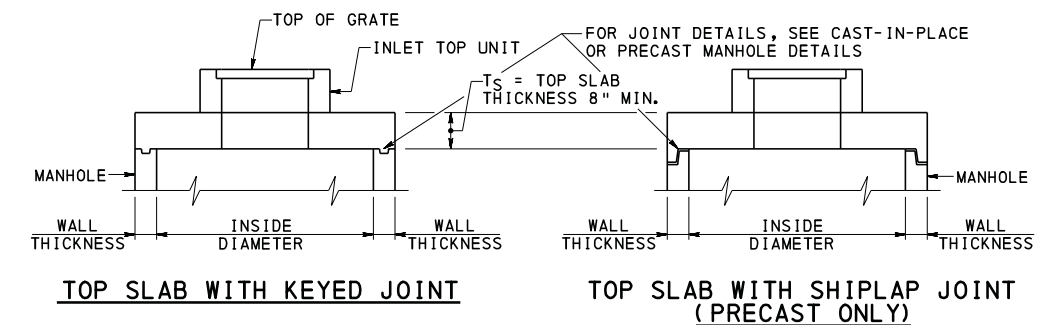


FOR TYPE 10 MANHOLE



FOR TYPE 12 MANHOLE

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



**SECTION H-H  
(TYPICAL)**

NOTE: GRADE ADJUSTMENT RINGS NOT SHOWN.

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. DIAMETER OF TOP SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
3. ALIGN OPENING AS SHOWN.
4. FOR SECTION I-I AND REINFORCEMENT REQUIREMENTS, SEE SHEET 15.
5. FOR CONCRETE TOP UNITS, SEE RC-45M.
6. REFER TO CONTRACT DRAWINGS FOR CURB HEIGHT.

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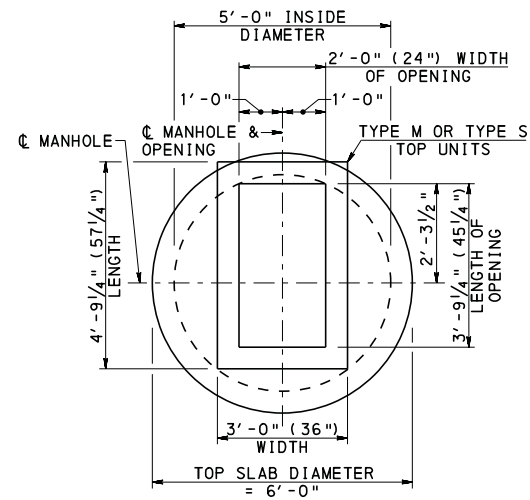
**STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 1**

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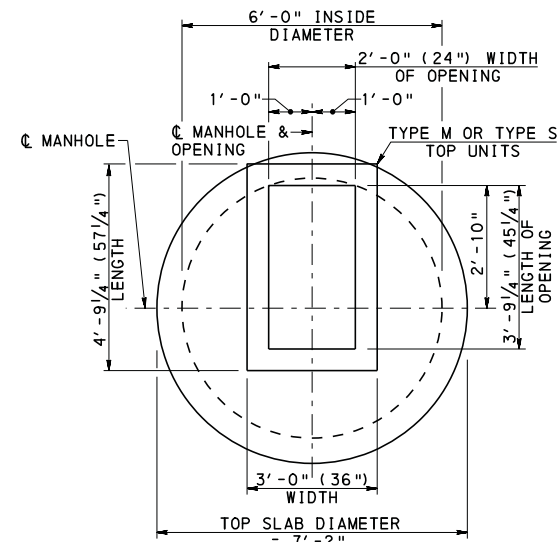
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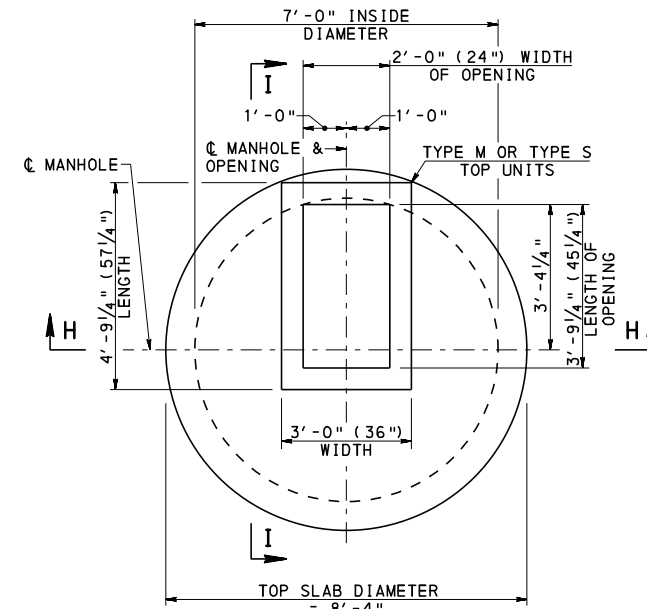
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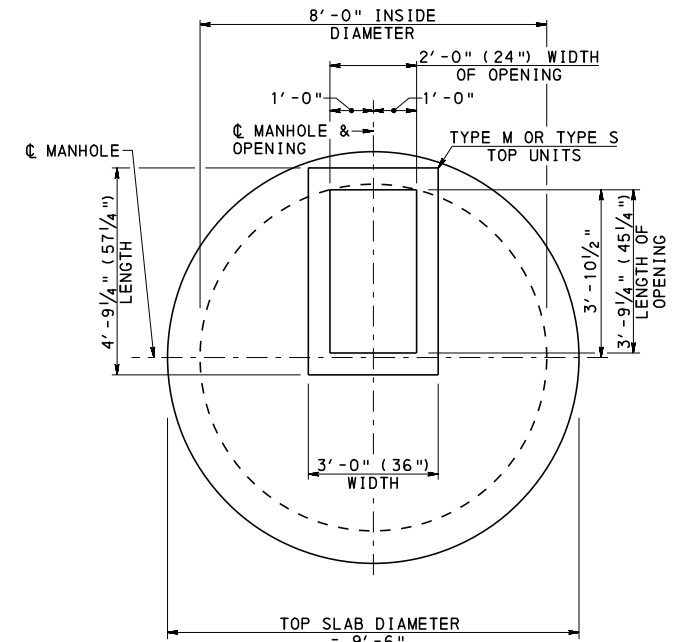
FOR TYPE 5 MANHOLE



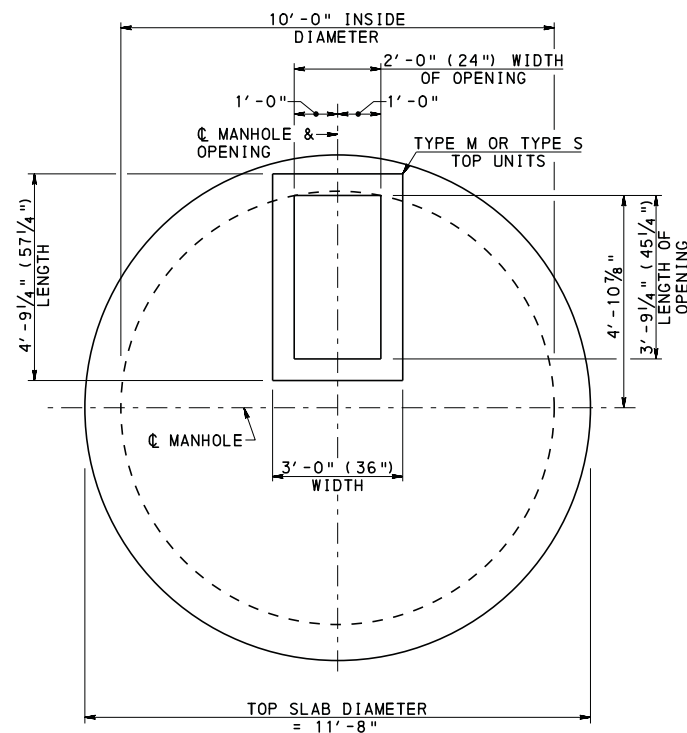
FOR TYPE 6 MANHOLE



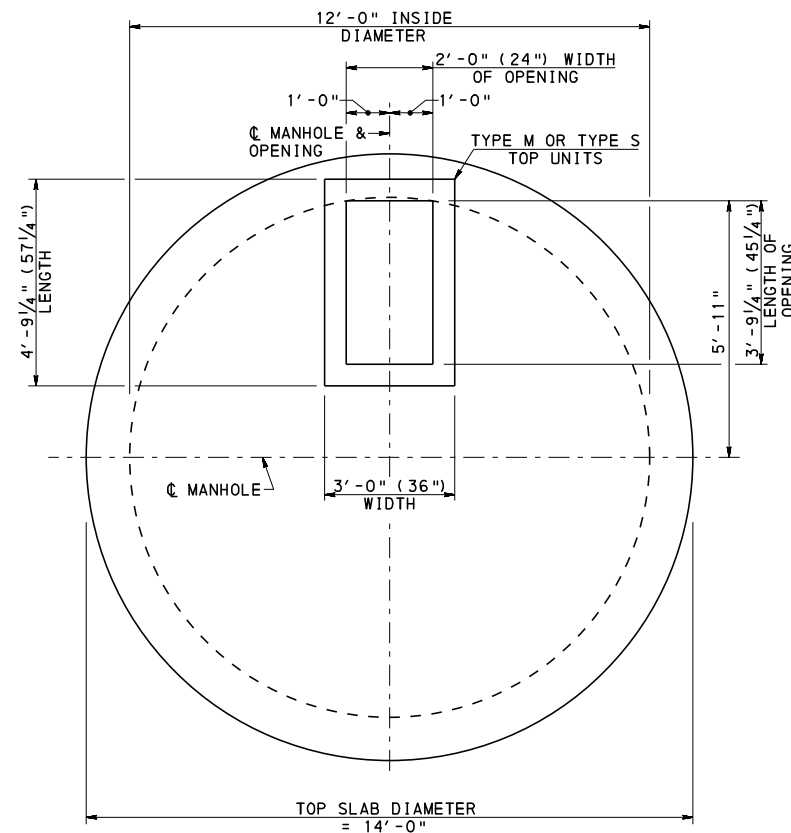
FOR TYPE 7 MANHOLE



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:**

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

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

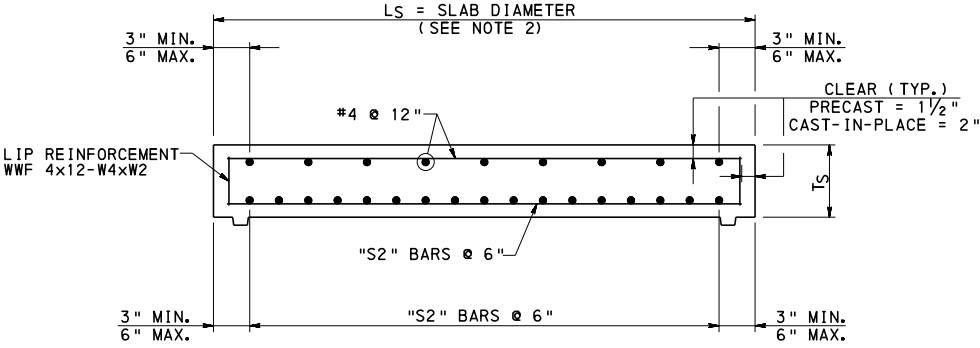
STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 2

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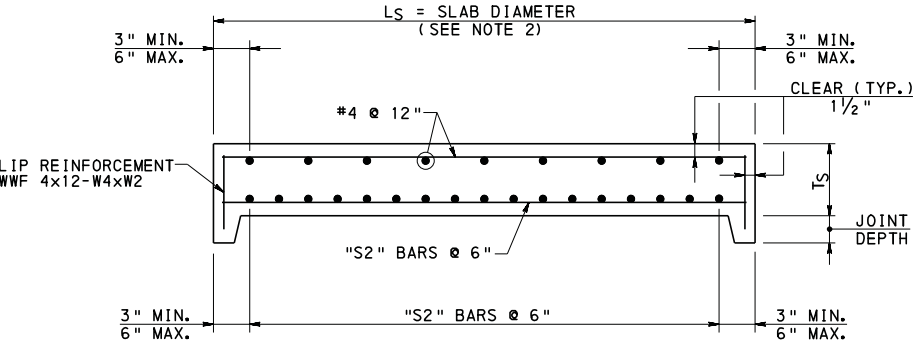
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TOP SLAB WITH KEYED JOINT



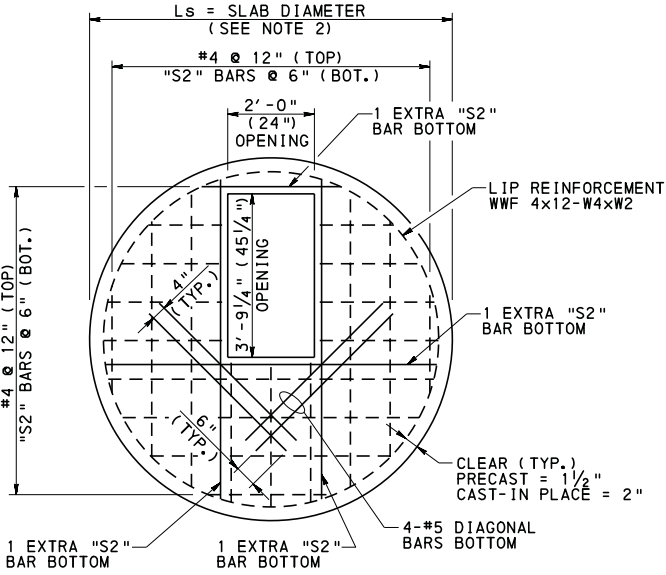
TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

SECTION I-I

(ADDITIONAL REINFORCEMENT NOT SHOWN)

TOP SLAB CAST-IN-PLACE CONCRETE		
MANHOLE TYPE	T <sub>S</sub> (IN.)	S <sub>2</sub> (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.)	S <sub>2</sub> (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 "T<sub>s</sub>" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.

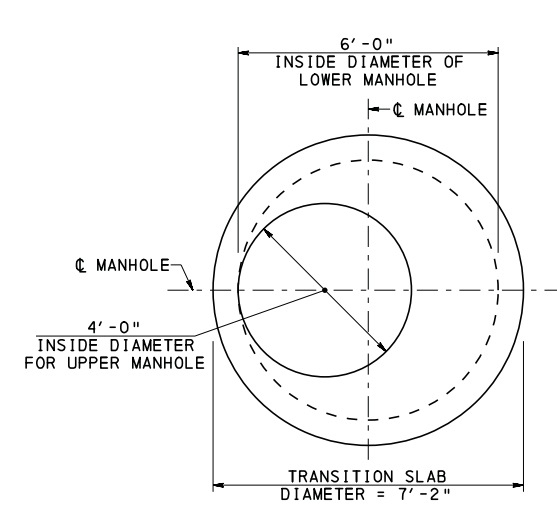
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STORM WATER MANHOLES  
TOP SLABS FOR INLET TOPS - 3

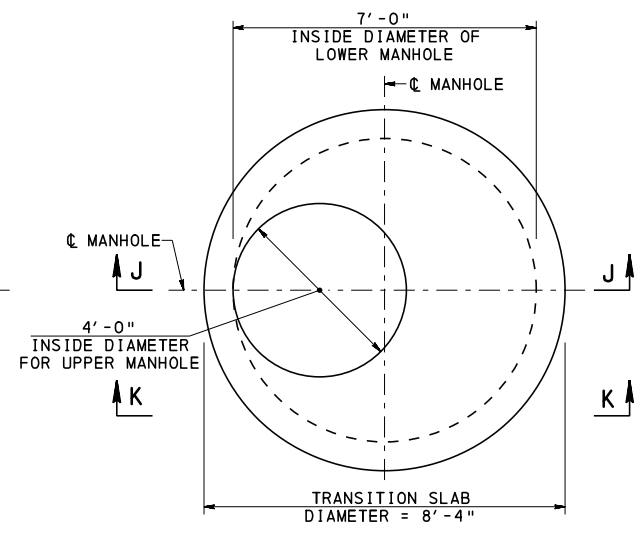
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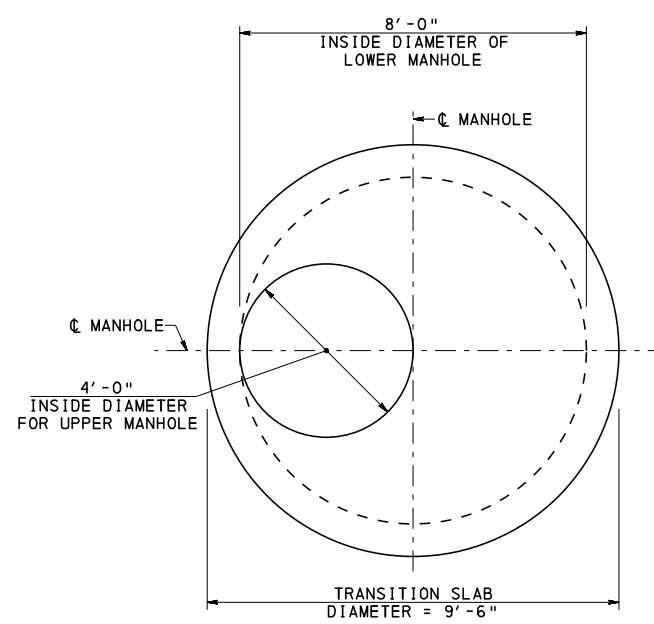
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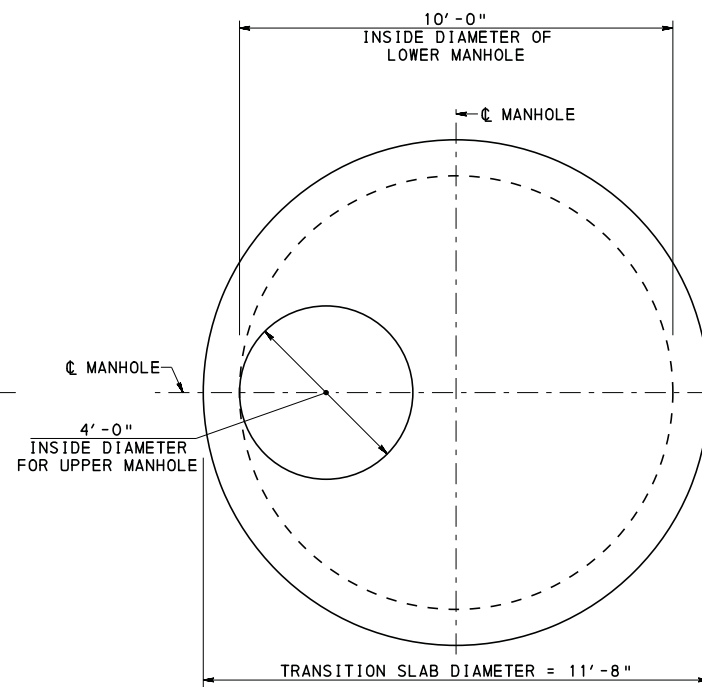
FOR TYPE 6 MANHOLE



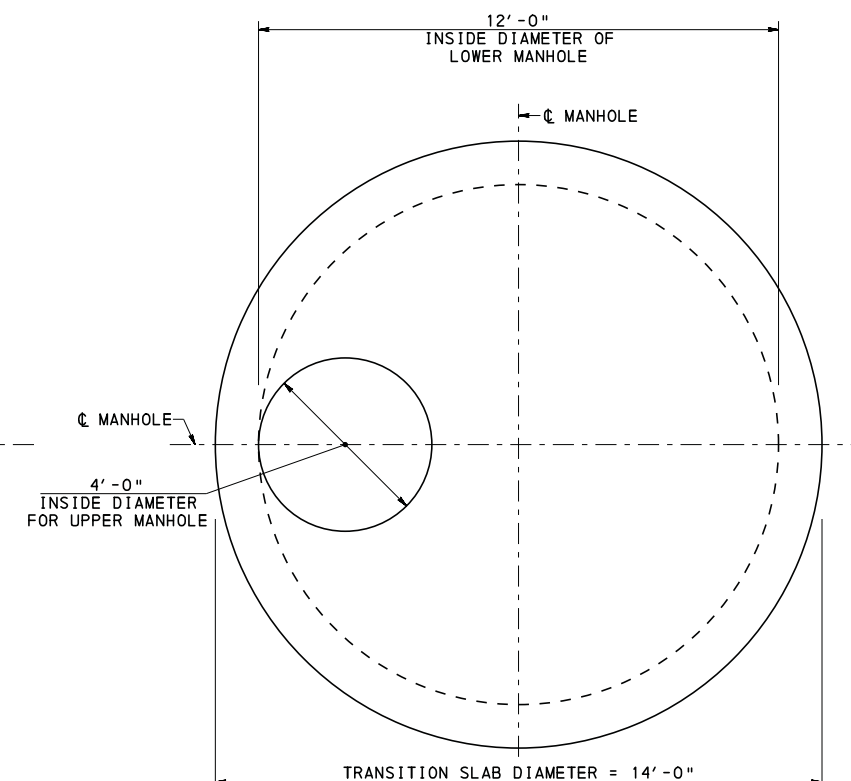
FOR TYPE 7 MANHOLE



FOR TYPE 8 MANHOLE



FOR TYPE 10 MANHOLE

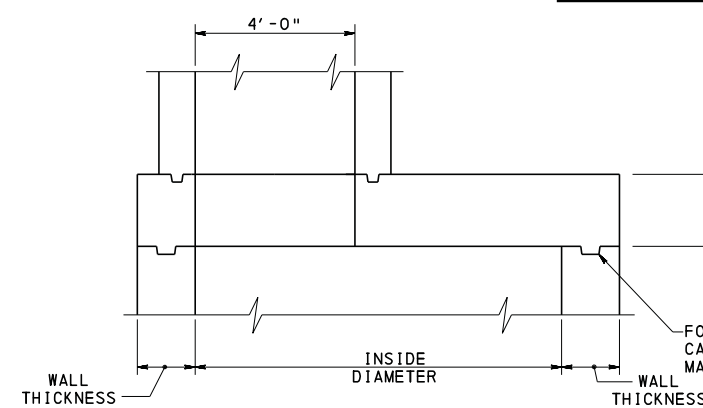


FOR TYPE 12 MANHOLE

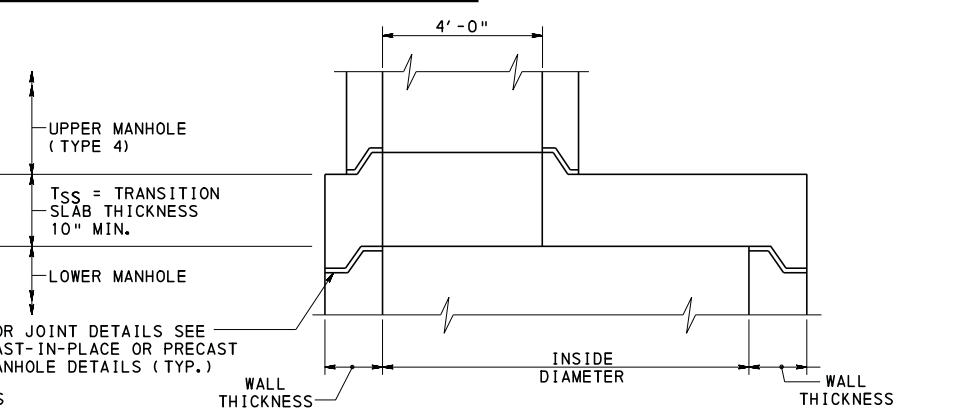
**NOTES:**

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.

**PLAN - ROUND TRANSITION SLABS**



TRANSITION SLAB WITH KEYED JOINT



TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

**SECTION J-J  
(TYPICAL)**

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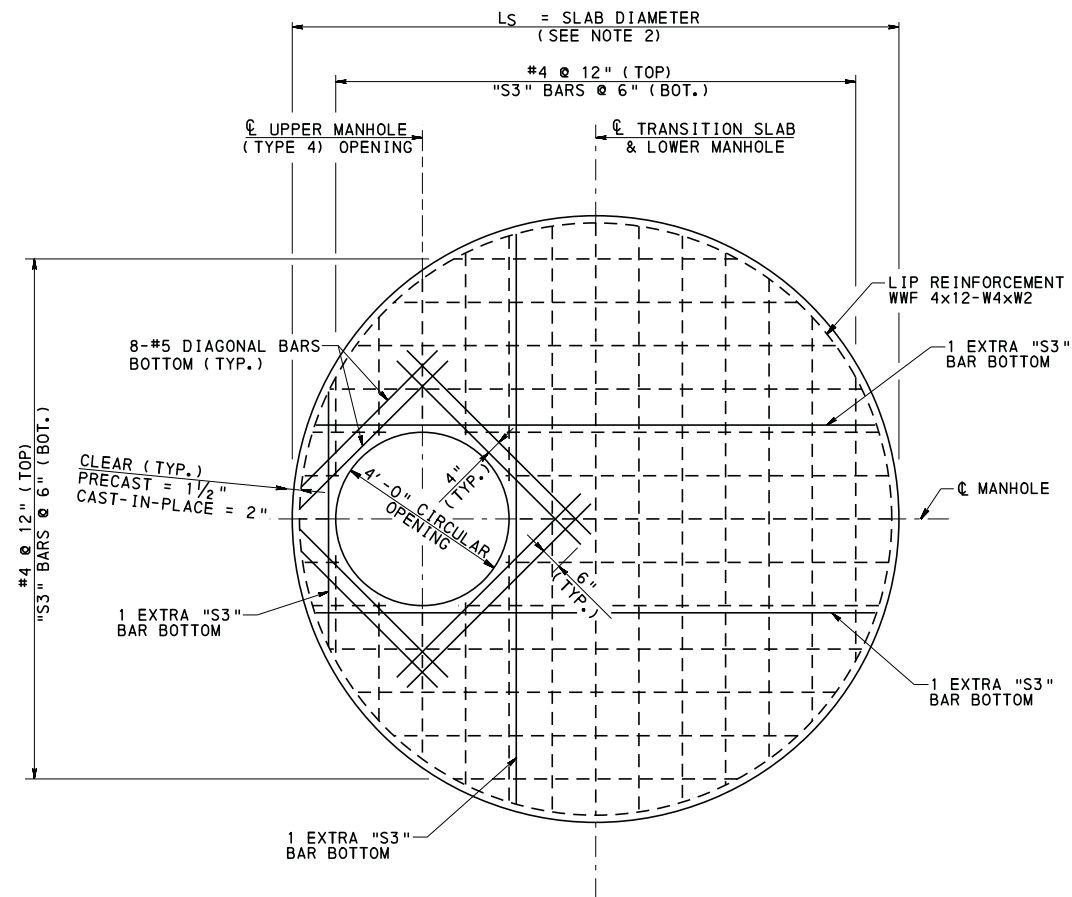
STORM WATER MANHOLES  
ROUND TRANSITION SLABS - 1

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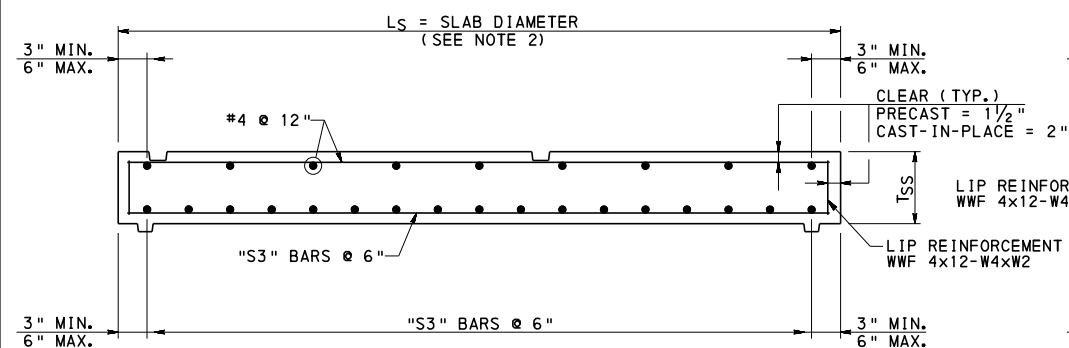


**ROUND TRANSITION SLAB REINFORCEMENT PLAN**

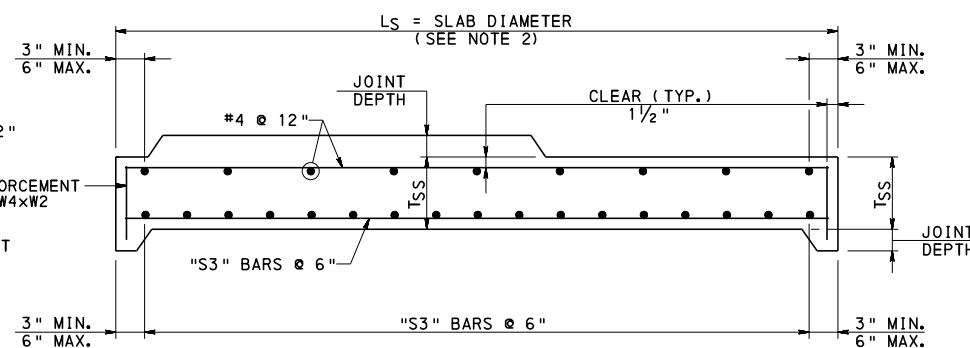
ROUND TRANSITION SLAB CAST-IN-PLACE CONCRETE			
MANHOLE TYPE	T <sub>SS</sub> (IN.)	S3 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.) *
TYPE 6	10	#7	25.5
TYPE 7	12	#7	25.0
TYPE 8	12	#8	24.5
TYPE 10	14	#9	23.0
TYPE 12	16	#10	22.0

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.



**TRANSITION SLAB WITH KEYED JOINT**



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

**SECTION K-K**

(ADDITIONAL REINFORCEMENT NOT SHOWN)

**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.

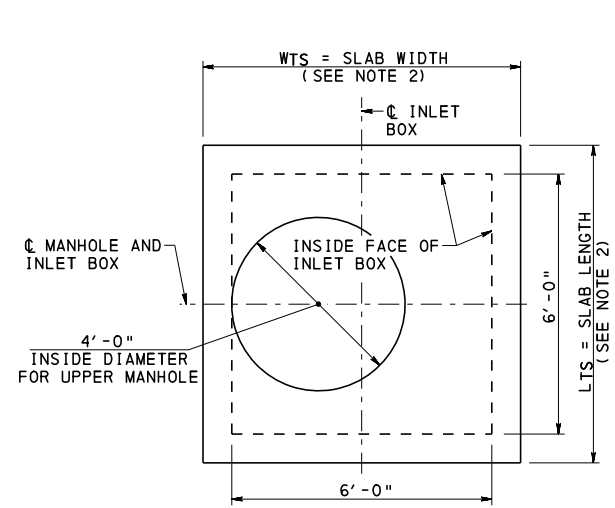
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STORM WATER MANHOLES  
ROUND TRANSITION SLABS - 2

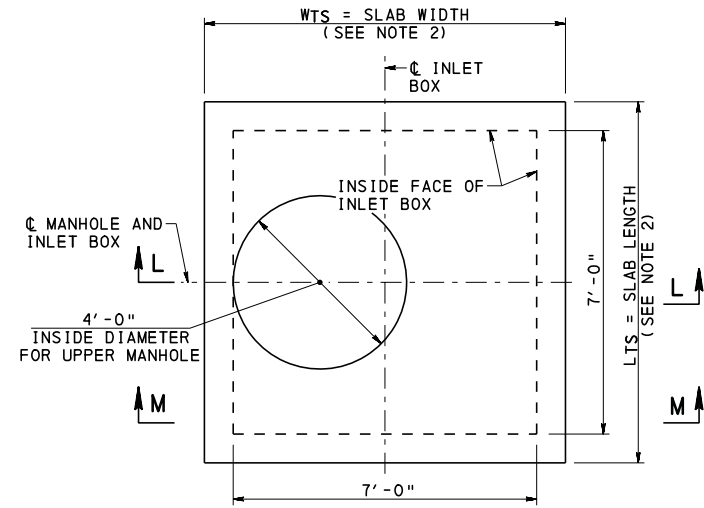
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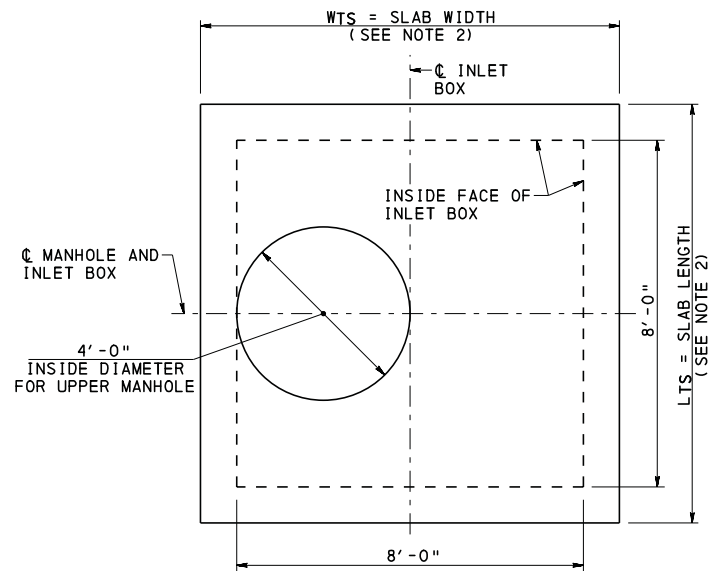
**TYPE 6 INLET BOX  
TO TYPE 4 MANHOLE**



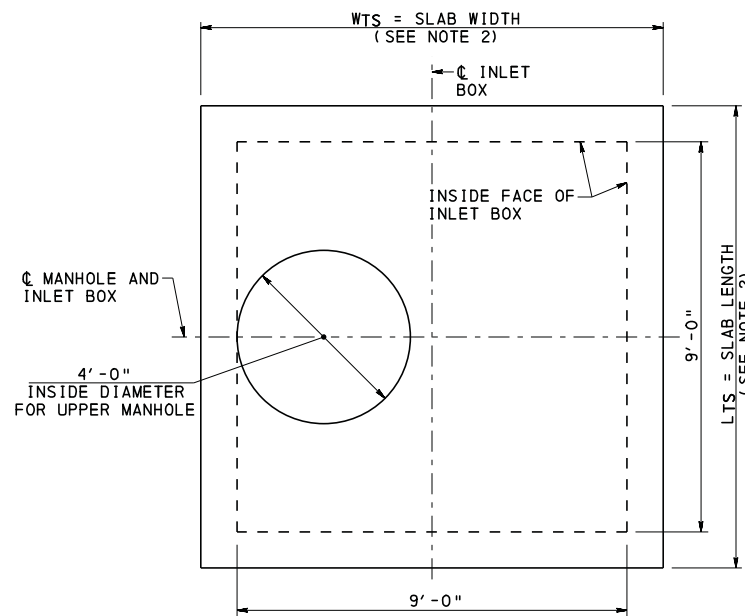
**TYPE 7 INLET BOX  
TO TYPE 4 MANHOLE**

**NOTES:**

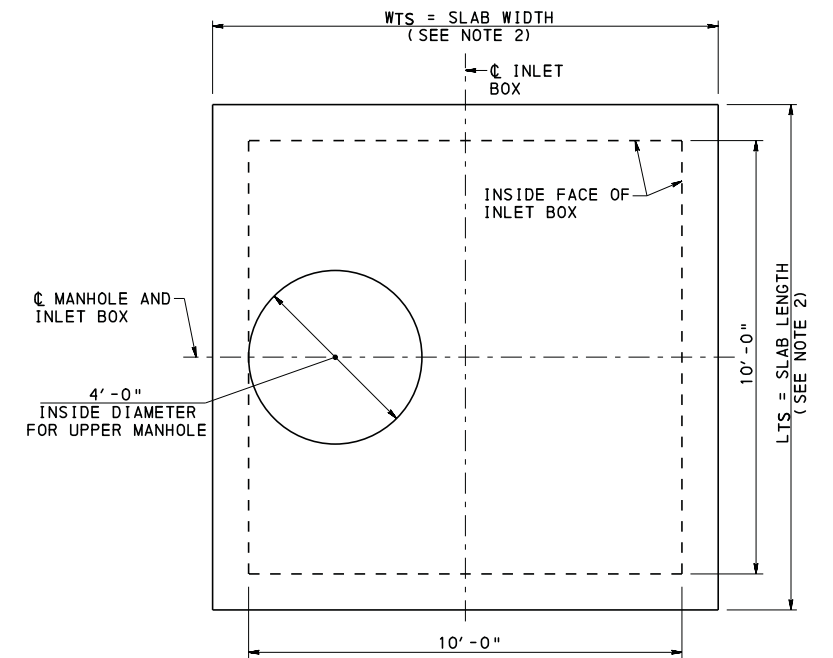
1. FOR NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS TO MATCH SIZE OF LOWER INLET BOX.
3. ALIGN OPENING WITH INSIDE FACE OF INLET BOX.
4. FOR SECTION M-M AND REINFORCEMENT REQUIREMENTS, SEE SHEET 19.



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

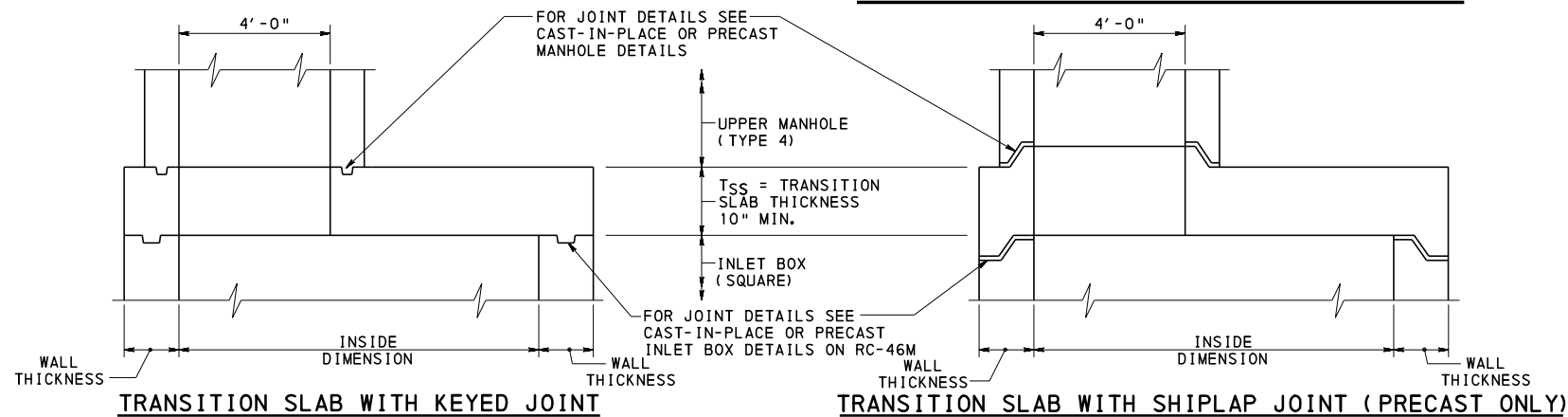


**TYPE 9 INLET BOX  
TO TYPE 4 MANHOLE**



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

**PLAN - SQUARE TRANSITION SLABS**



**SECTION L-L  
(TYPICAL)**

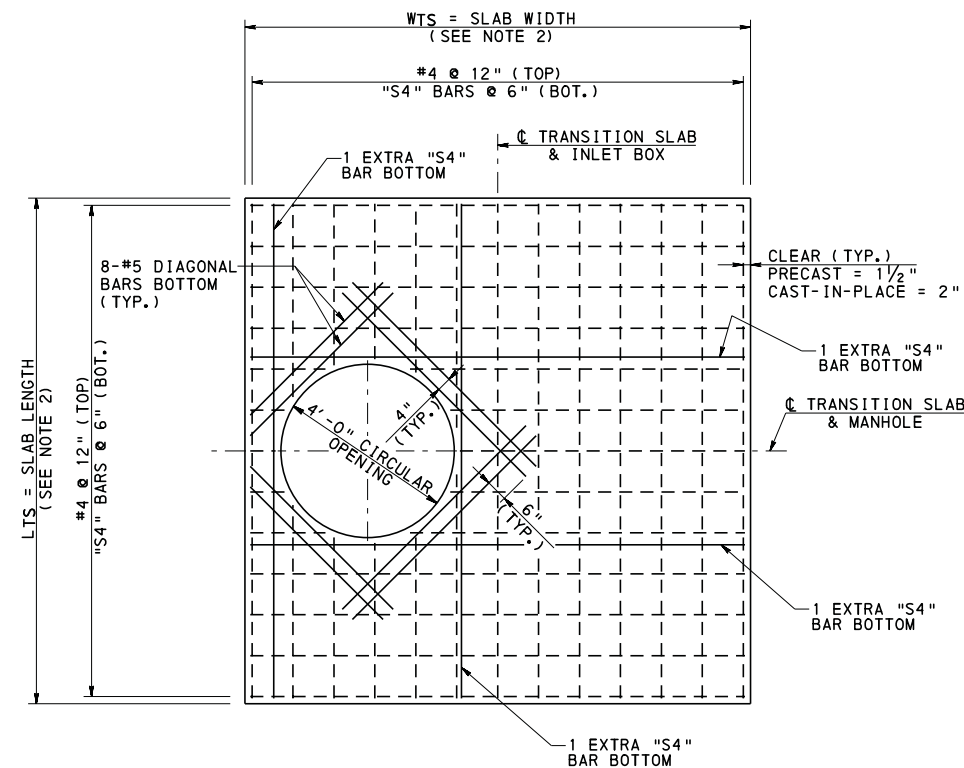
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BUREAU OF PROJECT DELIVERY

**STORM WATER MANHOLES  
SQUARE TRANSITION SLABS - 1**

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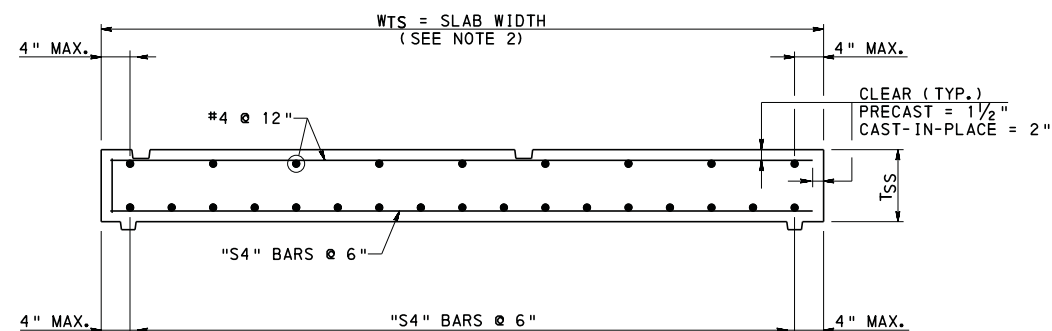


**SQUARE TRANSITION SLAB REINFORCEMENT PLAN**

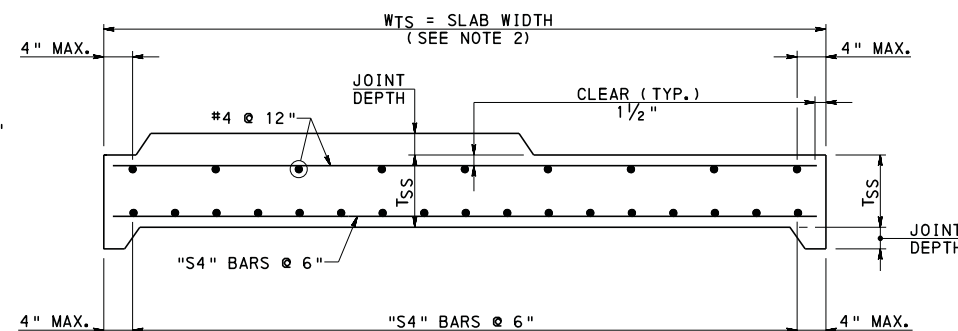
SQUARE TRANSITION SLAB CAST-IN-PLACE CONCRETE				
INLET TYPE BOTTOM SECTION	MANHOLE TYPE UPPER SECTION	T <sub>SS</sub> (IN.)	S4 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.) *
TYPE 6	TYPE 4	10	#7	23.0
TYPE 7	TYPE 4	12	#7	22.0
TYPE 8	TYPE 4	12	#7	21.0
TYPE 9	TYPE 4	12	#8	20.0
TYPE 10	TYPE 4	14	#8	19.0

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.

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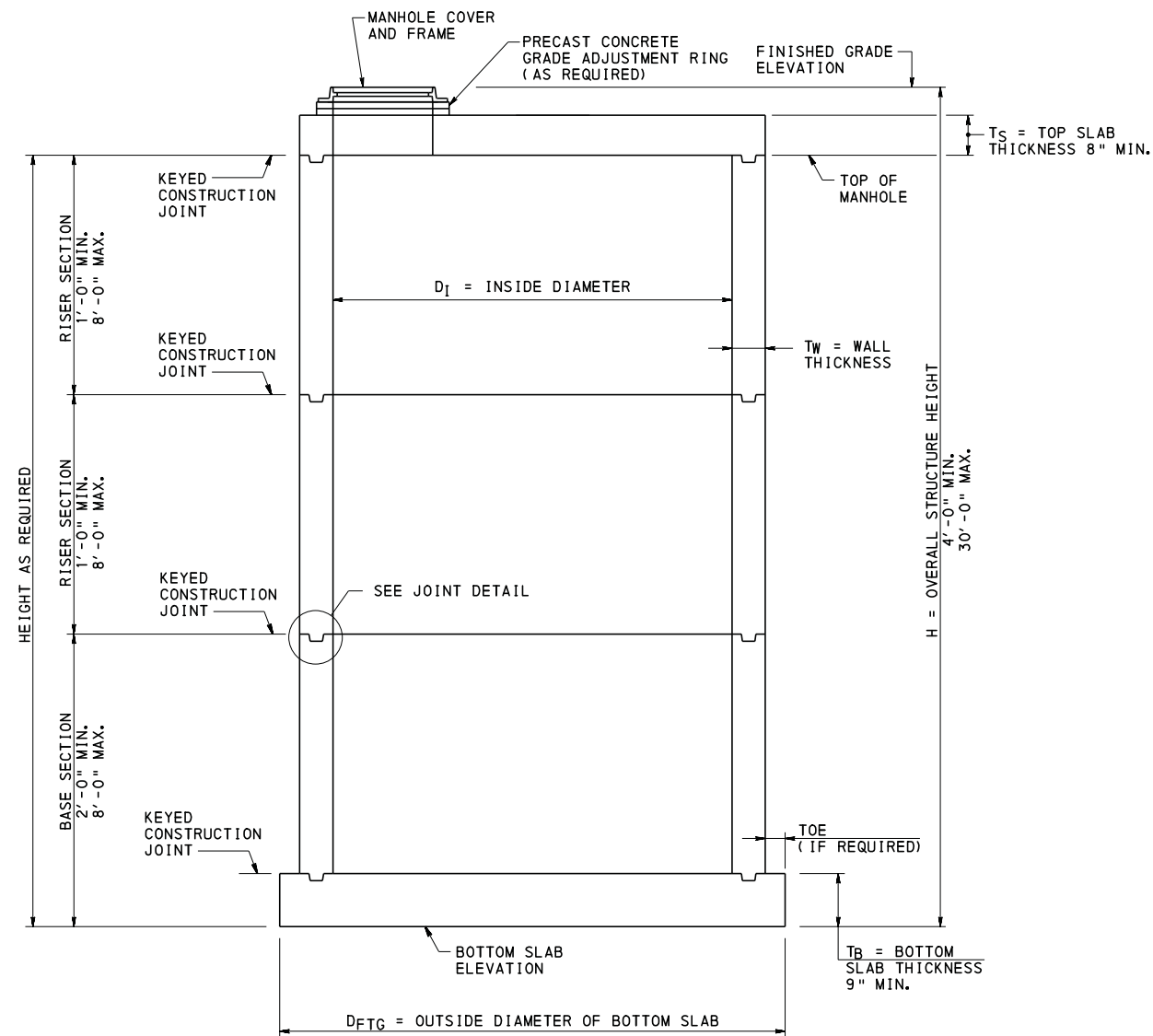
**STORM WATER MANHOLES  
SQUARE TRANSITION SLABS - 2**

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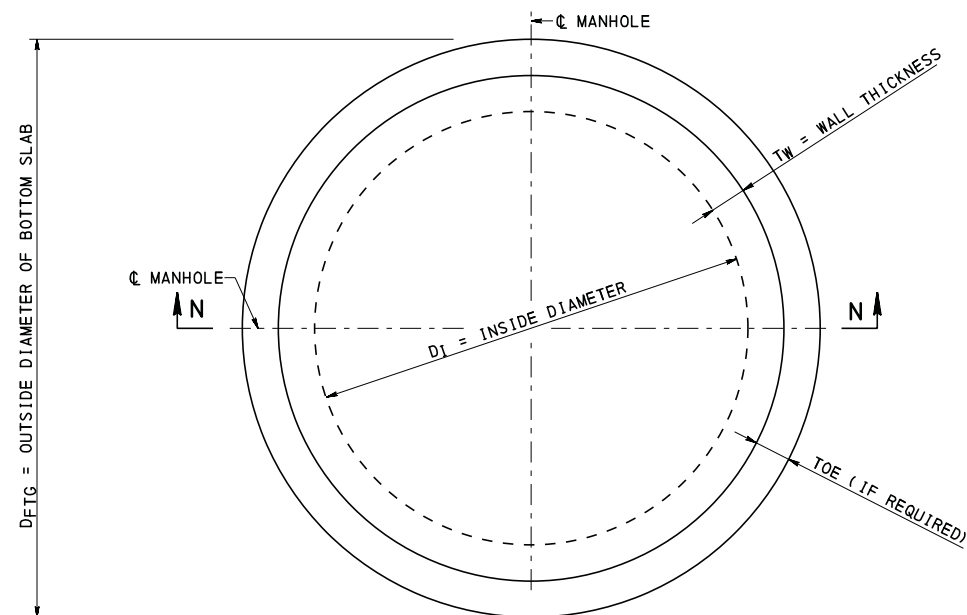
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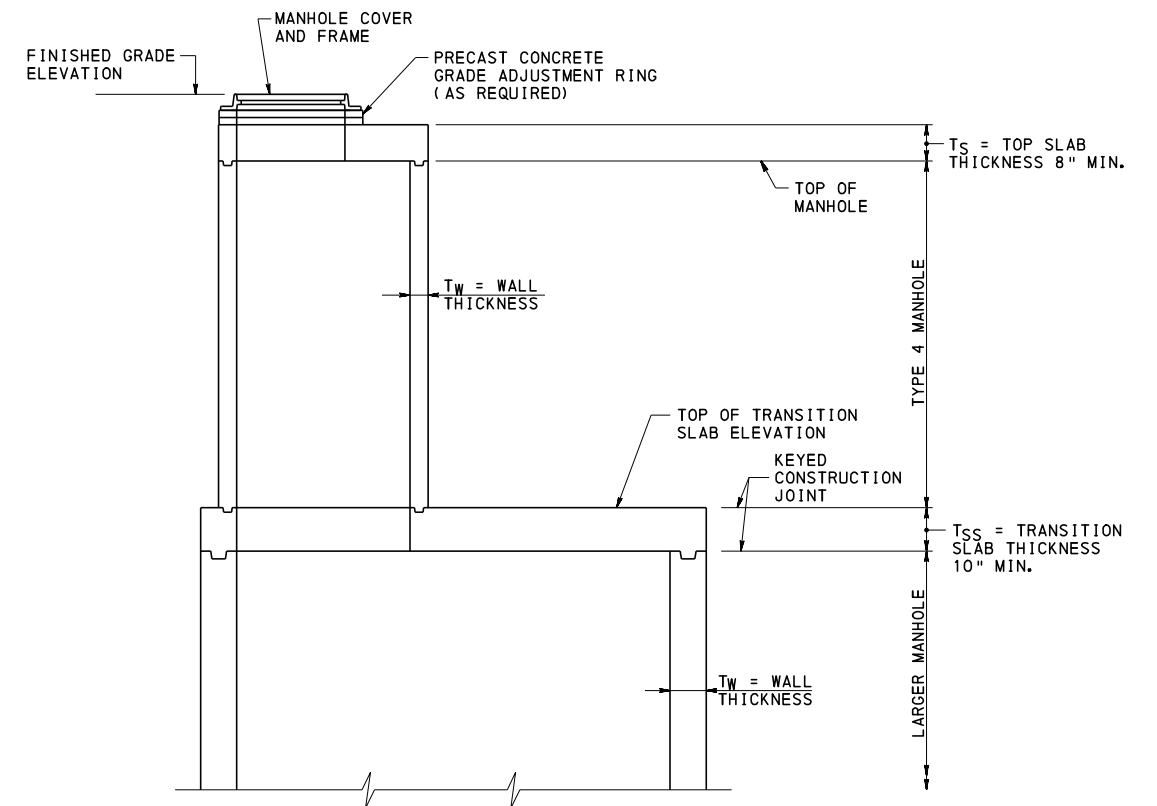
RC-39M



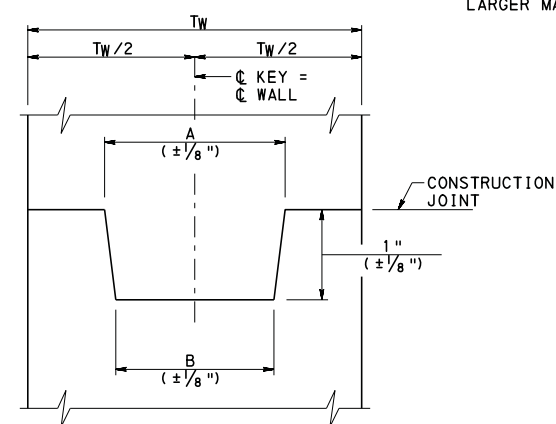
**SECTION N-N**  
SAME SIZE MANHOLE FULL HEIGHT WITH  
TOP SLAB AND MANHOLE COVER AND FRAME



**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.

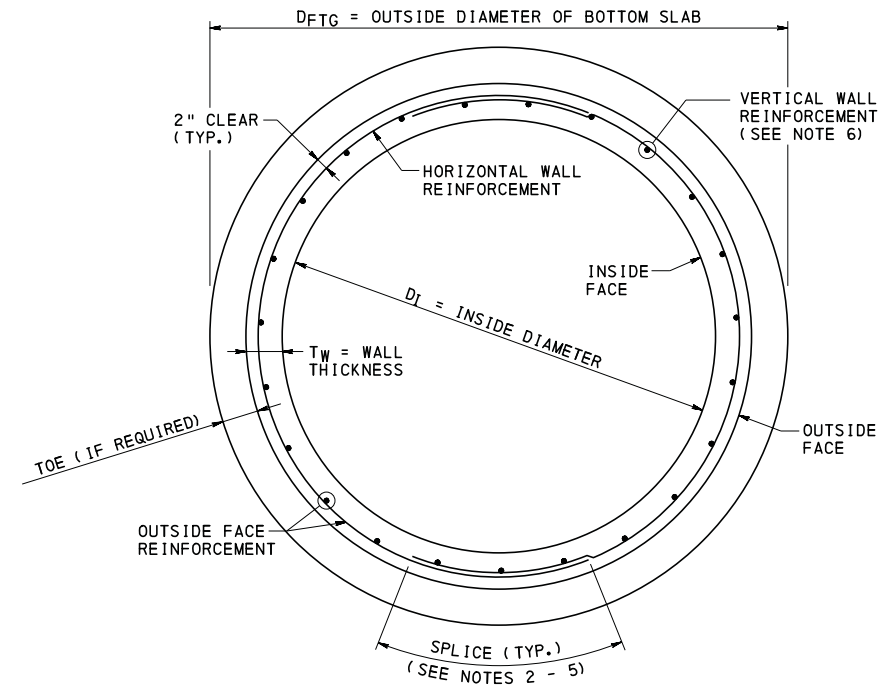
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STORM WATER MANHOLES  
CAST-IN-PLACE MANHOLES - 1

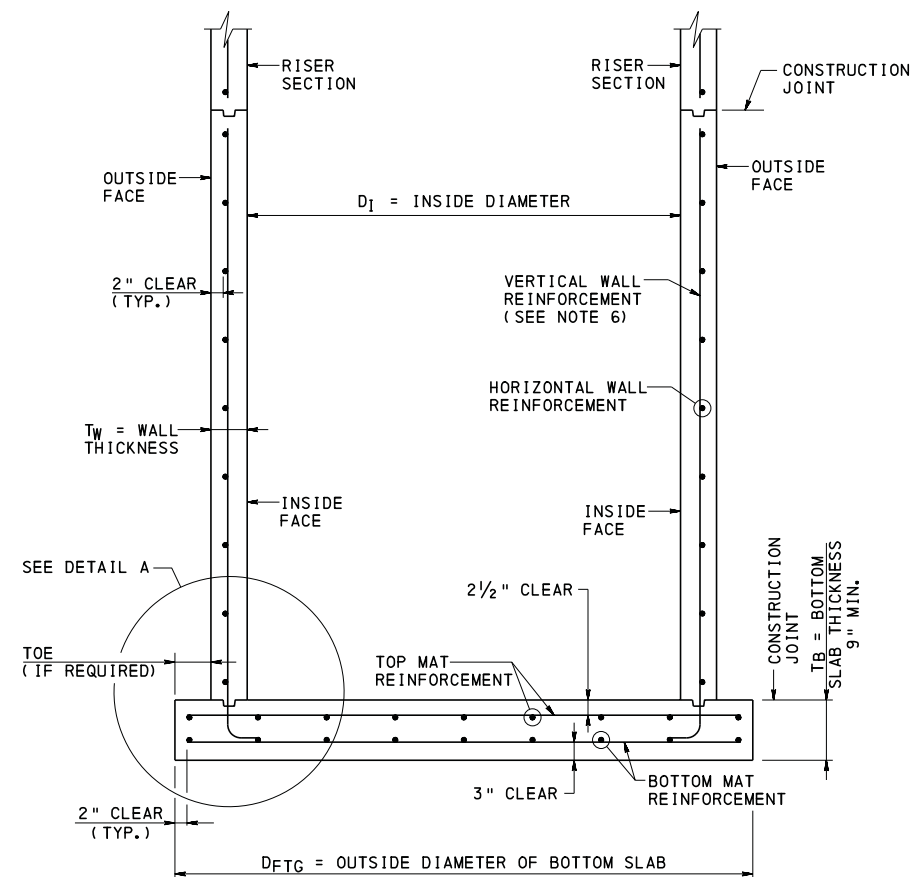
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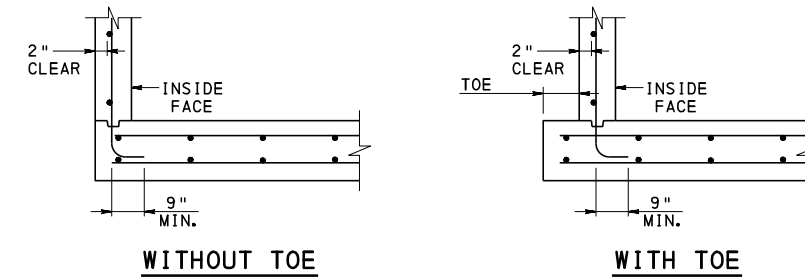


**HORIZONTAL SECTION**  
(RISER SECTIONS AND BASE SECTIONS)



**VERTICAL SECTION OF BASE SECTION**

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



**DETAIL A**

**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.

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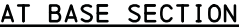
STORM WATER MANHOLES  
CAST-IN-PLACE MANHOLES - 2  
(REINFORCEMENT BAR DETAILS)

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PIPE OPENING LOCATION  
AND SIZE AS REQUIRED



## LOCATION OF PIPE OPENING



## ALTERNATE REINFORCEMENT DETAILS

1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENINGS IS REQUIRED WHEN THE PIPE OPENING IS GREATER THAN 15".
4. TIE ADDITIONAL REINFORCEMENT TO THE DESIGN REINFORCEMENT.
5. FOR REINFORCEMENT DETAILS, SEE SHEET 21.
6. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
7. SPLICE LOCATIONS TO BE DETERMINED BY CONTRACTOR.
8. ALTERNATE SPLICE LOCATIONS.
9. 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.

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>I</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>I</sub> ( FT. )	T <sub>W</sub> ( IN. )	D <sub>F</sub> T <sub>G</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								
TYPE 5	17.0	5	6	6' - 0"	9	#3	9	#3	11	#3	11	#3	7
	30.0	5	6	6' - 6"	9								
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								
	30.0	6	7	7' - 8"	12								
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								
	30.0	7	8	8' - 10"	12								
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								
	30.0	8	9	10' - 0"	14								
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								
	27.0	10	10	12' - 2"	15								
TYPE 12	30.0	10	10	12' - 8"	16	#5	10	#3	11	#4	12	#5	10
	6.0	12	12	14' - 0"	14								
	12.0	12	12	14' - 0"	15								
	18.0	12	12	14' - 6"	16								
	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:**
- 1. FOR NOTES, SEE SHEETS 1 - 3.
  - 2. FOR MANHOLE TYPES, SEE SHEET 4.
  - 3. FOR DETAILS, SEE SHEETS 20 - 22.

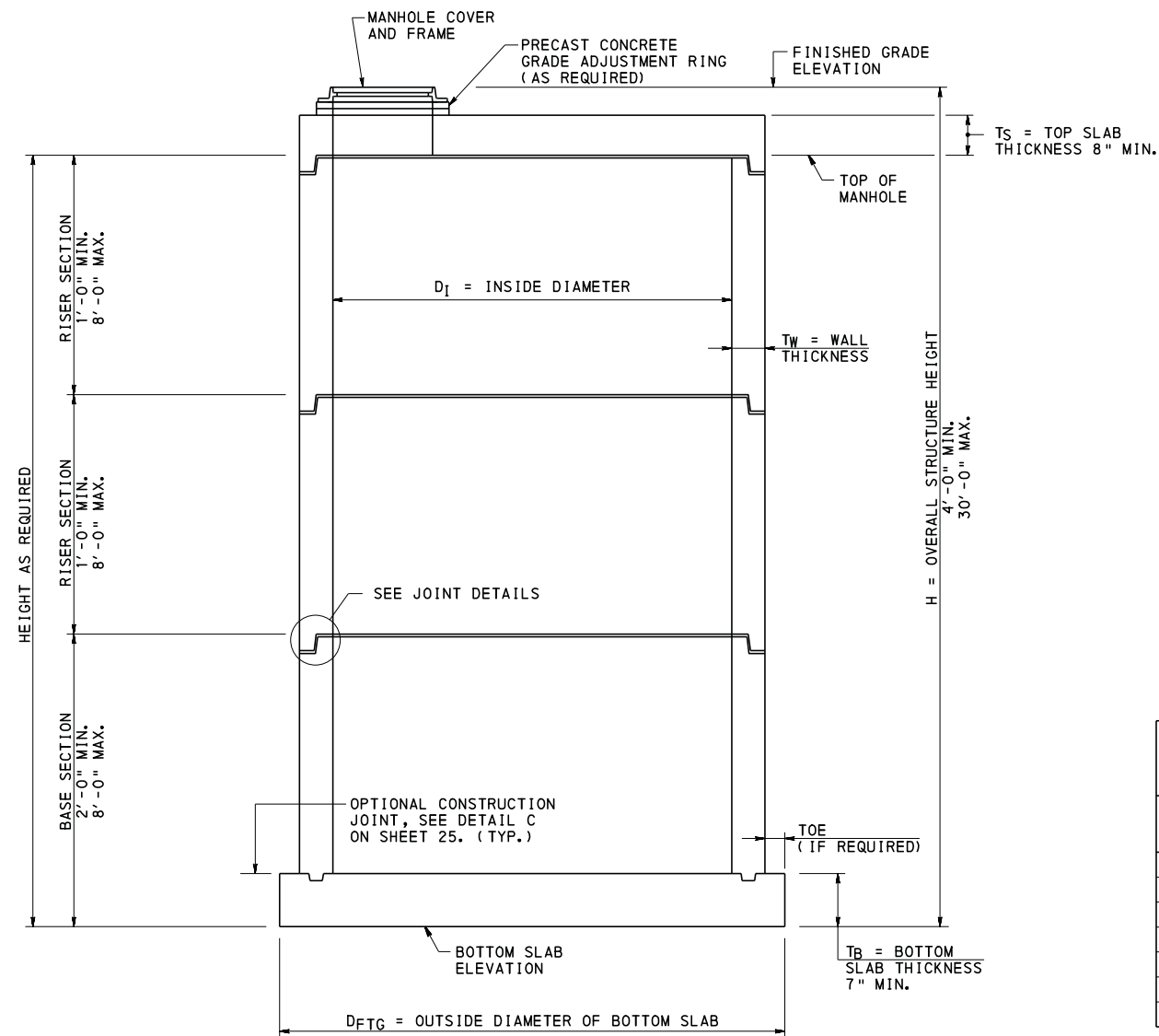
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STORM WATER MANHOLES  
CAST-IN-PLACE MANHOLES  
DESIGN TABLES

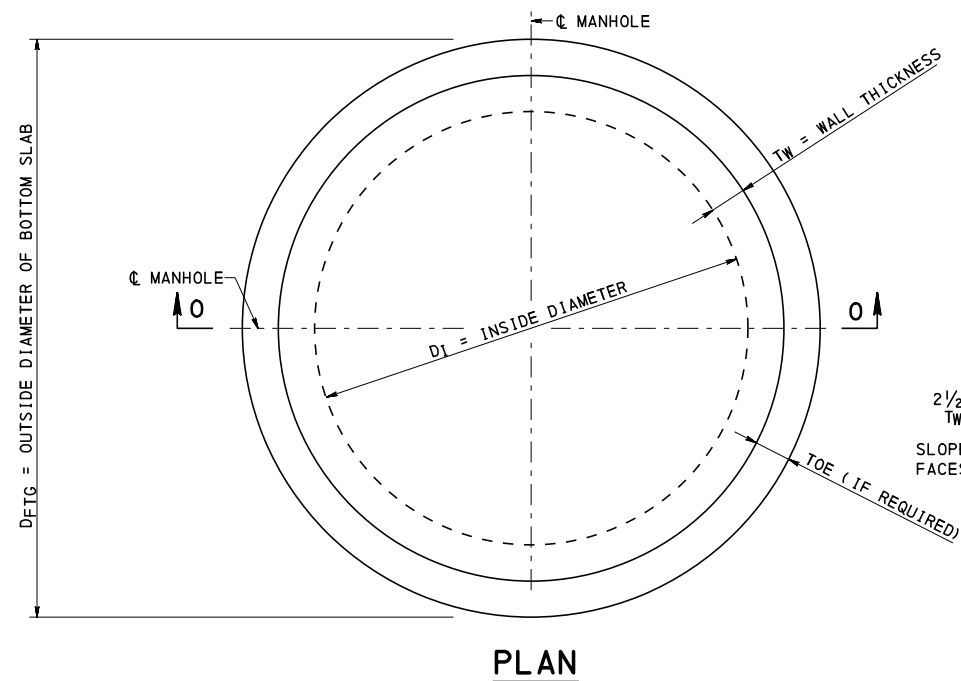
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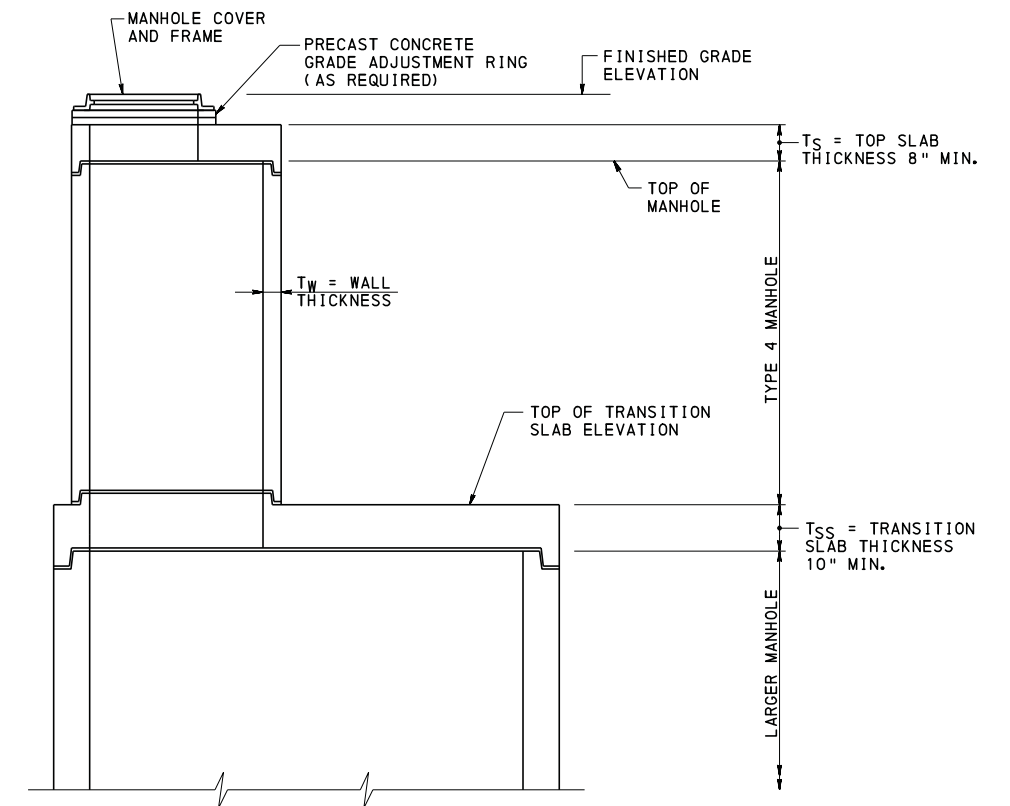


**SECTION 0-0**  
SAME SIZE MANHOLE FULL HEIGHT WITH  
TOP SLAB AND MANHOLE COVER AND FRAME

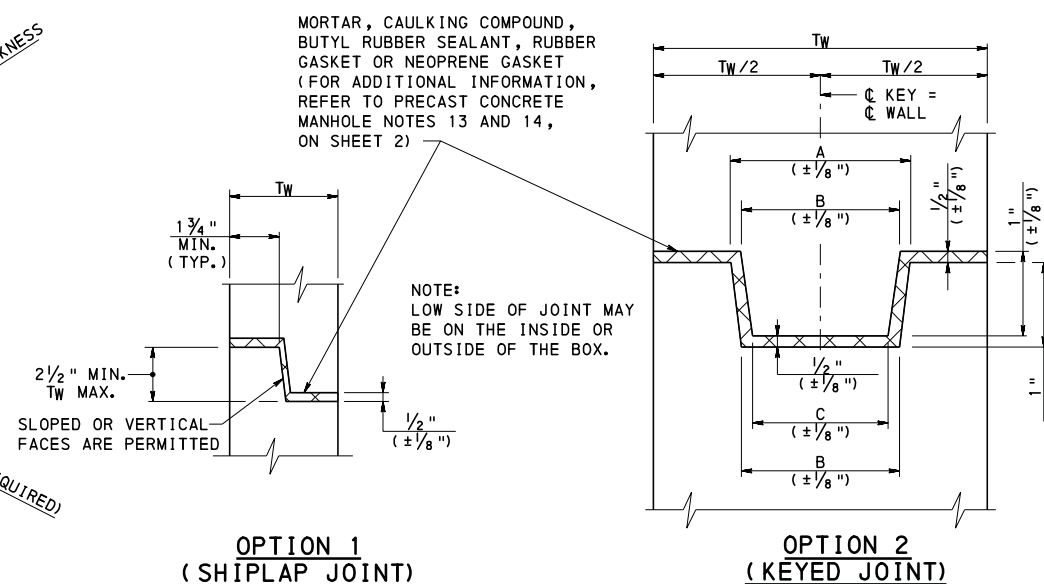


**PLAN**

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



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



**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.

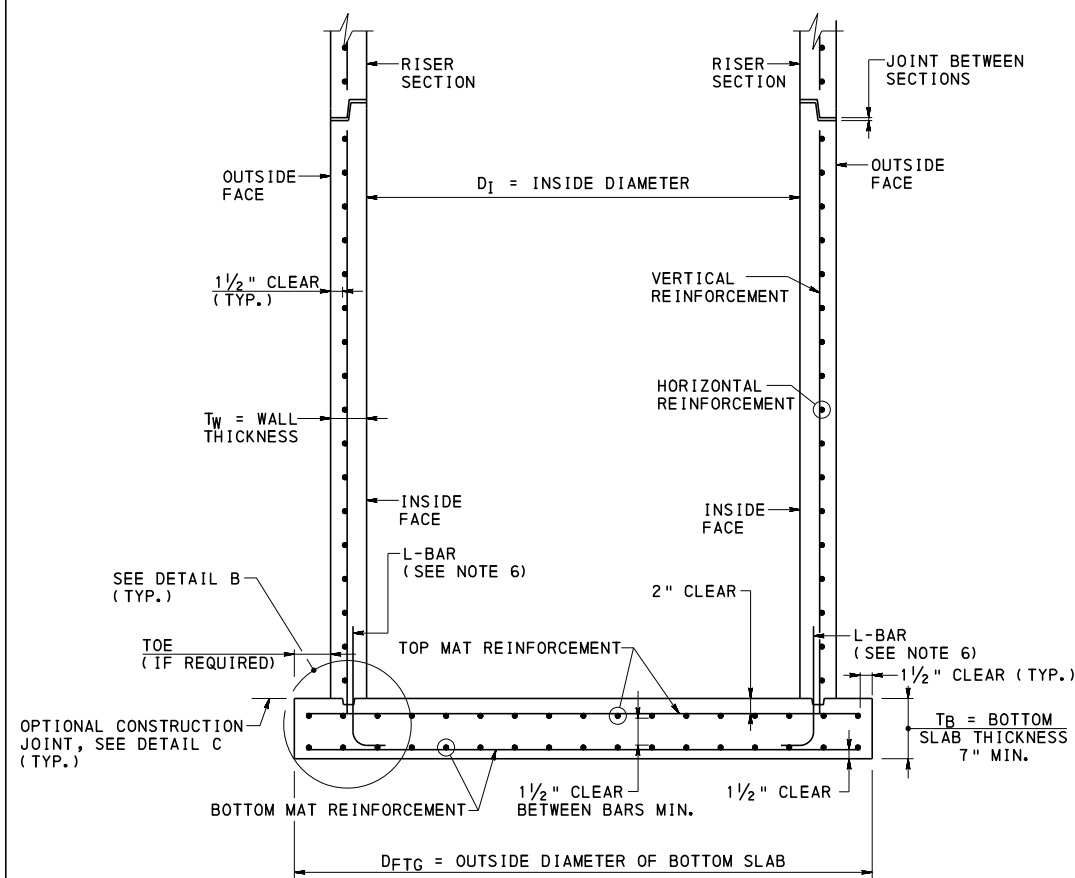
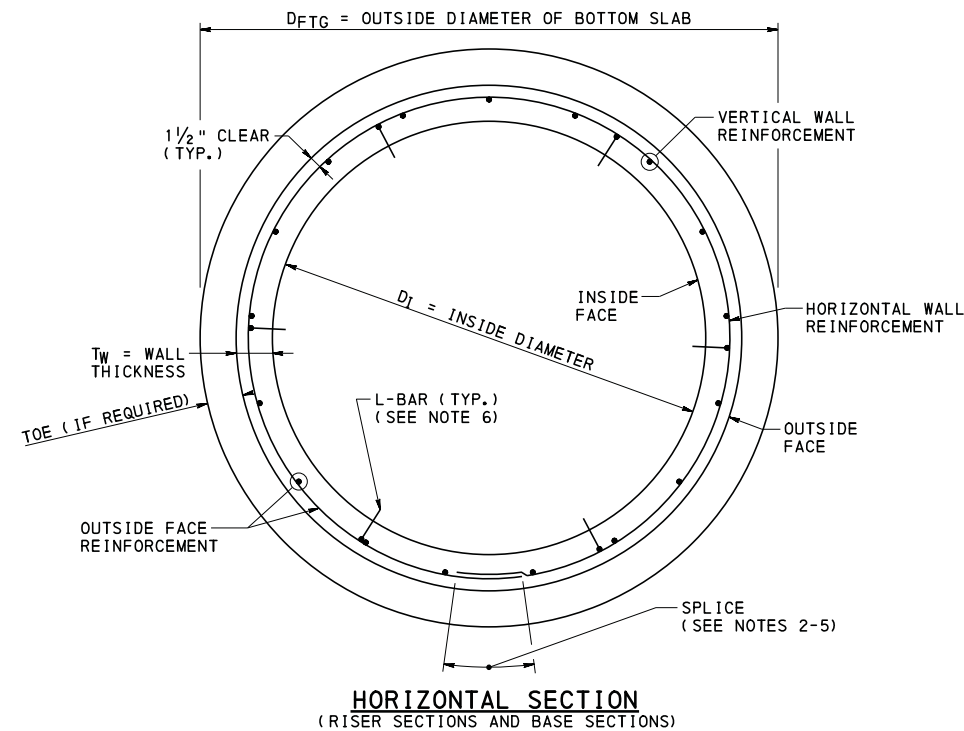
COMMONWEALTH OF PENNSYLVANIA  
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STORM WATER MANHOLES  
PRECAST MANHOLES - 1

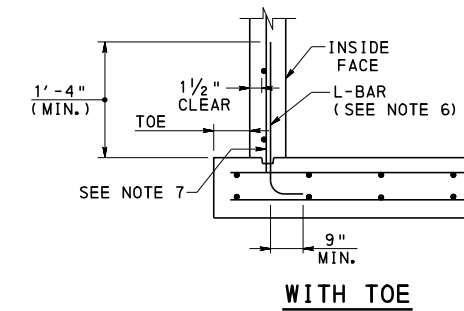
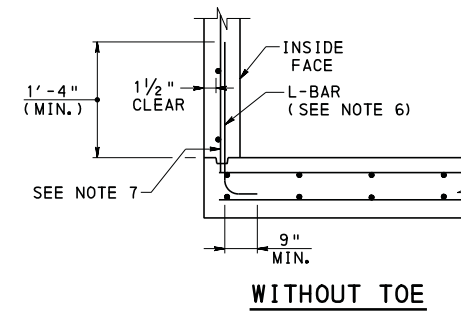
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DIRECTOR, BUREAU OF PROJECT DELIVERY

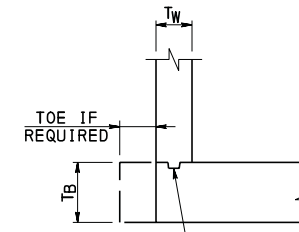
SHT 24 OF 30  
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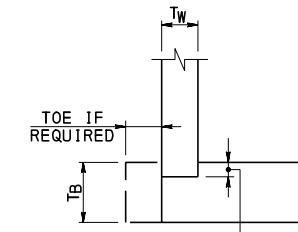
**TYPICAL SECTION  
PRECAST MANHOLES  
WITH REINFORCEMENT BARS  
OR WELDED WIRE FABRIC**



**DETAIL B**

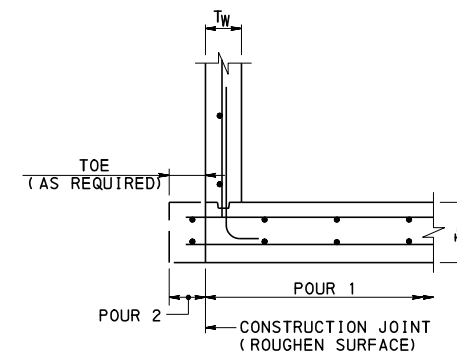


KEY MAY BE CONSTRUCTED  
UPWARDS OR DOWNWARDS  
FOR DIMENSIONS SEE  
TABLE ON SHEET 24



EMBED WALL INTO  
BOTTOM SLAB  
1" MIN.  
1 1/2" MAX.

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



**NOTES:**

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

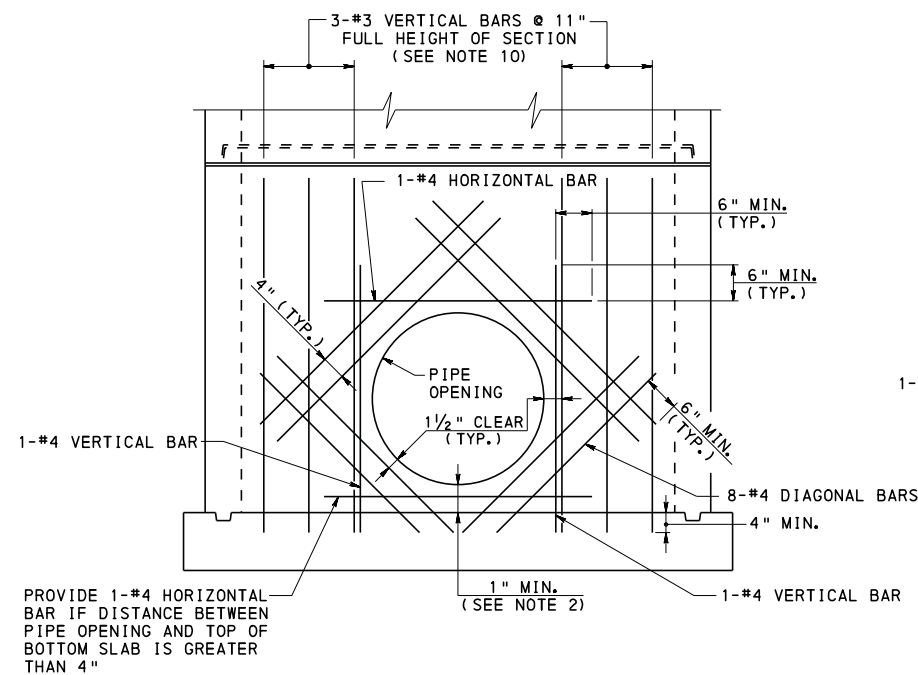
**COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF PROJECT DELIVERY**

**STORM WATER MANHOLES  
PRECAST MANHOLES - 2**

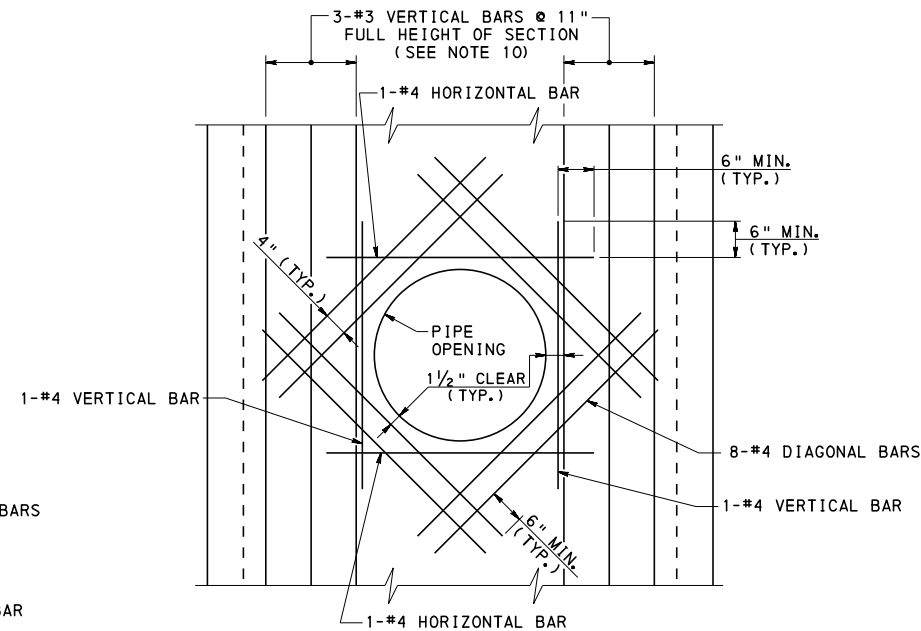
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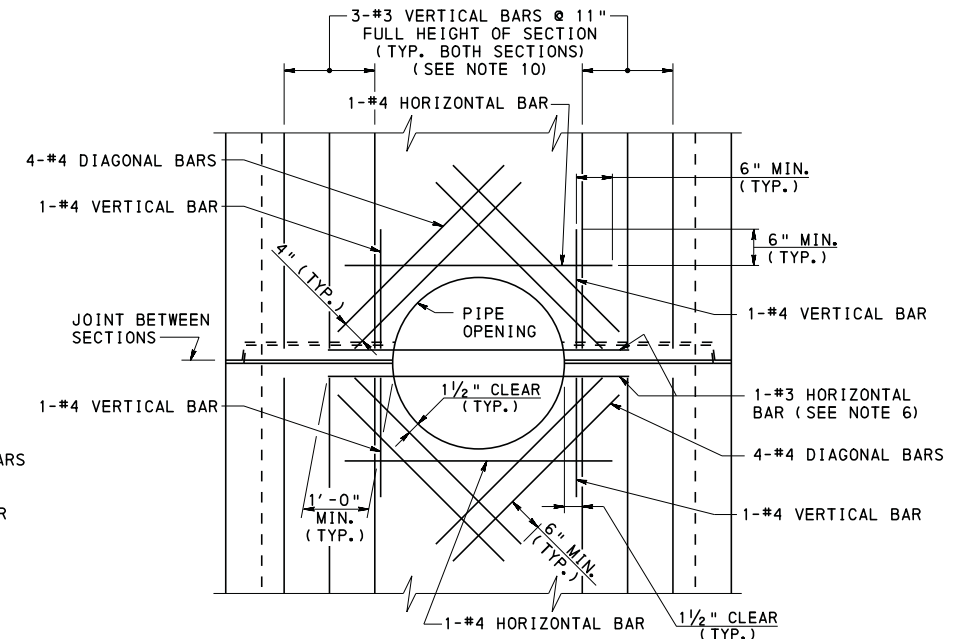
SHT 25 OF 30  
**RC-39M**



**AT BASE SECTION**



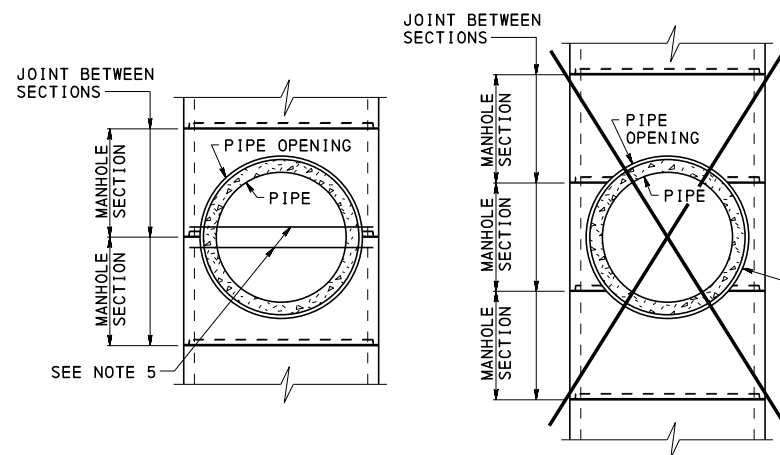
**WITHIN MANHOLE SECTION**



**BETWEEN MANHOLE SECTIONS**  
(NOT PREFERRED)

**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.



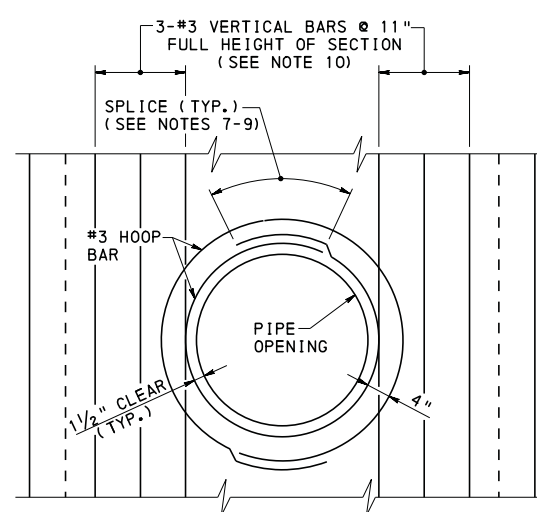
**CORRECT LOCATION**  
(NOT PREFERRED)

**WRONG LOCATION**

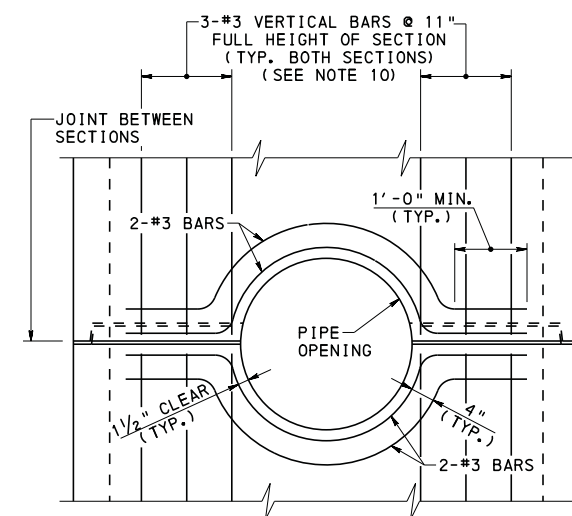
**LOCATION OF PIPE OPENING**

**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**

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BUREAU OF PROJECT DELIVERY

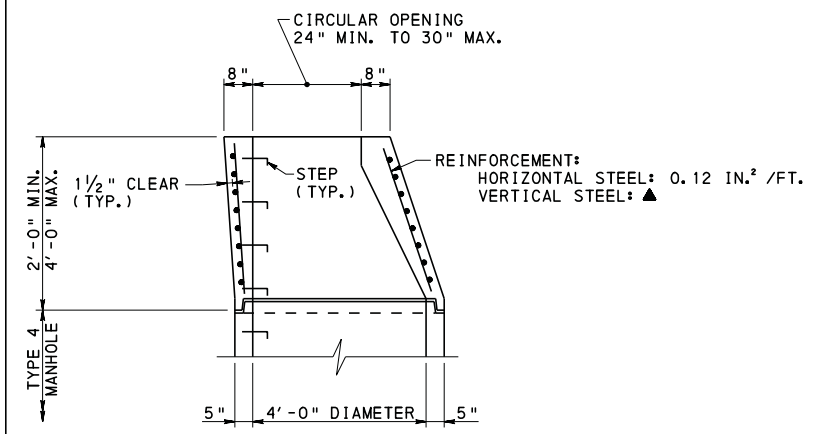
STORM WATER MANHOLES  
PRECAST MANHOLES - 3

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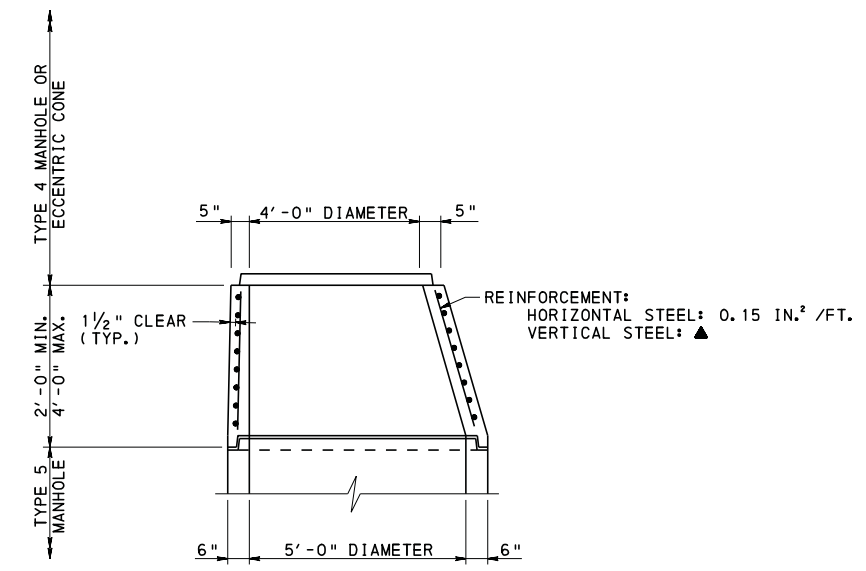
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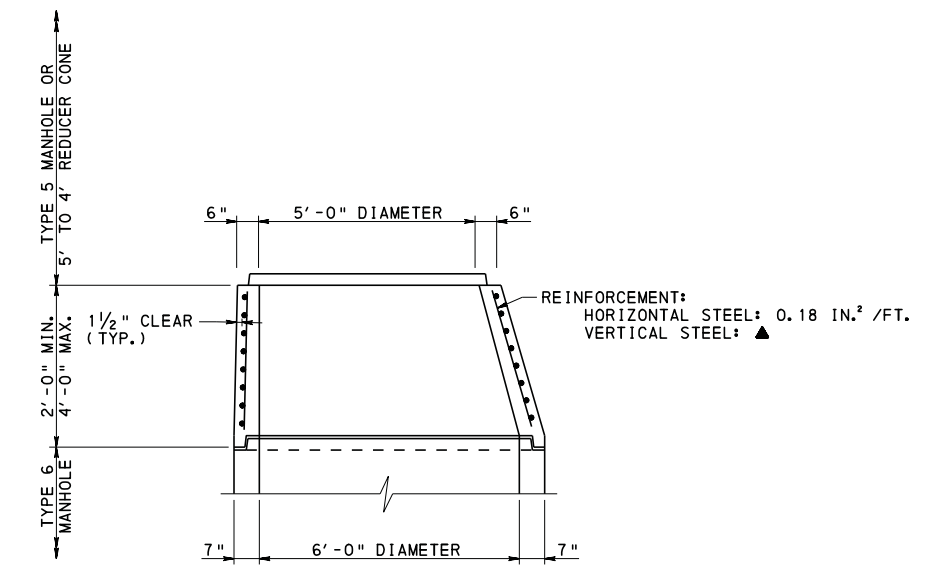




**ECCENTRIC CONE**



**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.

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STORM WATER MANHOLES PRECAST MANHOLES - 4		
RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 27 OF 30 RC-39M

PRECAST CONCRETE STORM WATER MANHOLE SUMMARY TABLE					
RISER SECTIONS					
MANHOLE TYPE	MAXIMUM JOINT DEPTH (FT.)	D <sub>I</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>I</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.

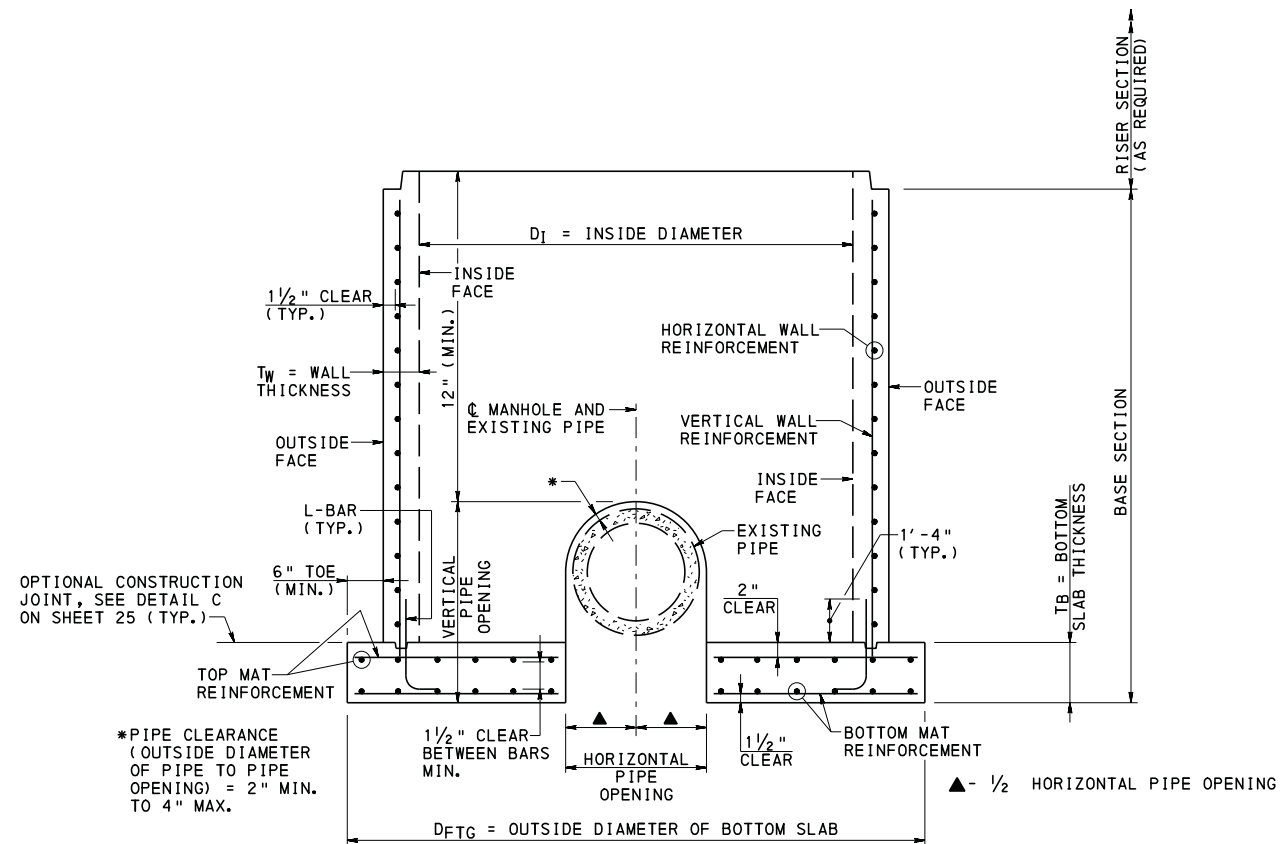
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STORM WATER MANHOLES  
PRECAST MANHOLES  
DESIGN TABLES

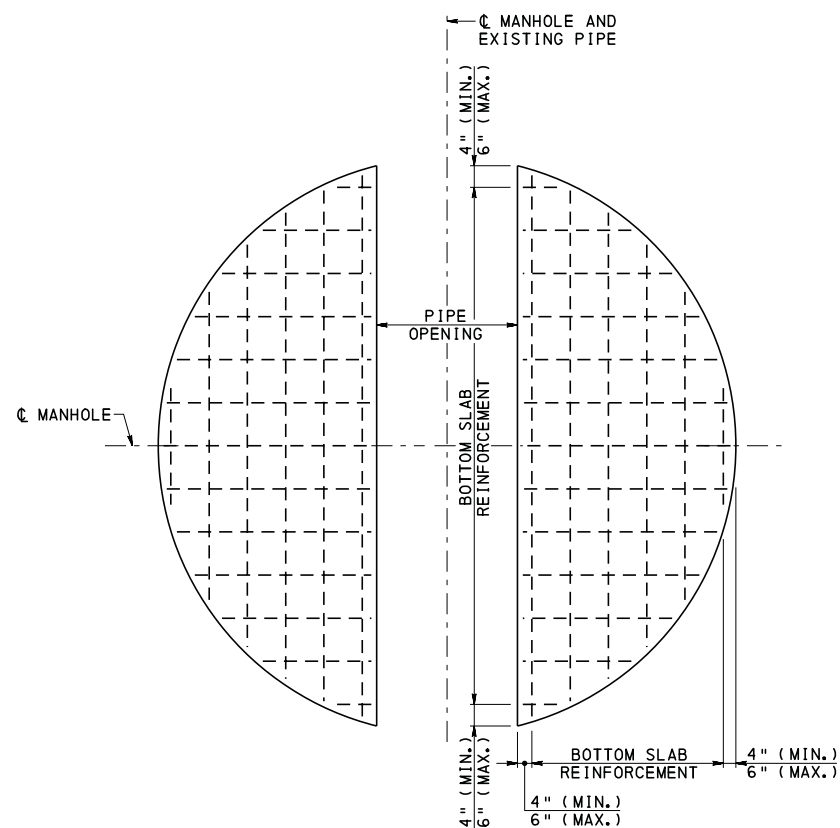
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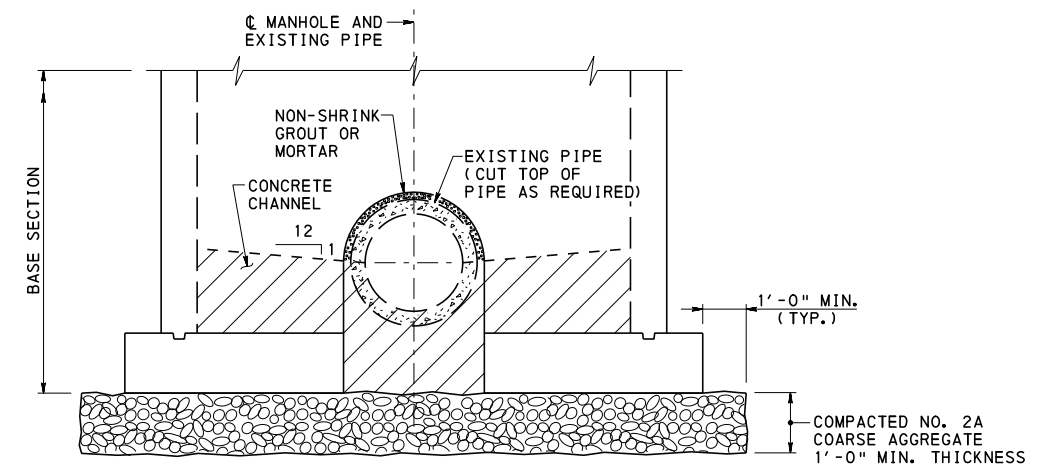
SHT 28 OF 30  
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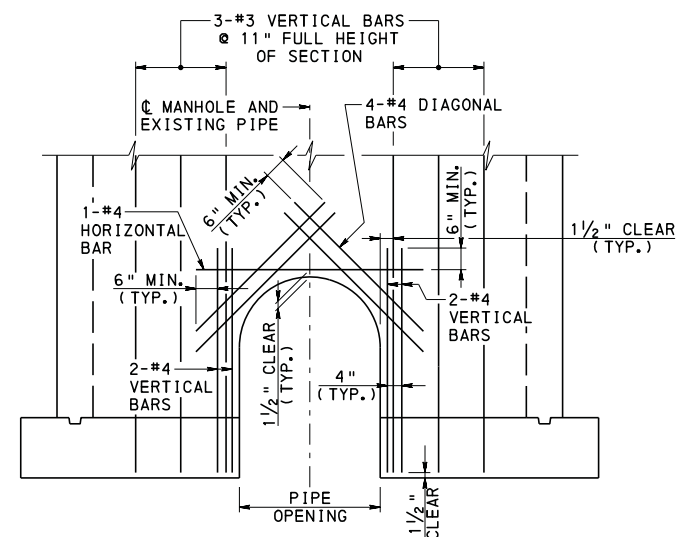
**TYPE A - DOGHOUSE MANHOLE  
(WITH BOTTOM SLAB)**  
(PRECAST BASE SECTION WITH BOTTOM SLAB)



**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.

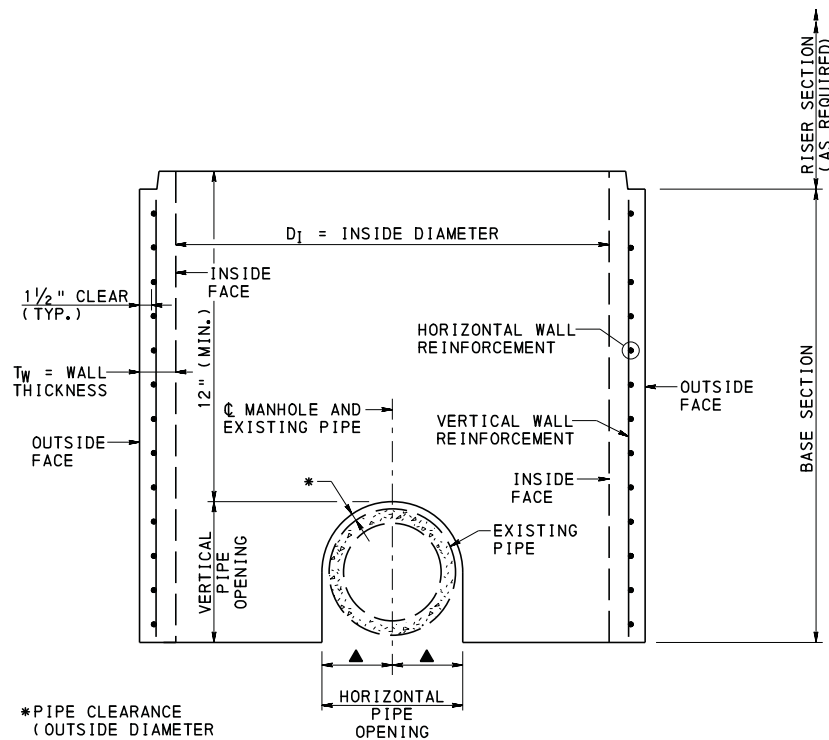
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STORM WATER MANHOLES  
DOGHOUSE MANHOLES - 1  
(TYPE A)

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DIRECTOR, BUREAU OF PROJECT DELIVERY

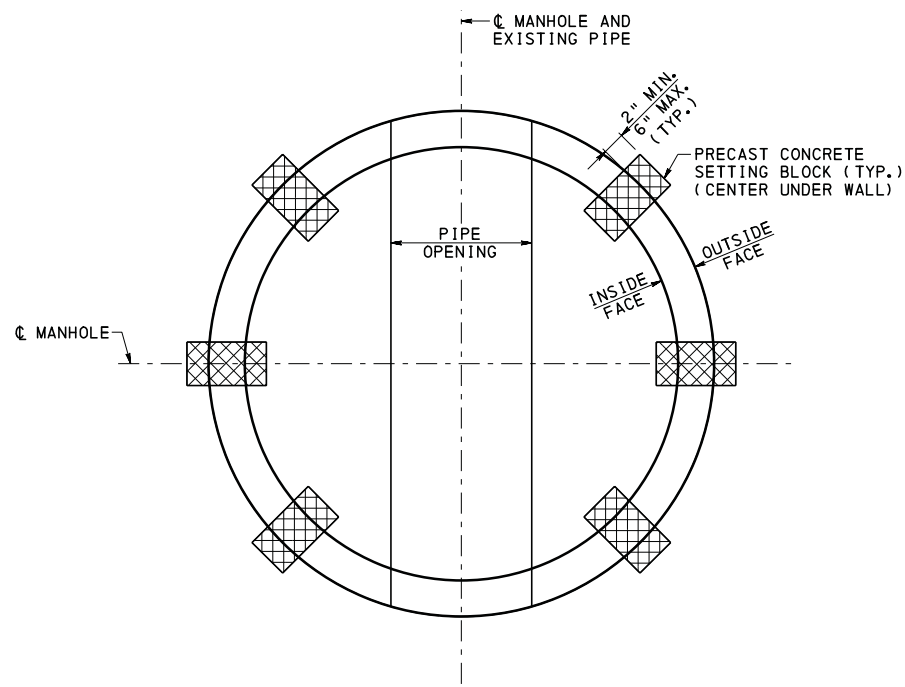
SHT 29 OF 30  
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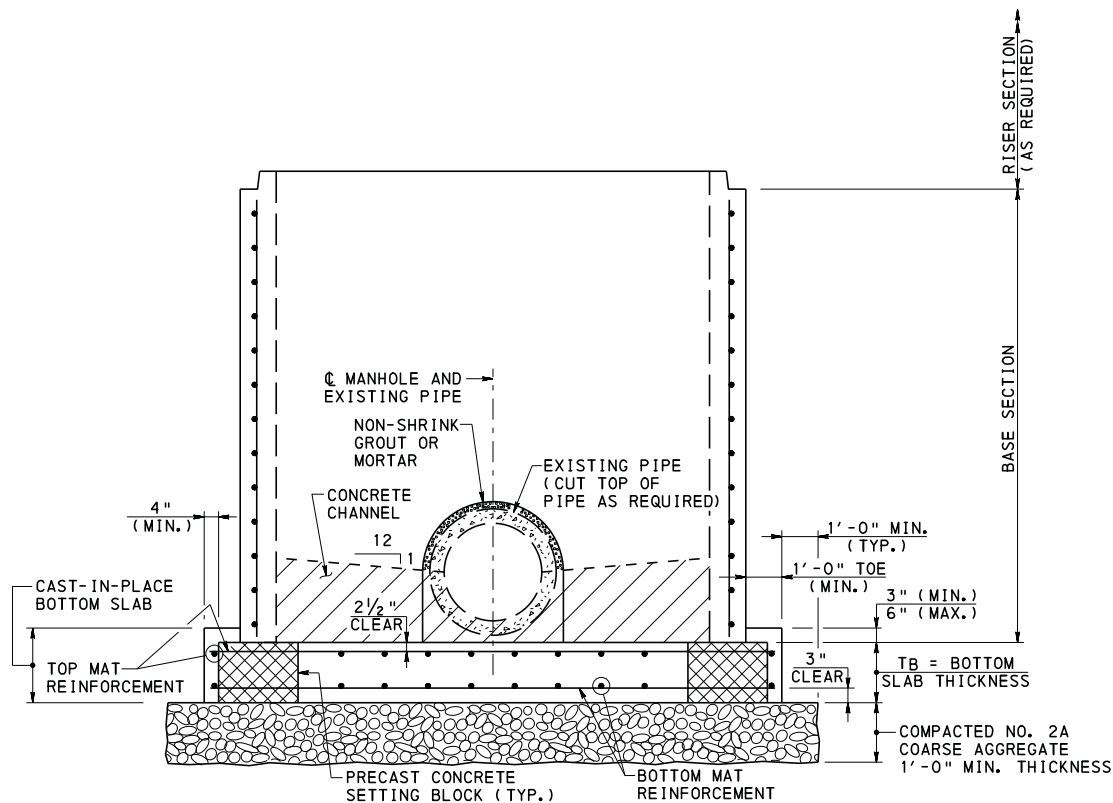
\*PIPE CLEARANCE  
(OUTSIDE DIAMETER  
OF PIPE TO PIPE  
OPENING) = 2" MIN.  
TO 4" MAX.

▲ - 1/2 HORIZONTAL PIPE OPENING

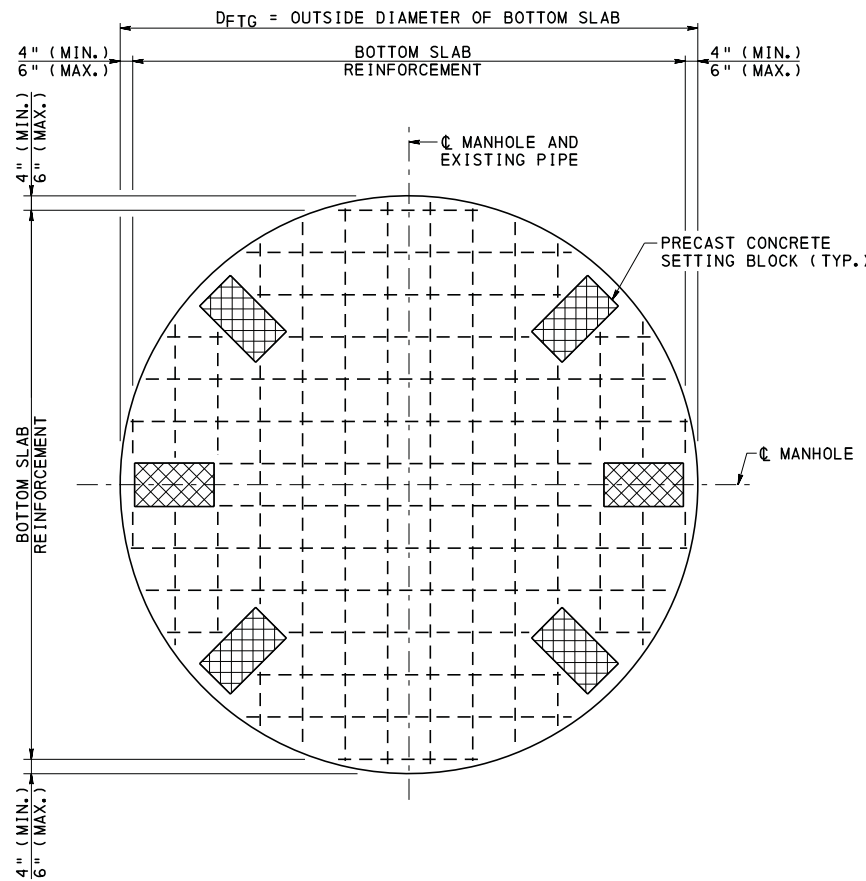
**TYPE B - DOGHOUSE MANHOLE  
(WITHOUT BOTTOM SLAB)**  
(PRECAST BASE SECTION WITHOUT BOTTOM SLAB)



**SETTING PLAN**



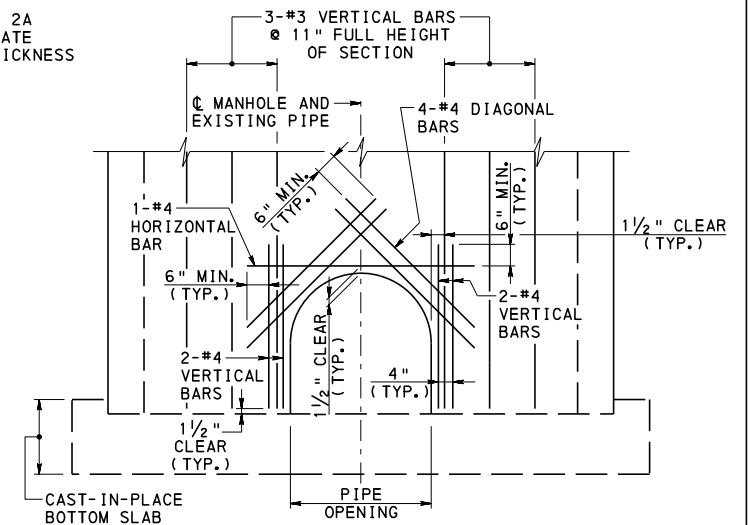
**TYPE B - DOGHOUSE MANHOLE  
CONSTRUCTION DETAIL**



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

**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.



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

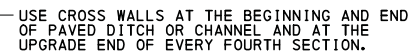
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STORM WATER MANHOLES  
DOGHOUSE MANHOLES - 2  
(TYPE B)

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CHIEF, HWY. DELIVERY DIVISION

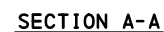
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*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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- NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND MATERIAL REQUIREMENTS OF SECTION 735.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. PLACE CONCRETE PIPE ANCHORS AT THE ENDS OF PIPE, UNDER ALL JOINTS AND AT INTERMEDIATE LOCATIONS AS REQUIRED. PROVIDE 10'-0" MAXIMUM SPACING BETWEEN ANCHORS.
4. DO NOT LINE ANY DITCHES OR SWALES WHERE GEOSYNTHETIC CLAY LINER HAS BEEN INSTALLED WITH LIMESTONE OR CARBONATE ROCK RIPROCK USED FOR EROSION CONTROL.



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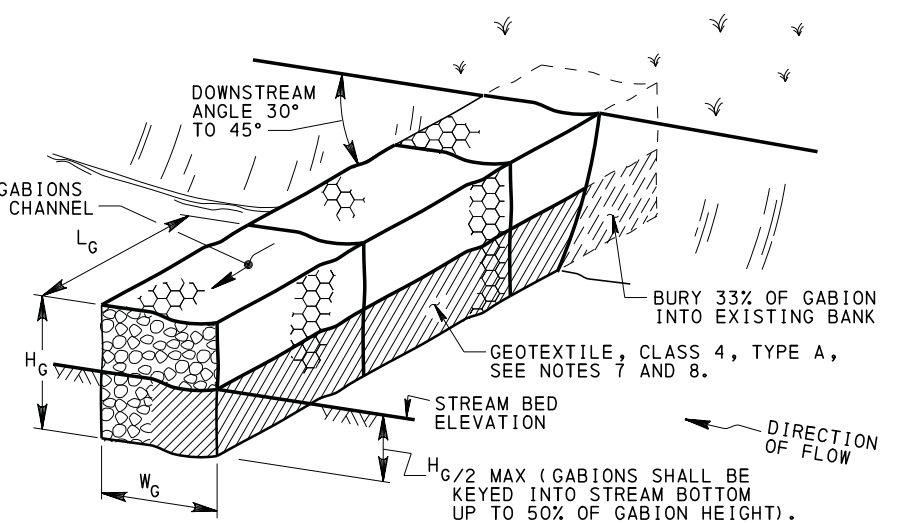
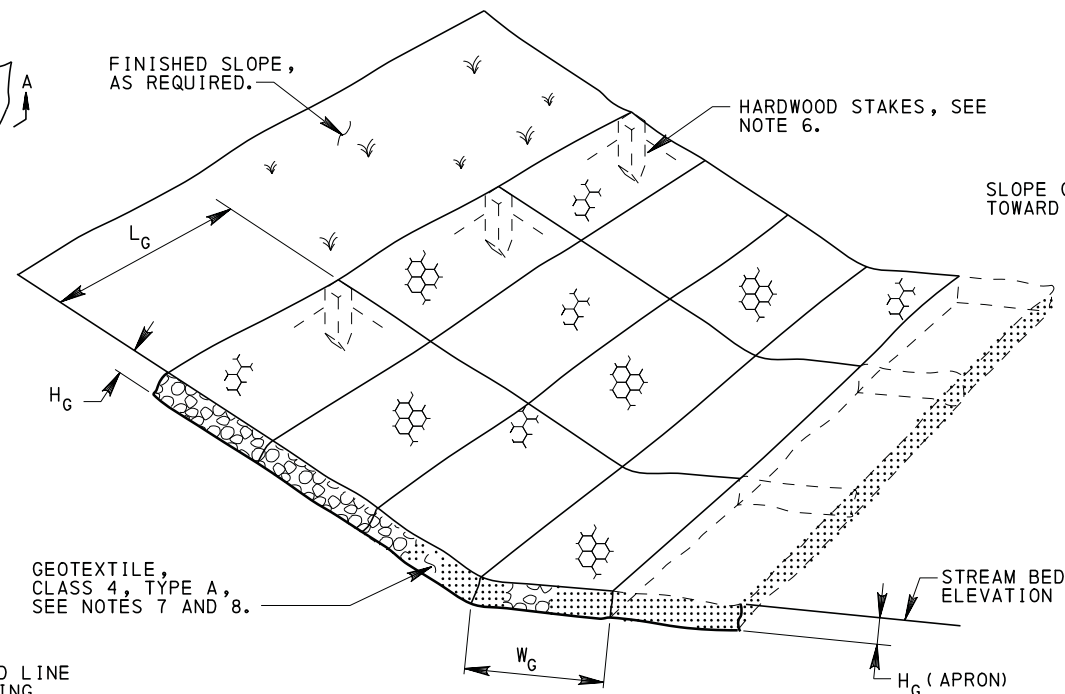
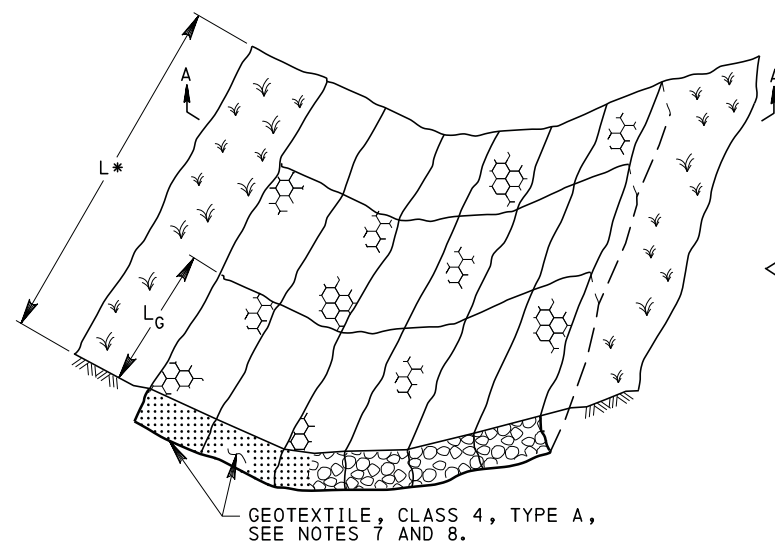
## SLOPE PROTECTION

*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

*Melissa J. Betuk*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

RC-40M

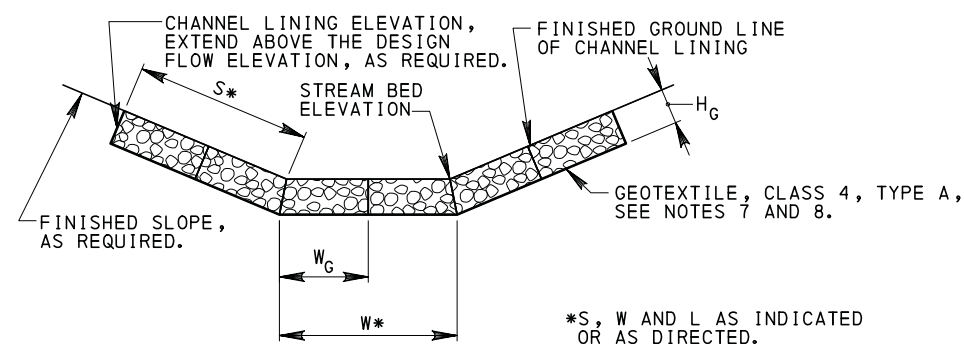




## CHANNEL DEFLECTOR

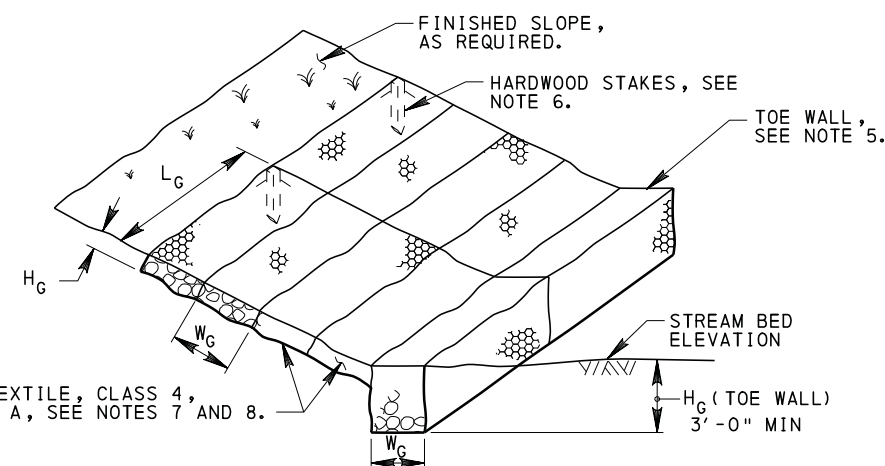
### NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 626.
2. SPECIFY TYPE A GABIONS OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OF COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED FACES, FOR A UNIFORM APPEARANCE.
3. SPECIFY TYPE B GABIONS OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OF COARSE AGGREGATE.
4. MAKE CORROSION RESISTANT TYPE A AND TYPE B GABIONS THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT SHEATH THE WIRE-MESH IN POLYVINYL CHLORIDE PLASTIC.
5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER. MAKE THE APRON APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.
6. WHEN GABIONS ARE PLACED ON A 1.5 : 1 SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. EMBED STAKES 18" MINIMUM BELOW GABION BOTTOM.
7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.
8. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
9. ON ANY GIVEN LEVEL, BASKETS WITH EXPOSED FACES MUST BE FILLED PRIOR TO FILLING BASKETS WITH NO EXPOSED FACE.
10. BASE OF GABION TO BE CONSTRUCTED BELOW SCOUR DEPTH NEXT TO STREAMS OR BELOW FROST DEPTH, WHICHEVER IS GREATER.

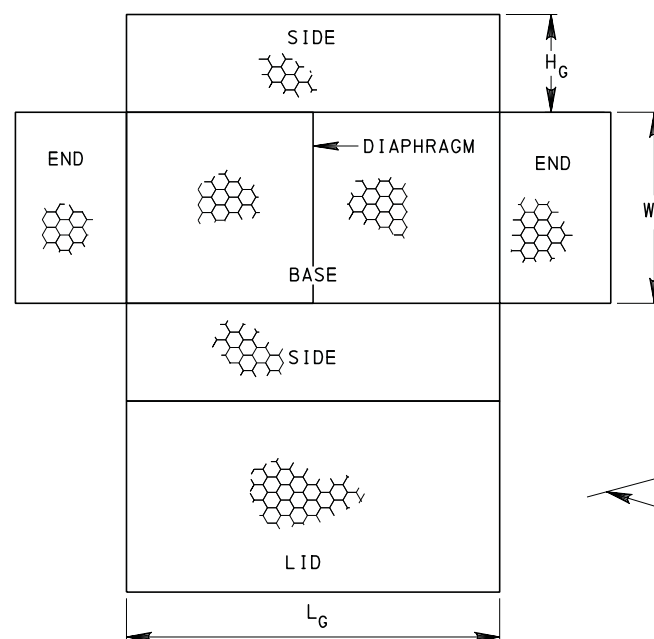


## SECTION A-A CHANNEL LINING

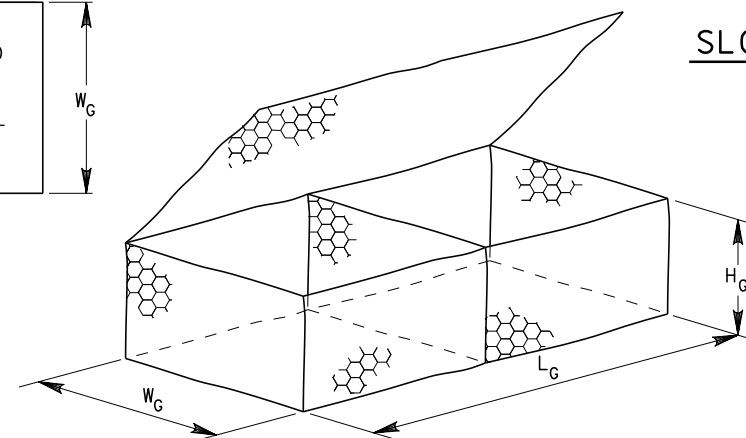
\*S, W AND L AS INDICATED OR AS DIRECTED.



## SLOPE WALLS



## WIRE MESH BASKETS



## GABIONS SIZES

MATTRESS TYPE		
W <sub>G</sub>	L <sub>G</sub>	H <sub>G</sub>
6'-0"	9'-0"	0'-9"
6'-0"	12'-0"	0'-9"

STANDARD		
W <sub>G</sub>	L <sub>G</sub>	H <sub>G</sub>
3'-0"	6'-0"	1'-0"
3'-0"	12'-0"	1'-0"
3'-0"	9'-0"	1'-6"
3'-0"	6'-0"	3'-0"
3'-0"	9'-0"	3'-0"
3'-0"	12'-0"	3'-0"

ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.

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## GABIONS

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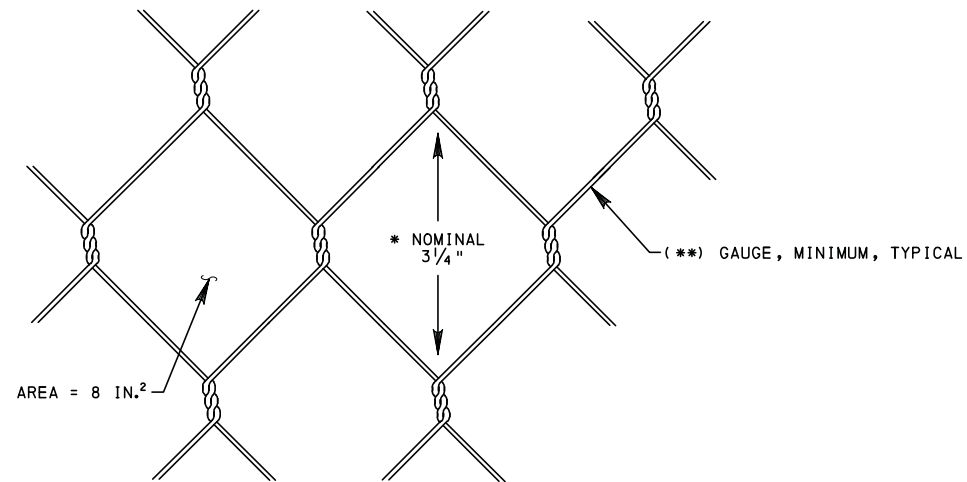
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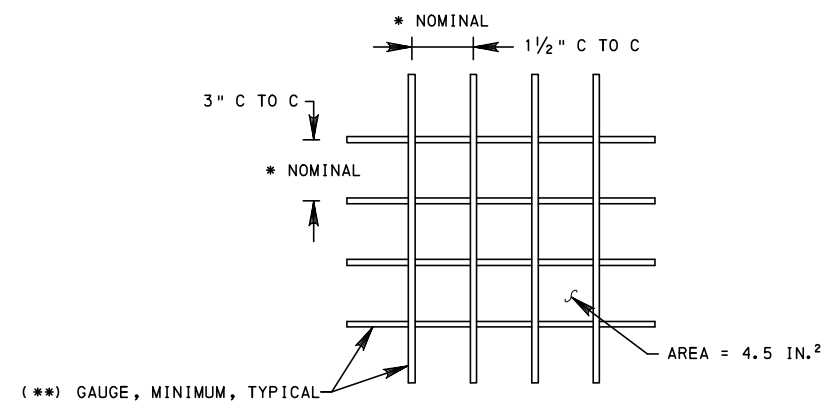
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 5

RC-43M



WOVEN WIRE MESH



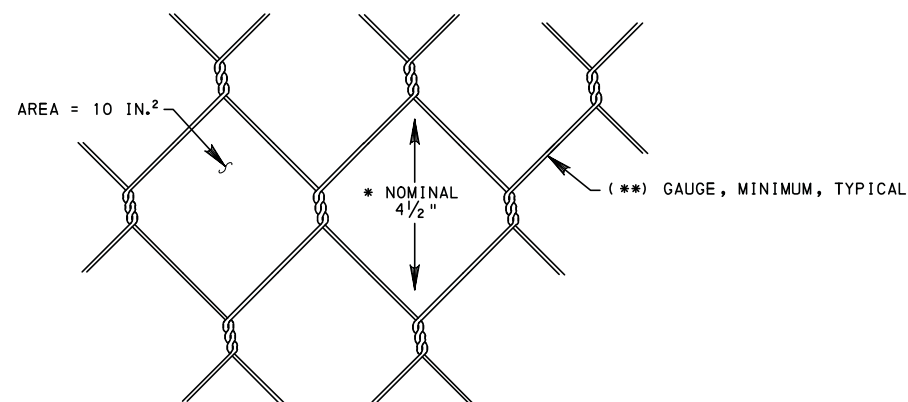
WELDED WIRE MESH

WIRE MESH FOR GABION BASKETS LESS THAN 12" IN HEIGHT

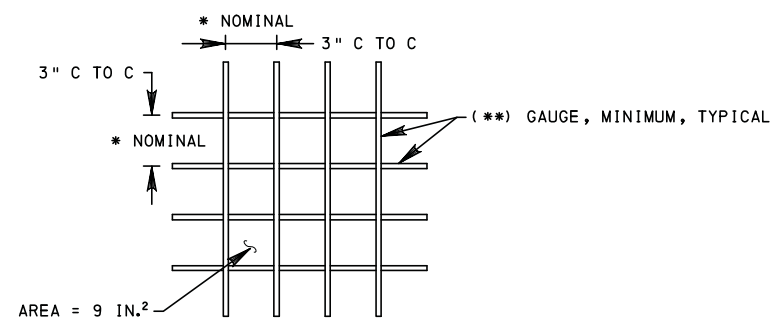
- \* SUBJECT TO A TOLERANCE LIMIT OF 3% OF MANUFACTURERS' SIZES.  
 \*\* FOR MINIMUM WIRE SIZES, REFER TO PUBLICATION 408, SECTION 626.

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.



WOVEN WIRE MESH



WELDED WIRE MESH

WIRE MESH FOR GABION BASKETS 12" IN HEIGHT OR OVER

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 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF PROJECT DELIVERY

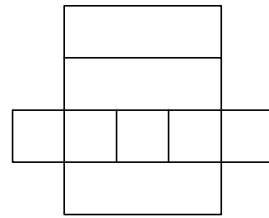
GABIONS

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*Mark J. Chynoweth*  
 CHIEF, HWY. DELIVERY DIVISION

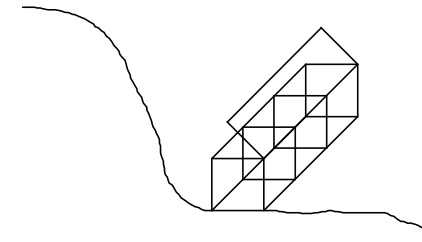
RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
 DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 5

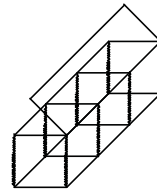
RC-43M



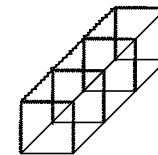
BASKET PRIOR TO ASSEMBLY



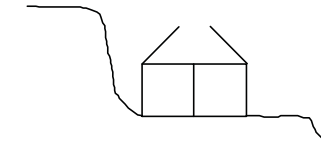
BASKET WITH HINGE AWAY FROM SLOPE FACE



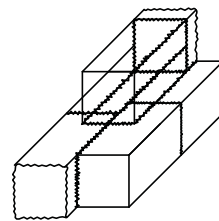
BASKET AFTER ASSEMBLY



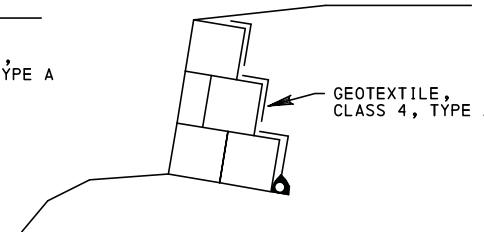
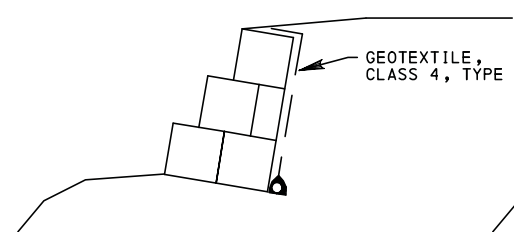
BASKET AFTER LID CLOSURE



ADJACENT BASKETS WITH HINGES ON OPPOSITE SIDES



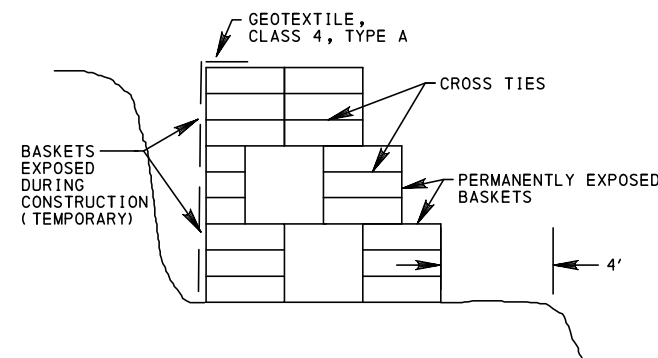
BASKET STAGGERING



GEOTEXTILE PLACEMENT

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.



CROSS TIES IN EXPOSED (EXTERIOR) BASKETS

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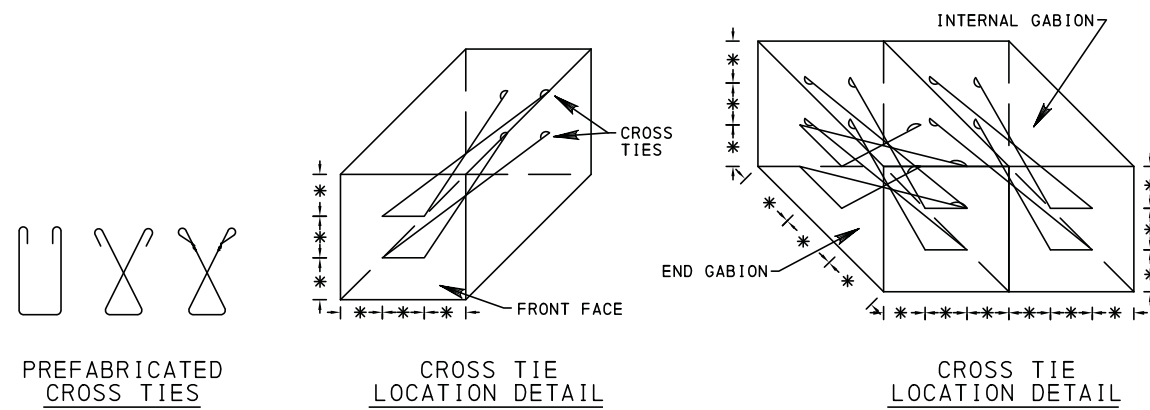
GABIONS

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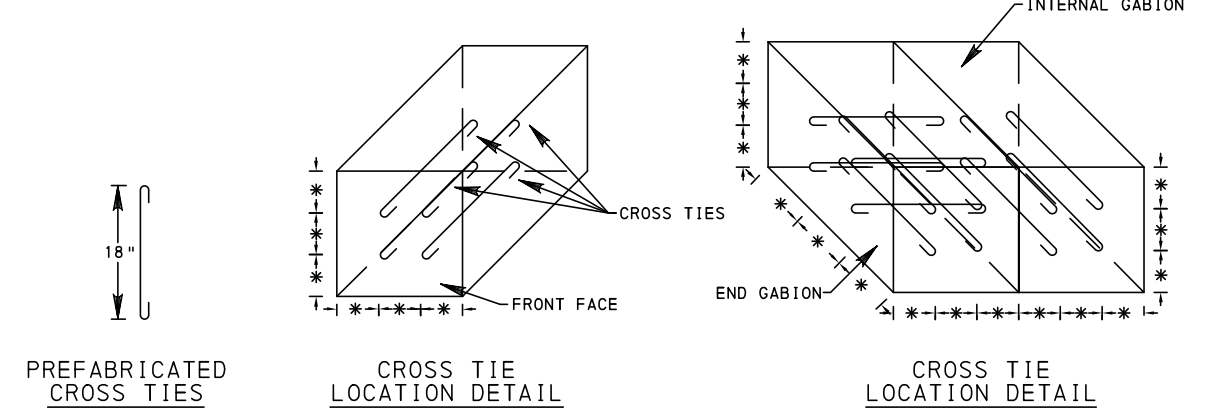
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SHT 3 OF 5

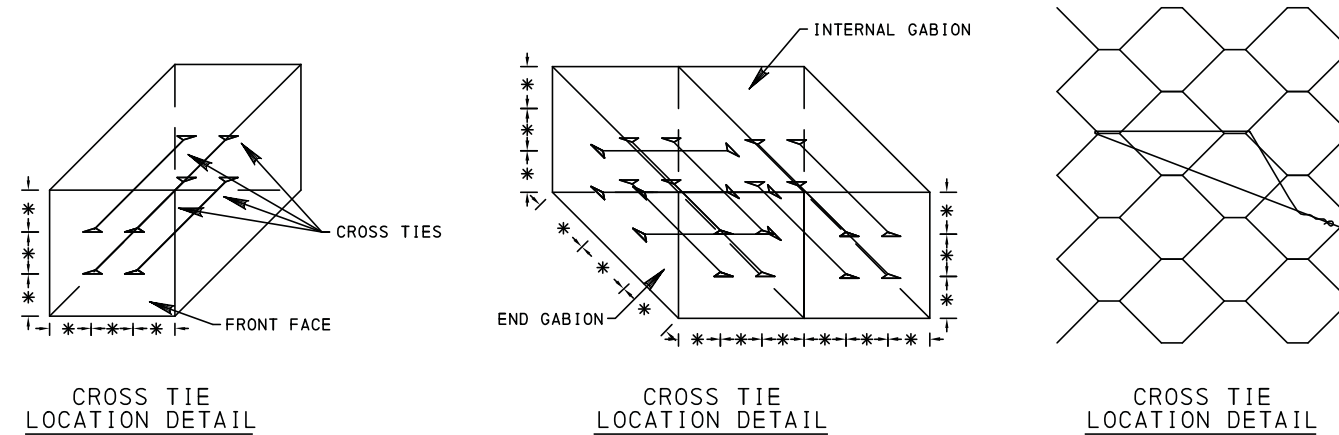
RC-43M



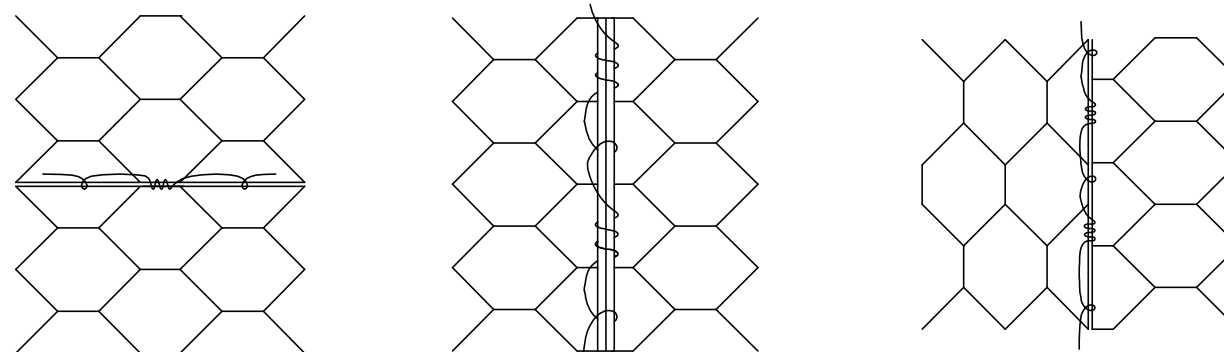
CROSS TIE DETAIL (PREFABRICATED WOVEN WIRE GABIONS)



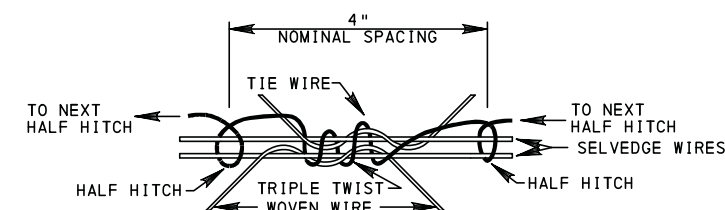
CROSS TIE DETAIL (PREFABRICATED WELDED WIRE GABIONS)



CROSS TIE DETAIL (LACING)



WOVEN WIRE MESH PLACEMENT AND TIE WIRE LACING PATTERNS  
SEE NOTE 5



TIE WIRE LACING DETAIL

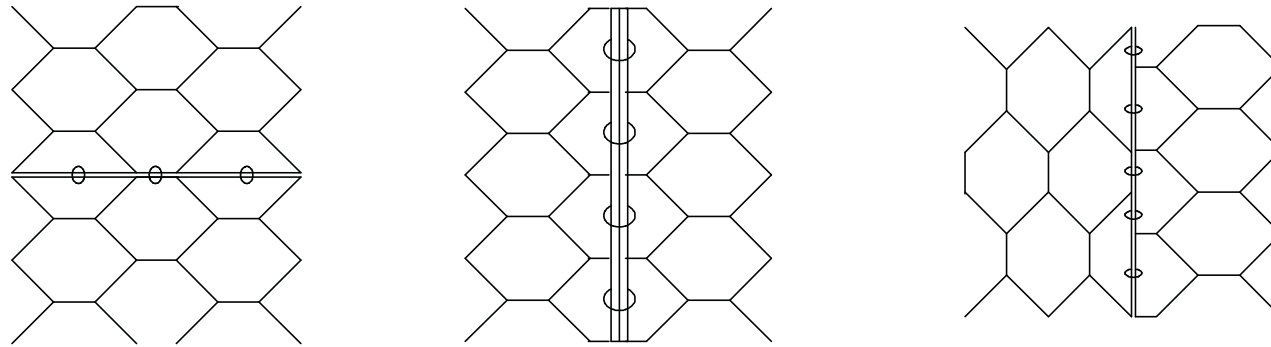
\* 12"

NOTES

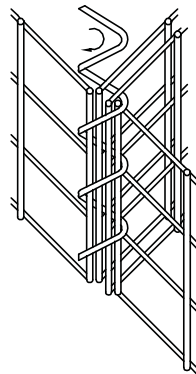
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. SEE PUBLICATION 408, SECTION 626 FOR PREFABRICATED CROSS TIE REQUIREMENTS.
3. CROSS TIE MAY BE FABRICATED IN FIELD USING TIE WIRE.
4. DO NOT MIX STRAIGHT AND CROSSED CROSS TIES IN SAME GABION INSTALLATION.
5. TIE WIRE LACING AS SHOWN IS FOR CLARITY OF LACING PATTERN. ACTUAL FIELD APPLICATION SHOULD HAVE TIE WIRE LACING SNUG WITH SELVAGE WIRE OF WOVEN WIRE MESH.

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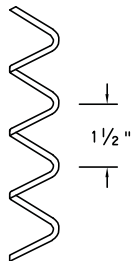
GABIONS



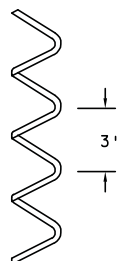
PLACEMENT AND FREQUENCY OF PREFABRICATED FASTENERS



SPIRAL INSTALLATION



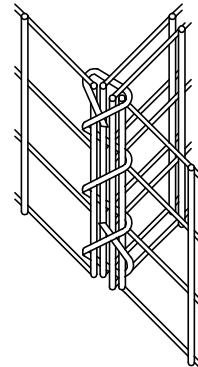
LESS THAN 12"  
BASKET HEIGHT



12" OR OVER  
BASKET HEIGHT

SPIRAL FASTENERS

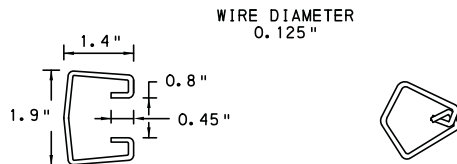
SEE NOTES 2 & 3



SPIRAL CLOSURE

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. USE SPIRAL FASTENERS WITH WELDED WIRE MESH ONLY.
3. ENSURE A MINIMUM OF ONE LOOP OF SPIRAL PASSES THROUGH EACH OPENING OF WIRE MESH.
4. USE INTERLOCKING FASTENER FOR BASKET CONNECTIONS.
5. USE ONE FASTENER PER WIRE MESH OPENING.
6. USE INTERLOCKING FASTENER WITH A MINIMUM FASTENING STRENGTH OF 900 LB WHILE REMAINING IN A LOCKED, CLOSED CONDITION.
7. USE NON-INTERLOCKING FASTENER FOR ASSEMBLY OF GABION BASKETS.
8. USE ONE FASTENER PER WIRE MESH OPENING EXCEPT USE TWO PER WIRE MESH OPENING ON EXPOSED ENDS OF GABION BASKETS AT BEGINNING OR END OF ROW.
9. USE NON-INTERLOCKING FASTENER WITH A MINIMUM FASTENING STRENGTH OF 500 LB WHILE REMAINING IN A WRAPPED, CLOSED CONDITION.



BEFORE CLOSURE

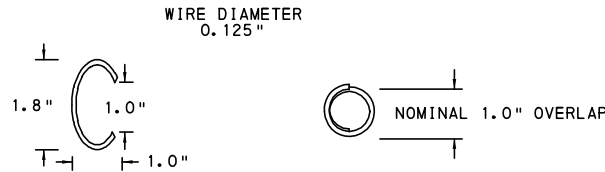


AFTER CLOSURE

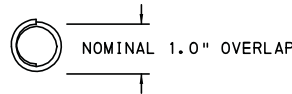
NOTE: ALL DIMENSIONS ARE NOMINAL

INTERLOCKING FASTENER

SEE NOTES 4, 5 & 6



BEFORE CLOSURE



AFTER CLOSURE

NOTE: ALL DIMENSIONS ARE NOMINAL

NON-INTERLOCKING FASTENER

SEE NOTES 7, 8 & 9

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GABIONS

RECOMMENDED FEB. 8, 2019  
*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 5 OF 5

RC-43M



GENERAL NOTES:

1. 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).
2. 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.
3. 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.
4. 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.
5. FOR INLET BOX DETAILS REFER TO RC-46M.

PLACEMENT NOTES:

1. 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. REFER TO CONTRACT DRAWINGS FOR CURB HEIGHT.

• 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.
2. 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.

3. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

4. 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 AS SPECIFIED IN 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 14.

5. BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.
- GENERAL GRATE NOTES:
1. 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)

2. THE SELECTION OF THE TYPE OF GRATE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
- CONCRETE TOP UNIT NOTES:
1. SHEETS 2 THRU 8 AND 20 THRU 24 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 PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE WELDED INLET ANGLE ASSEMBLIES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

4. CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.

5. PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605 AND 714, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.

6. THE SIZE OF THE INLET TOP UNITS IS BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX AS SHOWN ON RC-46M.

7. 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.

8. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.

9. 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.

10.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]

11.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.

12.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.

13.CLEAR COVER FOR STEEL:

• PRECAST: 1 1/2"

• CAST-IN-PLACE: 2"

14.PROVIDE STRUCTURAL STEEL (ANGLES AND PLATES) CONFORMING TO AASHTO M270 GRADE 36 [ASTM A709, GRADE 36].

15.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.

16.GALVANIZE PLATES, ANGLES AND STUDS OR BENT BAR ANCHORS (AFTER FABRICATION AND BEFORE INSTALLATION IN FORMS) AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).

17.CHAMFER EXPOSED CONCRETE EDGES 1/2" x 1/2", EXCEPT AS NOTED. (CHAMFERS ARE NOT SHOWN ON THE DETAILS)

18.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".

19.REHABILITATION PROJECTS:

• PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 20 THRU 24 IF THE AVAILABLE DEPTH IS LESS THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 6.

• PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 2 THRU 6 IF THE AVAILABLE DEPTH IS GREATER THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 6.

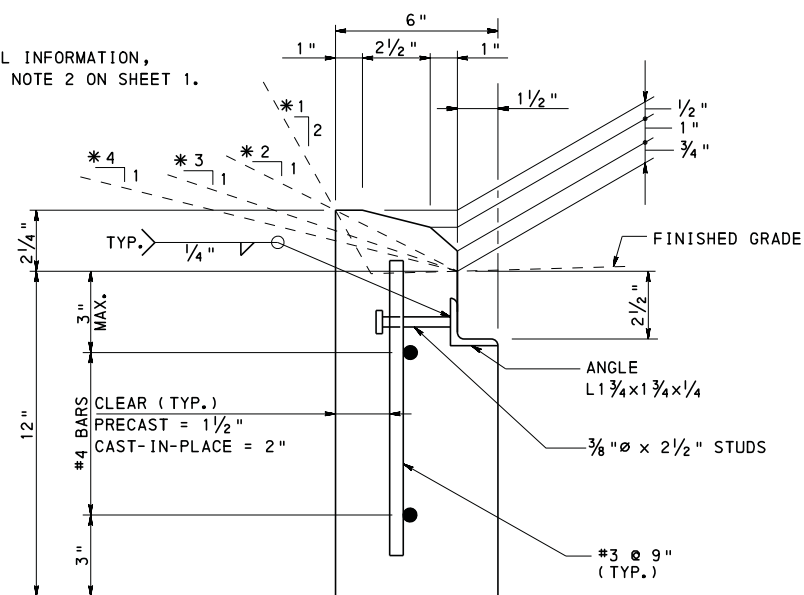
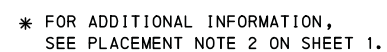
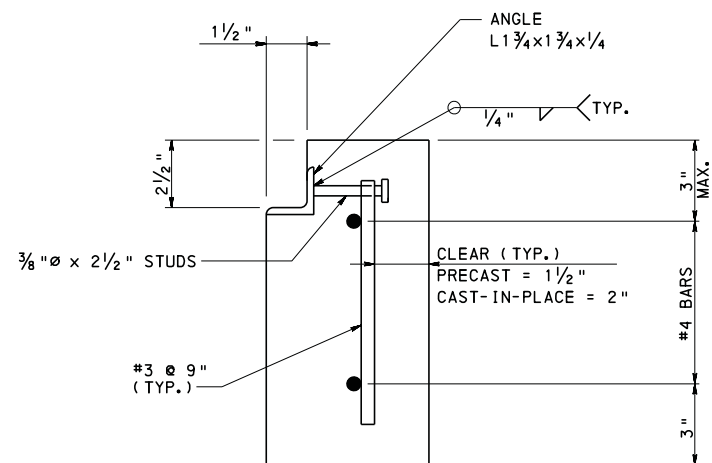
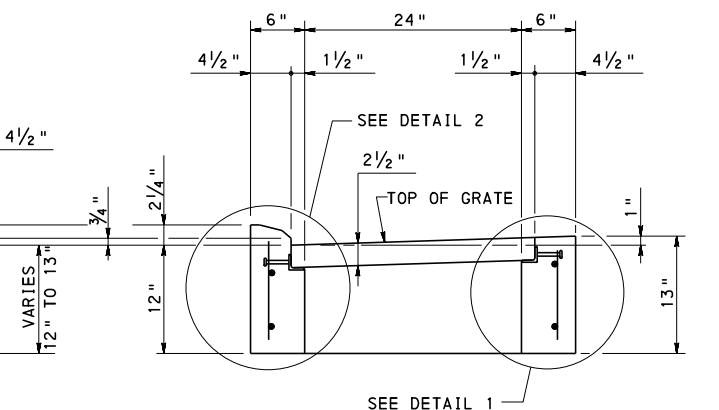
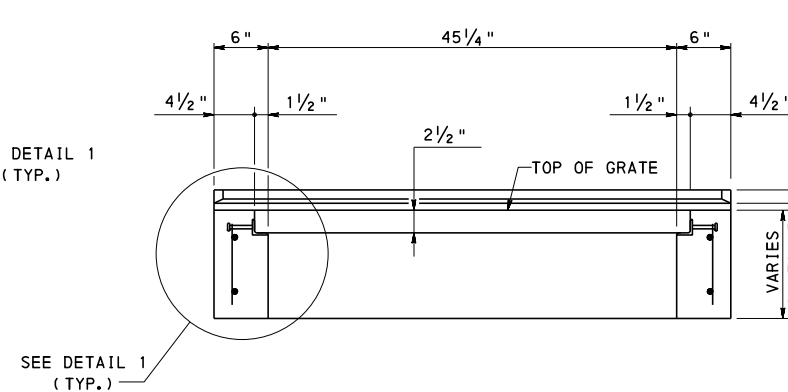
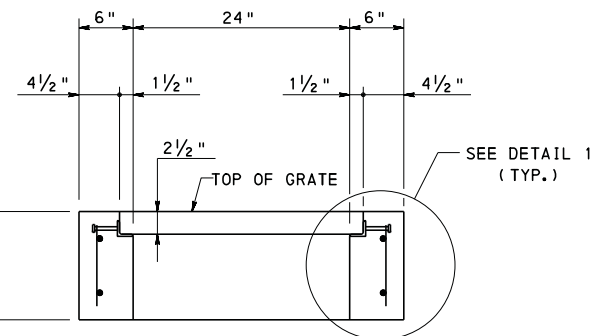
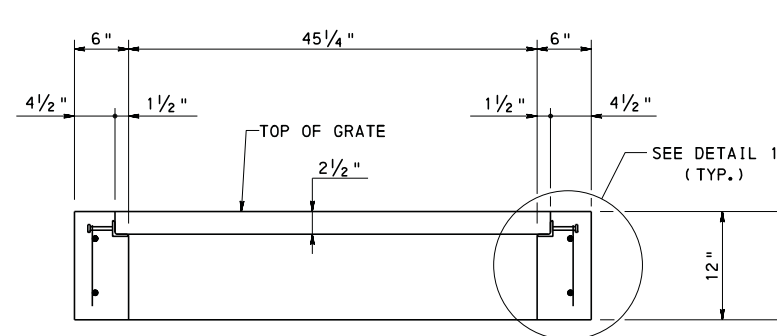
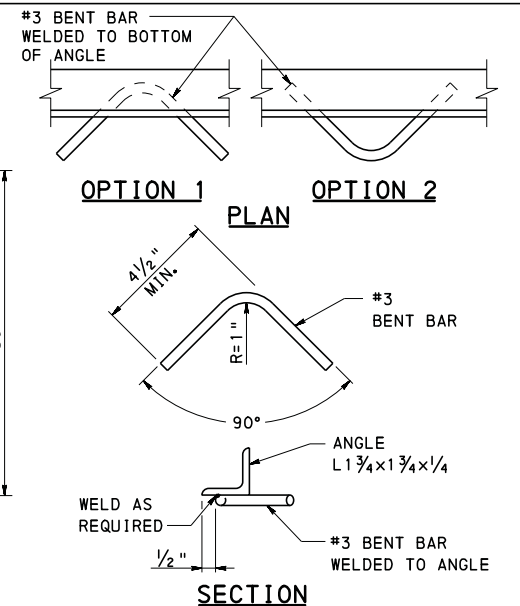
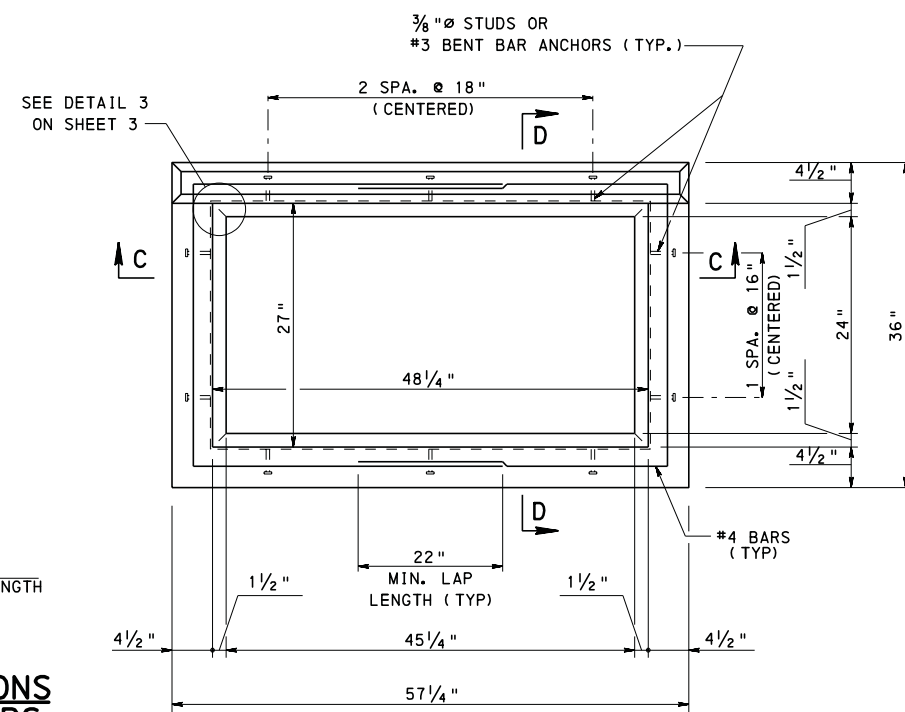
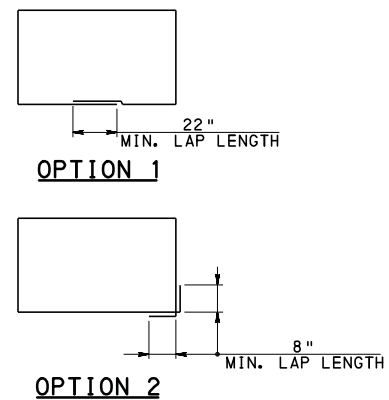
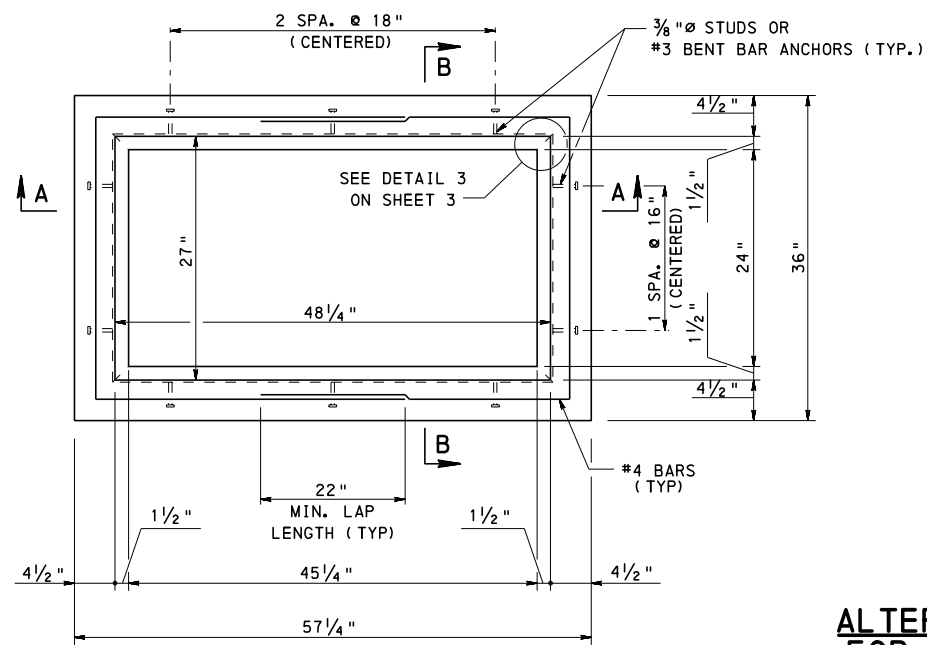
• CONTRACTOR TO REMOVE THE EXISTING TOP UNIT AND ANY GRADE ADJUSTMENT DEVICES, INCLUDING BRICK AND MORTAR AND GRADE ADJUSTMENT RINGS, DOWN TO THE TOP OF THE EXISTING INLET BOX. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE REQUIRED DEPTH OF THE NEW CONCRETE TOP UNIT BASED ON THE AVAILABLE DEPTH. COST 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 - 1                                       |
| 4               | CONCRETE TOP UNITS - TYPE C - 2                                       |
| 5               | CONCRETE TOP UNITS - TYPE C ALTERNATE - 1                             |
| 6               | CONCRETE TOP UNITS - TYPE C ALTERNATE - 2                             |
| 7               | CONCRETE TOP UNITS - TYPE D-H   |
| 8               | CONCRETE TOP UNITS - TYPE D-H LEVEL                                   |
| 9               | STRUCTURAL STEEL GRATE  |
| 10              | STRUCTURAL STEEL GRATE - BICYCLE SAFE                                 |
| 11              | CAST IRON GRATES - 1  |
| 12              | CAST IRON GRATES - 2  |
| 13              | CAST IRON VANE GRATE  |
| 14              | GRADE ADJUSTMENT RINGS - 1  |
| 15              | GRADE ADJUSTMENT RINGS - 2  |
| 16              | TYPE C FRAME  |
| 17              | TYPE M FRAME  |
| 18              | TYPE M PLACEMENT AT MEDIAN - 1  |
| 19              | TYPE M PLACEMENT AT MEDIAN - 2  |
| 20              | CONCRETE TOP UNITS - TYPE M AND TYPE S FOR REHABILITATION PROJECTS    |
| 21              | CONCRETE TOP UNITS - TYPE C FOR REHABILITATION PROJECTS - 1           |
| 22              | CONCRETE TOP UNITS - TYPE C FOR REHABILITATION PROJECTS - 2           |
| 23              | CONCRETE TOP UNITS - TYPE C ALTERNATE FOR REHABILITATION PROJECTS - 1 |
| 24              | CONCRETE TOP UNITS - TYPE C ALTERNATE FOR REHABILITATION PROJECTS - 2 |
- COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY
- INLET TOPS, GRATES, AND FRAMES  
GENERAL NOTES
- RECOMMENDED FEB. 19, 2021
- Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION
- RECOMMENDED FEB. 19, 2021
- Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY
- SHT 1 OF 24
- RC-45M





## NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.

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

RECOMMENDED FEB. 19, 2021

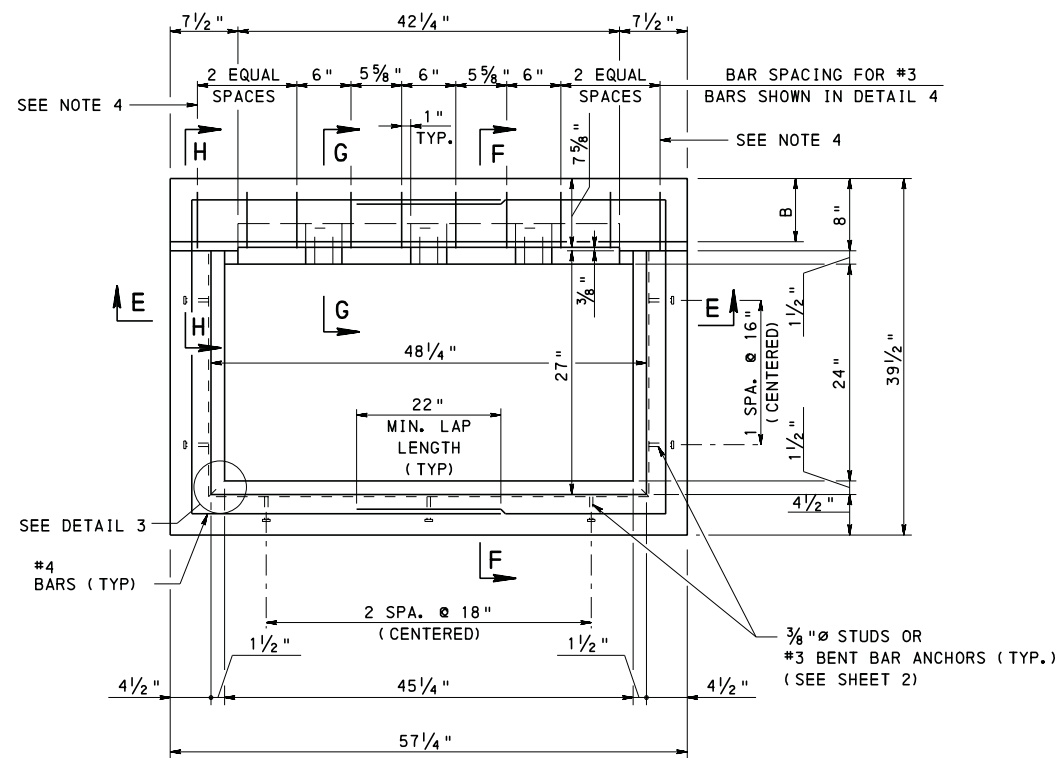
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021
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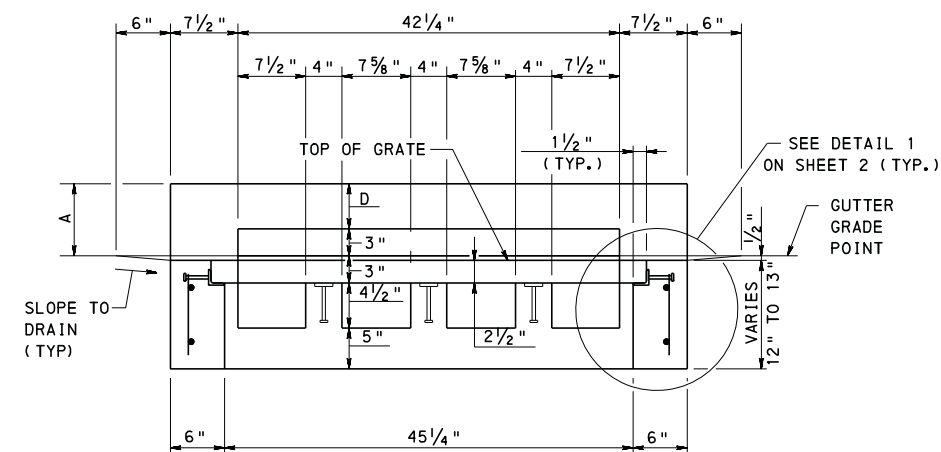
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 24

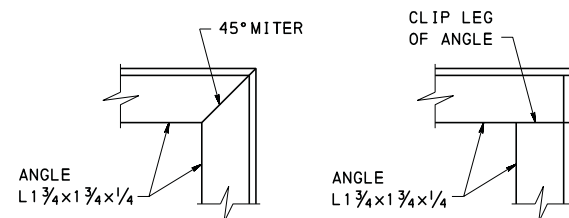
RC-45M



**PLAN VIEW - TYPE C**



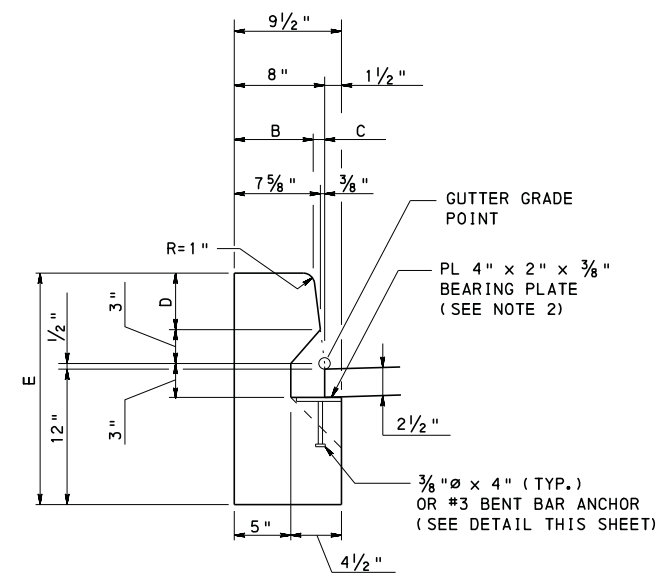
**SECTION E-E**



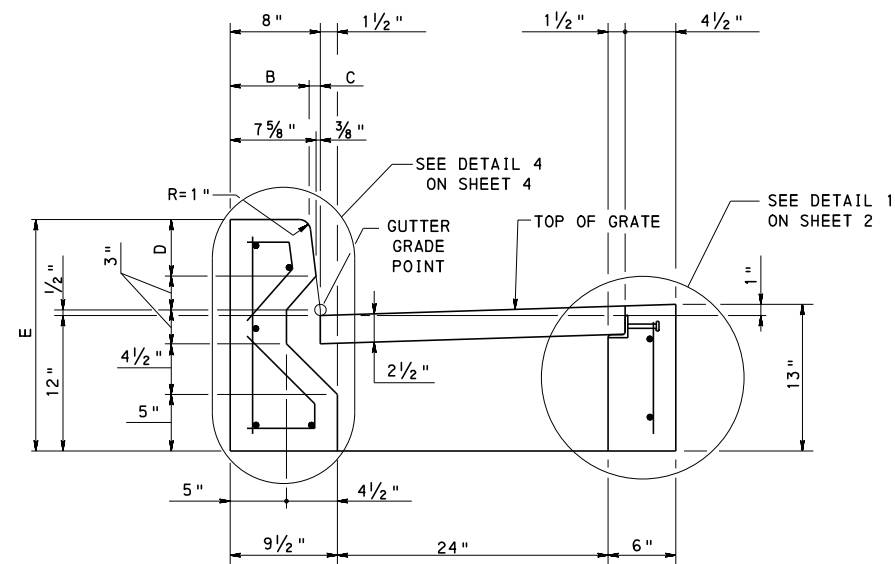
**OPTION 1**  
(MITERED)

**OPTION 2**  
(CLIPPED LEG)

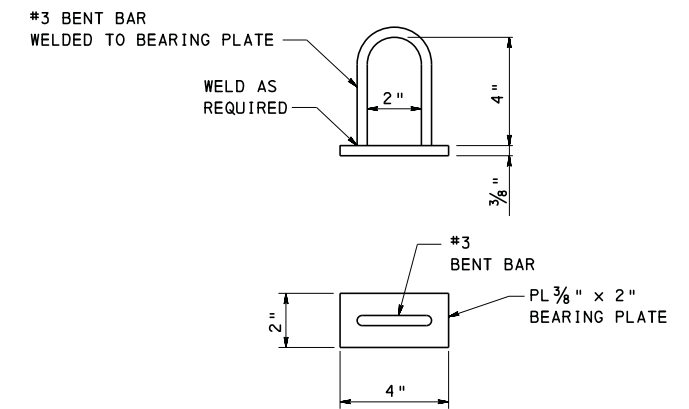
**DETAIL 3**



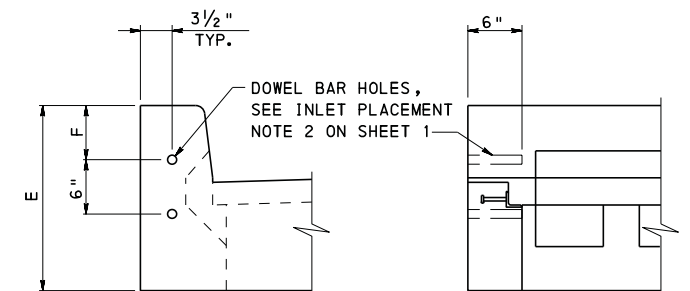
**SECTION G-G**



**SECTION F-F**



**#3 BENT BAR ANCHOR  
DETAIL ATTACHED  
TO BEARING PLATE**  
ALTERNATE DETAIL IN PLACE OF  
PROVIDING 3/8 inch 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 inch 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.

TABLE OF DIMENSIONS					
CURB HEIGHT A	B	C	D	E	F
8"	7"	1"	5"	20 1/2"	6"
6"	7 1/4"	3/4"	3"	18 1/2"	4"
4"	7 1/2"	1/2"	1"	16 1/2"	4"

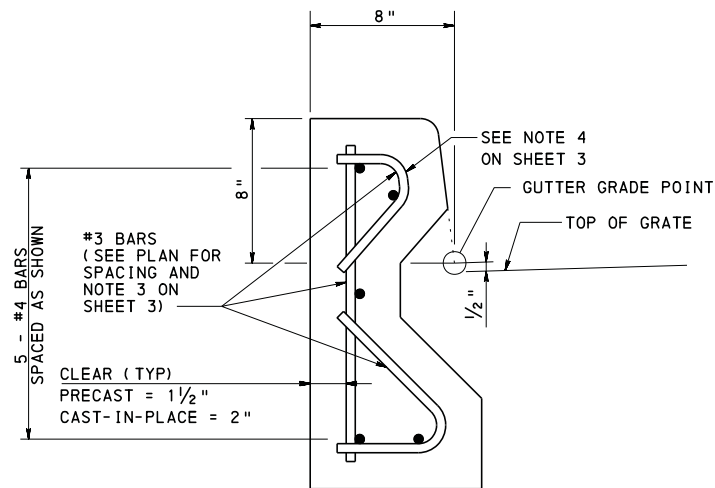
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C - 1

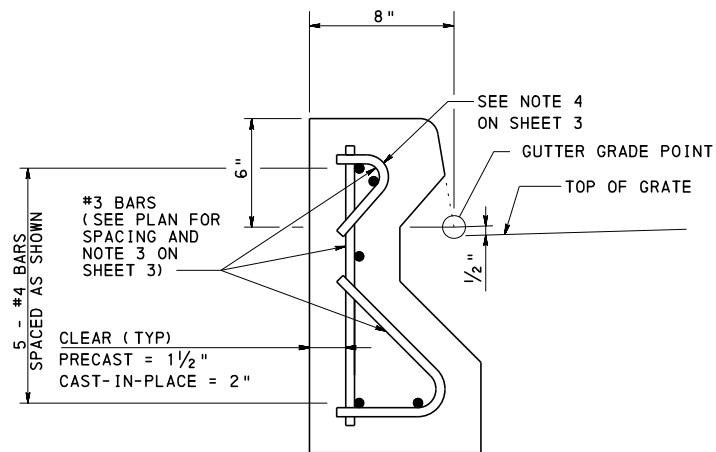
RECOMMENDED FEB. 19, 2021  
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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

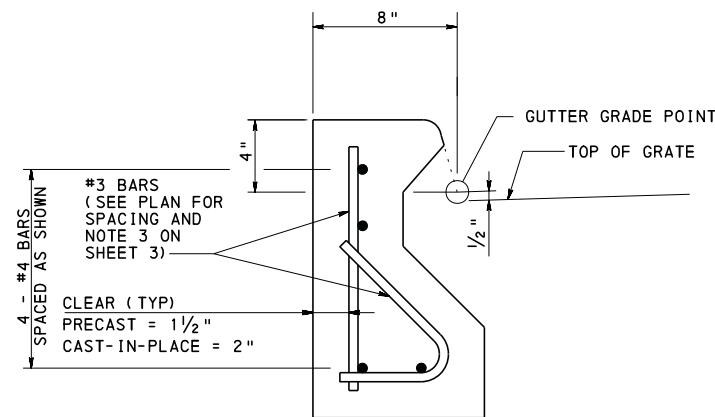
SHT 3 OF 24  
RC-45M



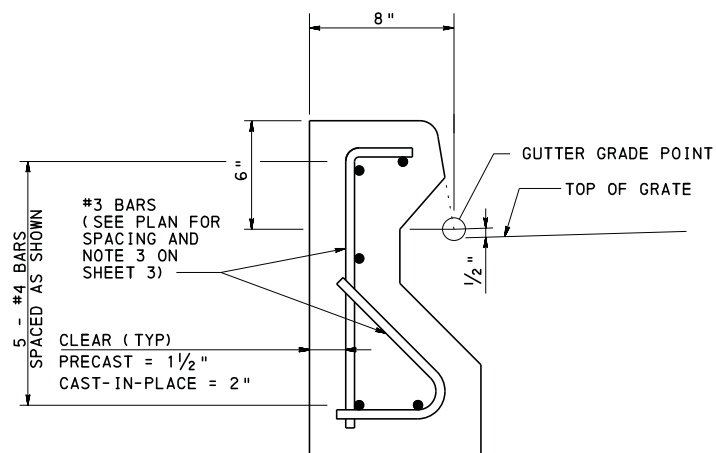
**DETAIL 4**  
8" CURB HEIGHT



**DETAIL 4**  
6" CURB HEIGHT



**DETAIL 4**  
4" CURB HEIGHT



**DETAIL 4 - ALTERNATE DETAIL**  
6" CURB HEIGHT

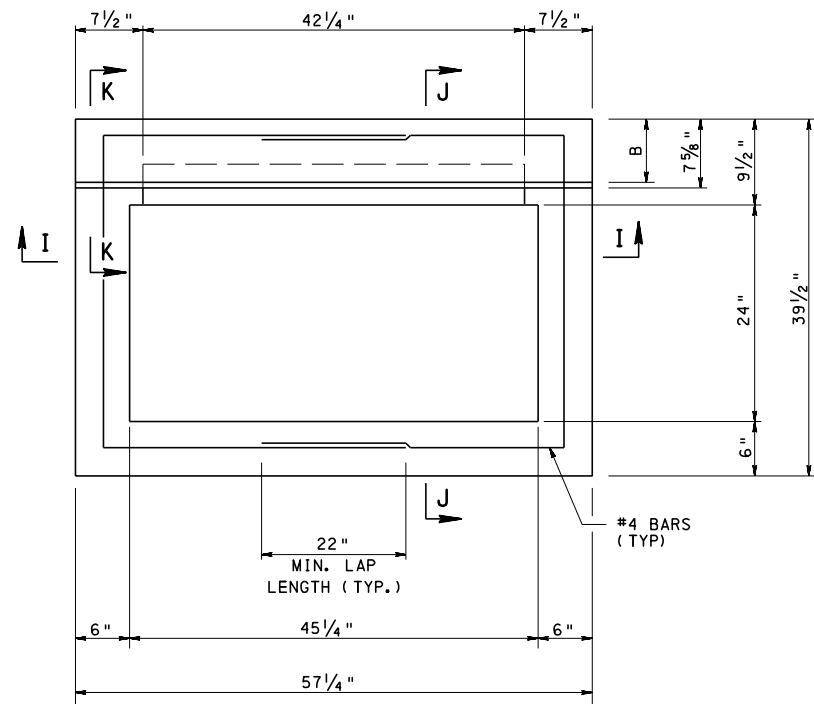
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C - 2

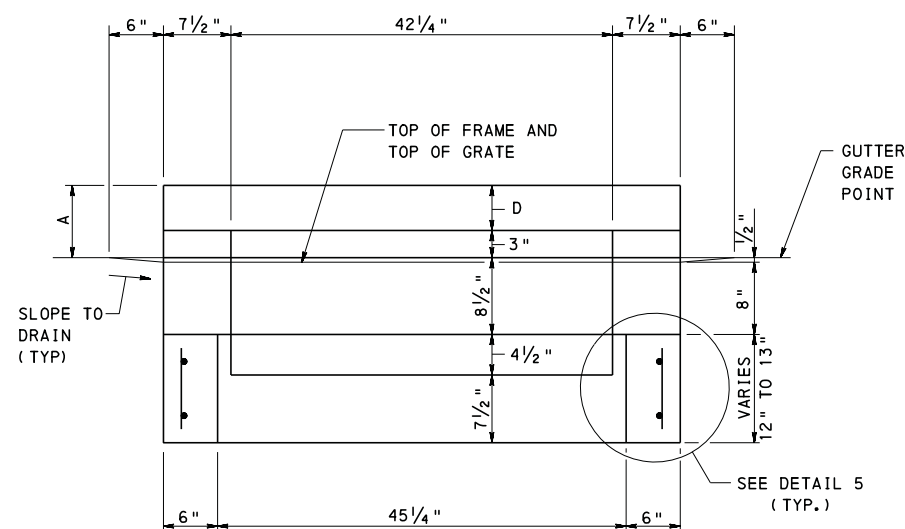
RECOMMENDED FEB. 19, 2021  
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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

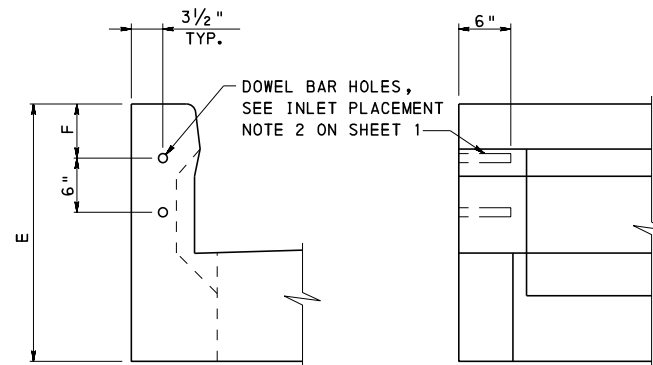
SHT 4 OF 24  
RC-45M



**PLAN VIEW - TYPE C ALTERNATE**

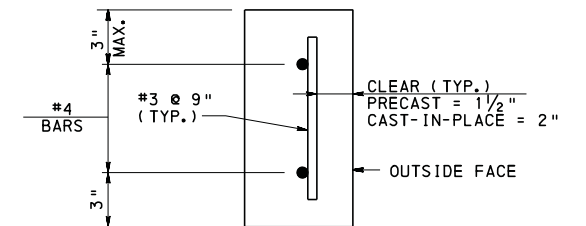


**SECTION I-I**



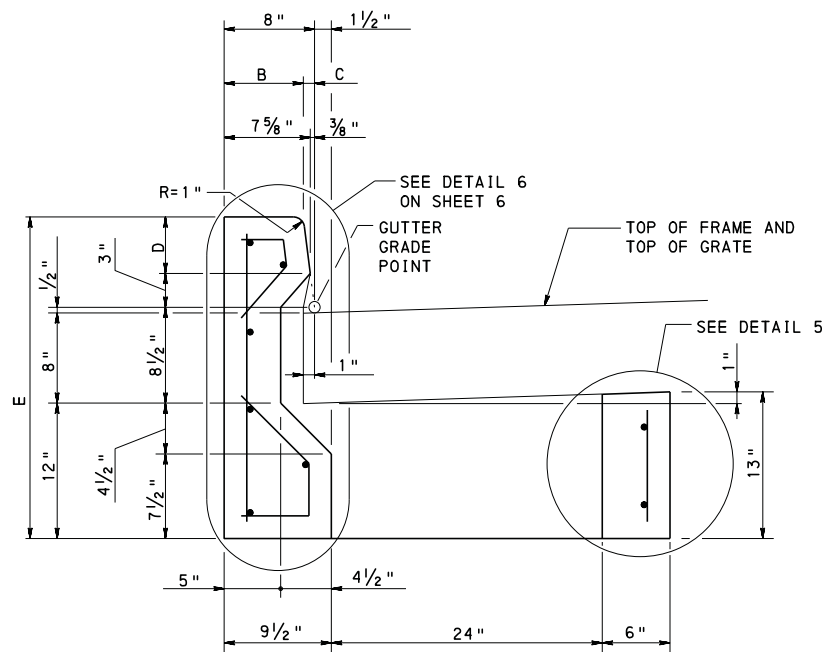
**SECTION K-K**

**FRONT ELEVATION**



**DETAIL 5**

TABLE OF DIMENSIONS					
CURB HEIGHT A	B	C	D	E	F
8"	7"	1"	5"	28 1/2"	6"
6"	7 1/4"	3/4"	3"	26 1/2"	4"
4"	7 1/2"	1/2"	1"	24 1/2"	4"



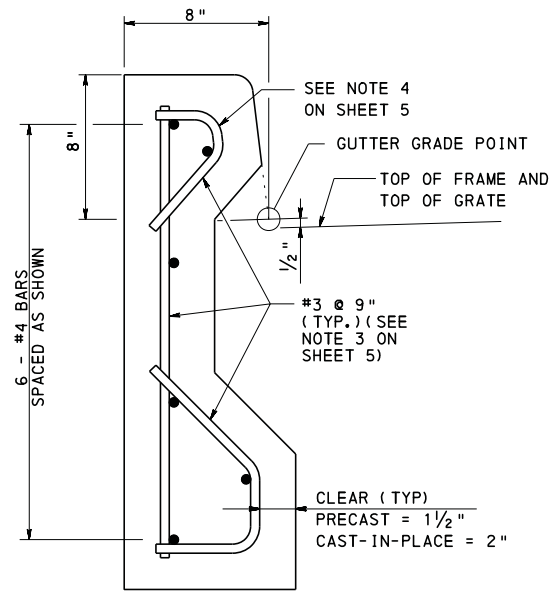
**SECTION J-J**

**NOTES**

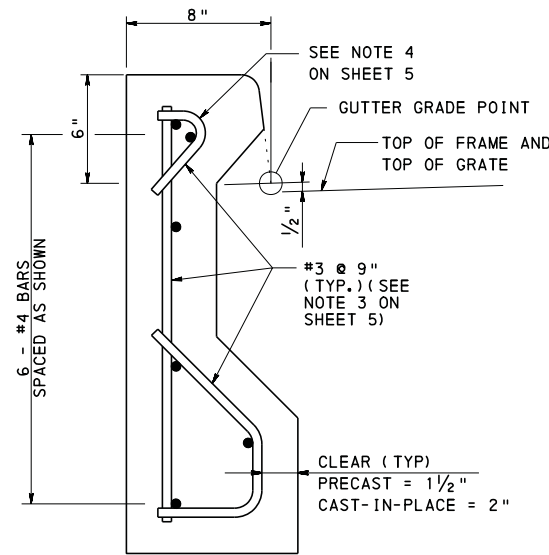
- FOR ADDITIONAL NOTES, SEE SHEET 1.
- FOR TYPE C FRAME, SEE SHEET 16.
- FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
- BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

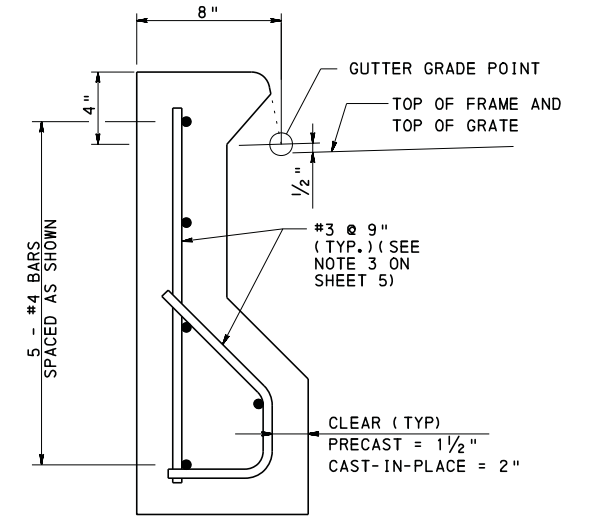
INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C ALTERNATE - 1



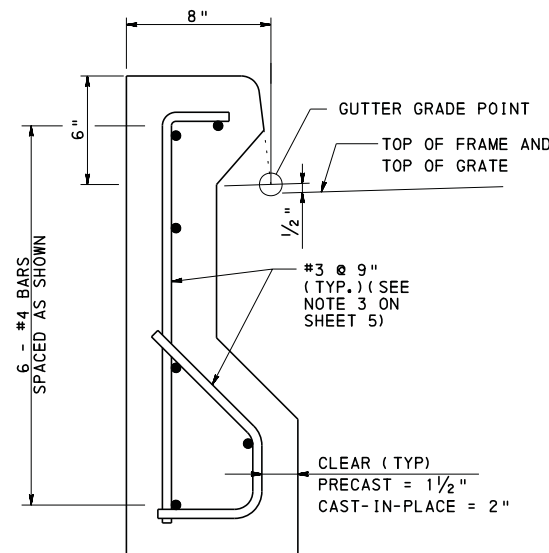
**DETAIL 6**  
8" CURB HEIGHT



**DETAIL 6**  
6" CURB HEIGHT



**DETAIL 6**  
4" CURB HEIGHT

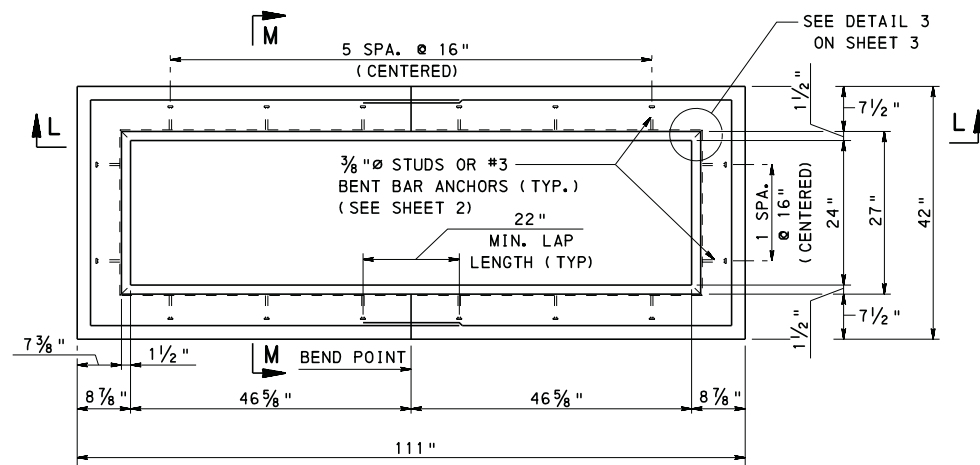


**DETAIL 6 - ALTERNATE DETAIL**  
6" CURB HEIGHT

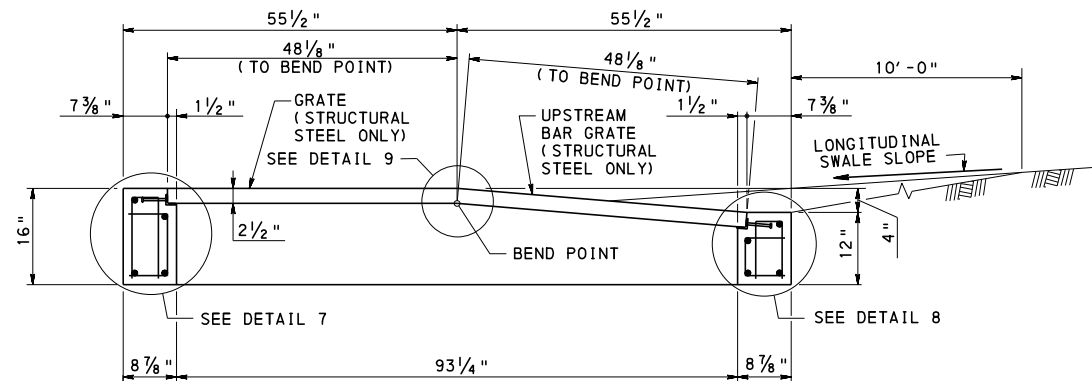
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C ALTERNATE - 2

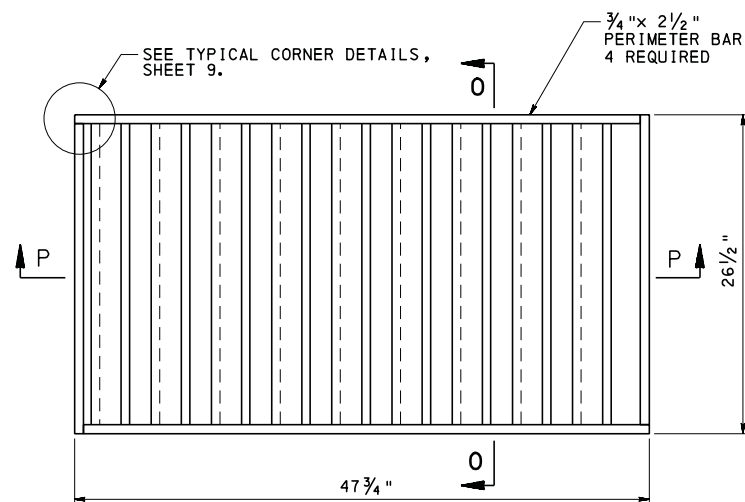
RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 6 OF 24 RC-45M
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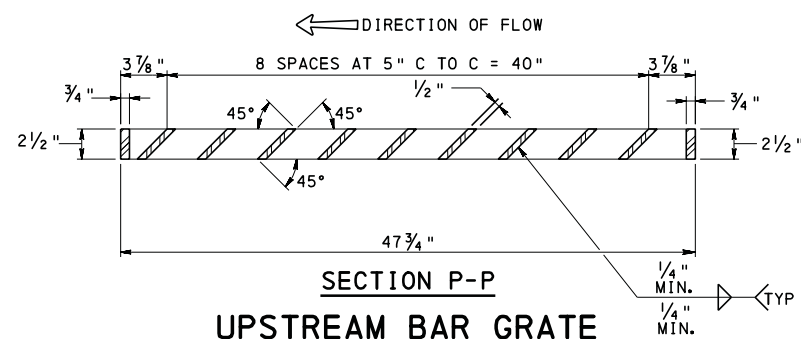
PLAN VIEW - TYPE D-H



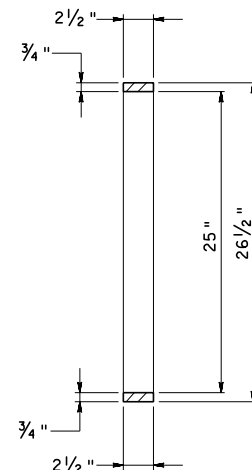
SECTION L-L



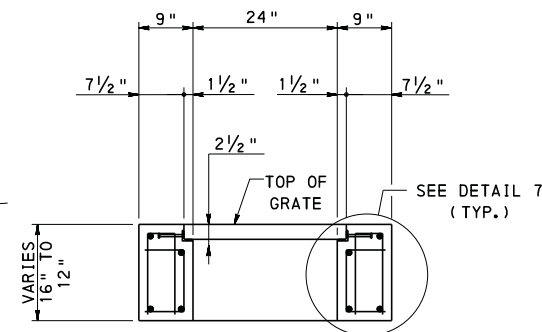
PLAN VIEW



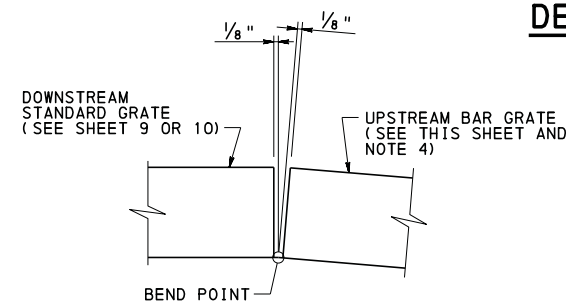
SECTION P-P  
UPSTREAM BAR GRATE



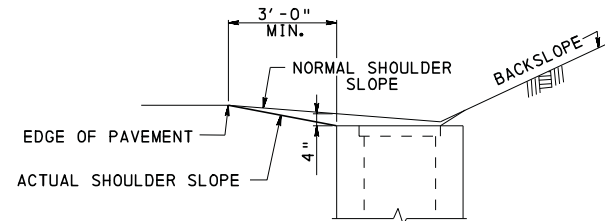
SECTION O-O



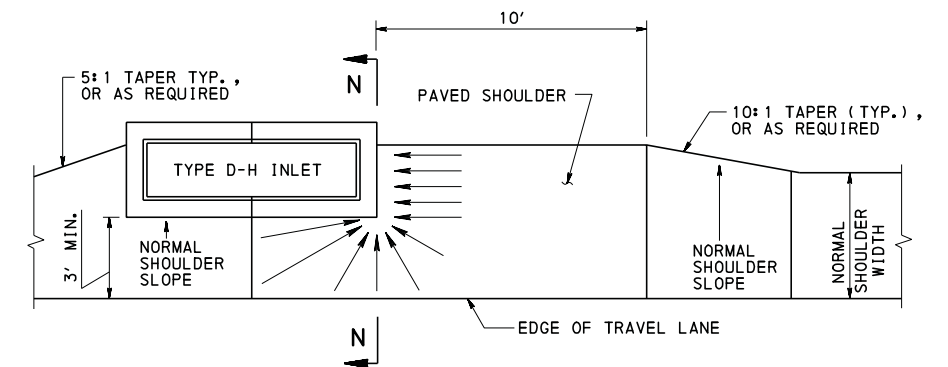
SECTION M-M



DETAIL 9  
TYPE AND LOCATION OF GRATES

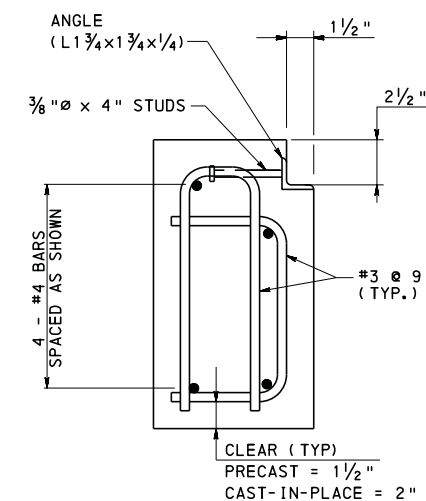


SECTION N-N

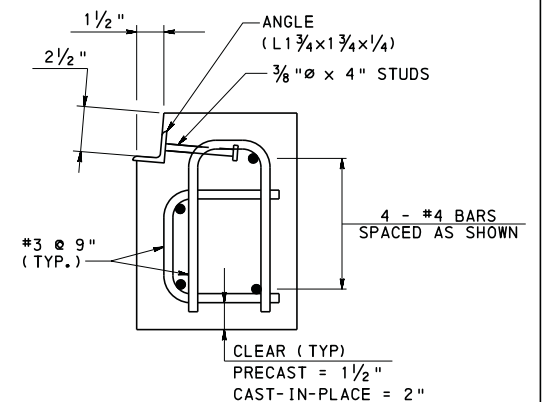


PLAN VIEW

TYPICAL TYPE D-H INLET LOCATION



DETAIL 7



DETAIL 8

## NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE DETAILS AND NOTES, SEE SHEET 9.
3. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 14.
4. UPSTREAM BAR GRATE IS NOT DESIGNED FOR PHL-93 OR HS-25 LOADING.
5. DO NOT PLACE TYPE D-H INLETS IN A LOCATION WHERE FREQUENT IMPACTS FROM TRAFFIC IS LIKELY.

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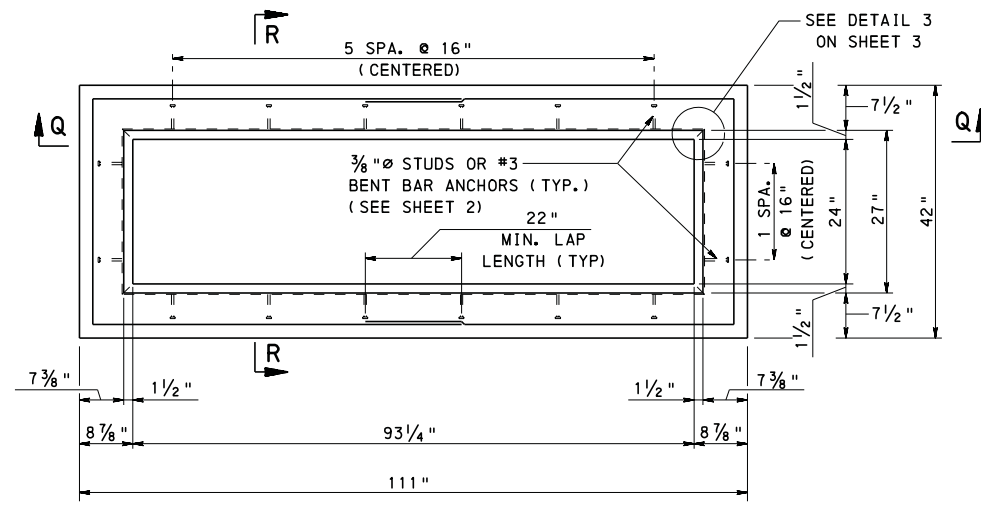
INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE D-H

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CHIEF, HWY. DELIVERY DIVISION

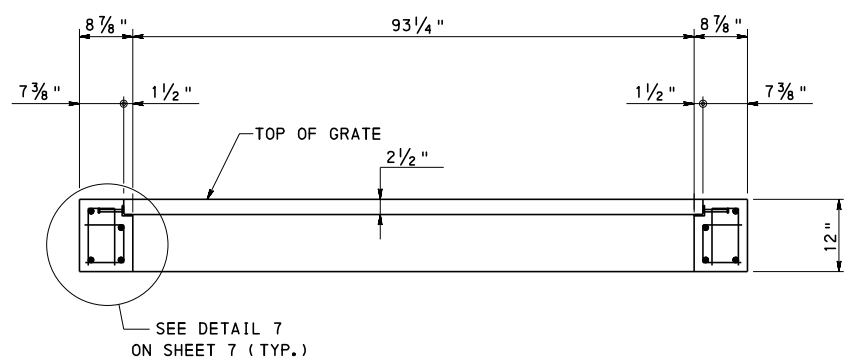
RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 7 OF 24  
RC-45M

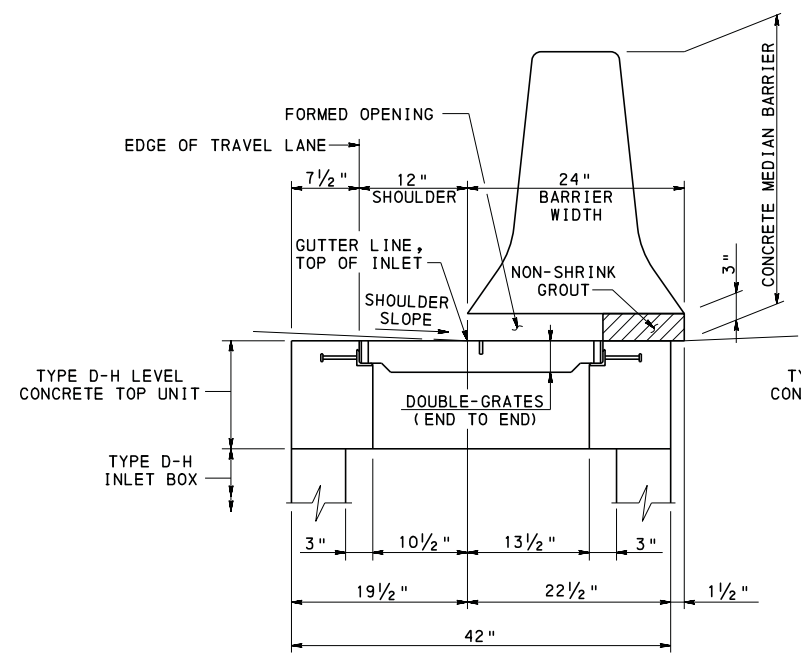




**PLAN VIEW - TYPE D-H LEVEL**

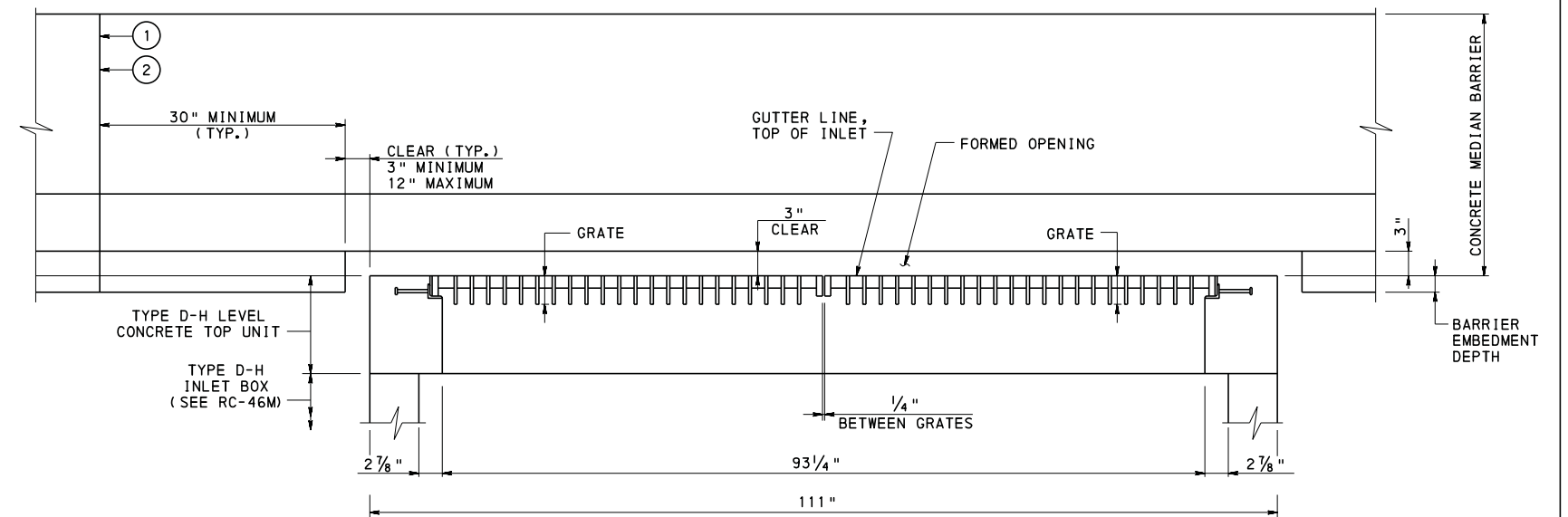


**SECTION Q-Q**

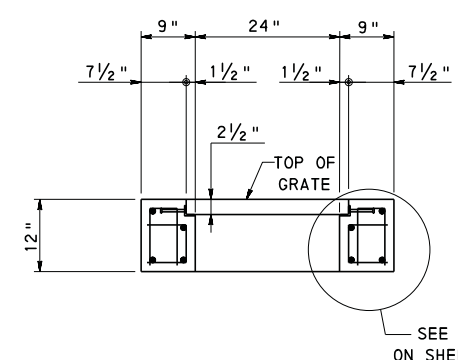


**PLACED ALONG 1'-0" WIDE SHOULDER**

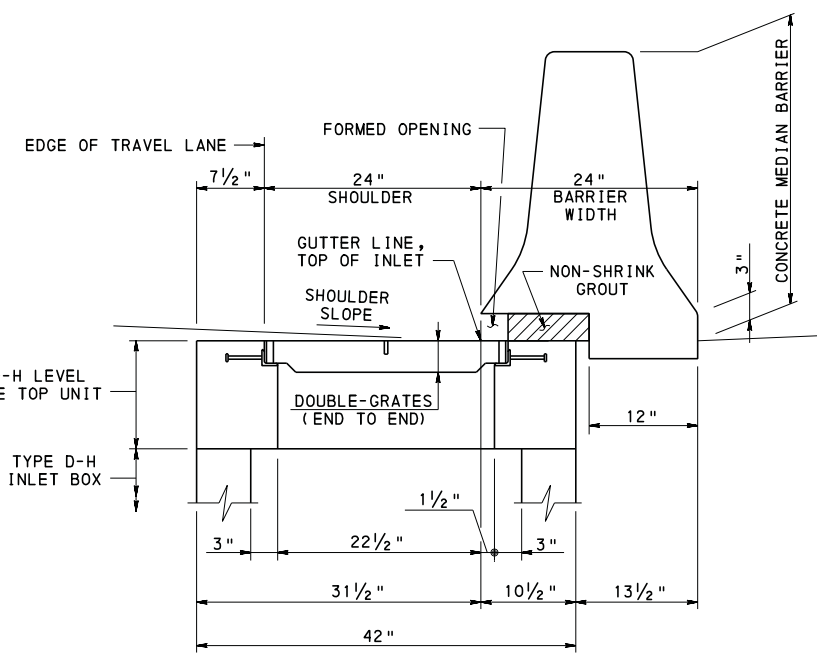
**SECTION S-S**



- ① END OF PRECAST CONCRETE MEDIAN BARRIER SEGMENT.
- ② EXPANSION OR CONTRACTION JOINT IN CAST-IN-PLACE CONCRETE MEDIAN BARRIER.

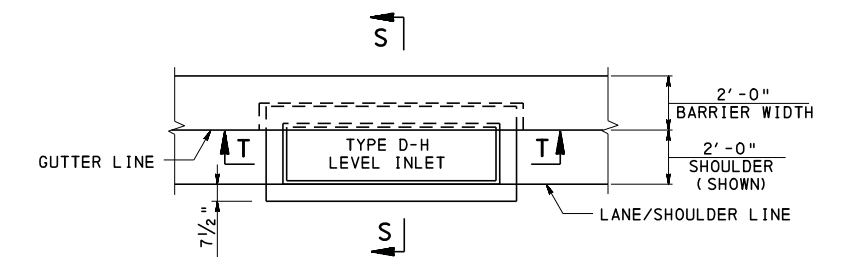


**SECTION R-R**



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

**SECTION T-T**



**PLAN VIEW**

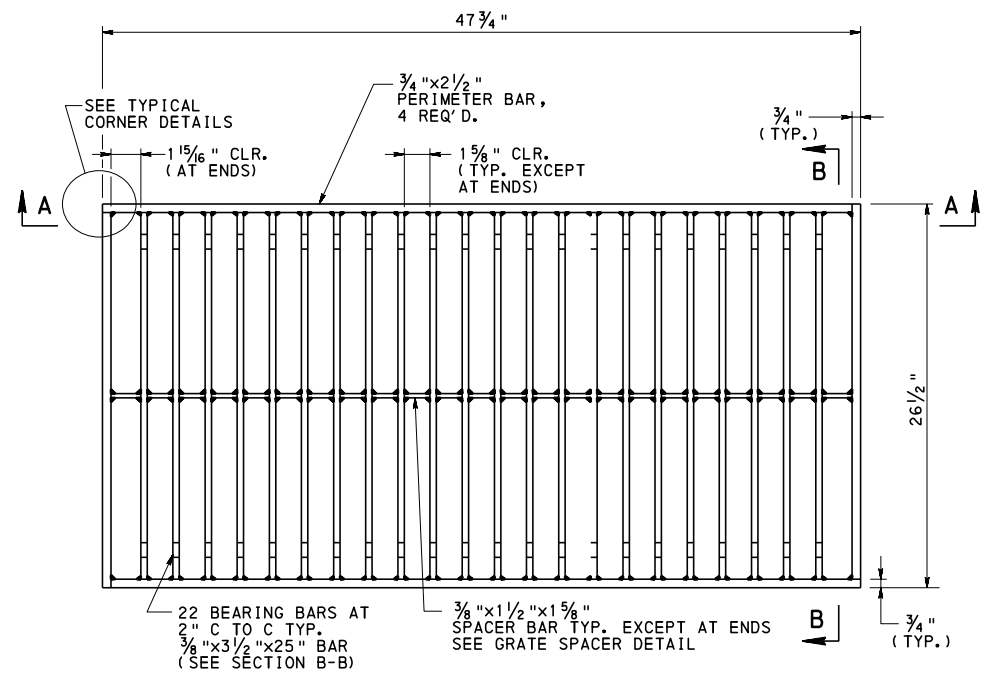
**TYPICAL TYPE D-H LEVEL INLET LOCATION AT CONCRETE MEDIAN BARRIER**

(FOR INFORMATION ONLY, REFER TO CONTRACT DRAWINGS FOR ADDITIONAL DETAILS.)

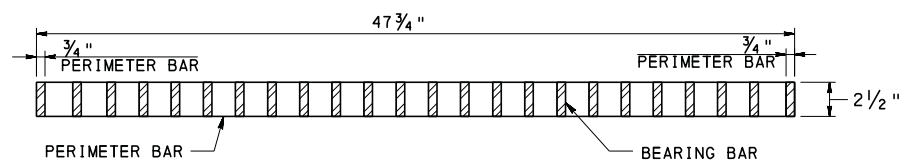
**NOTES**

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 14.
3. FOR INLET PLACEMENT NOTES, SEE SHEET 18.
4. PROVIDE A 15'-0" MINIMUM PRECAST CONCRETE MEDIAN BARRIER SEGMENT WHEN USING A TYPE D-H INLET BOX IN THE MEDIAN.

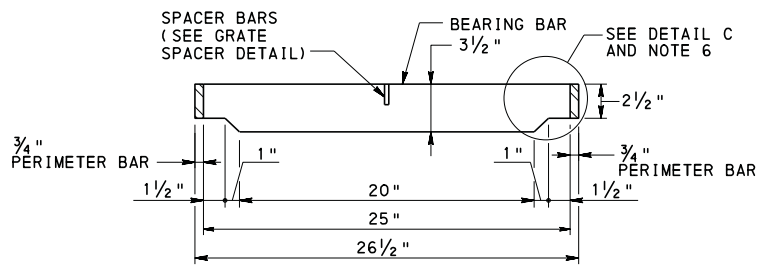
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE D-H LEVEL		
RECOMMENDED FEB. 19, 2021 <i>Chait &amp; Sp</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Burns &amp; Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 8 OF 24 RC-45M



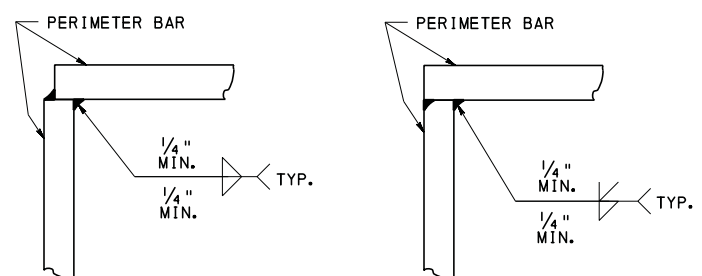
**STRUCTURAL STEEL GRATE**



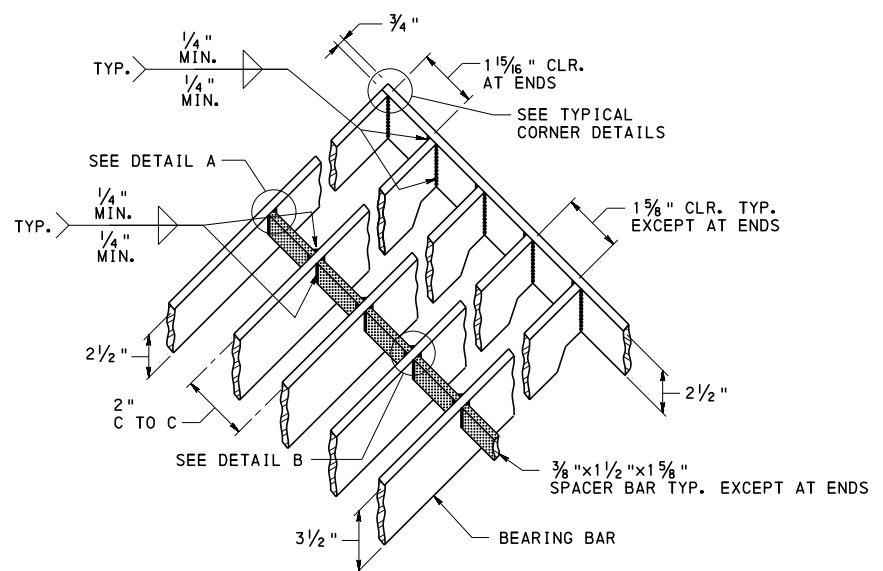
**SECTION A-A**



**SECTION B-B**

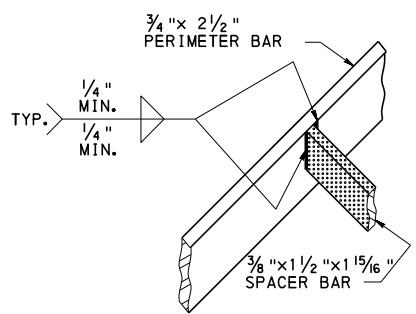


**TYPICAL CORNER DETAILS**

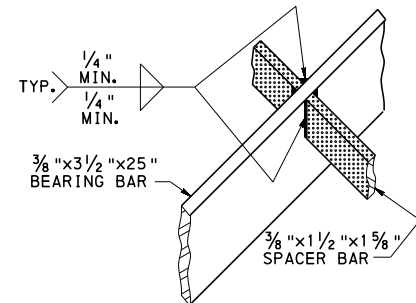


**GRATE SPACER DETAIL**

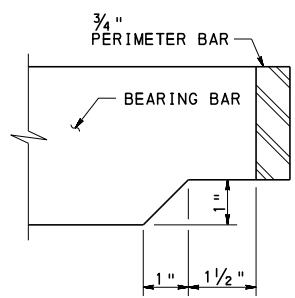
NOTE: PLACE SPACER BARS AT LONGITUDINAL C OF GRATE.



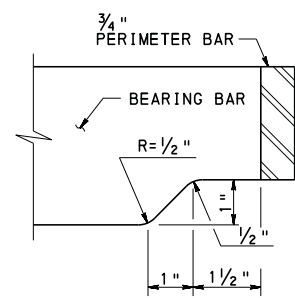
**DETAIL A**



**DETAIL B**



**OPTION 1**



**OPTION 2**

**DETAIL C**

**STRUCTURAL STEEL GRATE NOTES:**

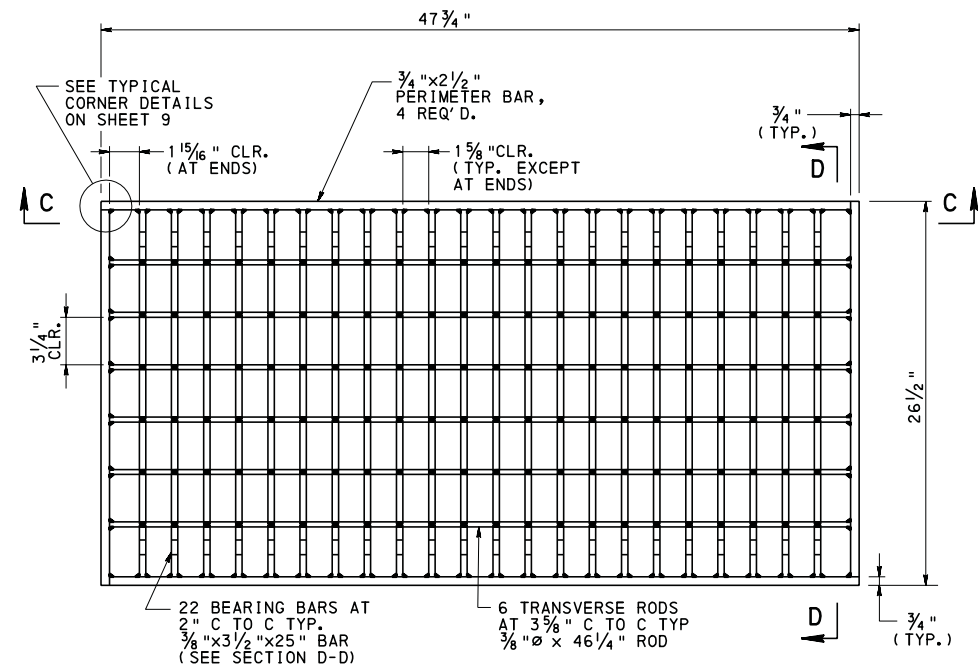
1. SHEETS 9 AND 10 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE STRUCTURAL STEEL GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH 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 ASPHALT PAINT, AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO ASPHALT PAINT, GALVANIZE GRATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).

**NOTES**

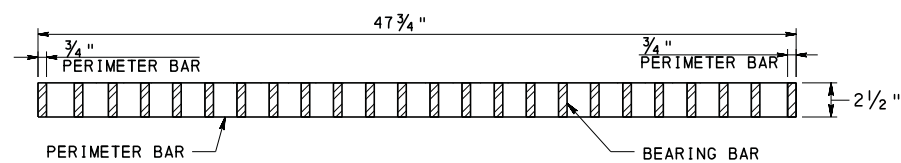
1. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

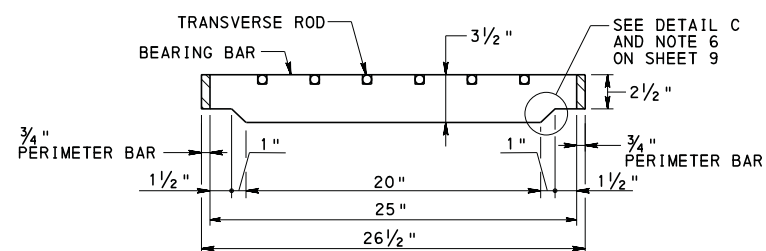
INLET TOPS, GRATES, AND FRAMES  
STRUCTURAL STEEL GRATE



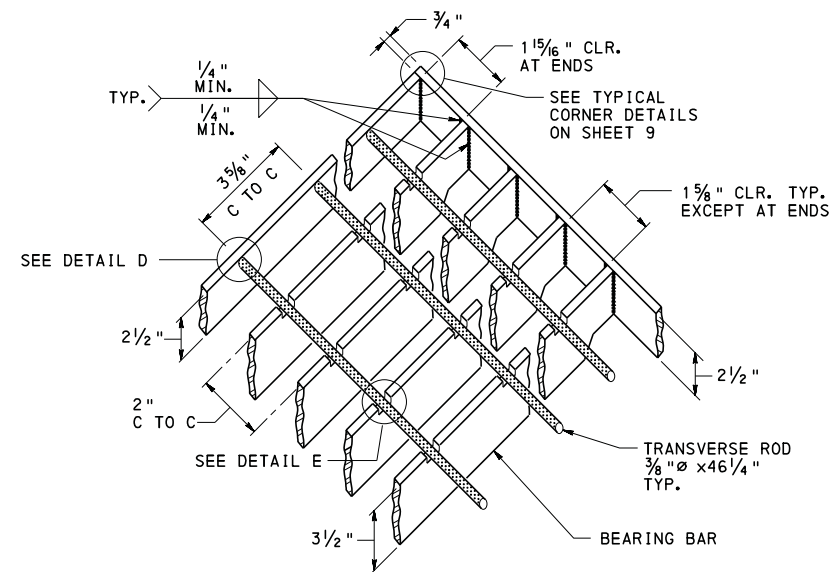
### STRUCTURAL STEEL GRATE BICYCLE SAFE



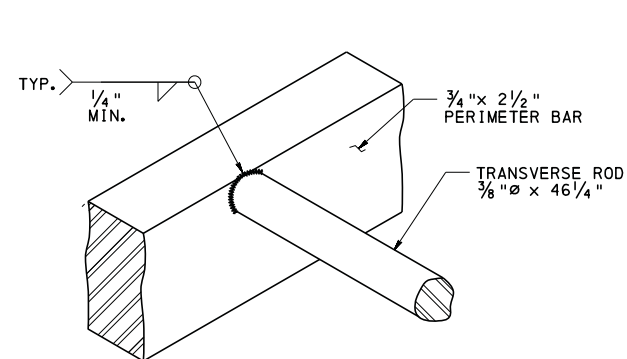
#### SECTION C-C



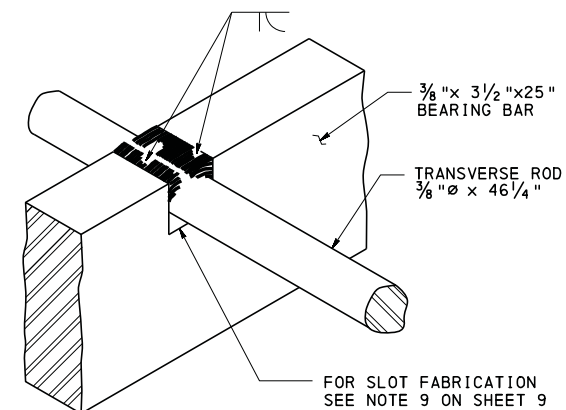
#### SECTION D-D



#### 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 9.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

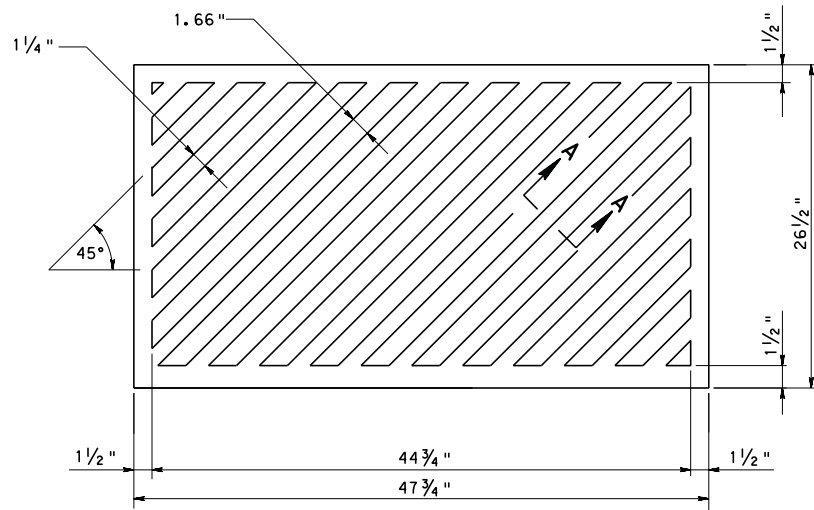
INLET TOPS, GRATES, AND FRAMES  
STRUCTURAL STEEL GRATE  
BICYCLE SAFE

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

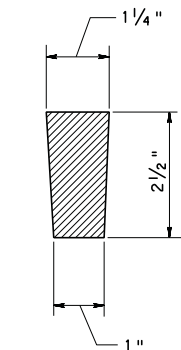
RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 10 OF 24

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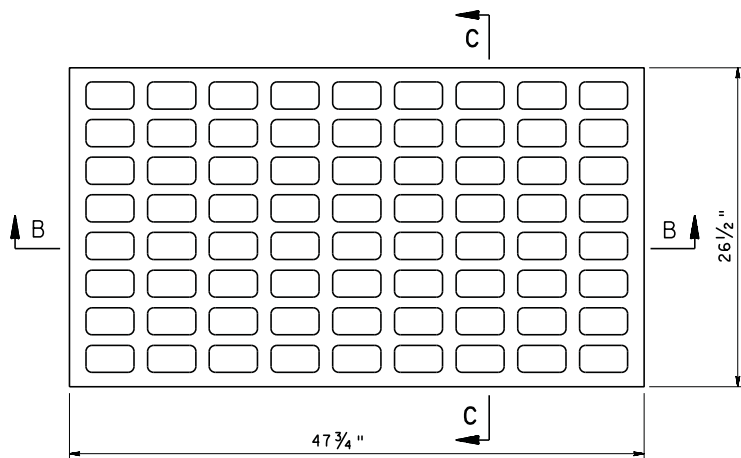


PLAN

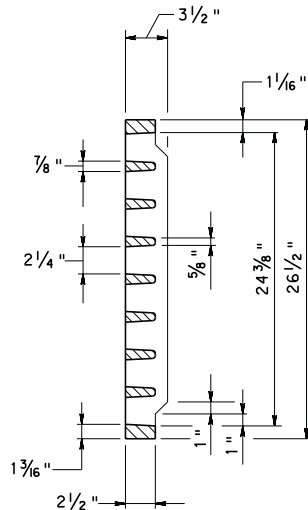


SECTION A-A

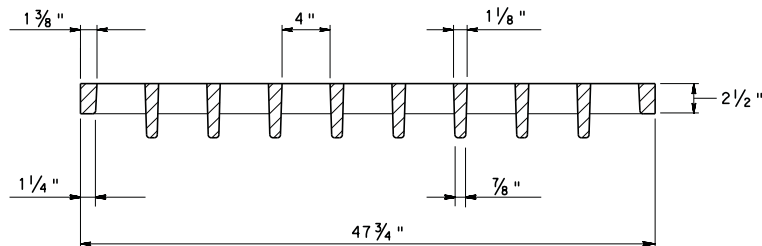
**ONE PIECE CAST IRON GRATE**



PLAN VIEW



SECTION C-C



SECTION B-B

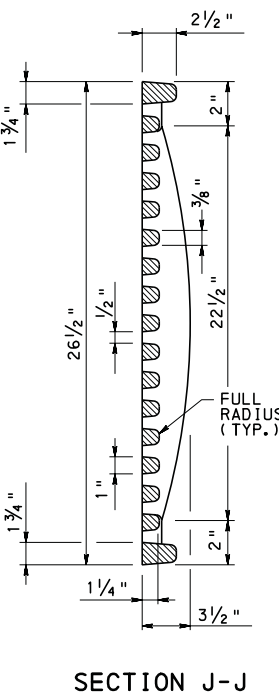
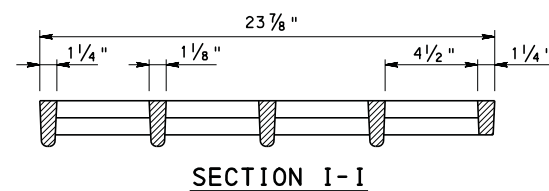
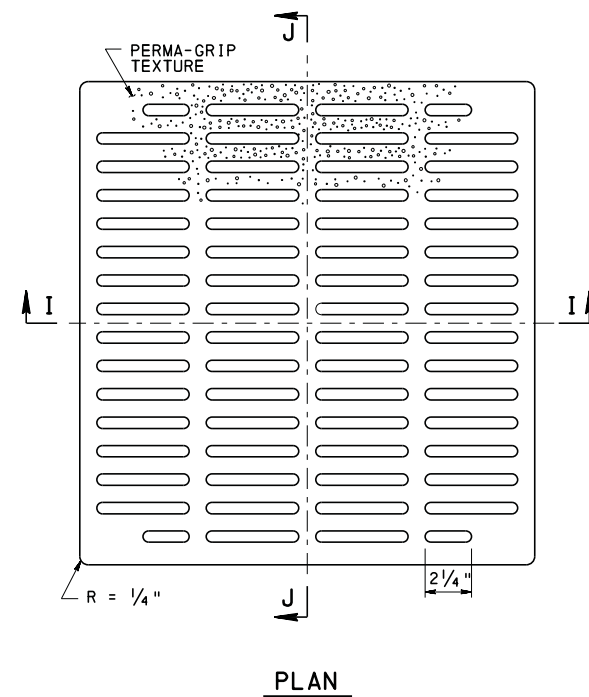
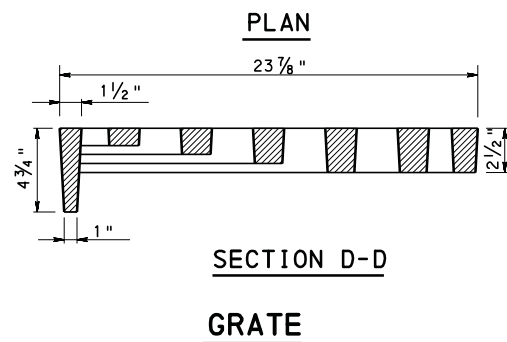
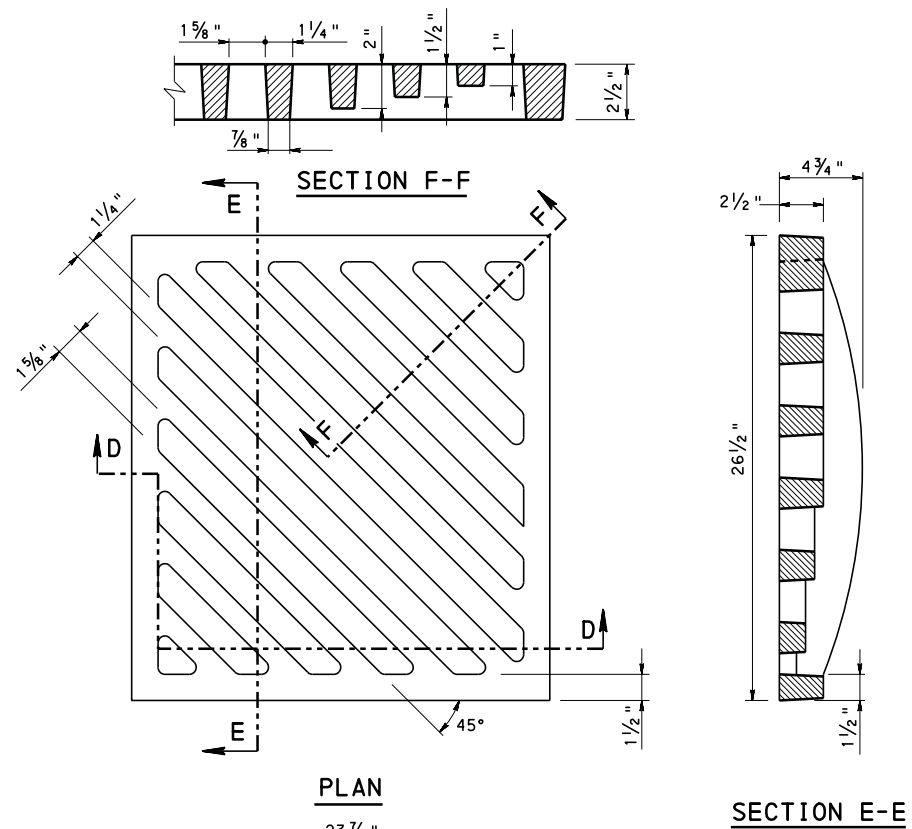
**ONE PIECE CAST IRON GRATE - BICYCLE SAFE**

**CAST IRON GRATE NOTES:**

1. SHEETS 11 AND 12 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 PERFORM WORK IN ACCORDANCE WITH 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.

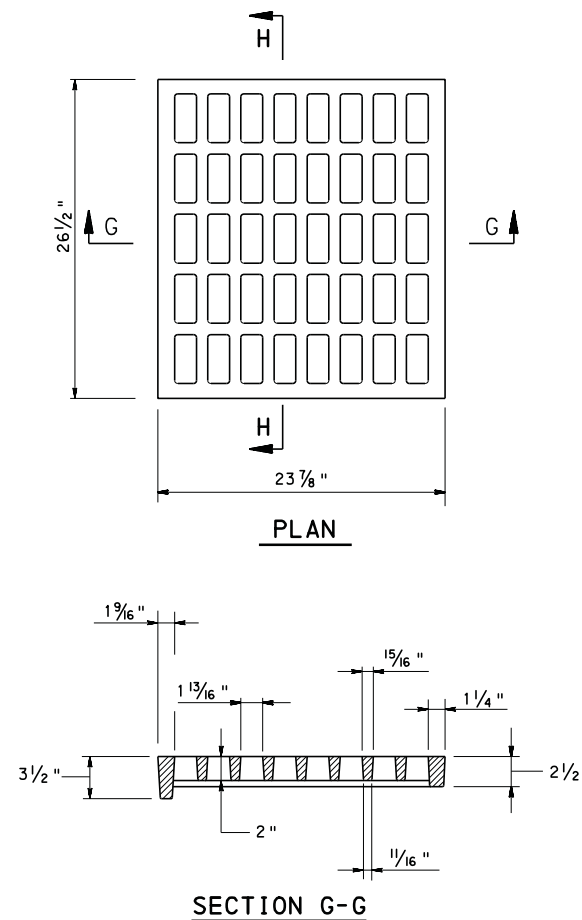
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

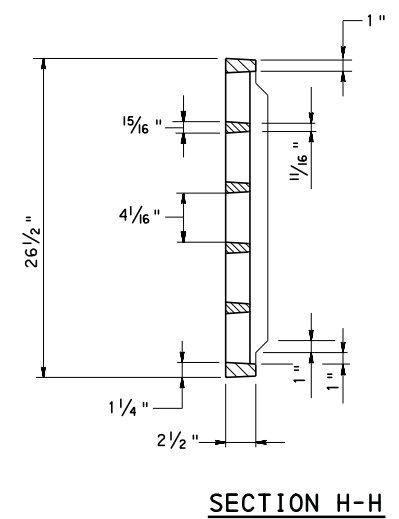


### ADA COMPLIANT GRATE

### TWO PIECE CAST IRON GRATES



### BICYCLE SAFE GRATE



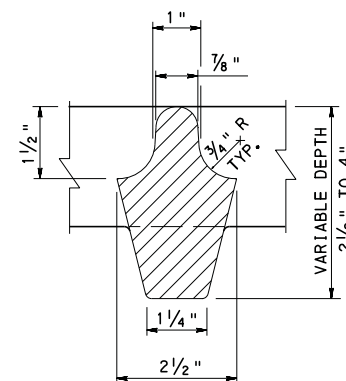
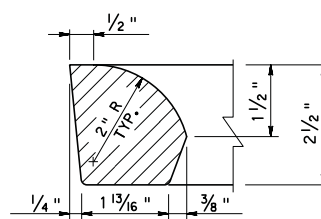
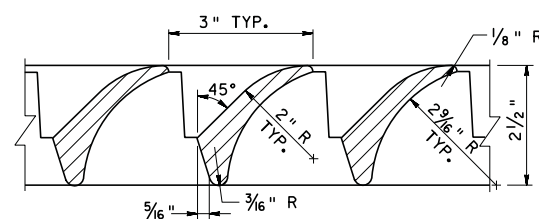
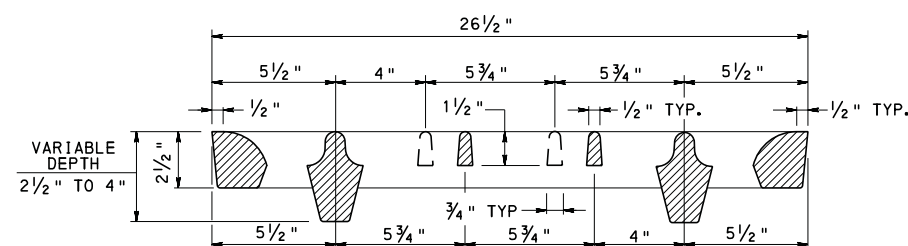
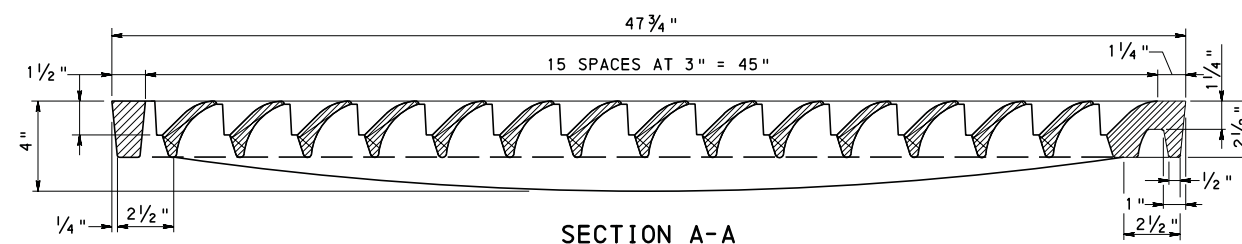
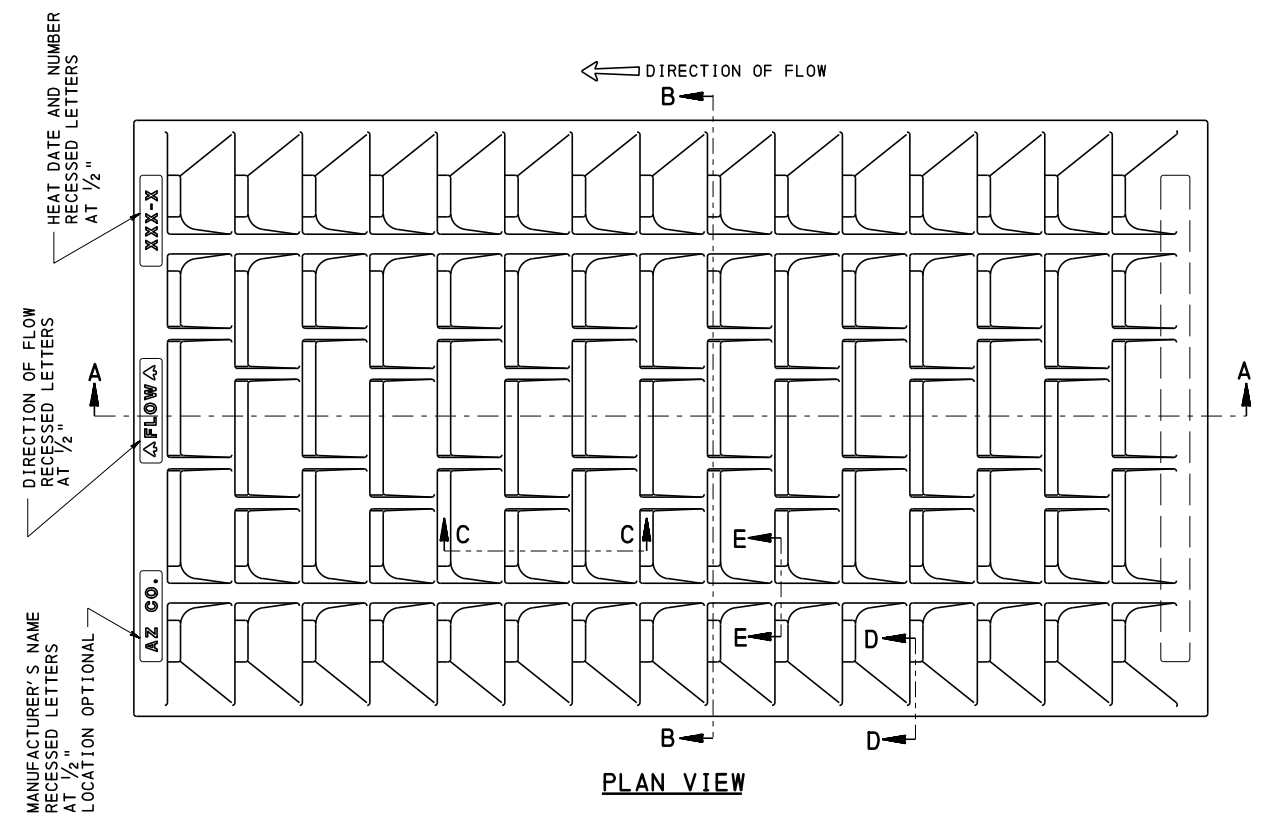
### NOTES

1. FOR CAST IRON GRATE NOTES, SEE SHEET 11.
2. FOR ONE PIECE CAST IRON GRATE DETAILS, SEE SHEET 11.

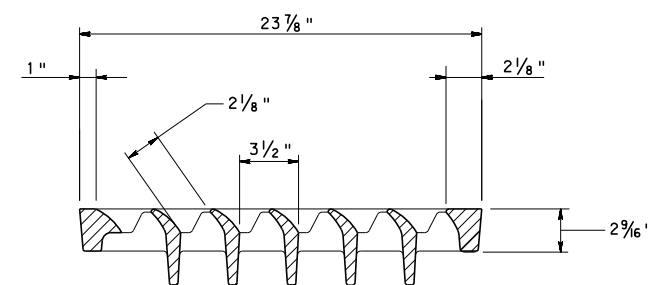
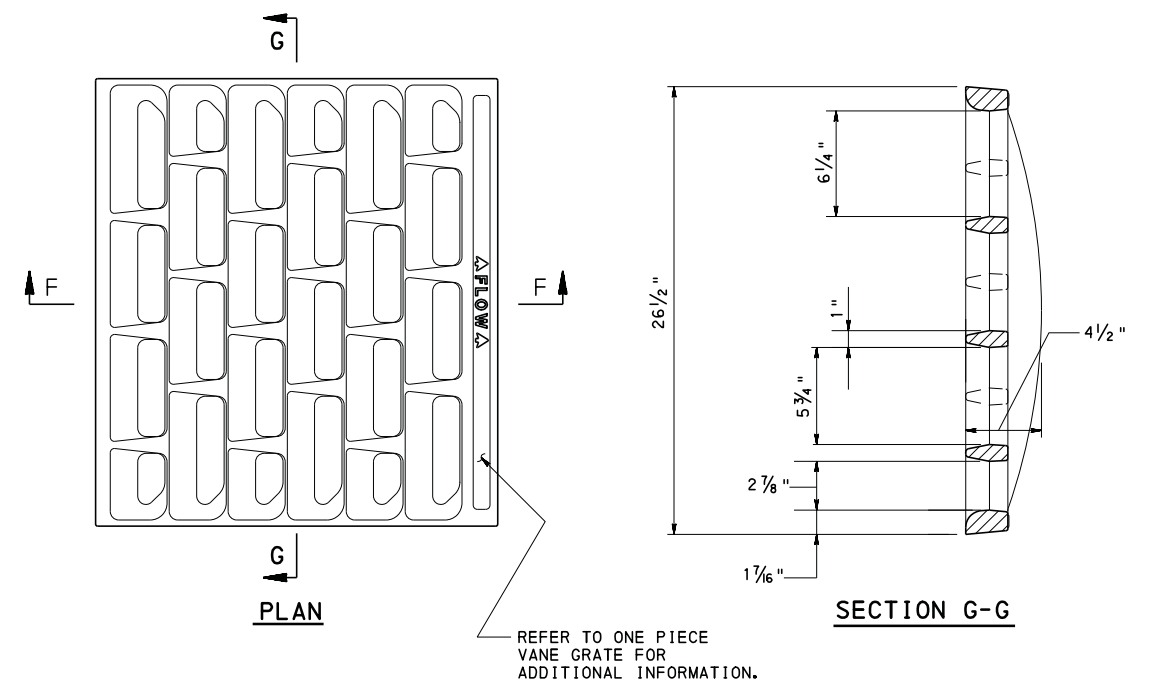
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

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**ONE PIECE CAST IRON VANE GRATE**



**TWO PIECE CAST IRON VANE GRATE**

**CAST IRON VANE GRATE NOTES:**

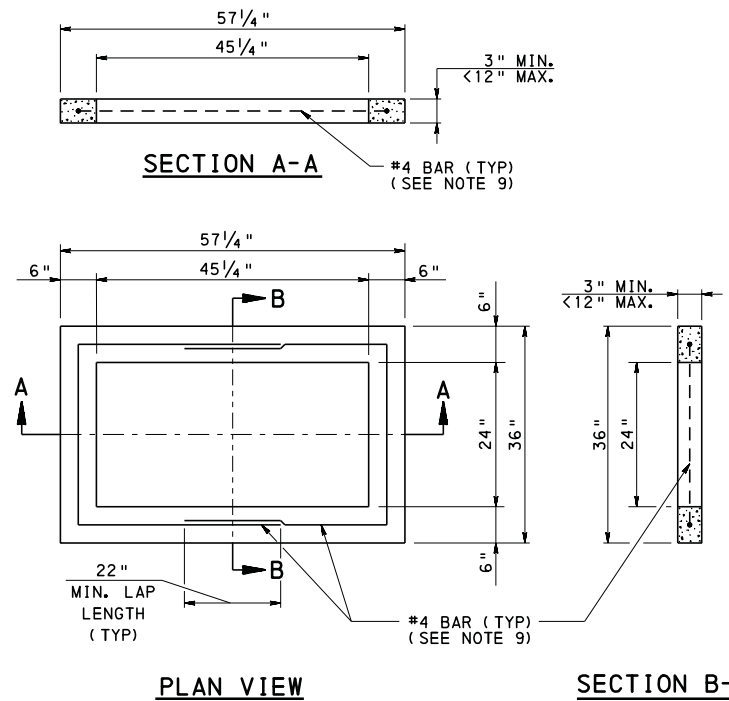
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE CAST IRON VANE GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH 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\"/>
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.

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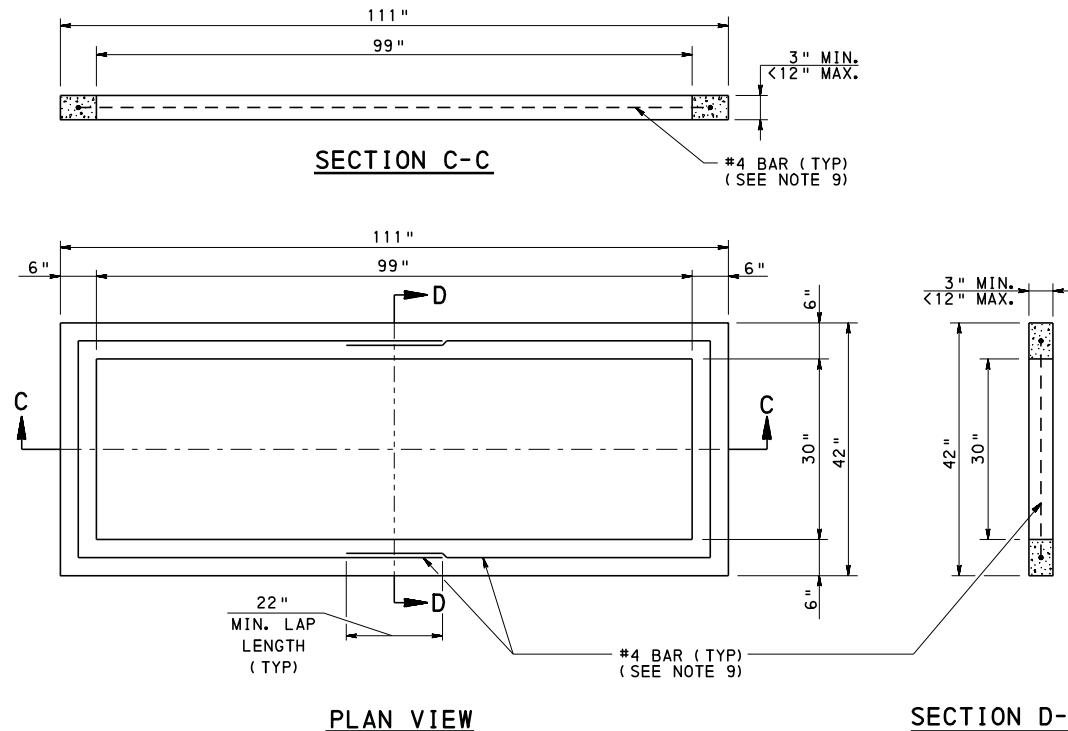
INLET TOPS, GRATES, AND FRAMES  
CAST IRON VANE GRATE

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**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 14 AND 15 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 PERFORM WORK IN ACCORDANCE WITH 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.

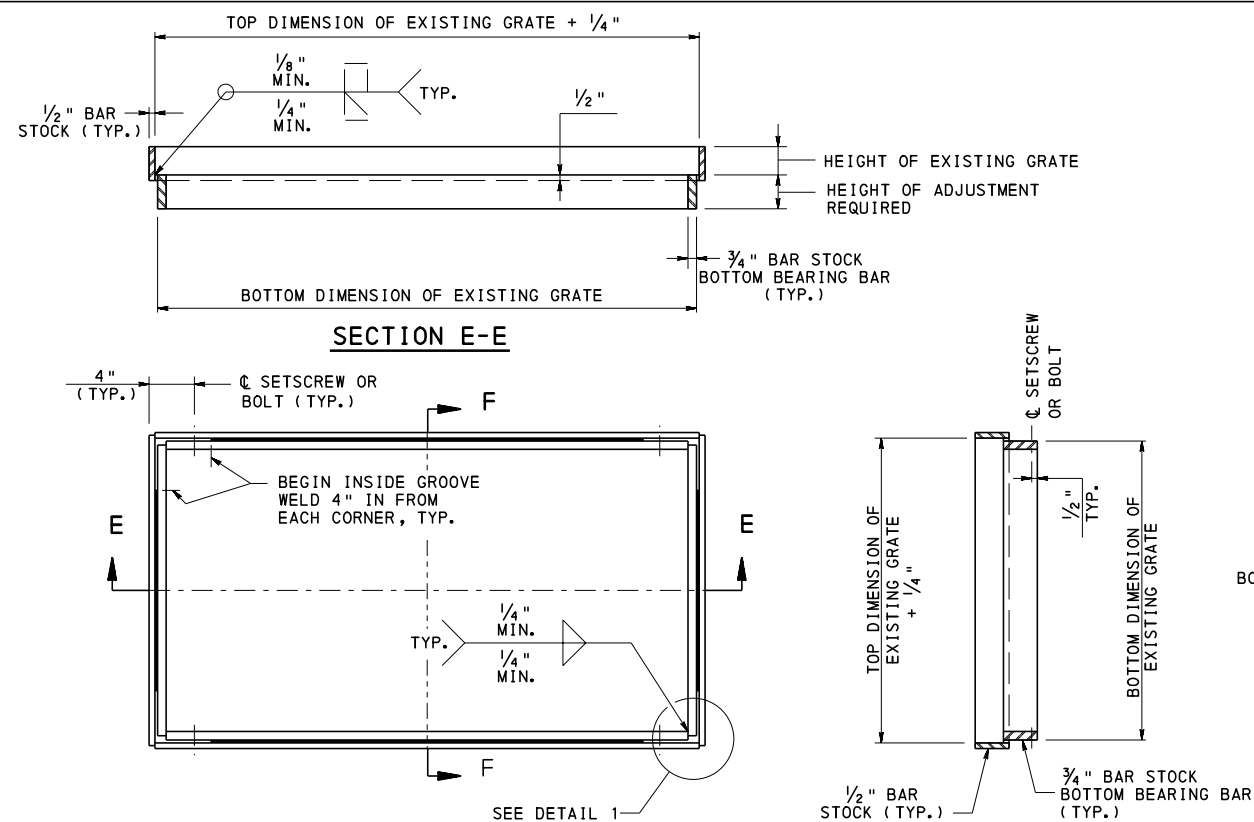
#### PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

- 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 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 12": PROVIDE ONE #4 BAR PLACED 1 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 AS SPECIFIED IN 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 LESS THAN 12".

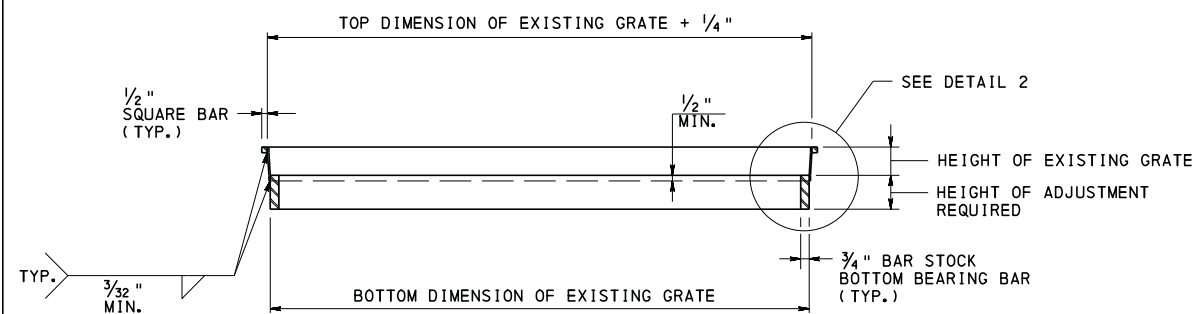
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
GRADE ADJUSTMENT RINGS - 1

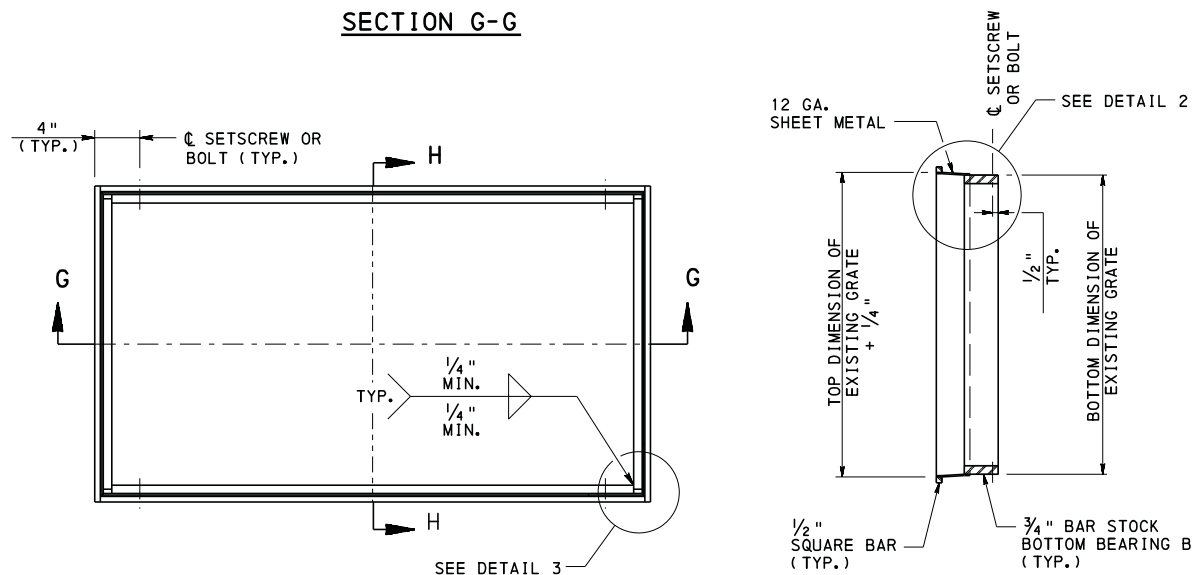
RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 14 OF 24 RC-45M
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## STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 1



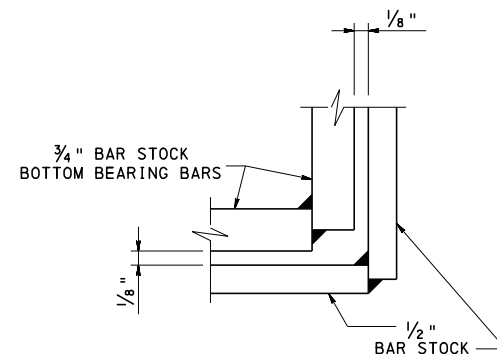
SECTION G-G



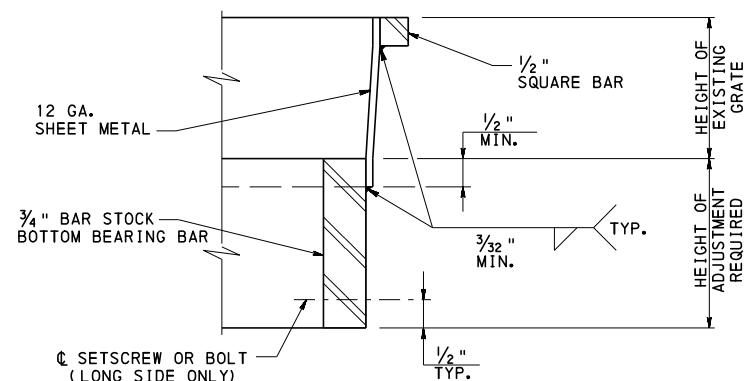
PLAN VIEW

SECTION H-H

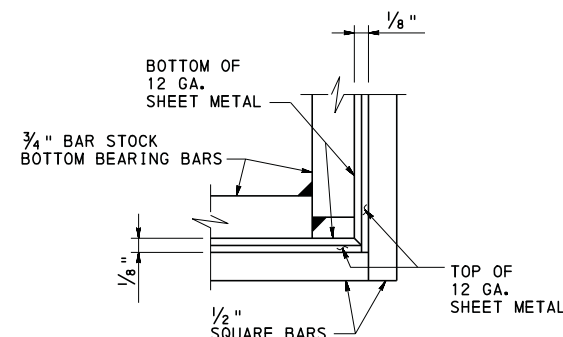
## STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 2



DETAIL 1



DETAIL 2



DETAIL 3

### 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 ASPHALT PAINT, AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO ASPHALT PAINT, GALVANIZE ADJUSTMENT RISERS AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
- FOR ADDITIONAL NOTES, REFER TO THE GRADE ADJUSTMENT RING GENERAL NOTES ON SHEET 14 AND GENERAL NOTES ON SHEET 1.

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

RECOMMENDED FEB. 19, 2021

*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 15 OF 24

RC-45M



SEE DETAIL 1

SEE DETAIL 2

8 in.

Technical drawing of a bracket with the following dimensions:

- Overall height: 8"
- Overall width: 4" MIN. to 6" MAX.
- Top horizontal section width: 1" MIN.
- Top horizontal section thickness:  $\frac{3}{4}$ " MIN.
- Vertical section thickness:  $1\frac{1}{4}$ " MIN.
- Vertical section height:  $2\frac{1}{2}$ "
- Horizontal section height: 1"
- Horizontal section thickness:  $1\frac{1}{2}$ "
- Bottom horizontal section thickness:  $\frac{3}{4}$ " MIN.

Technical drawing of a mechanical part with the following dimensions:

- Overall height: 8"
- Top flange width: 1" MIN.
- Top flange thickness: 3/4"
- Distance from top flange to start of cutout: 1 1/4" MIN.
- Height of cutout: 2 1/2"
- Width of cutout: 1"
- Distance from bottom of cutout to base: 1 1/2"

Technical drawing of a 1/2 inch thick L-shaped section. The vertical leg has a total height of 8 inches. The horizontal leg has a width of 4 inches minimum and 6 inches maximum. The thickness of the section is 1/2 inch minimum. A fillet weld is specified on the vertical leg, with a weld size of 1/4 inch minimum and 5/16 inch minimum. The weld is applied to a 1 inch wide area on the vertical leg, which is 2 1/2 inches from the top. The weld is a 1/2 inch minimum fillet weld.

A technical drawing of a vertical rectangular plate. The total height is dimensioned as 8". A horizontal dimension at the top indicates a distance of 1/2" MIN. from the right edge to a vertical centerline. A vertical dimension of 2 1/2" is shown from the top edge down to the top of a square feature. This square feature has a width of 1". To the left of the square, there are two horizontal dimension lines: the upper one is labeled 1/4" MIN. and the lower one is labeled 5/16" MIN., both preceded by the word "TYP". Below the square, a horizontal dimension line indicates a distance of 1" MIN. from the bottom edge to the bottom of the square.

1. FOR INLET FRAME NOTES, SEE SHEET 17.

### INLET TOPS, GRATES, AND FRAMES TYPE C FRAME

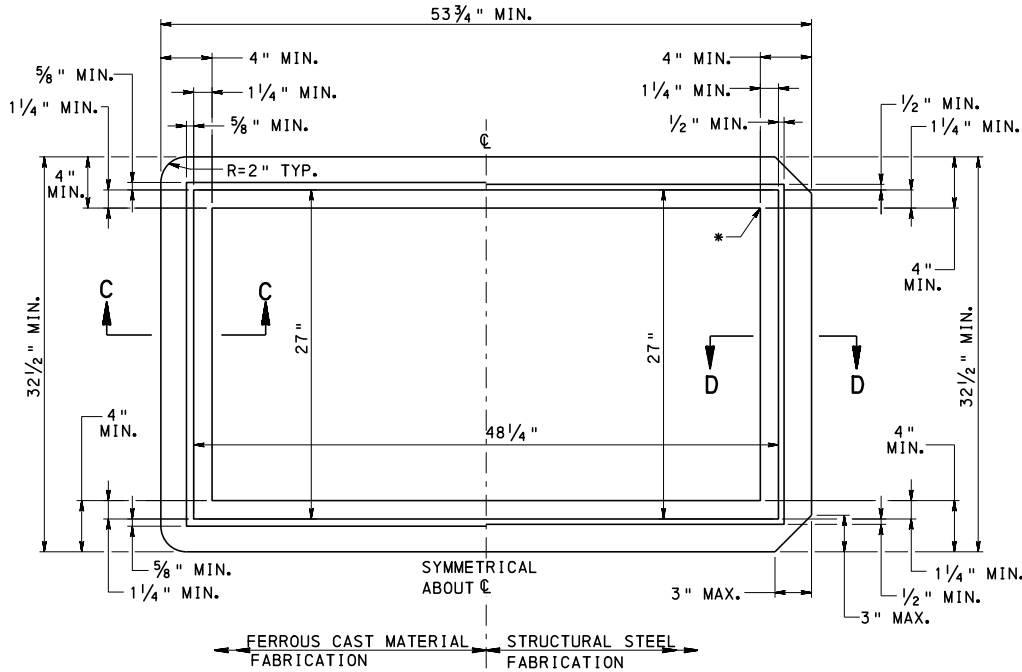
RECOMMENDED FEB. 19, 2021  
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*Bruce B. Thompson*  
 DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-45M

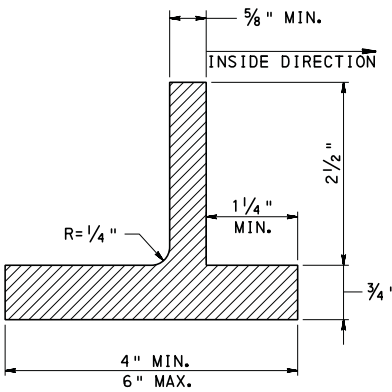
INLET FRAME NOTES:

1. SHEETS 16 AND 17 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 PERFORM WORK IN ACCORDANCE WITH 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 ASPHALT PAINT, AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO ASPHALT PAINT, GALVANIZE FRAMES AS SPECIFIED IN 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.

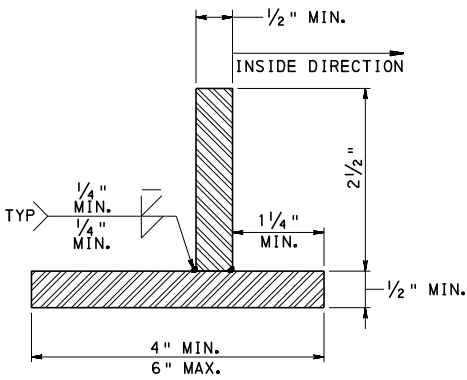


TYPE M FRAME

\*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)

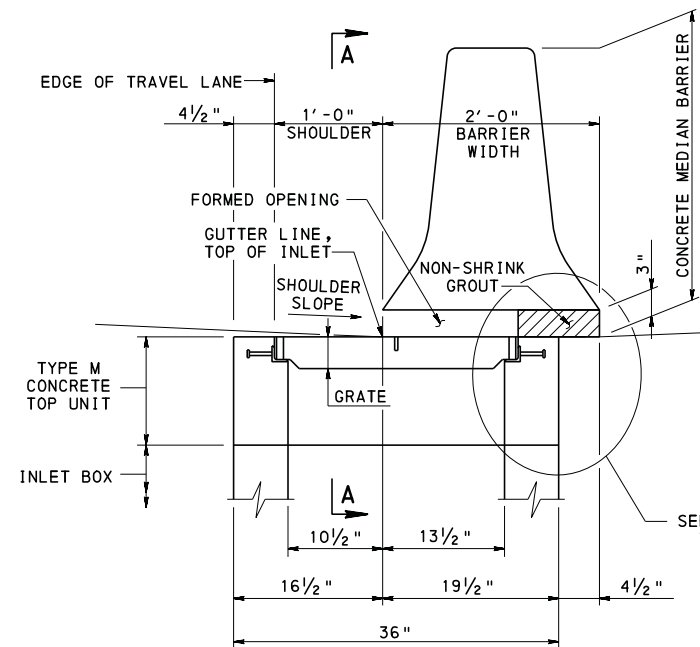
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BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
TYPE M FRAME

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CHIEF, HWY. DELIVERY DIVISION

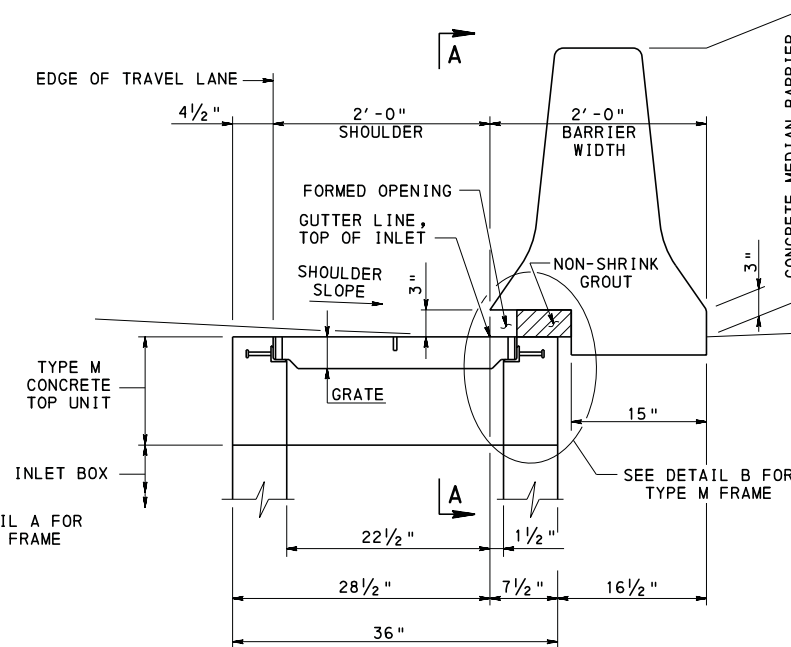
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DIRECTOR, BUREAU OF PROJECT DELIVERY

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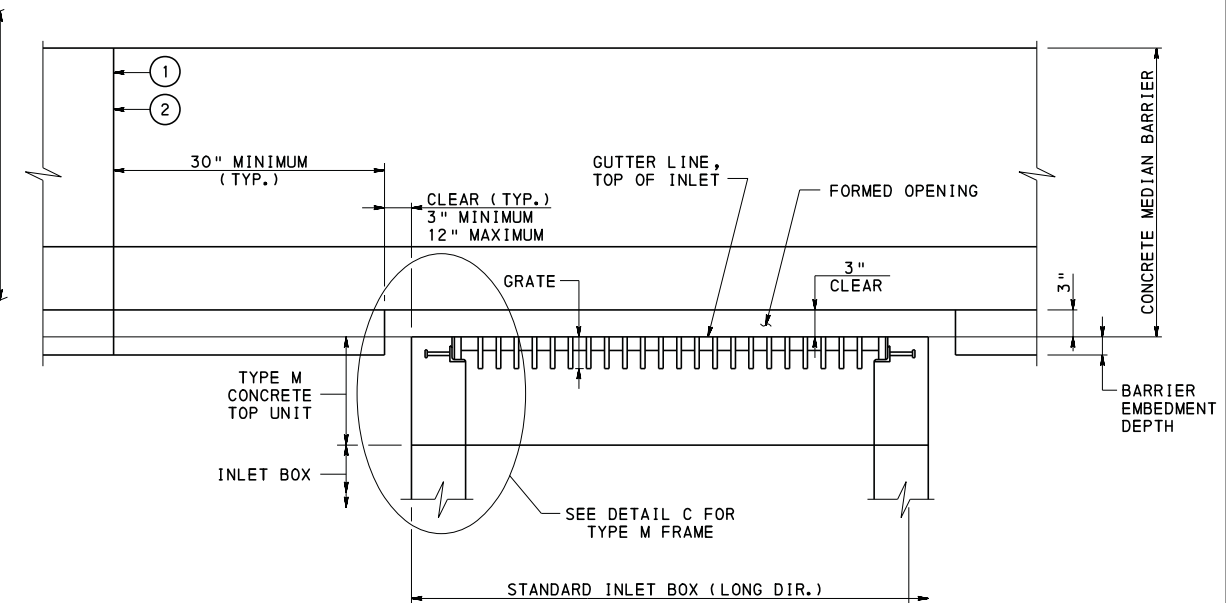
### TYPE M CONCRETE TOP UNIT PLACED ALONG 1'-0" WIDE SHOULDER

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



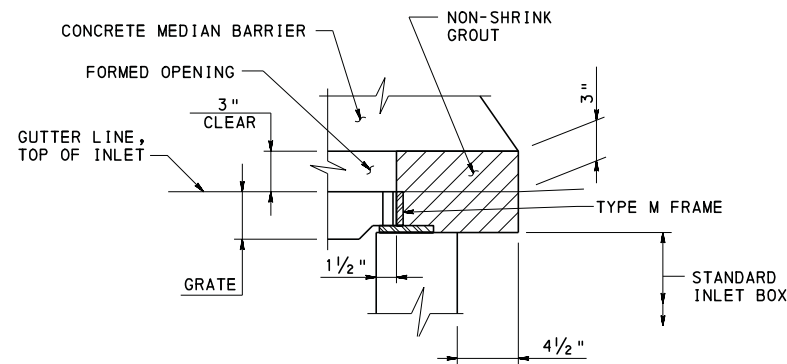
### TYPE M CONCRETE TOP UNIT PLACED ALONG 2'-0" WIDE SHOULDER

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

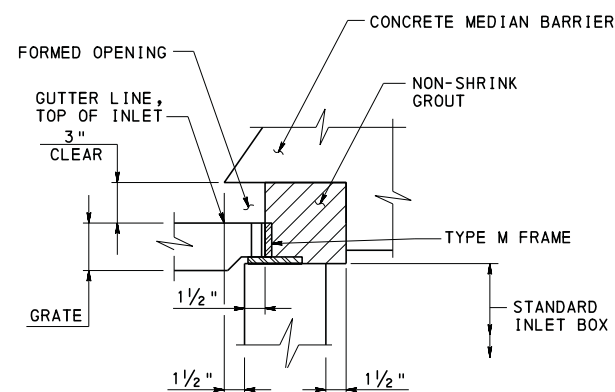


- ① END OF PRECAST CONCRETE MEDIAN BARRIER SEGMENT.
- ② EXPANSION OR CONTRACTION JOINT IN CAST-IN-PLACE CONCRETE MEDIAN BARRIER.

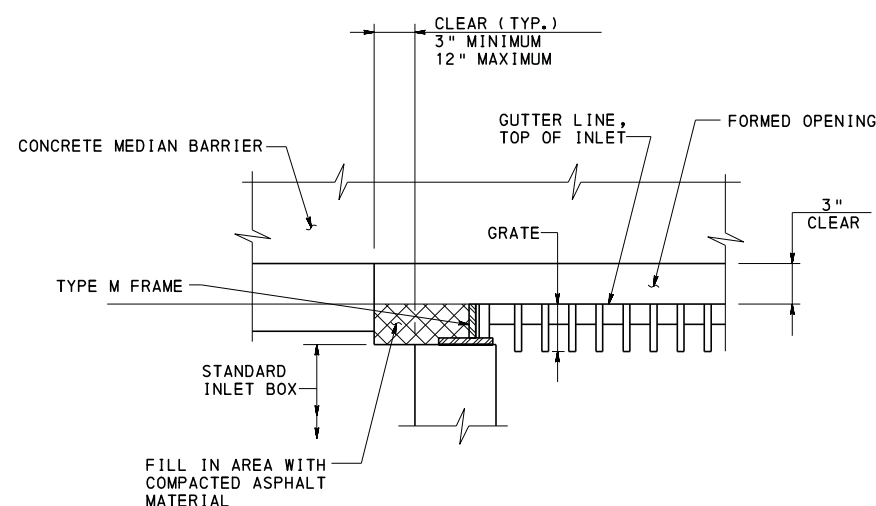
### SECTION A-A



### DETAIL A TYPE M FRAME



### DETAIL B TYPE M FRAME



### DETAIL C TYPE M FRAME

### INLET PLACEMENT NOTES:

1. DETAILS SHOWN ON SHEETS 18 AND 19 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.
5. NO JOINT IN A PRECAST CONCRETE MEDIAN BARRIER IS PERMITTED WITHIN 30" OF THE FORMED OPENING AND ABOVE THE FORMED OPENING.
6. NO EXPANSION OR CONTRACTION JOINT IN A CAST-IN-PLACE CONCRETE MEDIAN BARRIER IS PERMITTED WITHIN 30" OF THE FORMED OPENING AND ABOVE THE FORMED OPENING.

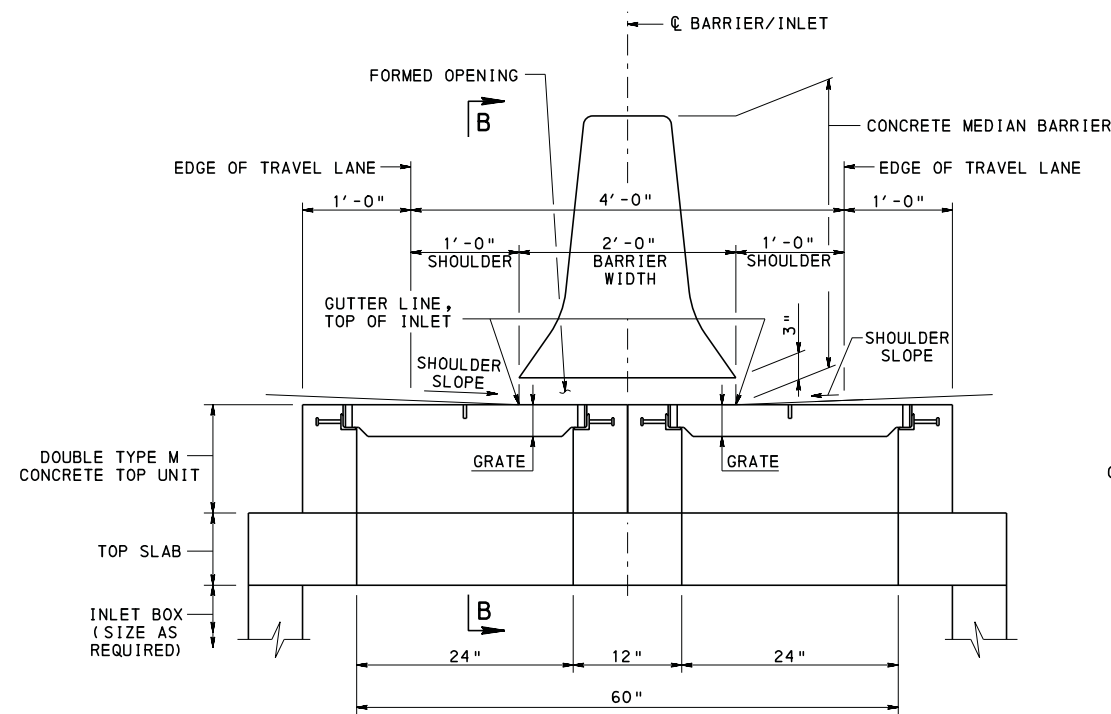
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

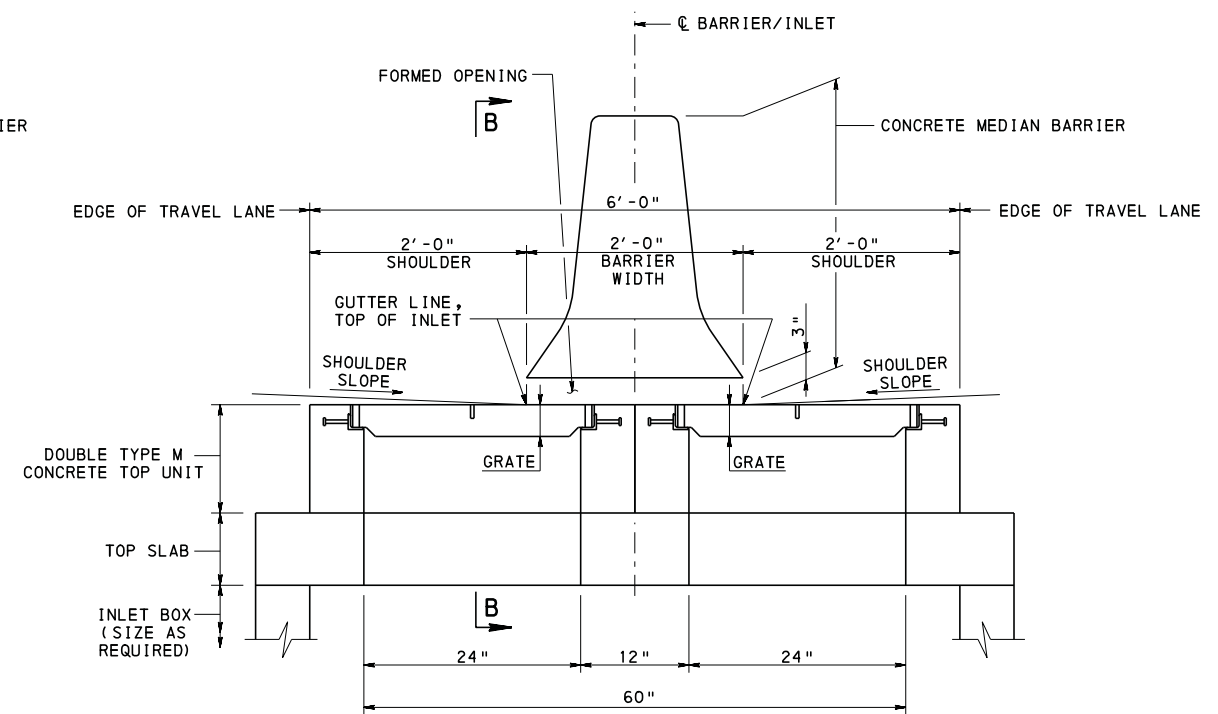
RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

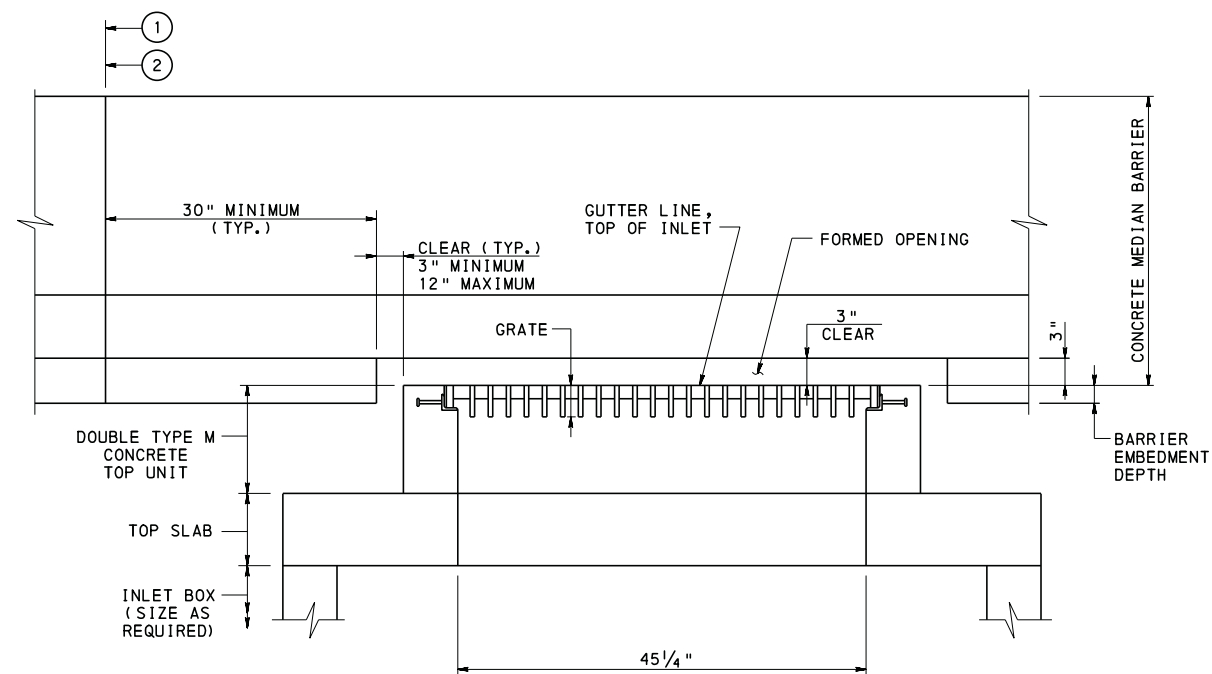
SHT 18 OF 24  
RC-45M



**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**

- ① END OF PRECAST CONCRETE MEDIAN BARRIER SEGMENT.
- ② EXPANSION OR CONTRACTION JOINT IN CAST-IN-PLACE CONCRETE MEDIAN BARRIER.

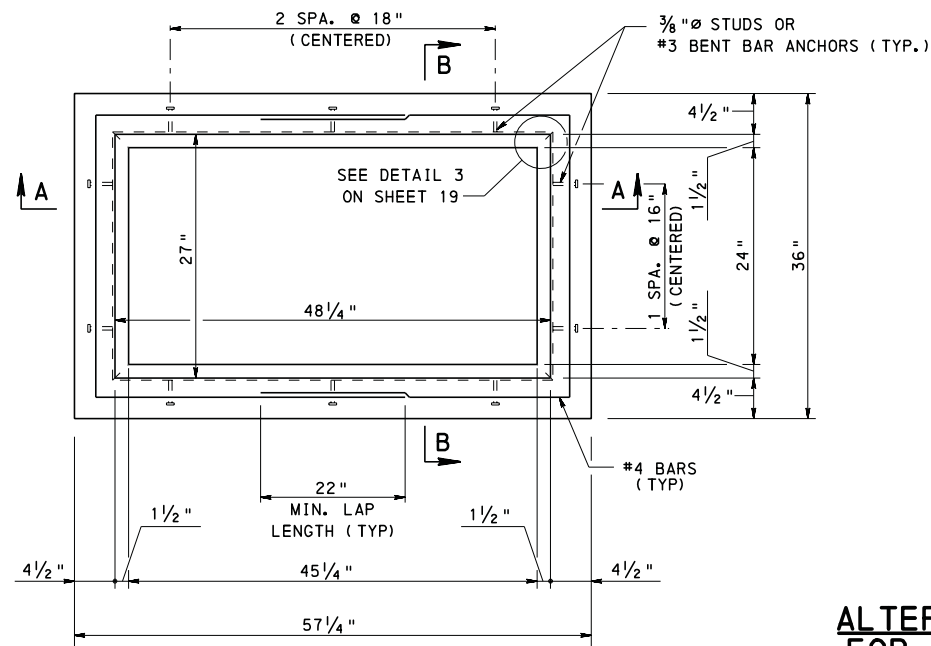
**NOTES**

- 1. FOR INLET PLACEMENT NOTES, SEE SHEET 18.

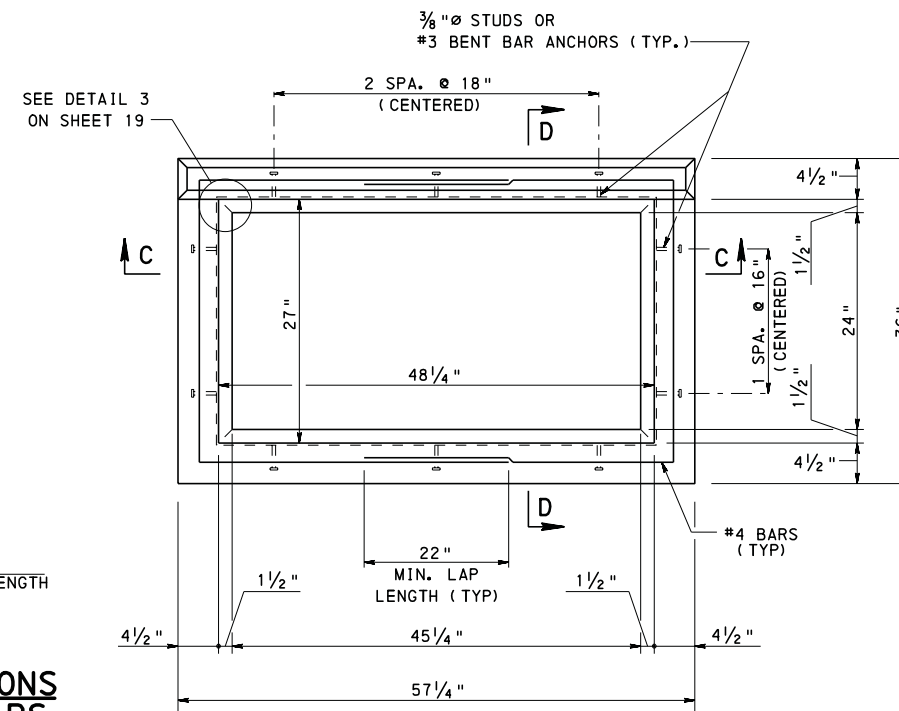
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

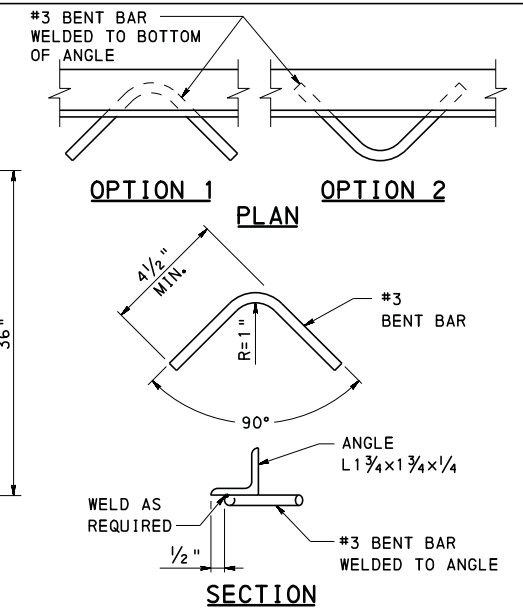




PLAN VIEW - TYPE M

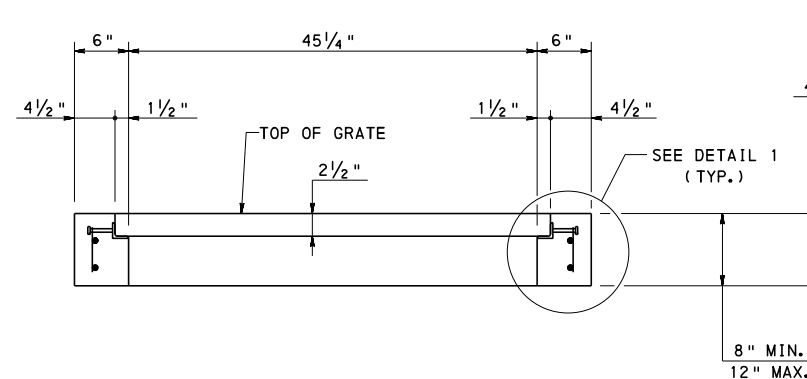


PLAN VIEW - TYPE S

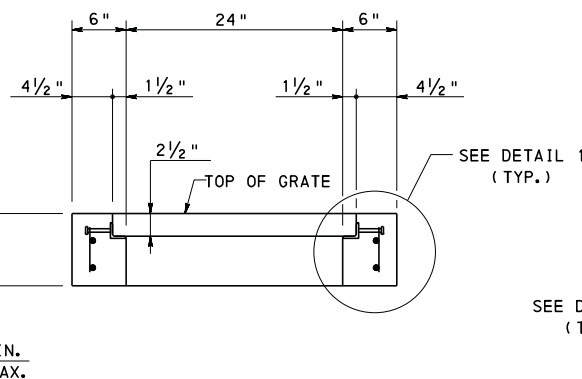


#3 BENT BAR ANCHOR  
DETAIL ATTACHED  
TO ANGLE

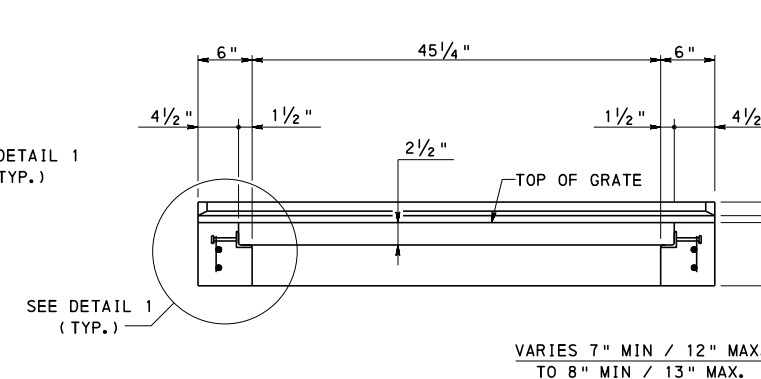
ALTERNATE DETAIL IN PLACE OF  
PROVIDING 3/8" STUDS



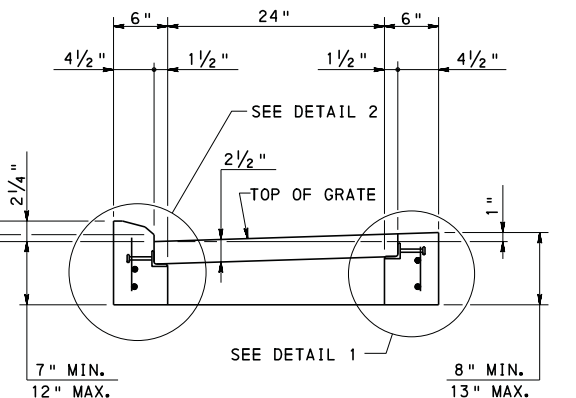
SECTION A-A



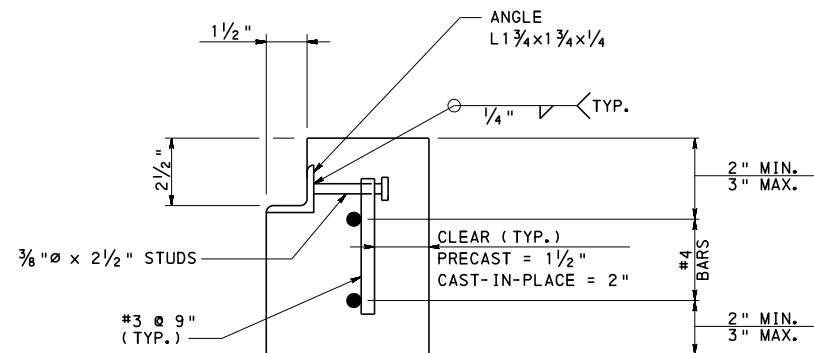
SECTION B-B



SECTION C-C

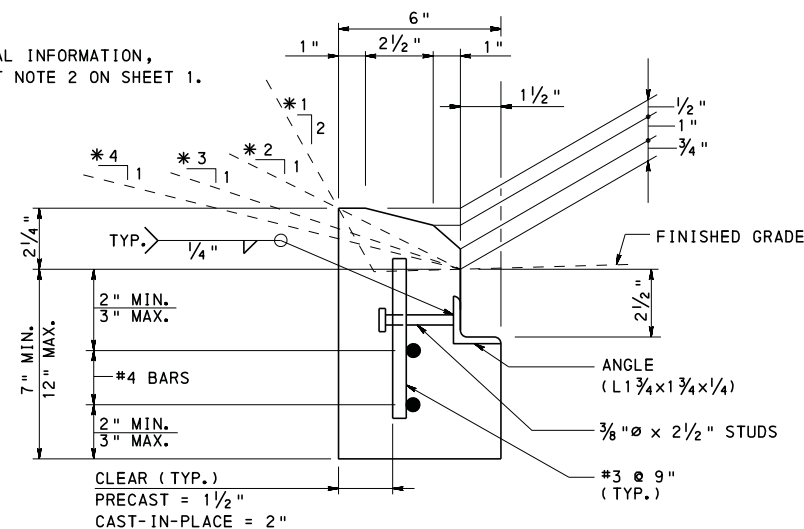


SECTION D-D



DETAIL 1

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



DETAIL 2

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 AND 23.

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

RECOMMENDED FEB. 19, 2021

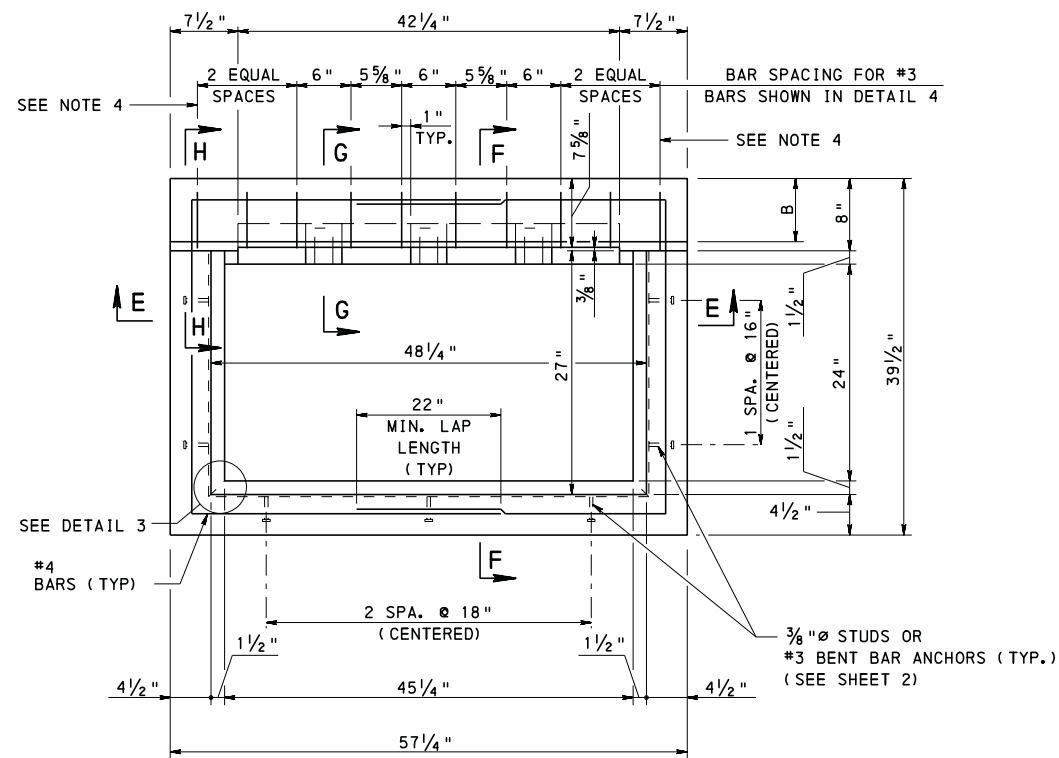
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

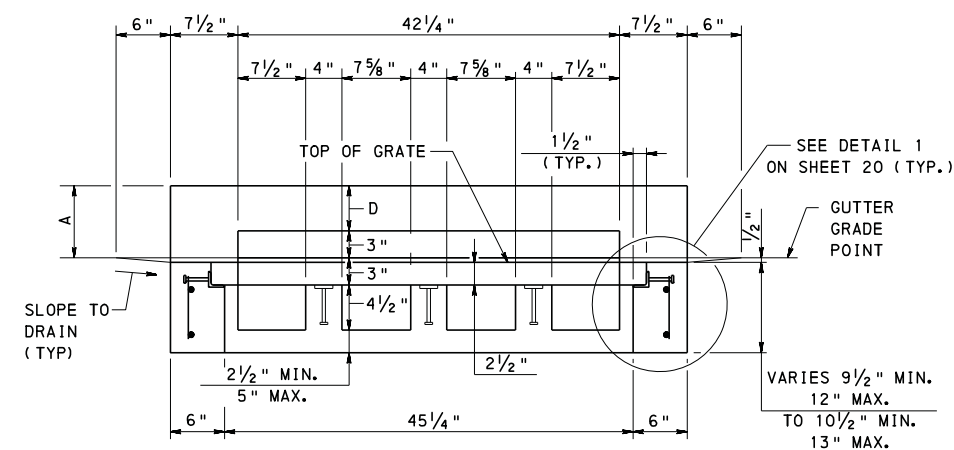
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 20 OF 24

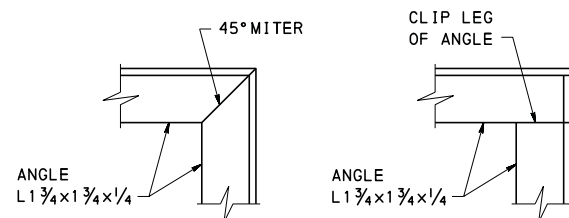
RC-45M



PLAN VIEW - TYPE C



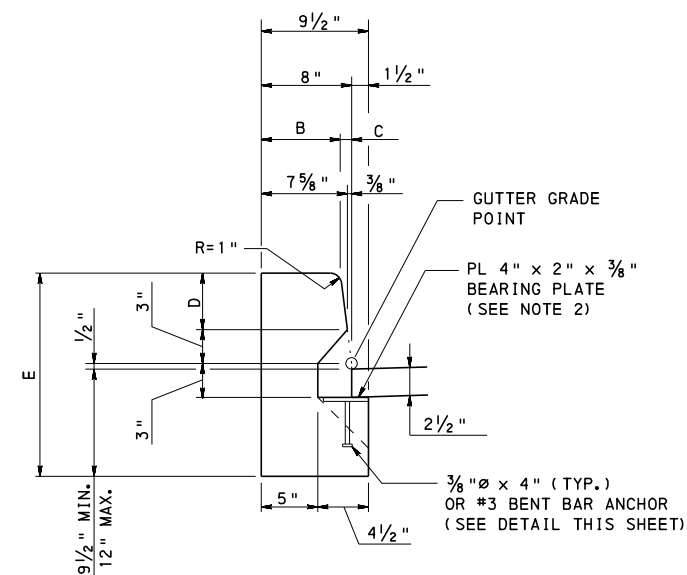
SECTION E-E



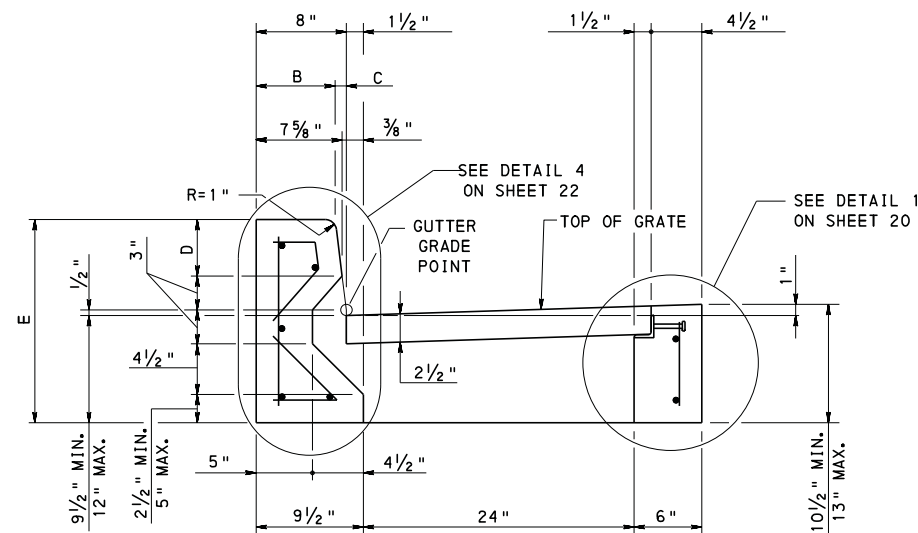
OPTION 1  
(MITERED)

OPTION 2  
(CLIPPED LEG)

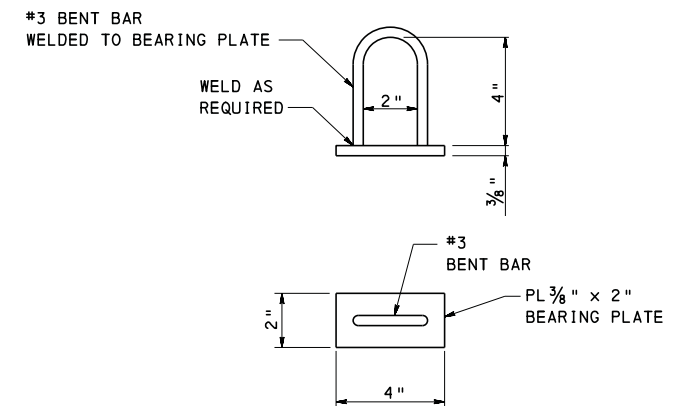
DETAIL 3



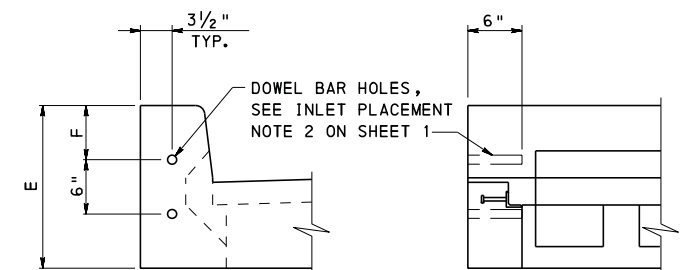
SECTION G-G



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 SHEETS 1 AND 23.
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.

TABLE OF DIMENSIONS					
CURB HEIGHT A	B	C	D	E	F
8"	7"	1"	5"	18" MIN. TO 20 1/2" MAX.	6"
6"	7 1/4"	3/4"	3"	16" MIN. TO 18 1/2" MAX.	4"
4"	7 1/2"	1/2"	1"	14" MIN. TO 16 1/2" MAX.	4"

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C  
FOR REHABILITATION PROJECTS - 1

RECOMMENDED FEB. 19, 2021

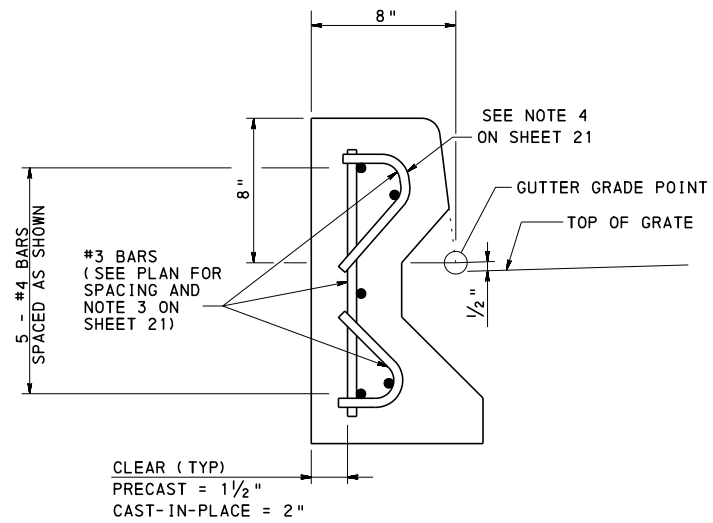
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

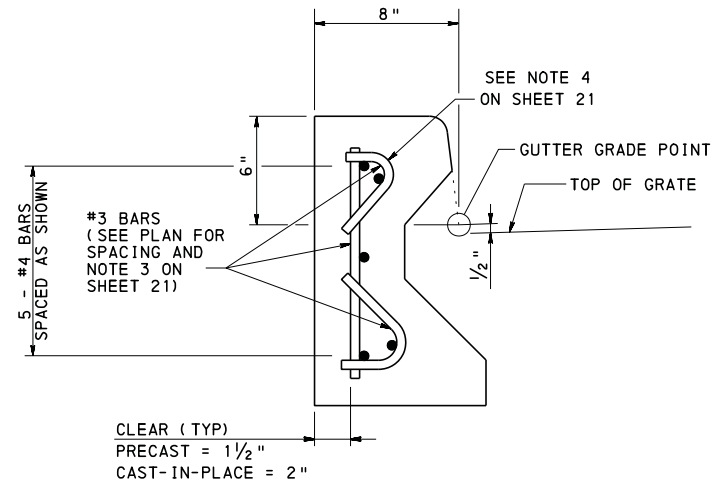
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 21 OF 24

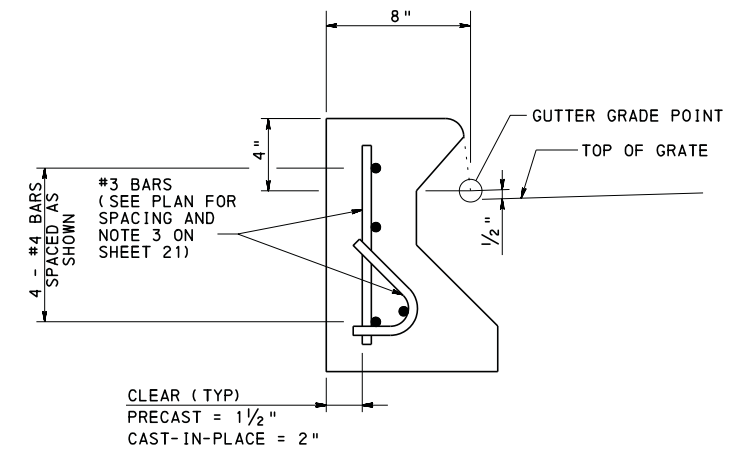
RC-45M



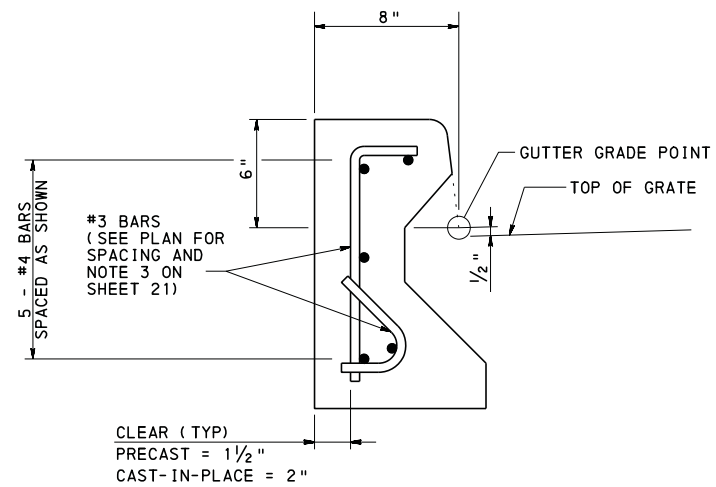
**DETAIL 4**  
8" CURB HEIGHT



**DETAIL 4**  
6" CURB HEIGHT



**DETAIL 4**  
4" CURB HEIGHT

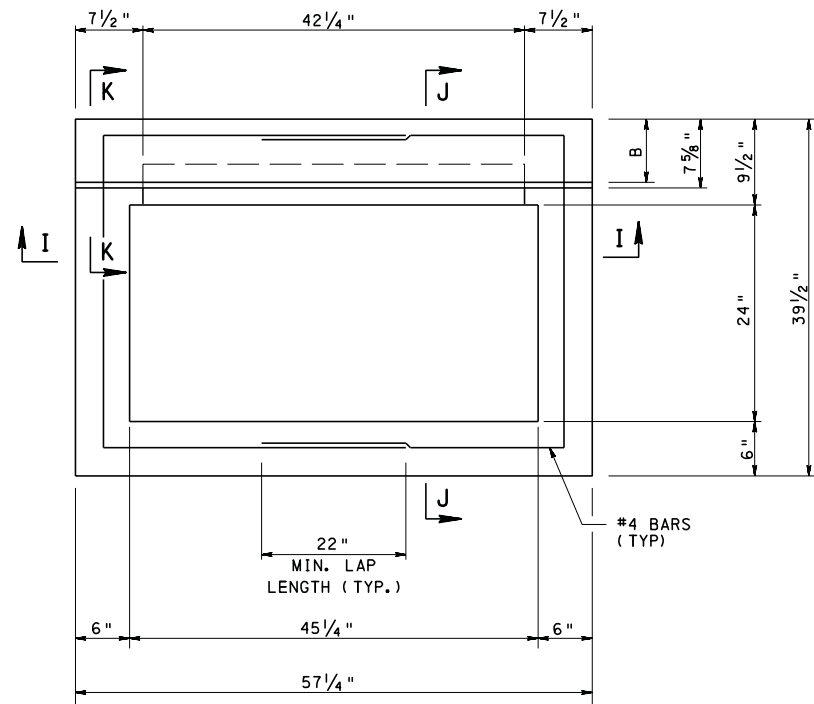


**DETAIL 4 - ALTERNATE DETAIL**  
6" CURB HEIGHT

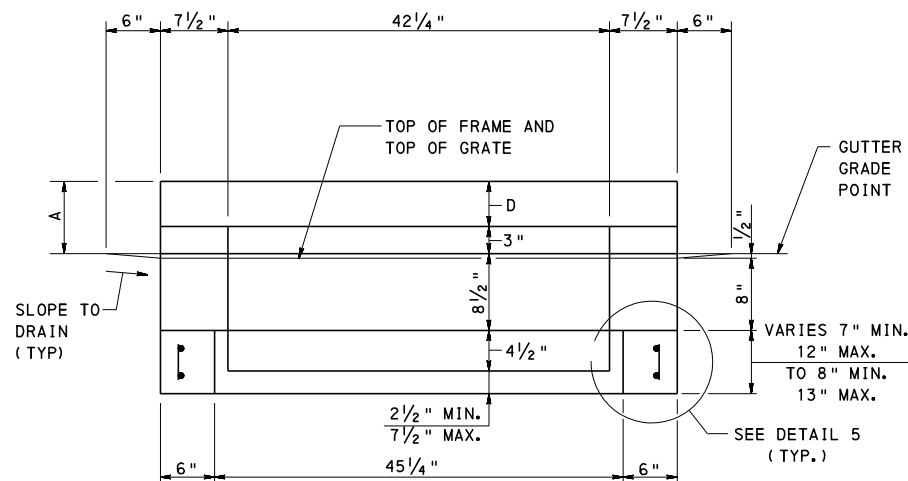
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C  
FOR REHABILITATION PROJECTS - 2

RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 22 OF 24 RC-45M
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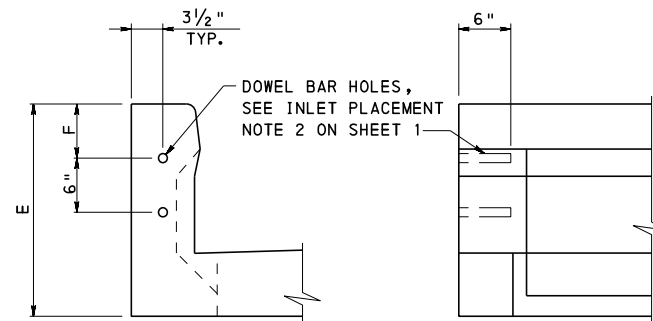


**PLAN VIEW - TYPE C ALTERNATE**

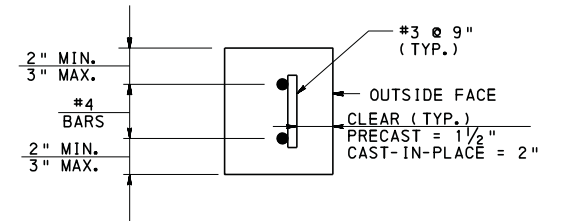


**SECTION I-I**

TABLE OF DIMENSIONS					
CURB HEIGHT A	B	C	D	E	F
8"	7"	1"	5"	23 1/2" MIN. TO 28 1/2" MAX.	6"
6"	7 1/4"	3/4"	3"	21 1/2" MIN. TO 26 1/2" MAX.	4"
4"	7 1/2"	1/2"	1"	19 1/2" MIN. TO 24 1/2" MAX.	4"



**SECTION K-K FRONT ELEVATION**



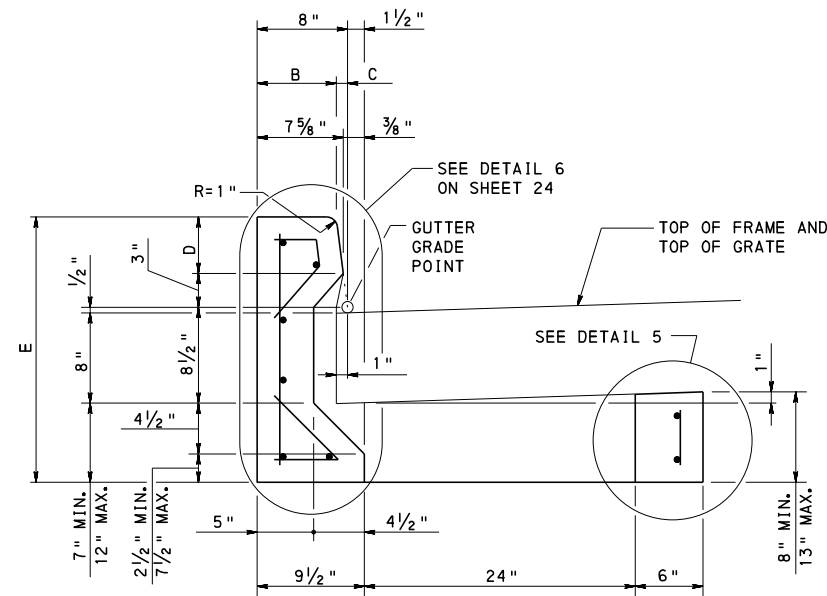
**DETAIL 5**

**CONCRETE TOP UNIT NOTES  
FOR REHABILITATION PROJECTS:**

1. SHEETS 20 THRU 24 DEPICTS DETAILS FOR REHABILITATION PROJECTS ONLY. IF FEASIBLE, UTILIZE CONCRETE TOP UNITS DETAILED ON SHEETS 2 THRU 6.
2. USE OF BRICK OR BRICK AND MORTAR FOR REPAIRS OR GRADE ADJUSTMENTS IS NOT PERMITTED. USE GRADE ADJUSTMENT DEVICES AS DETAILED IN THIS STANDARD.
3. IF FINAL GRADE ELEVATIONS CANNOT BE MADE WITH GRADE ADJUSTMENT DEVICES, THE TOP OF THE INLET BOX MUST BE REBUILT OR THE INLET BOX REPLACED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

**NOTES**

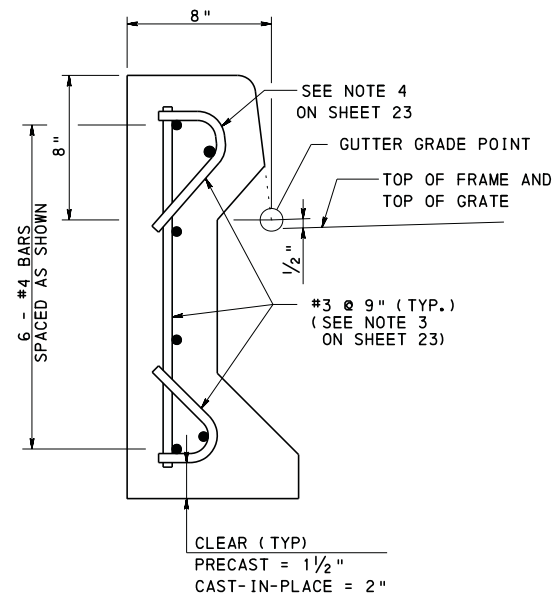
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR TYPE C FRAME, SEE SHEET 16.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.



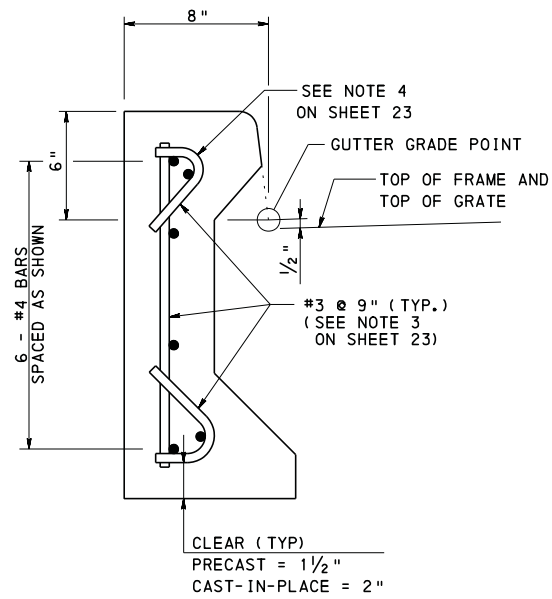
**SECTION J-J**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

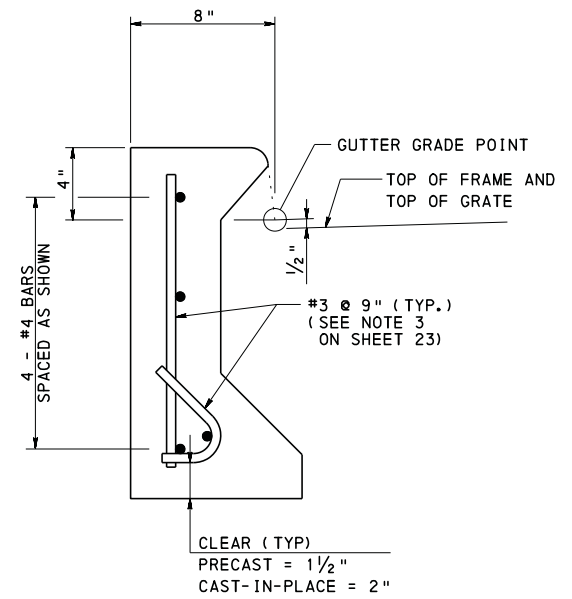
INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C ALTERNATE  
FOR REHABILITATION PROJECTS - 1



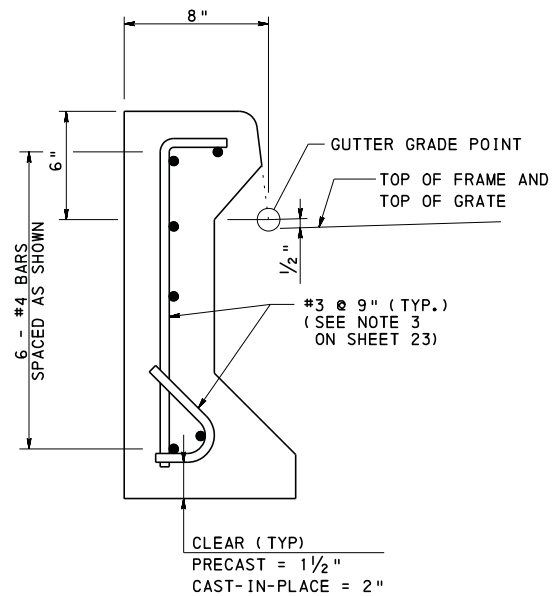
**DETAIL 6**  
8" CURB HEIGHT



**DETAIL 6**  
6" CURB HEIGHT



**DETAIL 6**  
4" CURB HEIGHT



**DETAIL 6 - ALTERNATE DETAIL**  
6" CURB HEIGHT

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET TOPS, GRATES, AND FRAMES  
CONCRETE TOP UNITS  
TYPE C ALTERNATE  
FOR REHABILITATION PROJECTS - 2

RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 24 OF 24 RC-45M
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GENERAL NOTES:

1. 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.
2. 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.
3. SHOP DRAWINGS FOR INLET BOXES, TOP SLABS, AND TRANSITION SLABS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.
4. 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.
5. 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.
6. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
7. THE SIZE OF THE INLET TOP UNITS, PER RC-45M, ARE BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX.
8. 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"
9. 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.
10. 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.
- 11.SHOW ORIENTATION OF INLET BOXES ON THE CONTRACT DRAWINGS.
- 12.THE TOP SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT BOX SECTION.
- 13.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.
- 14.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.
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.
- 16.FOR INLET TOPS, GRATES, GRADE ADJUSTMENT RINGS AND FRAMES, REFER TO RC-45M.

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 ASTM 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 = 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<sup>2</sup>/ft EACH WAY
    - BOTTOM SLAB:
      - TOP MAT = 0.20 in<sup>2</sup>/ft EACH WAY
      - BOTTOM MAT = 0.20 in<sup>2</sup>/ft EACH WAY
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.
  - 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<sup>2</sup>/ft EACH WAY
    - BOTTOM SLAB:
      - TOP MAT = 0.20 in<sup>2</sup>/ft EACH WAY
      - BOTTOM MAT = 0.20 in<sup>2</sup>/ft EACH WAY
5. NON-SHRINK GROUT:
  - PROVIDE NON-SHRINK GROUT AS SPECIFIED IN PUBLICATION 408, SECTION 1001.2(d).
6. EPOXY BONDING COMPOUND:
  - PROVIDE EPOXY BONDING COMPOUND AS SPECIFIED IN PUBLICATION 408, SECTION 706.1.
7. MORTAR:
  - PROVIDE MORTAR AS SPECIFIED IN PUBLICATION 408, SECTION 705.6(b).
8. CAULKING COMPOUND:
  - PROVIDE CAULKING COMPOUND AS SPECIFIED IN PUBLICATION 408, SECTION 705.7(d).
9. GASKETS:
  - PROVIDE GASKETS AS SPECIFIED IN PUBLICATION 408, SECTION 705.5(b).
- 10.MANHOLE STEPS:
  - PROVIDE MANHOLE STEPS AS SPECIFIED IN PUBLICATION 408, SECTION 605.2(c).
- 11.SUBBASE MATERIAL AND PREPARATION:
  - PROVIDE NO. 2A COARSE AGGREGATE AS SPECIFIED IN PUBLICATION 408, SECTION 703.2 AND COMPACT AS SPECIFIED IN PUBLICATION 408, SECTION 350.3(e).
  - PLACE AND COMPACT IN 4" MAXIMUM LAYERS.
  - PROVIDE A 1'-0" MINIMUM DEPTH.

FIELD CONSTRUCTION NOTES:

1. CONSTRUCT OR PLACE INLET BOXES LEVEL, UNLESS OTHERWISE INDICATED OR DIRECTED.
2. 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.
3. LOCATE PIPE OR PIPES AS INDICATED OR DIRECTED.
4. CONNECT PIPES TO INLET BOXES WITH MORTAR OR WATERTIGHT RUBBER FLEXIBLE CONNECTORS.
5. 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".
6. BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE WITH ACCEPTABLE EMBANKMENT MATERIAL.
7. 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.

INDEX OF SHEETS	
SHEET NO.	SHEET TITLE
1	GENERAL NOTES - 1
2	GENERAL NOTES - 2
3	GENERAL NOTES - 3
4	INLET ASSEMBLIES - 1
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34	MISCELLANEOUS DETAILS

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
GENERAL NOTES - 1

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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 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 1½" 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 AS SPECIFIED IN 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: 2½"
    - 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 AS SPECIFIED IN 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: 1½"
  - FOOTINGS [BOTTOM SLAB]:
    - TOP COVER: 2"
    - BOTTOM COVER: 1½"
    - SIDE COVER: 1½"
  - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 1½"
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 ¼"/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"

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
INLET BOXES GENERAL NOTES - 2		
RECOMMENDED FEB. 19, 2021 <i>Chris L. Sp...</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Bruce Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT _2 OF 34  RC-46M

DESIGN TABLE GENERAL NOTES:

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

CUSTOMIZED RECTANGULAR BOX NOTES:

- 1. 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.
- 2. 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".
- 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:

- 1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 9'-0" MAXIMUM HEIGHT.
- 2. AVOID USING RISER SECTIONS WHEN THE HEIGHT OF THE INLET BOX IS LESS THAN 9'-0".
- 3. WHEN RISER SECTIONS ARE REQUIRED, ALWAYS MAXIMIZE THE HEIGHT OF THE BASE SECTION.
- 4. THE WALL THICKNESS FOR THE RISER SECTION MUST ALWAYS MATCH THE WALL THICKNESS REQUIRED FOR THE BASE SECTION, UNLESS A TRANSITION SLAB IS USED.
- 5. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE CONCRETE INLET BOXES.
- 6. 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.
- 7. 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:

- 1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 8'-0" MAXIMUM HEIGHT.
- 2. 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.
- 3. 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.
- 4. 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.
- 5. 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.
- 6. 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.
- 7. 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.
- 8. 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'-10"	1'-7"
#4	2'-5"	2'-1"
#5	3'-0"	2'-7"
#6	3'-7"	3'-1"
#7	4'-2"	4'-1"
#8	4'-9"	5'-1"
#9	5'-10"	6'-4"
#10	7'-3"	7'-8"
#11	8'-8"	9'-2"

NOTES:

- 1. SPLICE LENGTHS BASED ON UNCOATED DEFORMED BARS.
- 2. SPLICE LENGTHS BASED ON HORIZONTAL BARS WITH A CLASS B SPLICE.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
GENERAL NOTES - 3

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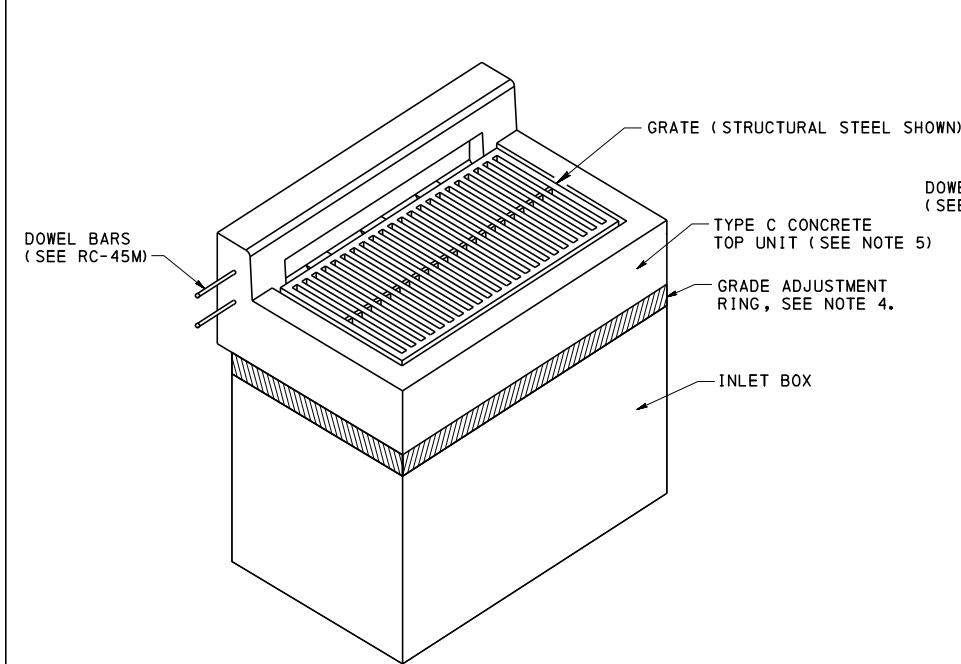
*Chris L. Spill*  
CHIEF, HWY. DELIVERY DIVISION

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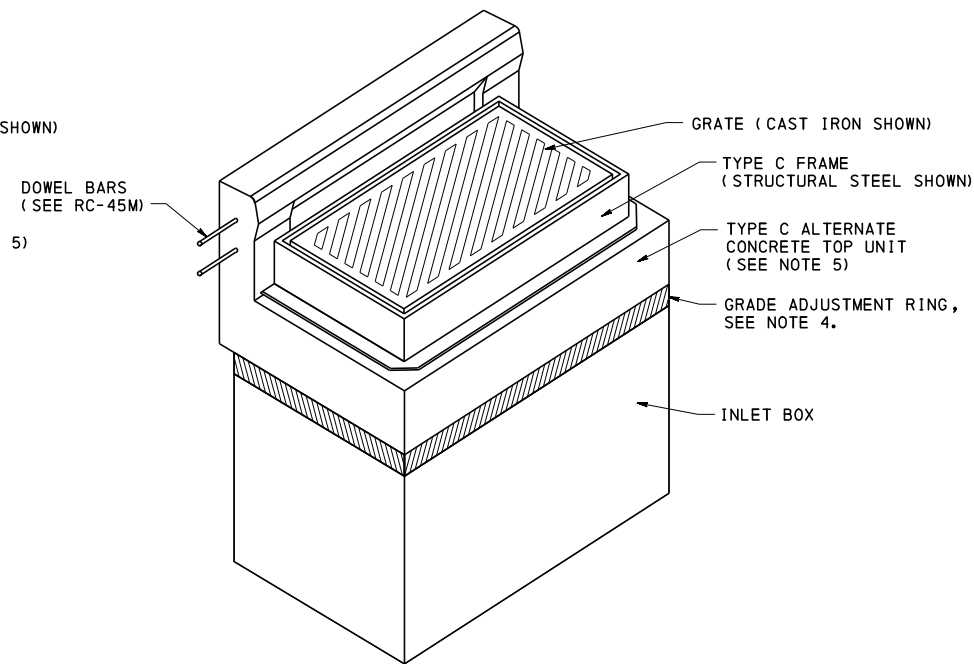
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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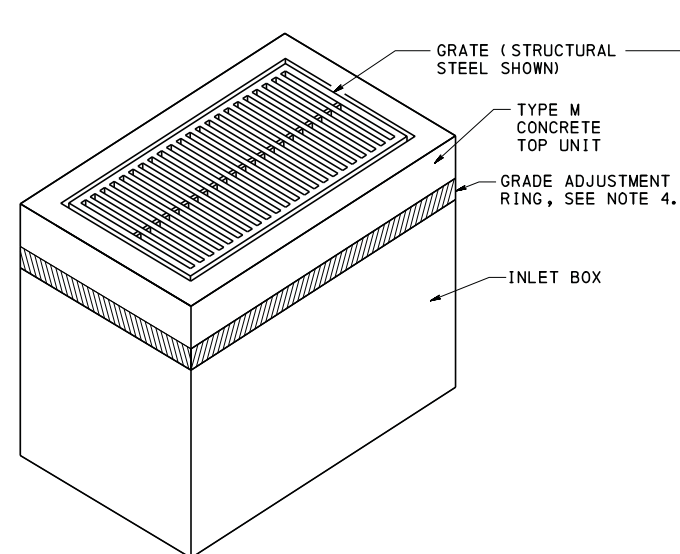
RC-46M



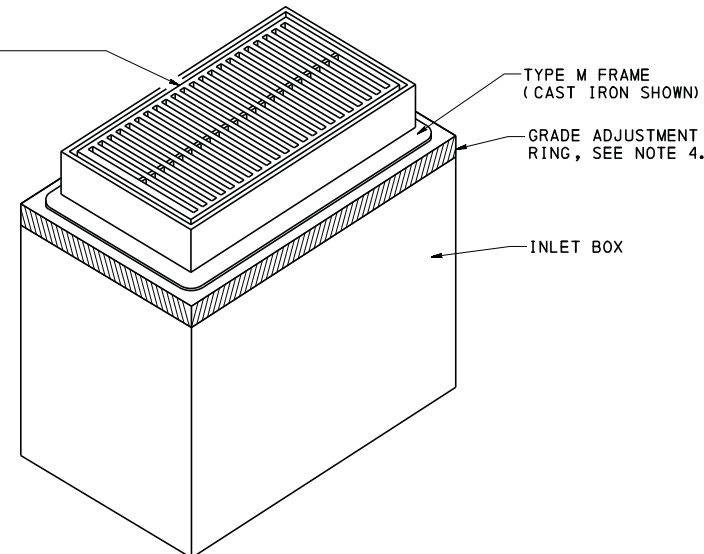
**CONCRETE TOP UNIT - TYPE C**



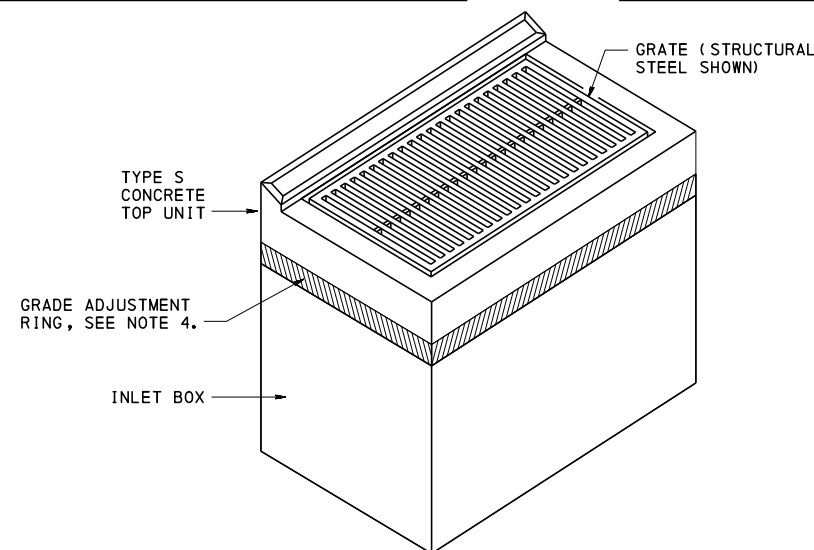
**CONCRETE TOP UNIT - TYPE C ALTERNATE  
WITH TYPE C FRAME**



**CONCRETE TOP UNIT - TYPE M**



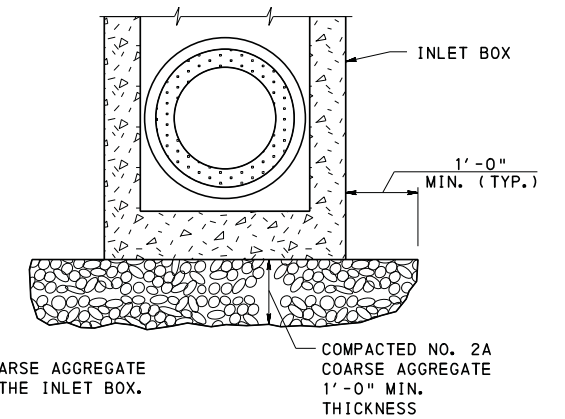
**INLET BOX WITH TYPE M FRAME**



**CONCRETE TOP UNIT - TYPE S**

**NOTES:**

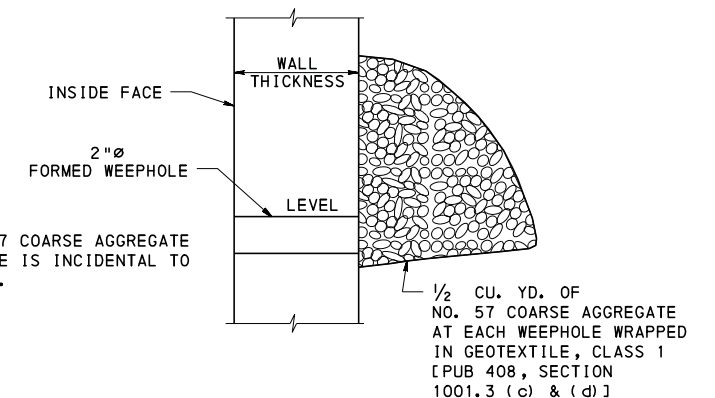
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. STANDARD INLET BOXES SHOWN, PROVIDE TOP SLABS FOR OTHER INLET BOX TYPES.
3. SEE RC-45M FOR DETAILS FOR THE CONCRETE TOP UNITS, FRAMES, AND GRATES.
4. PROVIDE GRADE ADJUSTMENT RINGS WHEN REQUIRED. SEE RC-45M FOR DETAILS.
5. REFER TO CONTRACT DRAWINGS FOR CURB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



**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

RECOMMENDED FEB. 19, 2021

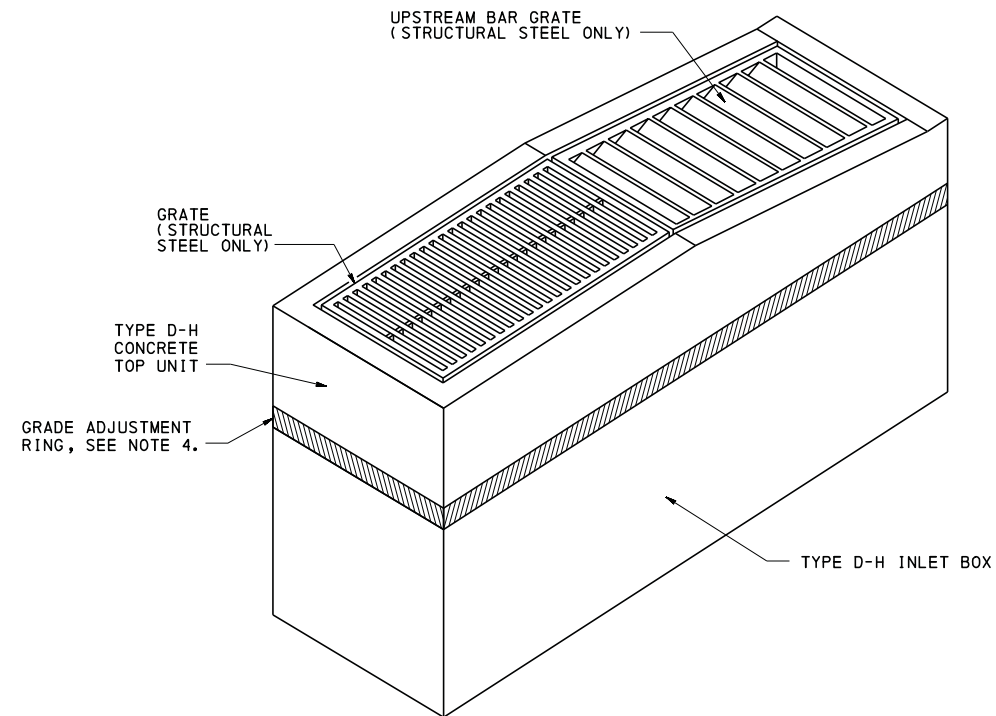
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

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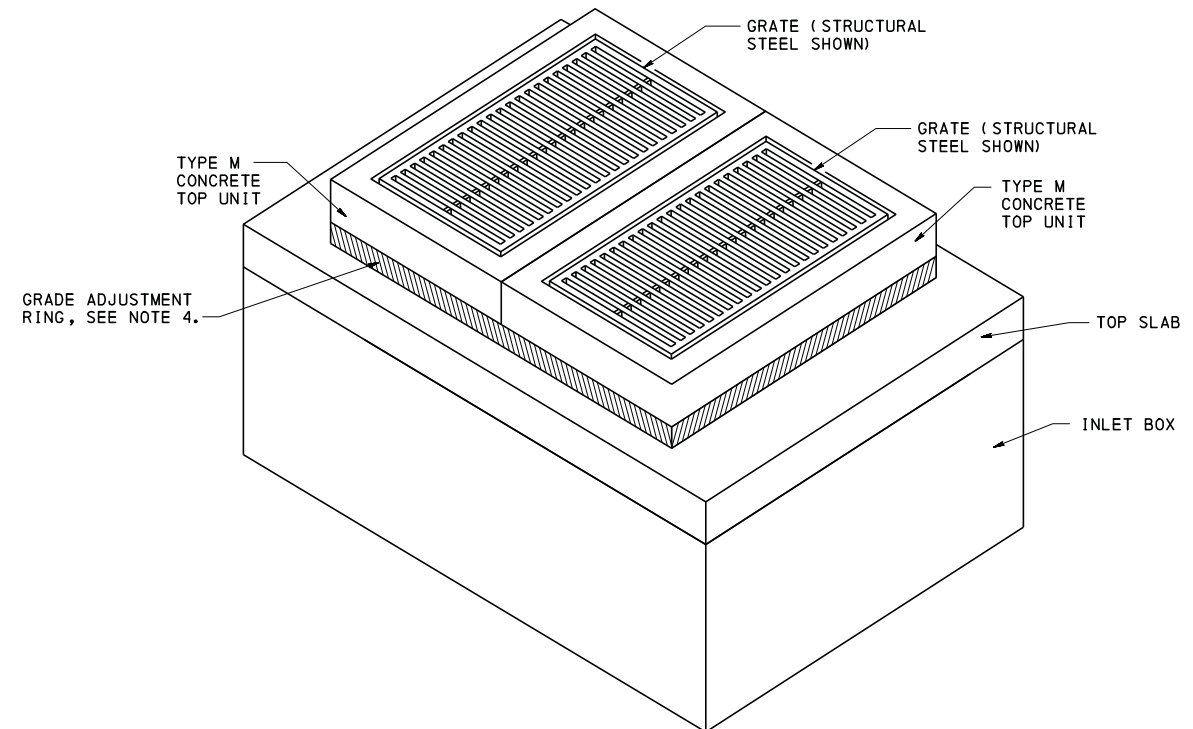
*Brian D. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 4 OF 34

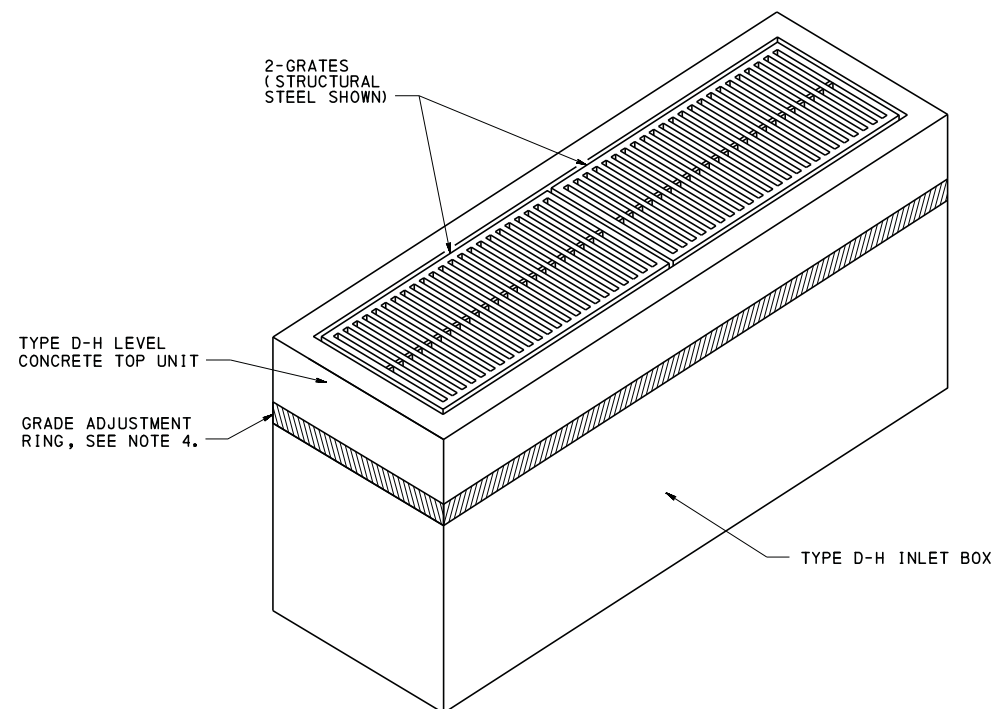
RC-46M



CONCRETE TOP UNIT - TYPE D-H



CONCRETE TOP UNIT - DOUBLE TYPE M



CONCRETE TOP UNIT - TYPE D-H LEVEL

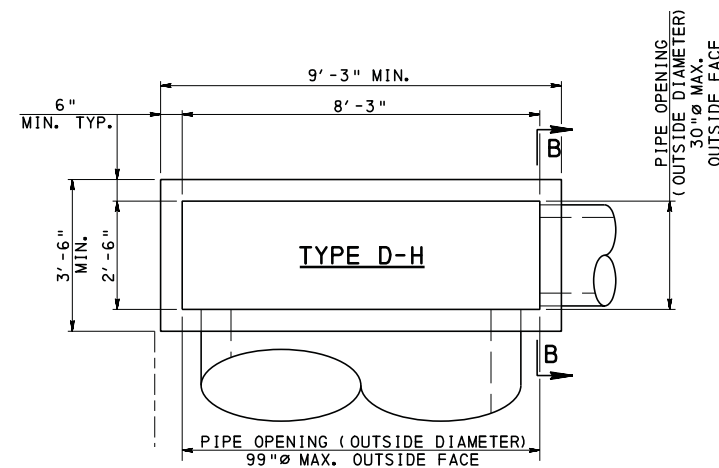
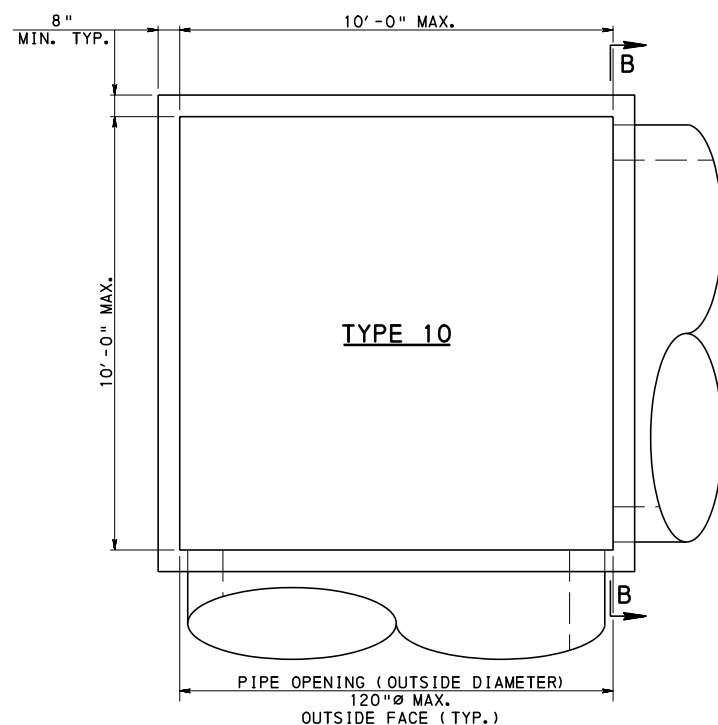
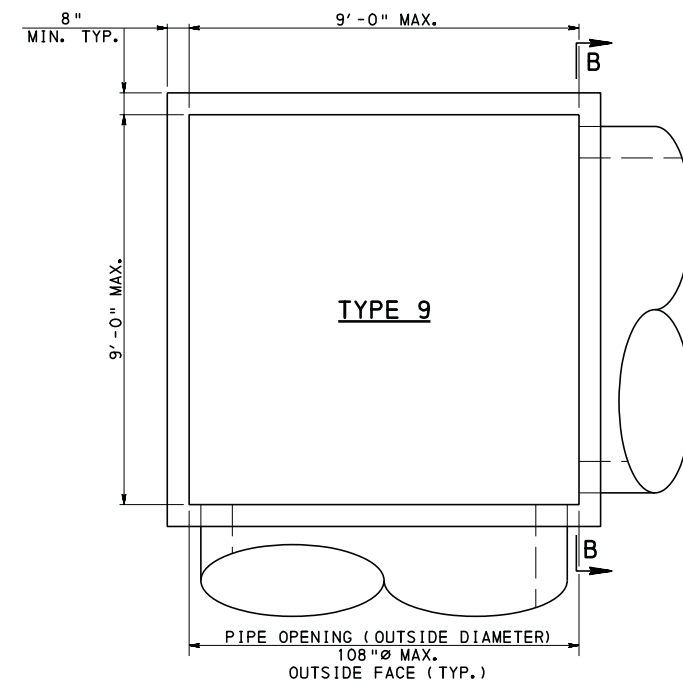
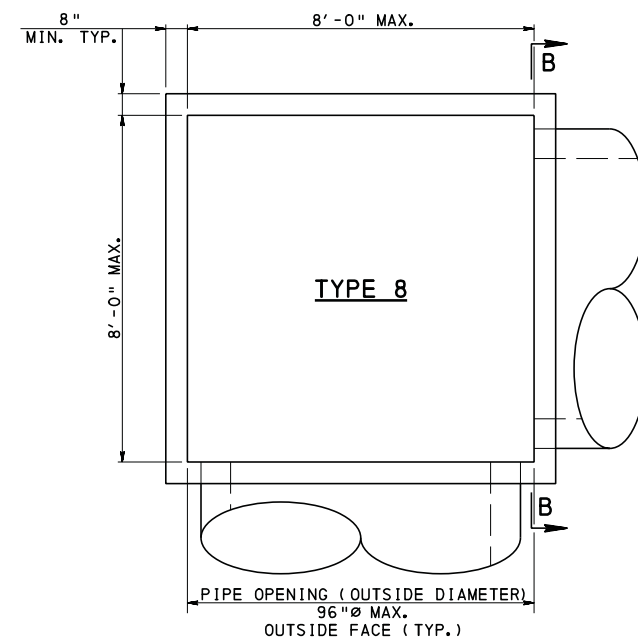
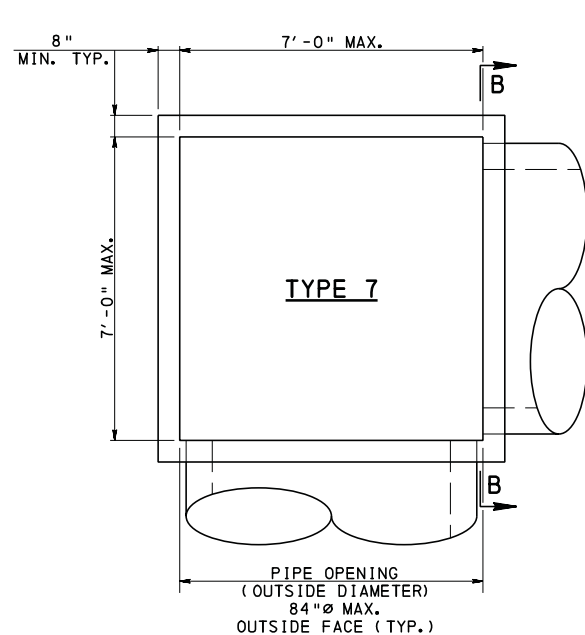
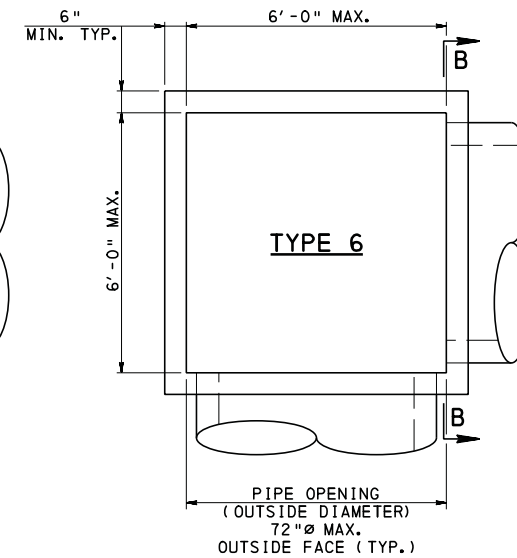
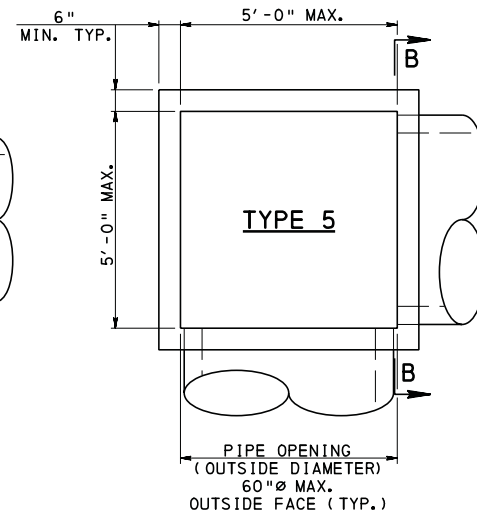
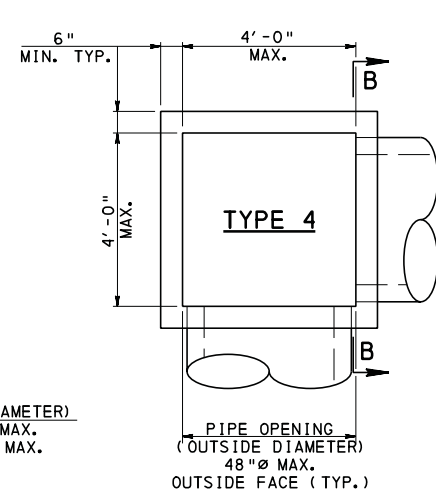
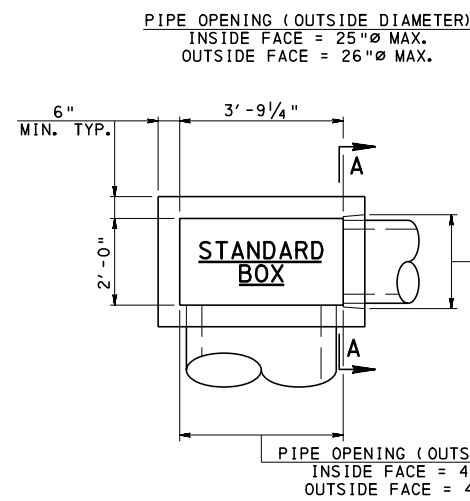
**NOTES:**

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.

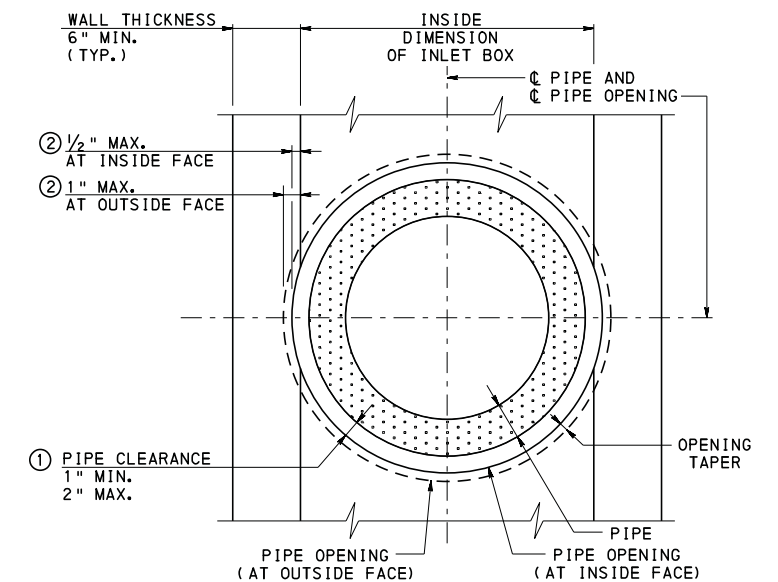
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
INLET ASSEMBLIES - 2

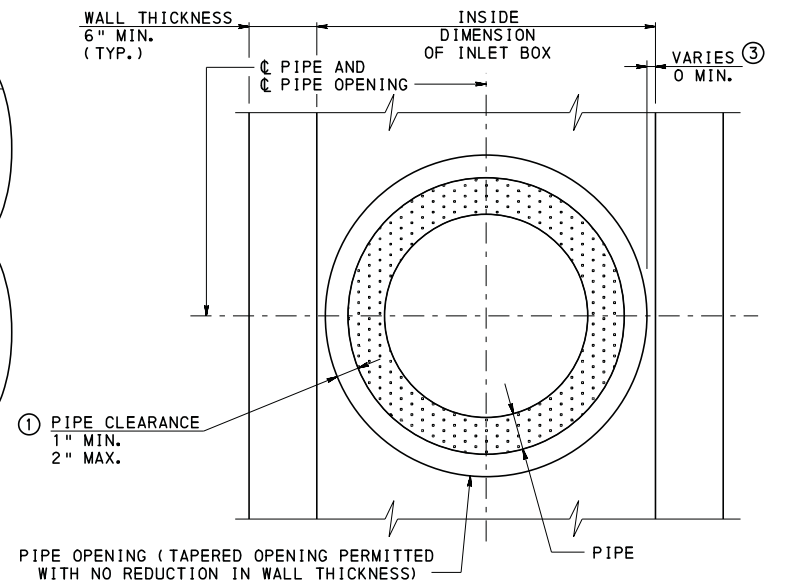




**PLAN - INLET BOXES**



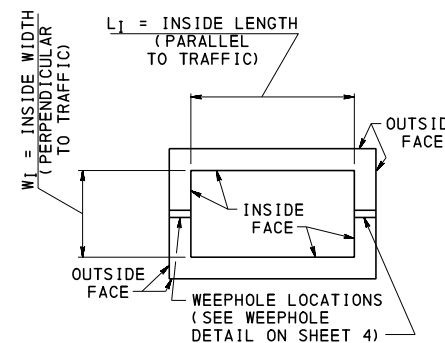
**SECTION A-A**  
(STANDARD INLET BOX ONLY)



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

**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

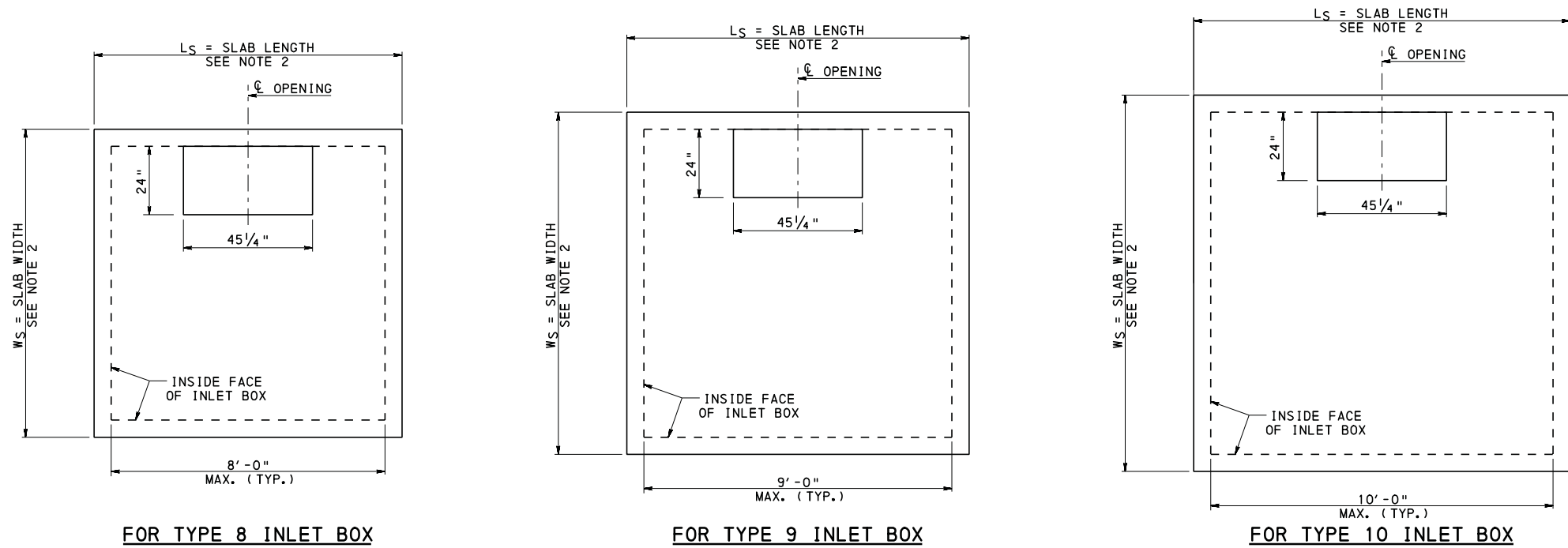
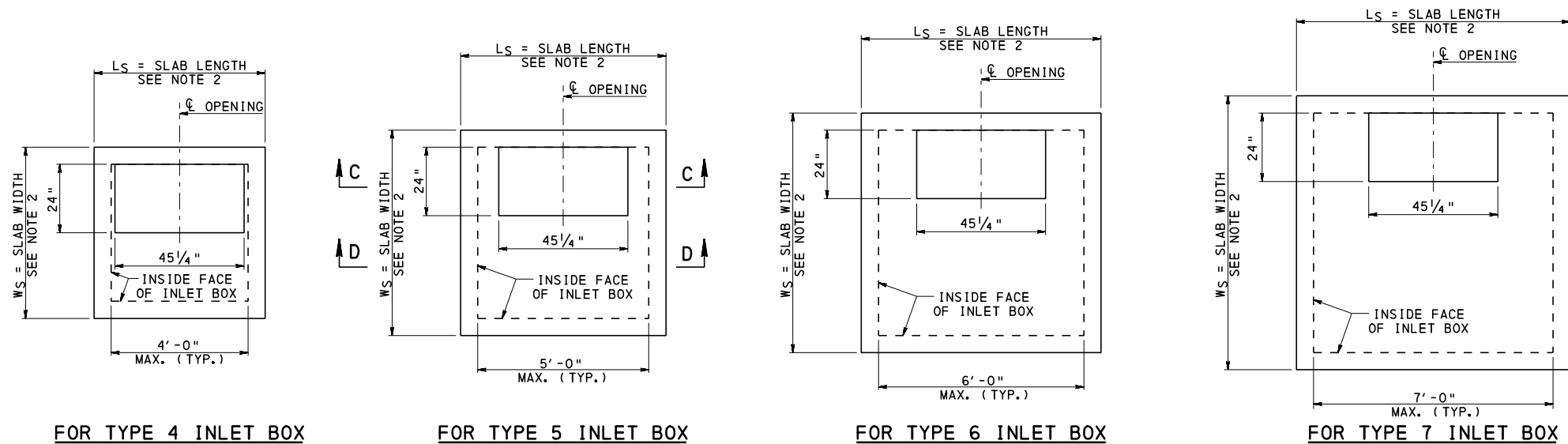
**LEGEND**

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

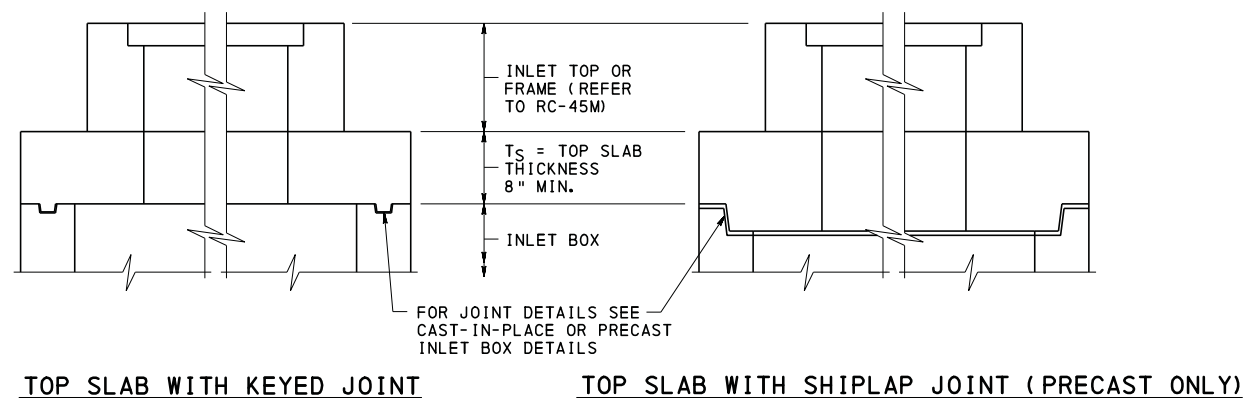
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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**INLET BOXES**  
**INLET BOX TYPES**

RECOMMENDED FEB. 19, 2021 <i>Chris L. Sp...</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian D. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 6 OF 34 RC-46M
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**PLAN - TOP SLABS**  
(WITH STANDARD OPENING)



**SECTION C-C**  
(TYPICAL)

NOTE: GRADE ADJUSTMENT RINGS NOT SHOWN

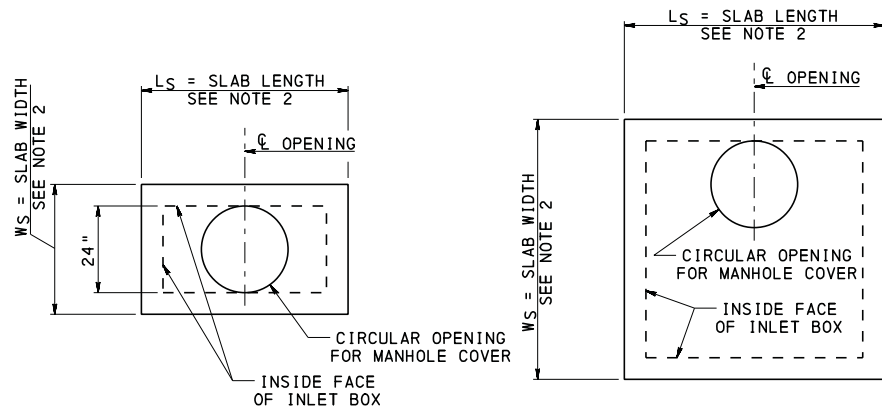
**NOTES:**

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.

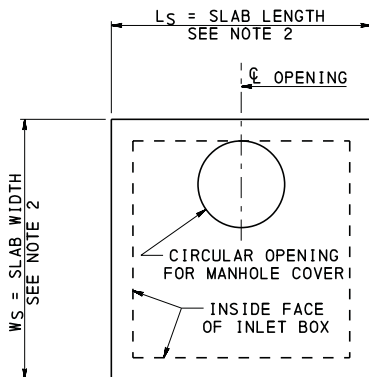
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TOP SLABS - 1

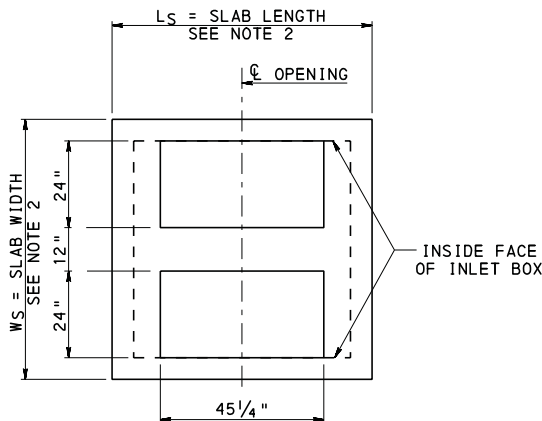




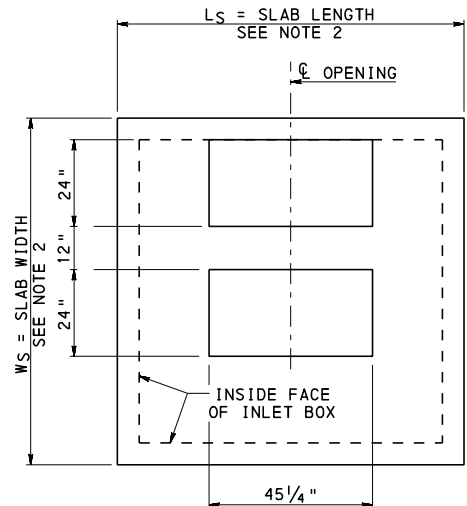
**STANDARD INLET BOX**



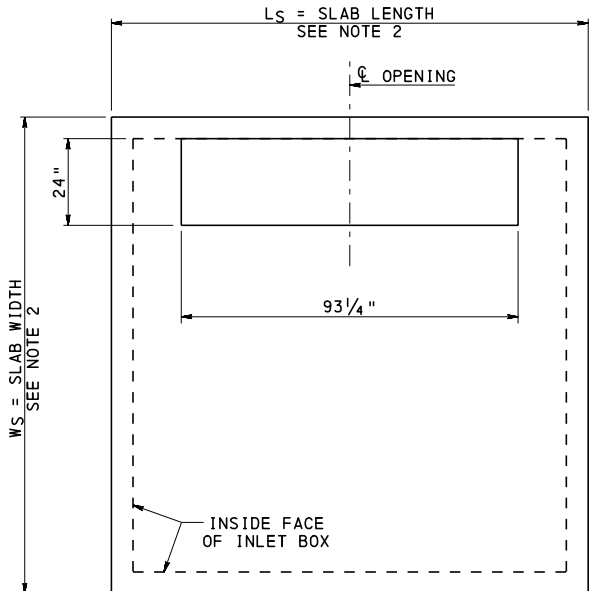
**OTHER INLET BOXES**



**TYPE 5 INLET BOX**



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

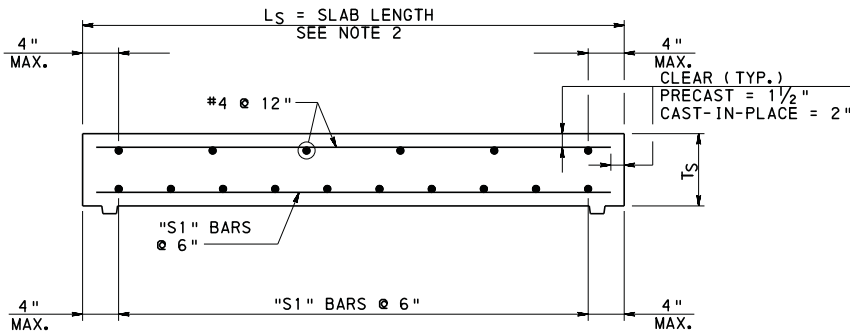


**PLAN - TOP SLAB  
FOR TYPE D-H  
CONCRETE TOP UNITS**  
FOR TYPES 8, 9 OR 10  
INLET BOXES ONLY

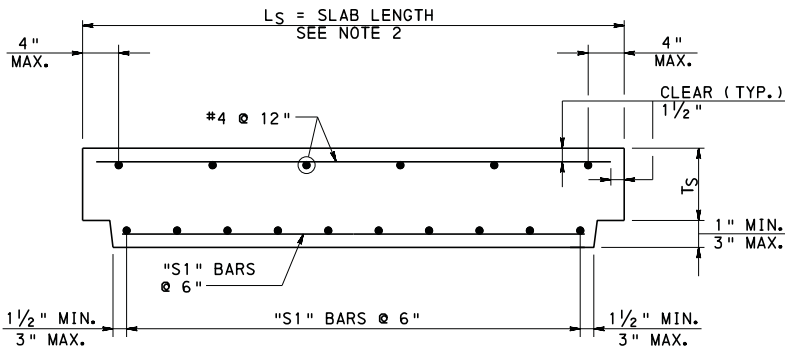
**PLAN - TOP SLAB WITH  
OPTIONAL ROUND OPENING  
FOR MANHOLE COVER**

- CIRCULAR OPENINGS:**
1. THE FOLLOWING CIRCULAR OPENINGS ARE PERMITTED:  
24"Ø  
27"Ø  
30"Ø
  2. 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.)	S <sub>1</sub> (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.)	S <sub>1</sub> (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:**
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 ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEETS 9 & 10.
  5. FOR JOINT DETAILS, SEE SHEETS 13 OR 20.
  6. ANY REINFORCEMENT BARS LESS THAN 6" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.

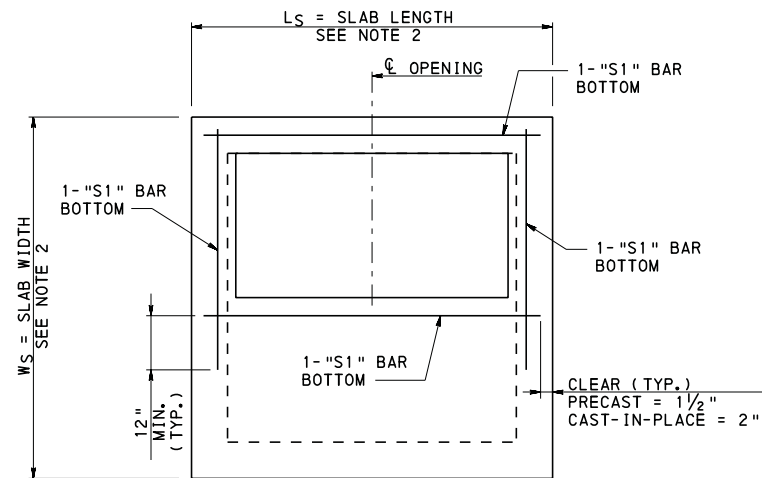
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TOP SLABS - 2

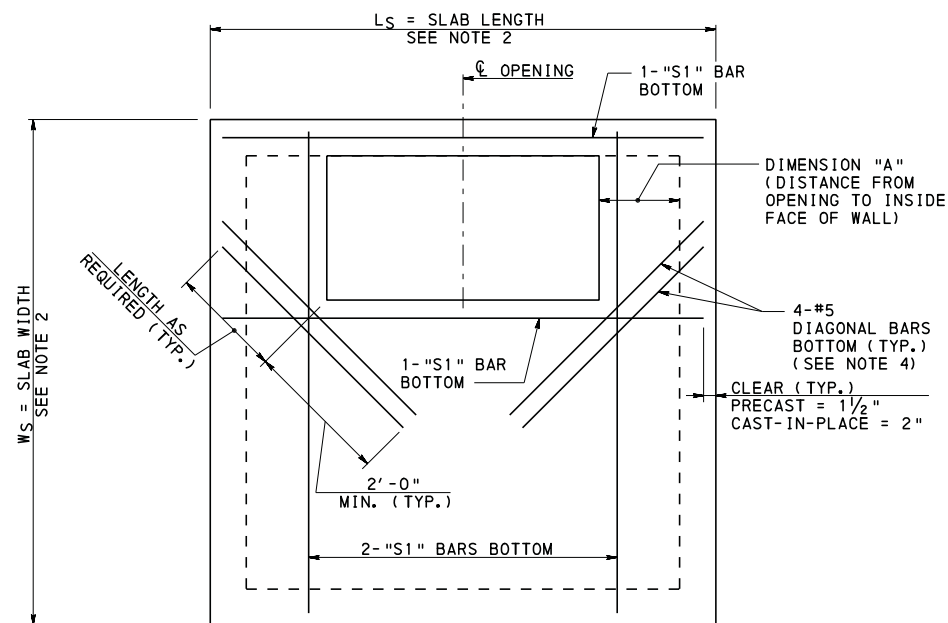
RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-46M

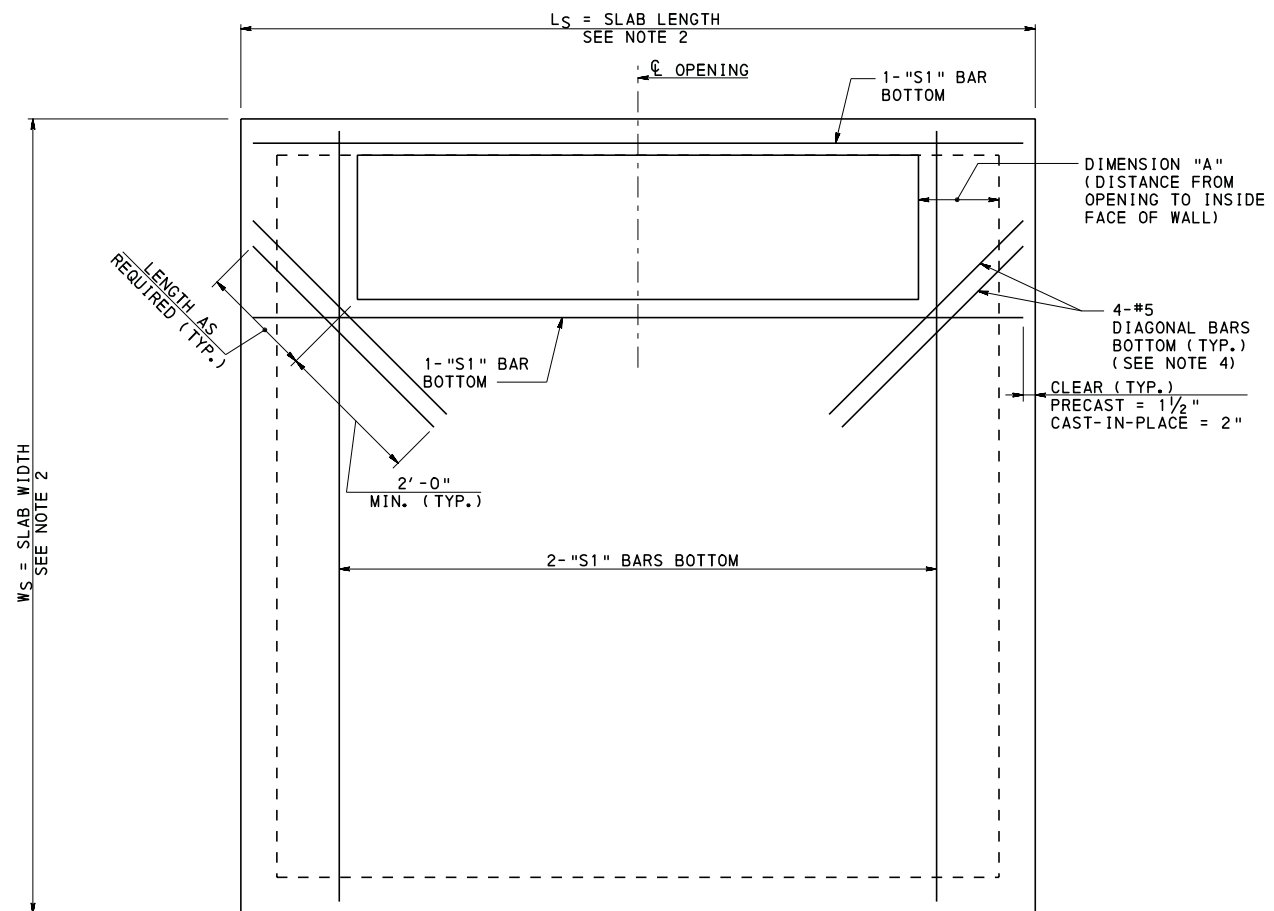


**FOR TYPE 4 AND 5 INLET BOXES**



**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".

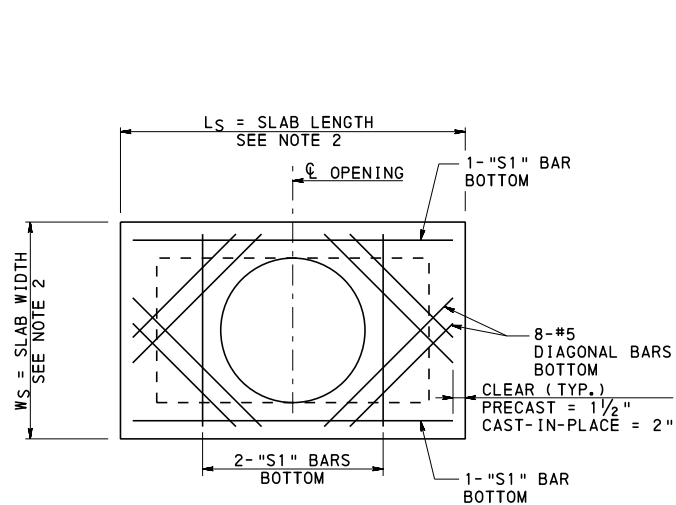
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TOP SLABS - 3

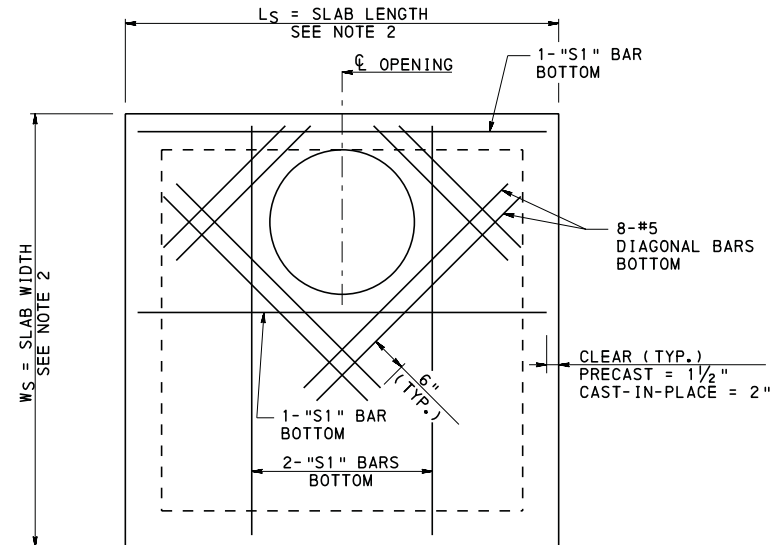
RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-46M



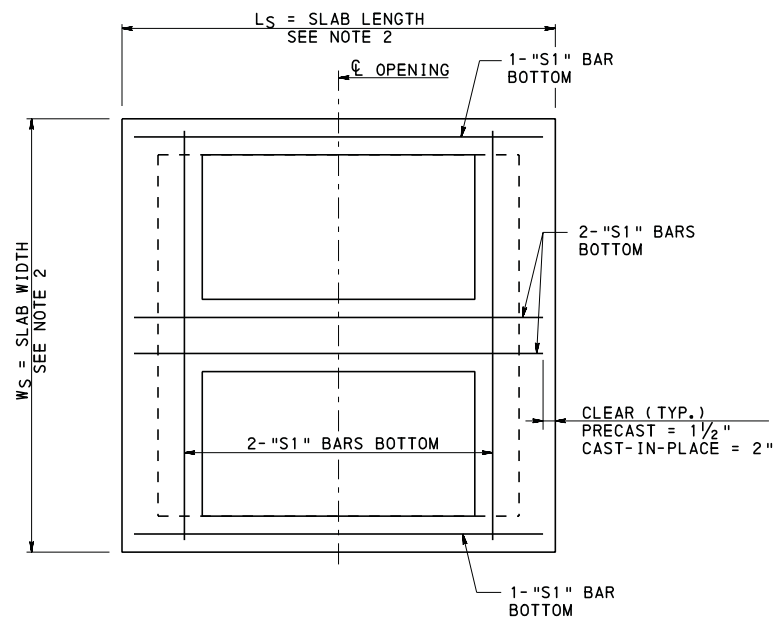
FOR STANDARD INLET BOX



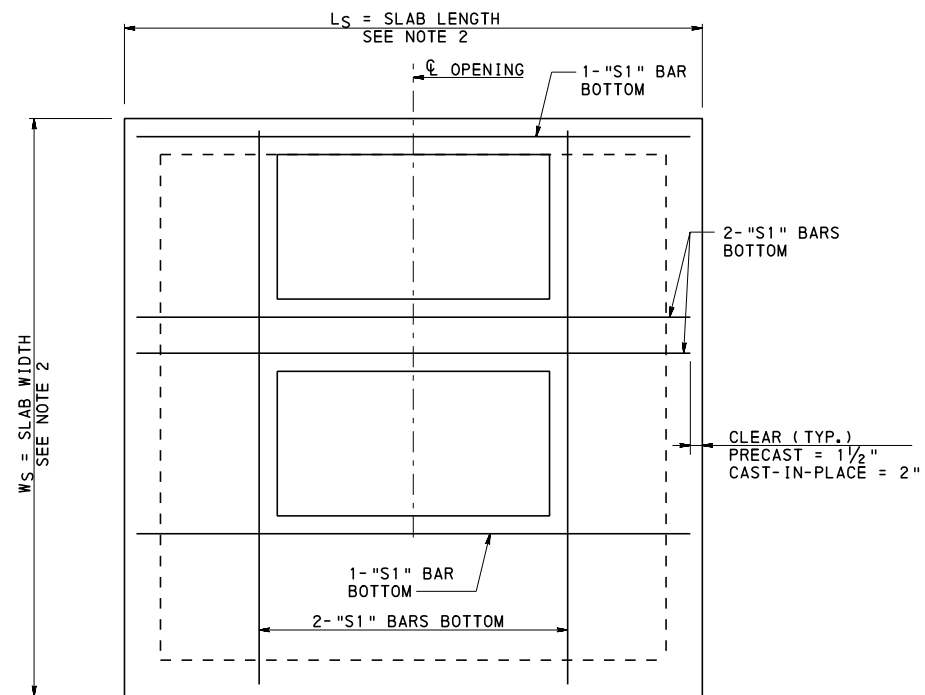
FOR OTHER INLET BOXES

### 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)

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

(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.

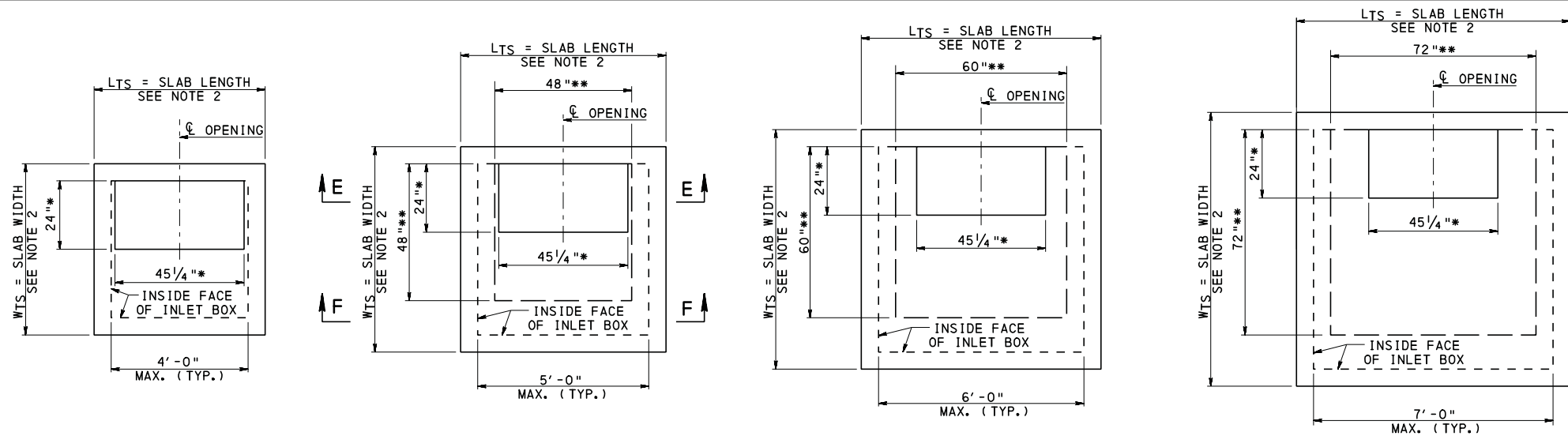
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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INLET BOXES  
TOP SLABS - 4

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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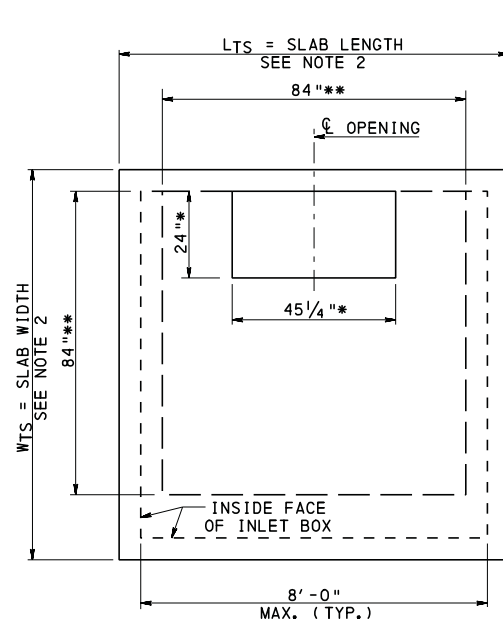


FOR TYPE 4 INLET BOX

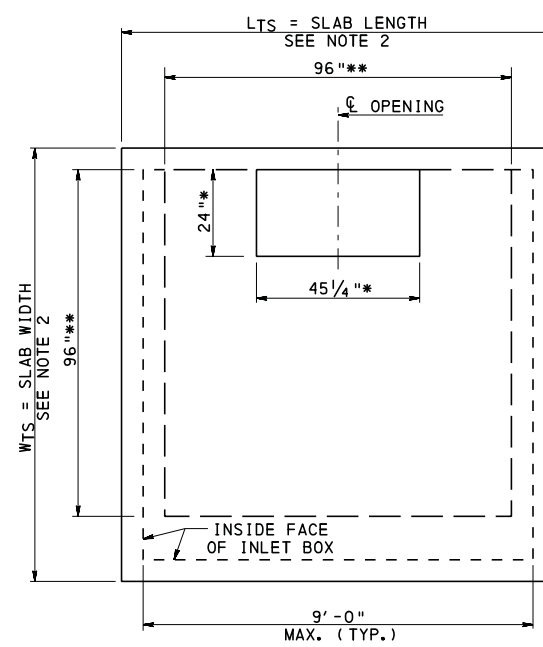
FOR TYPE 5 INLET BOX

FOR TYPE 6 INLET BOX

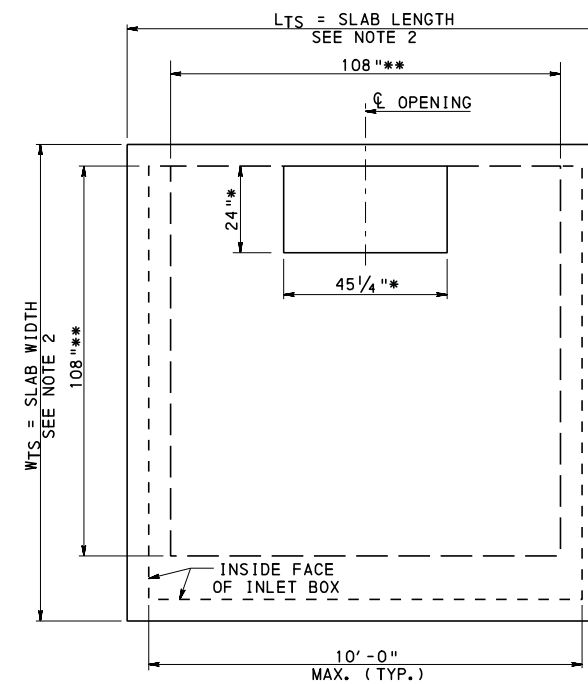
FOR TYPE 7 INLET BOX



FOR TYPE 8 INLET BOX



FOR TYPE 9 INLET BOX



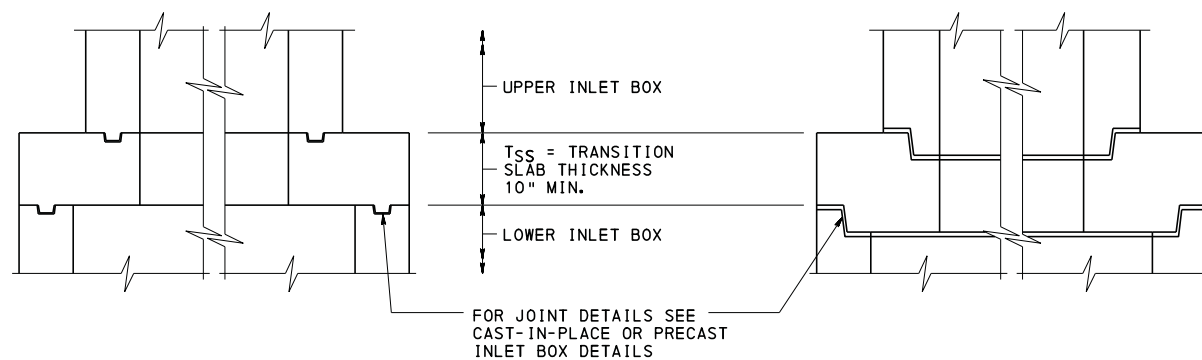
FOR TYPE 10 INLET BOX

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

**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.

**PLAN - TRANSITION SLABS**



TRANSITION SLAB WITH KEYED JOINT

TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

**SECTION E-E  
(TYPICAL)**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
TRANSITION SLABS - 1



TRANSITION SLAB PRECAST CONCRETE			
BOTTOM BOX TYPE	TSS ( 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

NOTES:

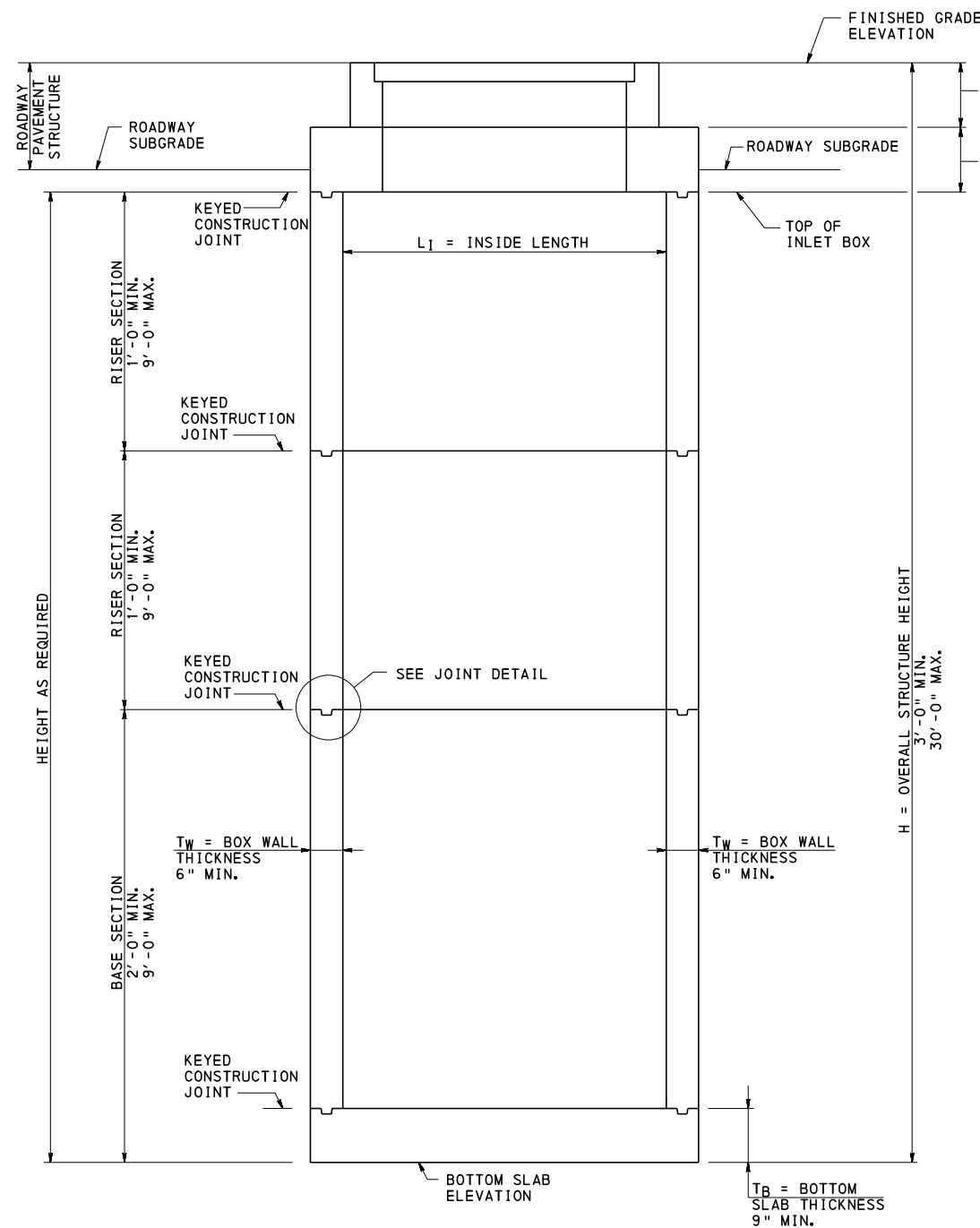
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TRANSITION SLAB TO MATCH SIZE OF LOWER INLET BOX.
3. ANY REINFORCEMENT BARS LESS THAN 6" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
4. DIAGONAL BARS NOT REQUIRED WHEN DIMENSION "A" IS LESS THAN 6".



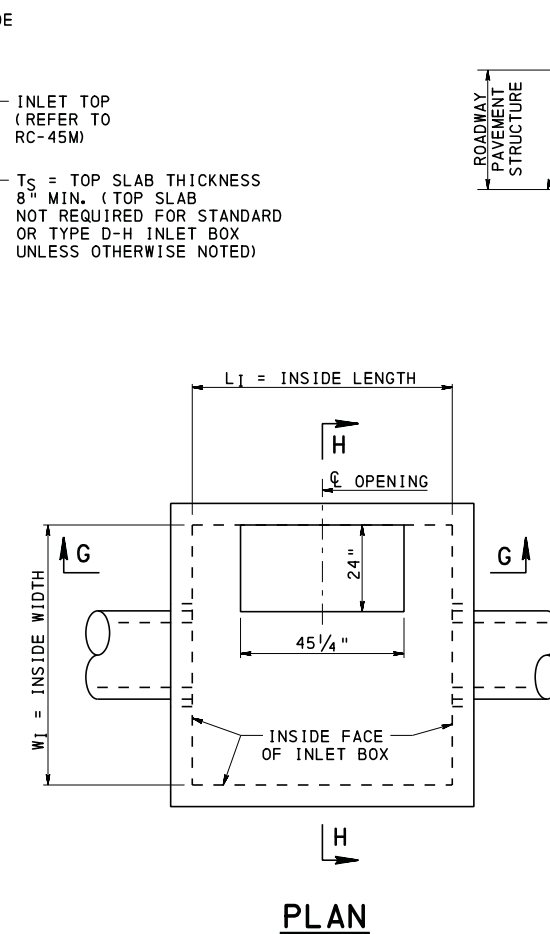
( ADDITIONAL REINFORCEMENT NOT SHOWN )

INLET BOXES  
TRANSITION SLABS - 2

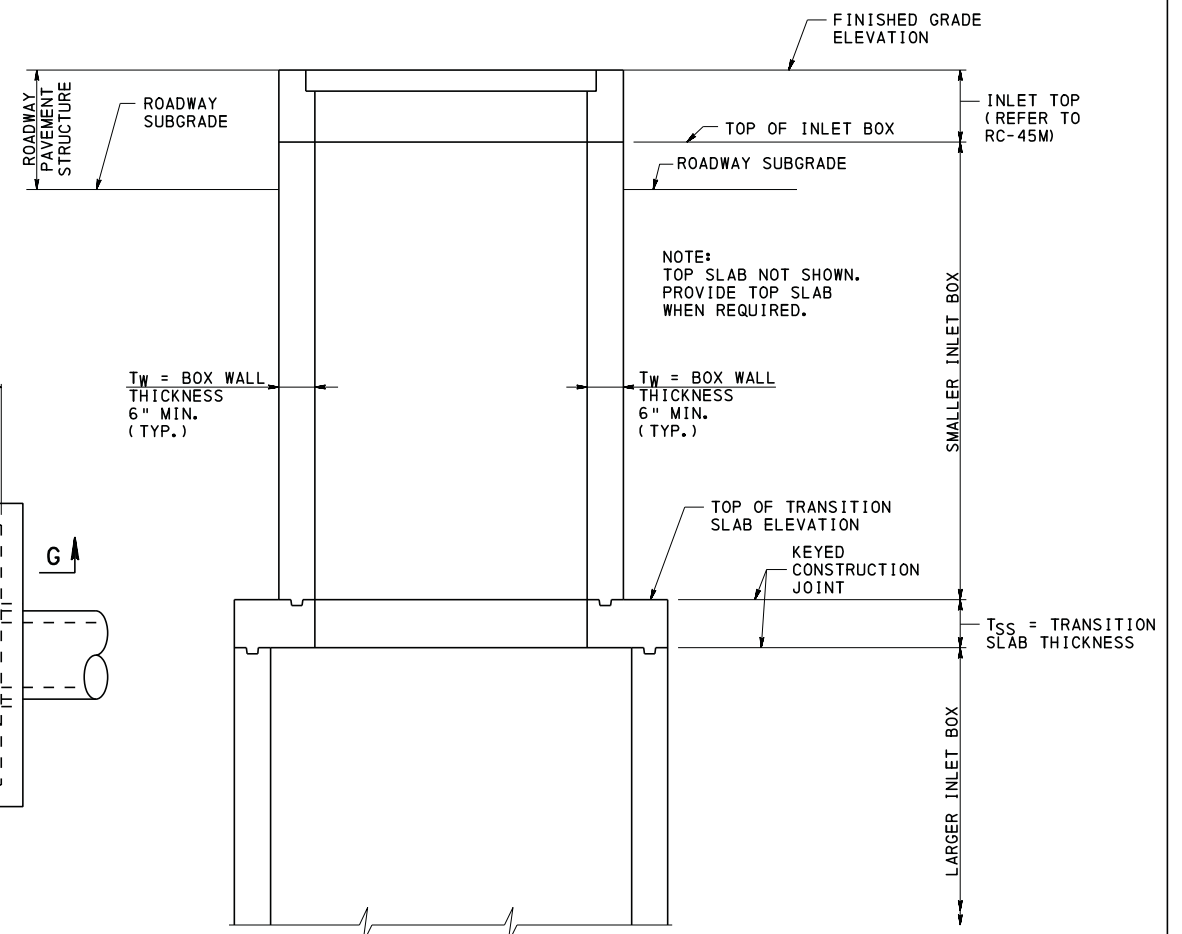
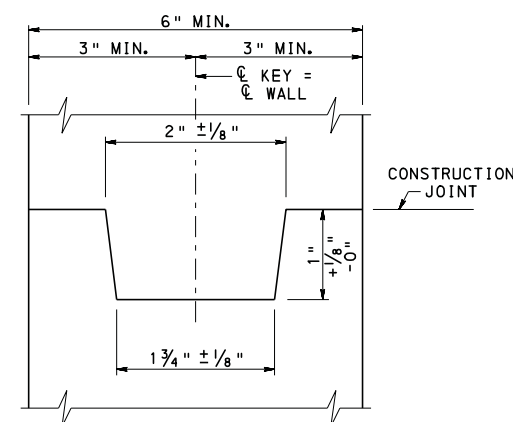
RC-46M



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



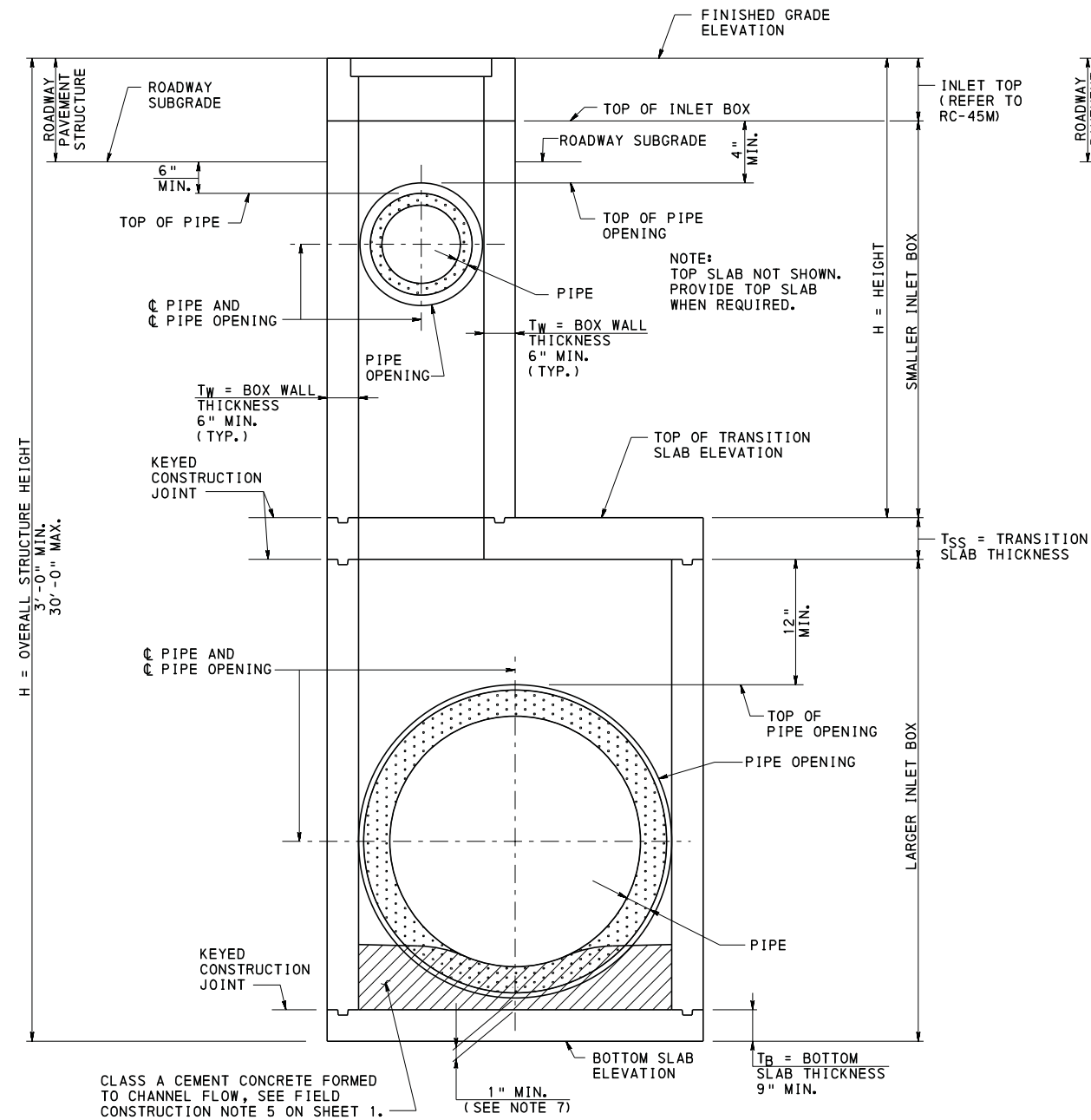
**JOINT DETAIL (CAST-IN-PLACE)**  
(KEYED CONSTRUCTION JOINT)



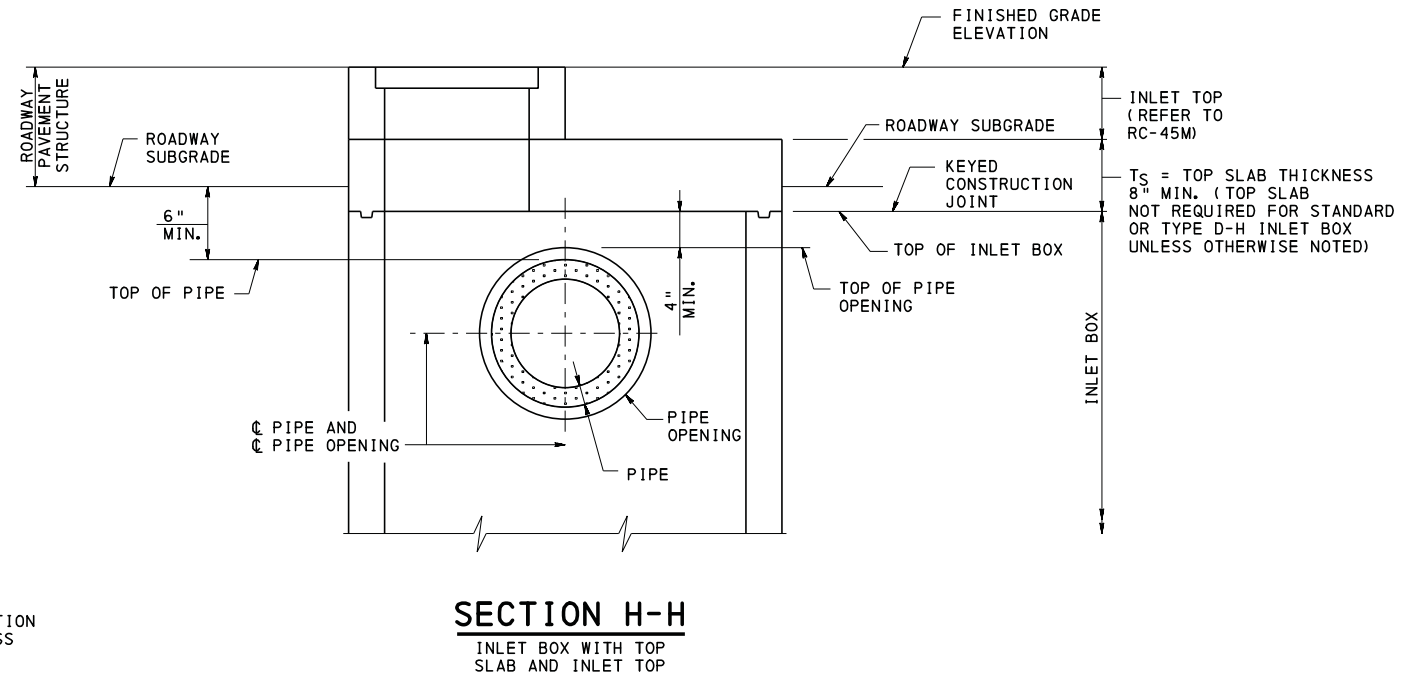
**SECTION G-G**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP

- 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 H-H, SEE SHEET 14.
  6. FOR REINFORCEMENT DETAILS, SEE SHEETS 15 & 16.
  7. FOR DESIGN TABLES, SEE SHEETS 17 - 19.





**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.

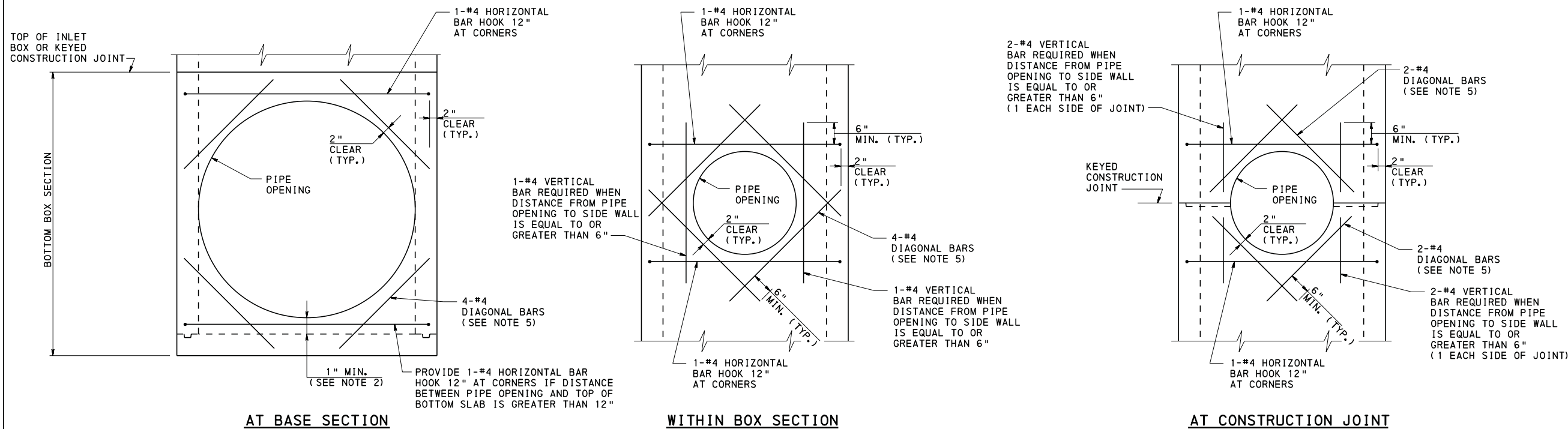
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET BOXES  
CAST-IN-PLACE INLET BOXES - 2

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

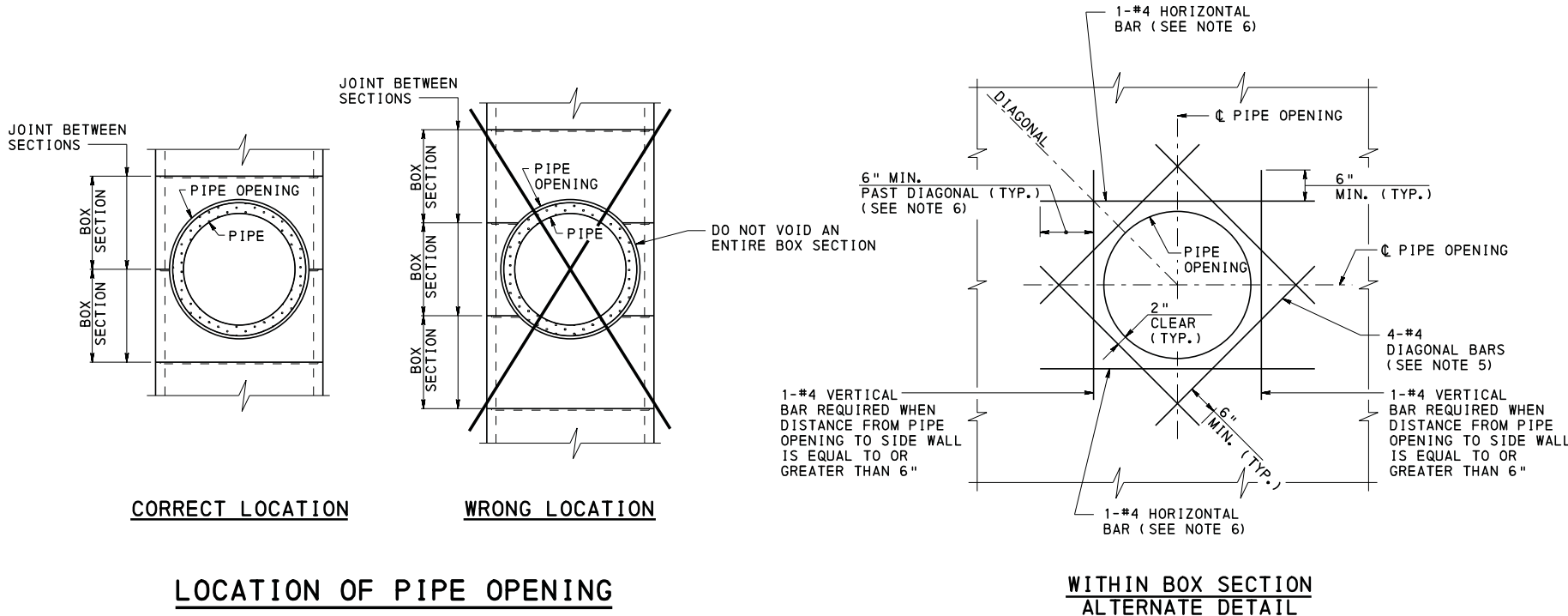
RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-46M

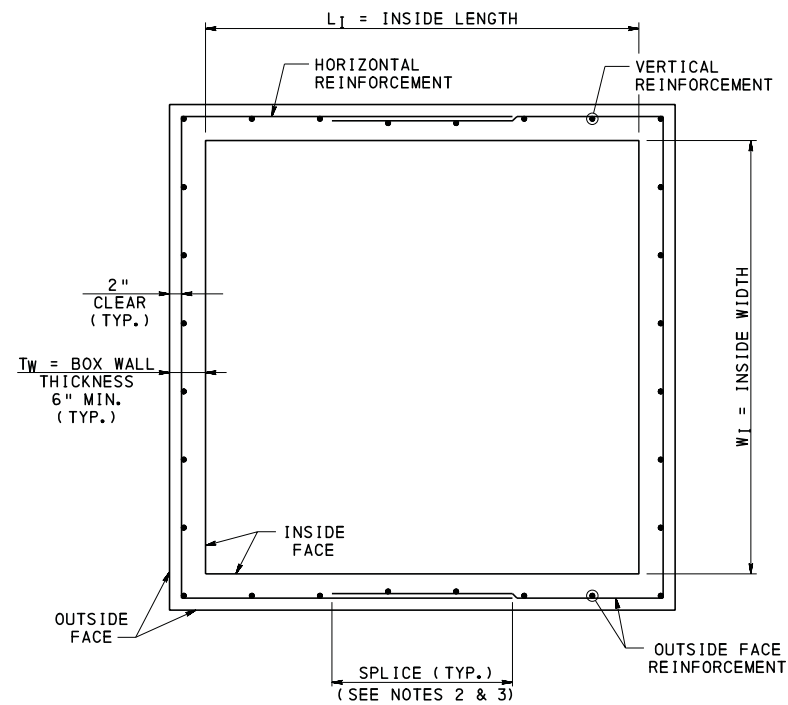


### ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL

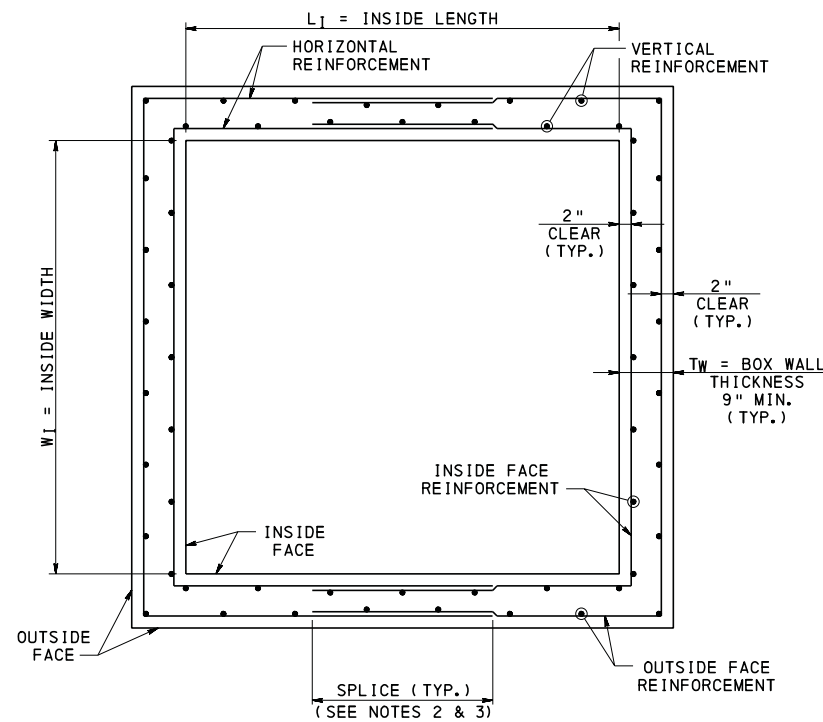
PIPE OPENING LOCATION  
AND SIZE AS REQUIRED



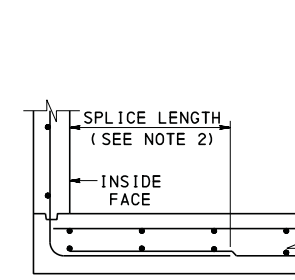
- NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
  3. TIE ADDITIONAL REINFORCEMENT TO THE OUTSIDE FACE REINFORCEMENT.
  4. FOR REINFORCEMENT DETAILS, SEE SHEET 16.
  5. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS GREATER THAN 3'-0".
  6.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



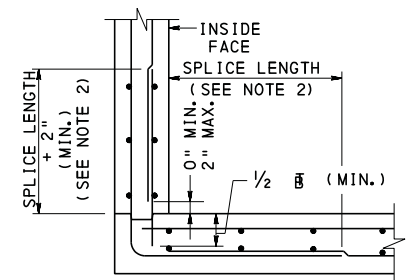
**HORIZONTAL SECTION  
WITH OUTSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)



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

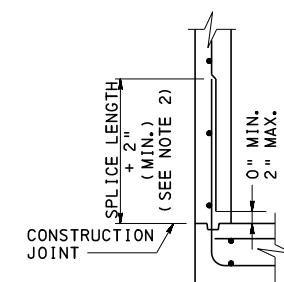


**WITH OUTSIDE FACE  
REINFORCEMENT**

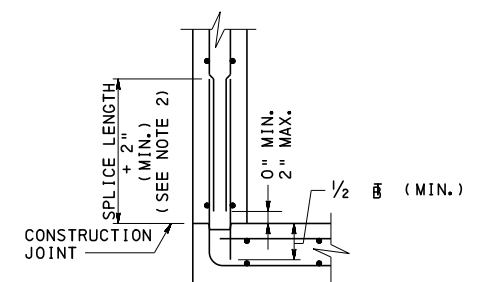


**WITH OUTSIDE FACE AND  
INSIDE FACE REINFORCEMENT**

**SPLICE IN BOTTOM SLAB**



**WITH OUTSIDE FACE  
REINFORCEMENT**



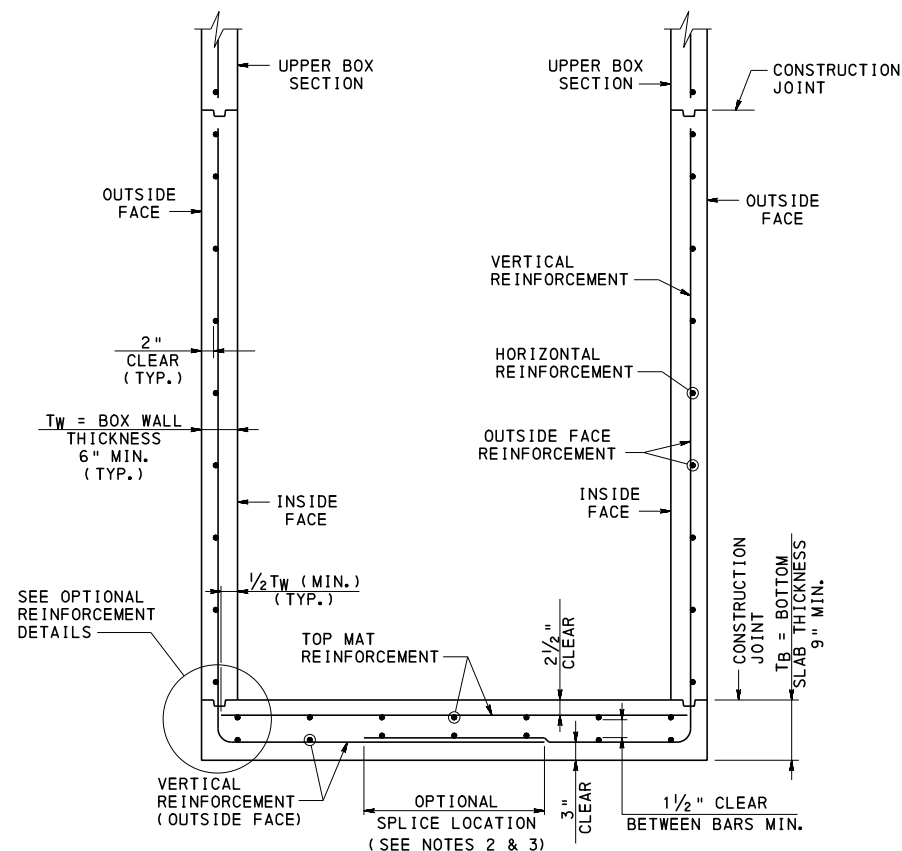
**WITH OUTSIDE FACE AND  
INSIDE FACE REINFORCEMENT**

**SPLICE IN WALLS**

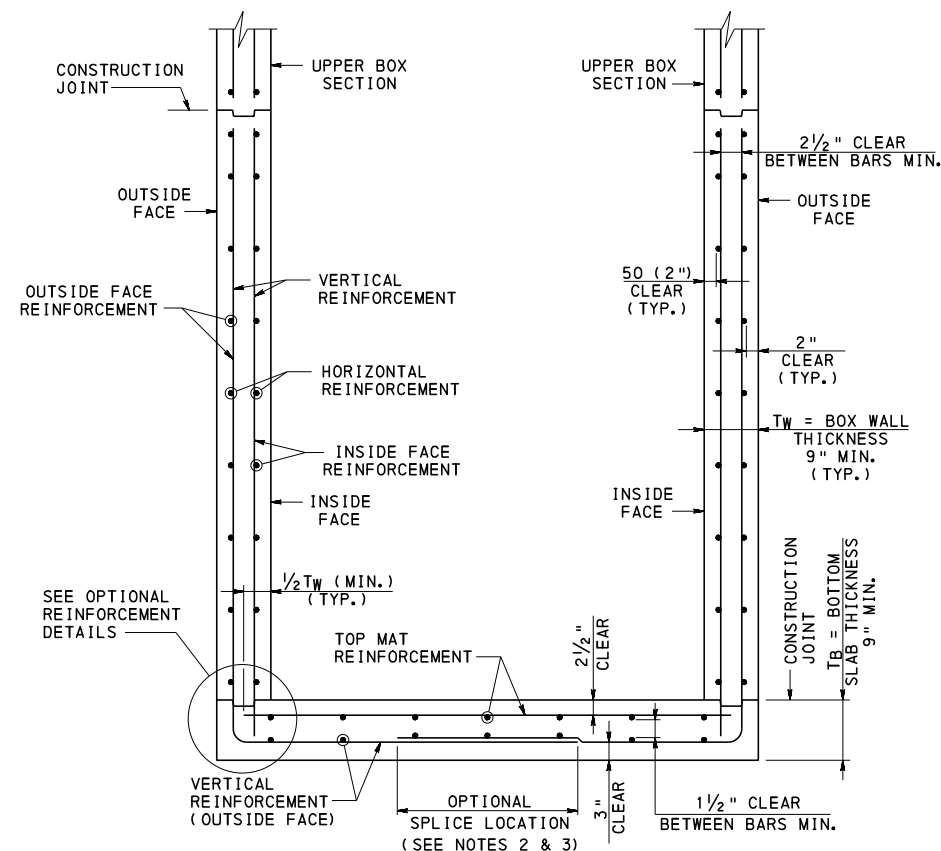
## OPTIONAL REINFORCEMENT DETAILS

### 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.



**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

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 16 OF 34  
RC-46M

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - STANDARD																							
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. )	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	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	9	#3	6	---	---	---	---	#4	12
14.0	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	6	#3	6	---	---	---	---	#4	12
17.0	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
21.0	45¼	24	9	#4	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
25.0	45¼	24	9	#4	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
28.0	45¼	24	9	#5	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
30.0	45¼	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. )	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. )	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. )	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. )	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:**
- 1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  - 2. FOR INLET BOX TYPES, SEE SHEET 6.
  - 3. 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 - 1  
( REINFORCEMENT BARS )

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 17 OF 34  
  
RC-46M

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. )	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	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.)	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.)		
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.)	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.)		
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:**
- 1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  - 2. FOR INLET BOX TYPES, SEE SHEET 6.
  - 3. 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)

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 18 OF 34  
  
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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. )	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. )		
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

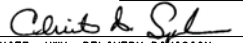
CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - 10																									
H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS									BASE SECTIONS													
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT		
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				
				BAR SIZE	SPACING (IN.)	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.)
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		

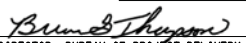
CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - D-H																							
H (FT.)	L1 (IN.)	W1 (IN.)	RISER SECTIONS									BASE SECTIONS											
			Tw (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				Tw (IN.)	Tb (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	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.)		
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:**
- 1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
  - 2. FOR INLET BOX TYPES, SEE SHEET 6.
  - 3. FOR DETAILS, SEE SHEETS 13 - 16.

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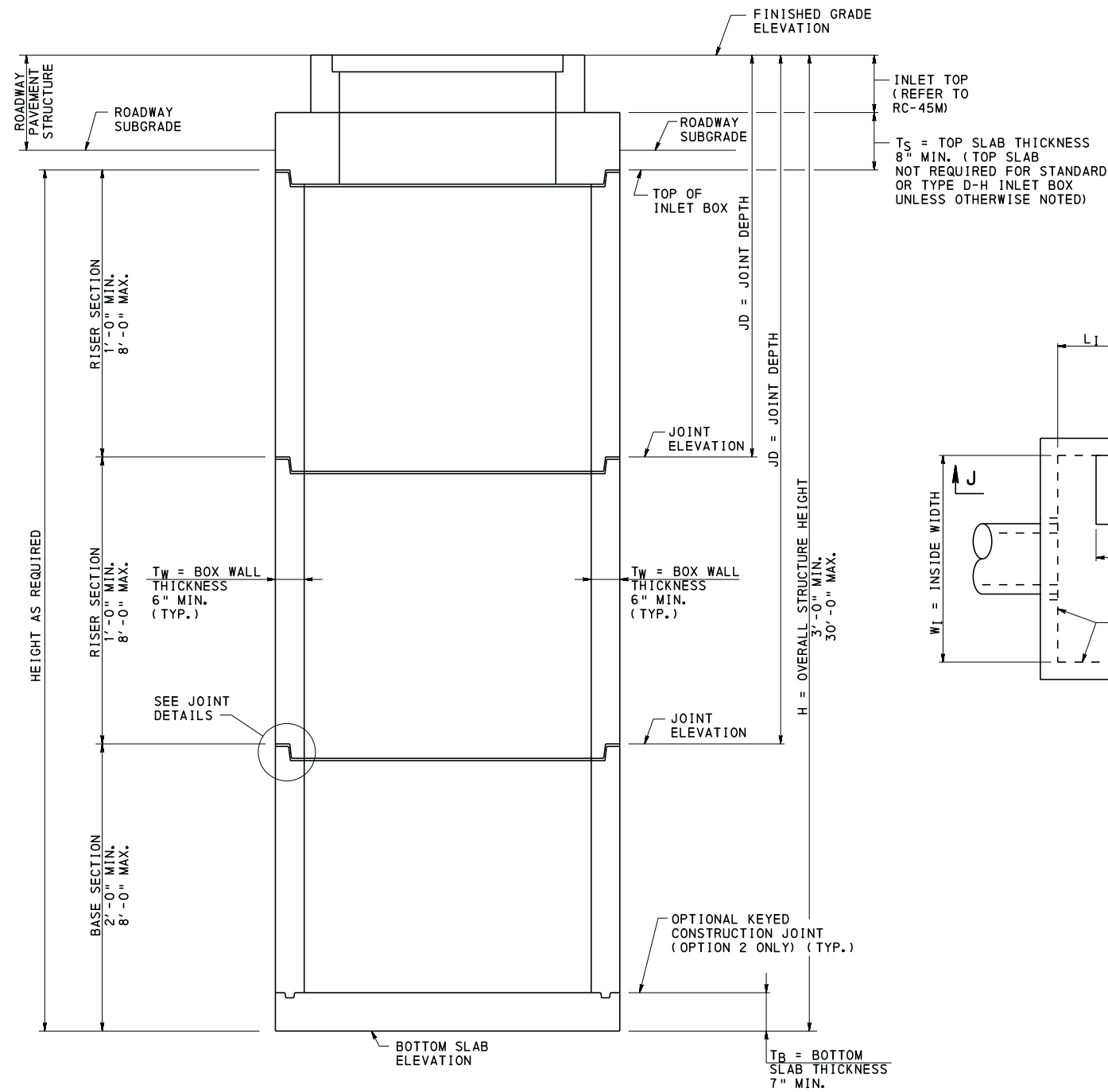
INLET BOXES  
  
CAST-IN-PLACE INLET BOXES  
DESIGN TABLES - 3  
(REINFORCEMENT BARS)

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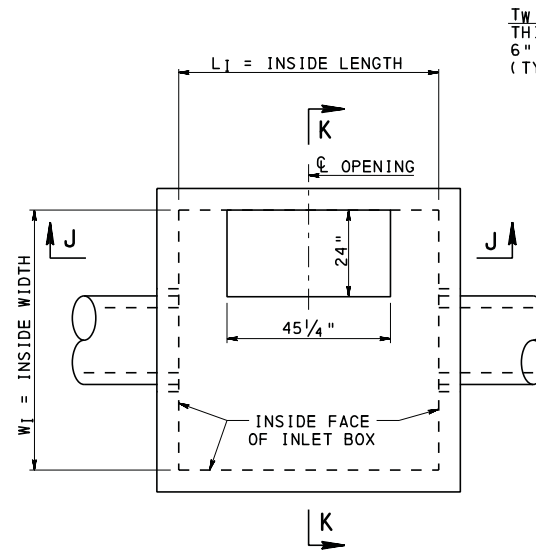
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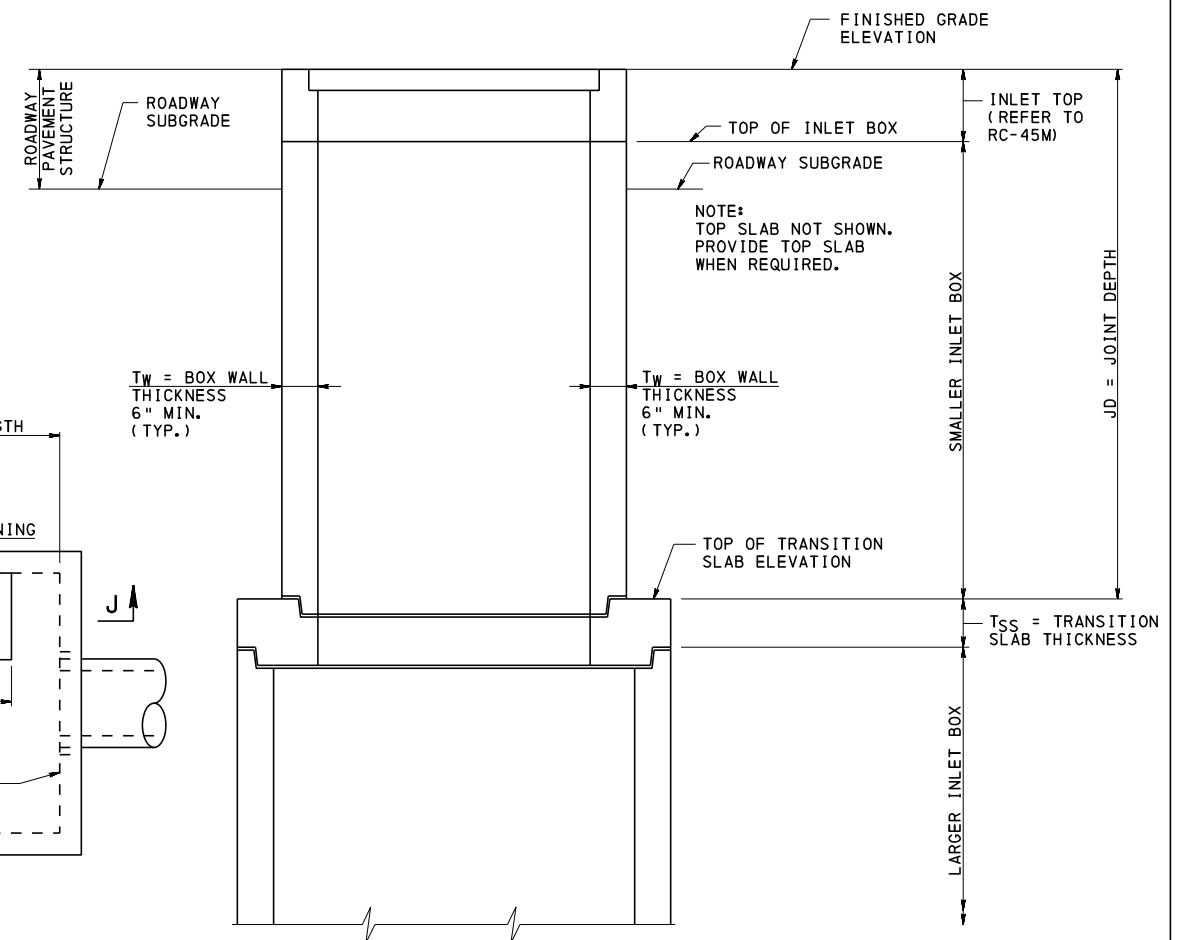




**SECTION J-J**  
SAME SIZE INLET BOX FULL HEIGHT  
WITH TOP SLAB AND INLET TOP



**PLAN**

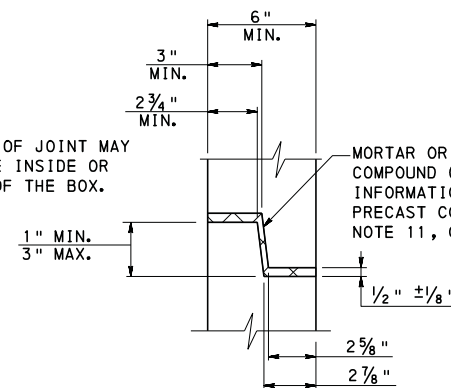


**SECTION J-J**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP

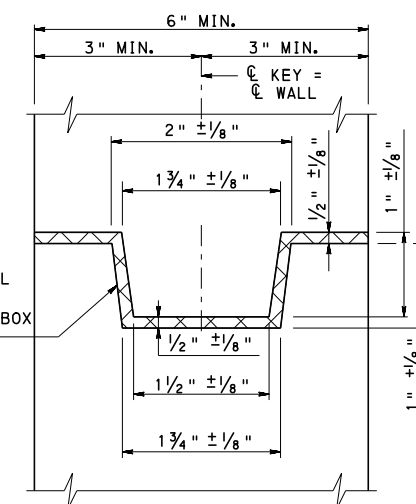
**NOTES:**

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.

NOTE:  
LOW SIDE OF JOINT MAY  
BE ON THE INSIDE OR  
OUTSIDE OF THE BOX.



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



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

**JOINT DETAILS (PRECAST)**

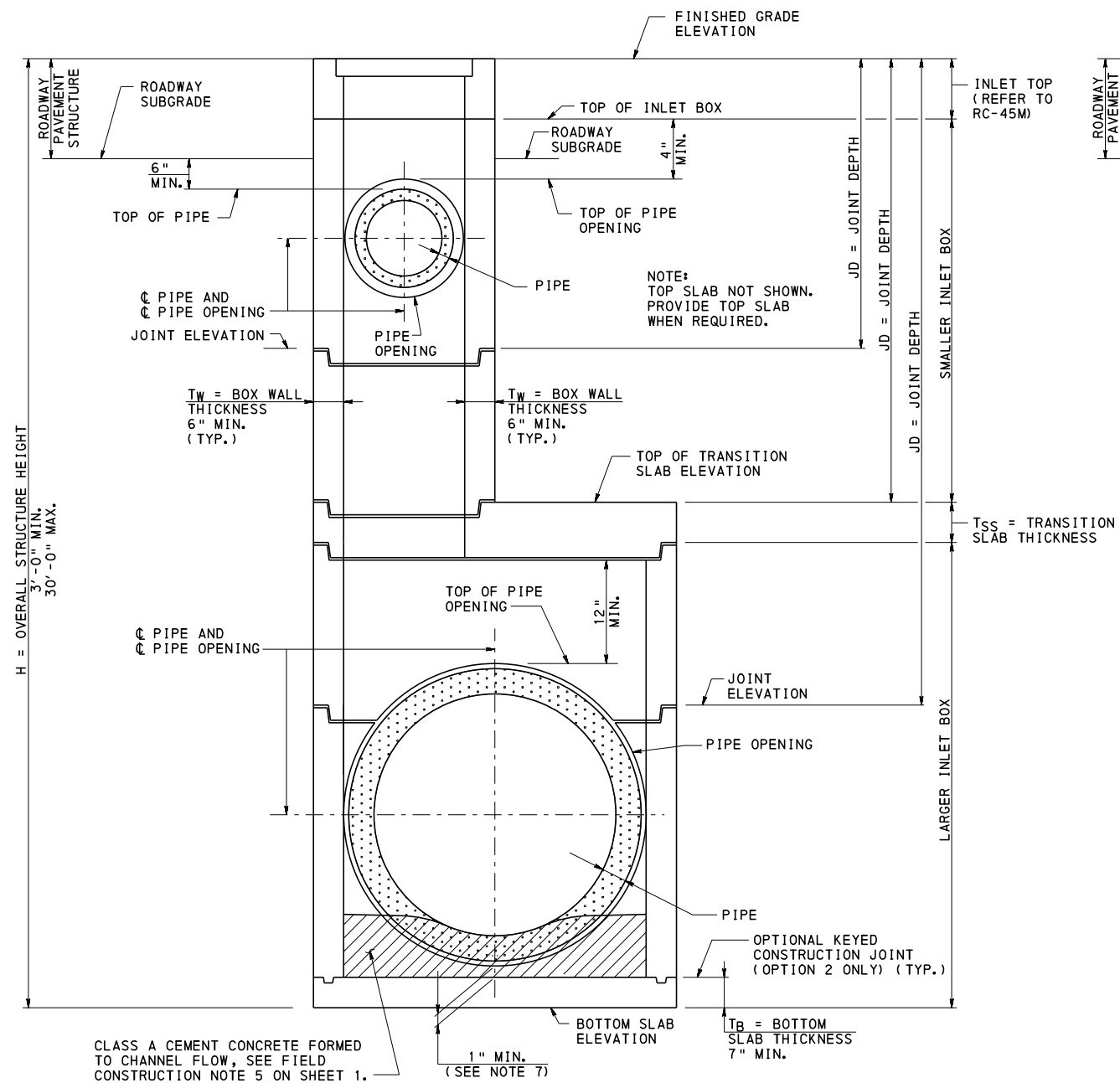
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INLET BOXES  
PRECAST INLET BOXES - 1

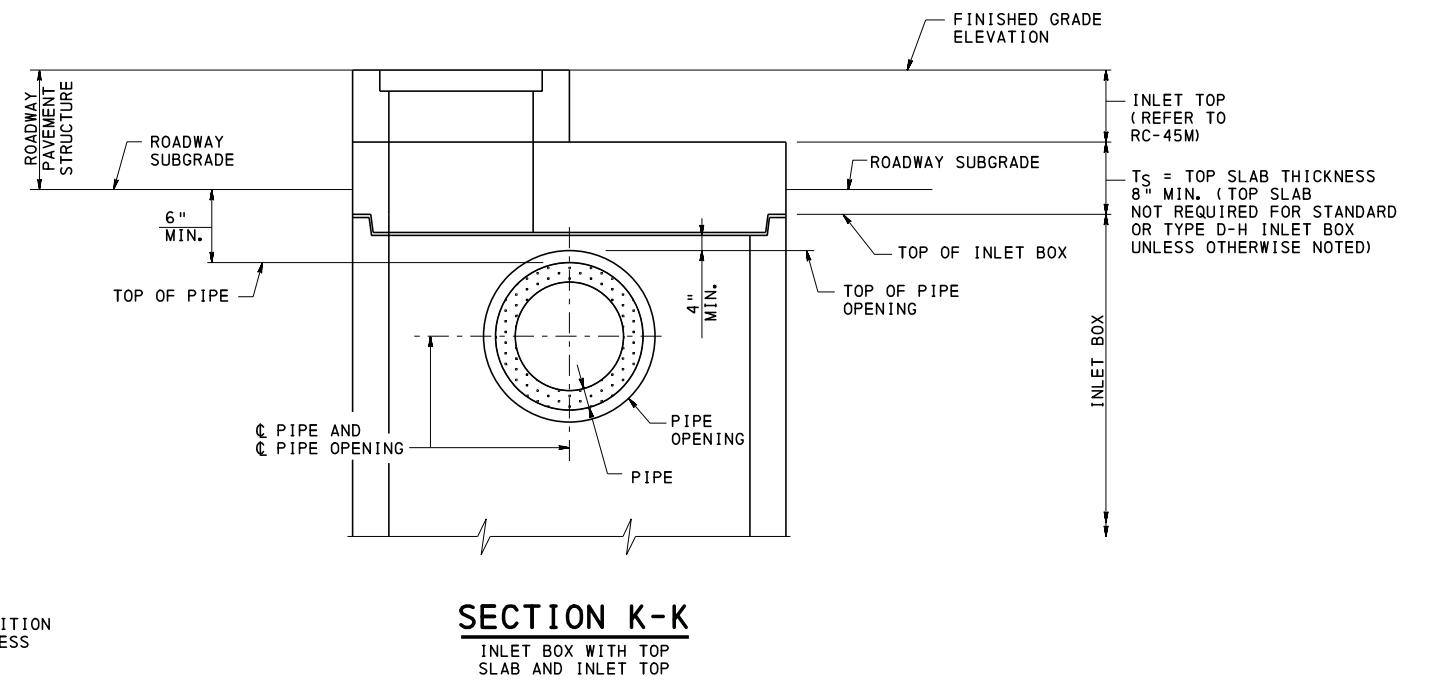
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**SECTION K-K**  
LARGER INLET BOX TO SMALLER INLET BOX  
WITH TRANSITION SLAB AND INLET TOP



**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.

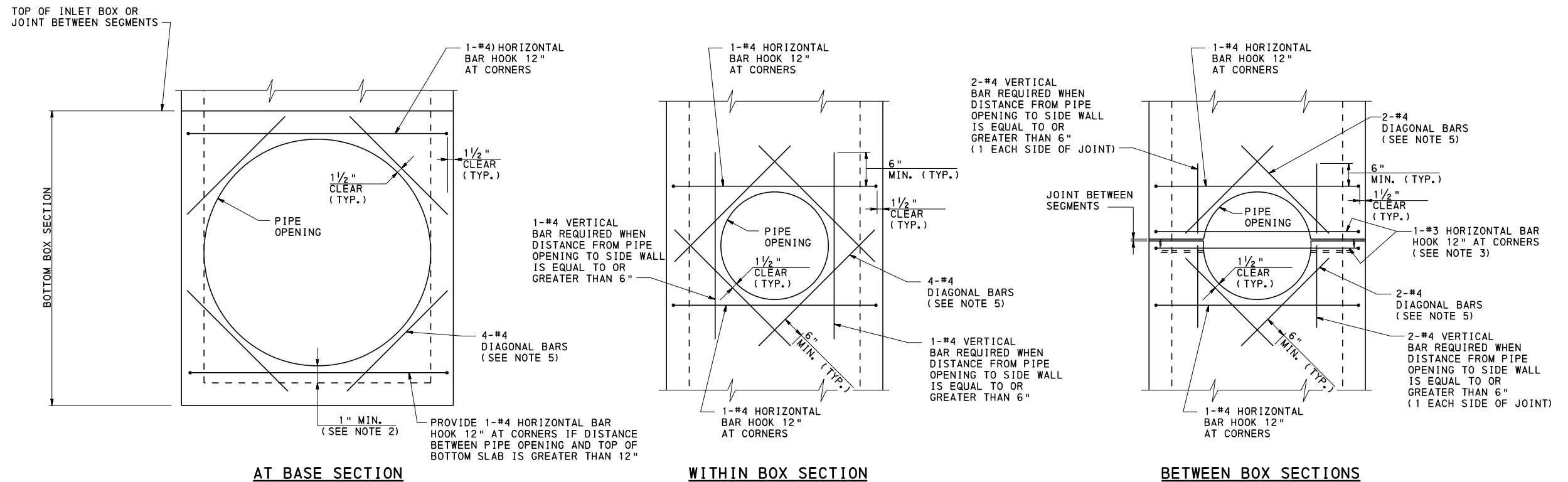
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INLET BOXES  
PRECAST INLET BOXES - 2

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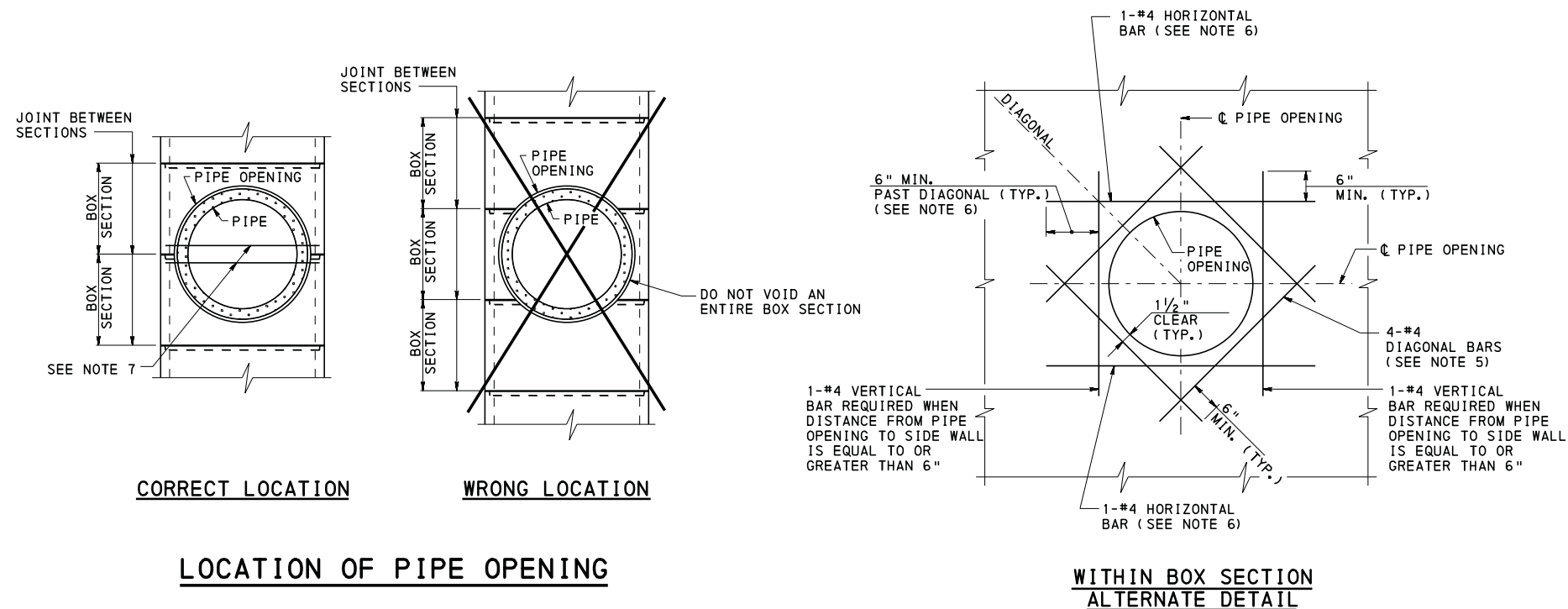
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### ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL

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 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.

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### INLET BOXES PRECAST INLET BOXES - 3

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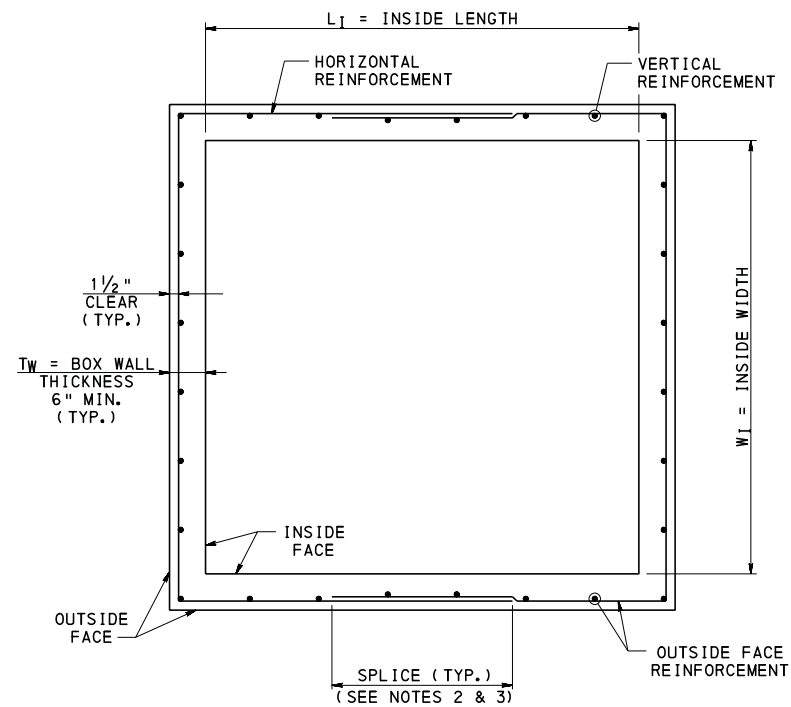
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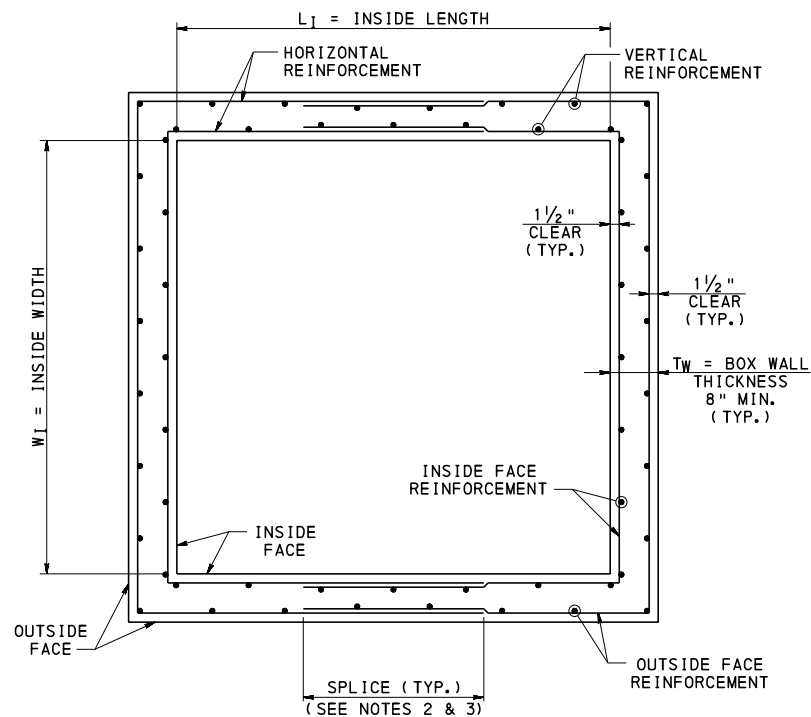
*Bruce Thompson*  
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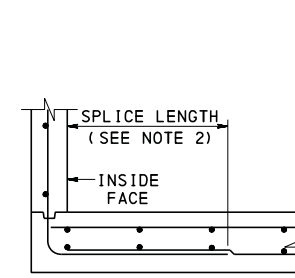
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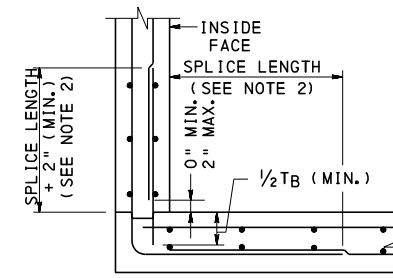
**HORIZONTAL SECTION  
WITH OUTSIDE FACE REINFORCEMENT**  
(RISER SECTIONS AND BASE SECTIONS)



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

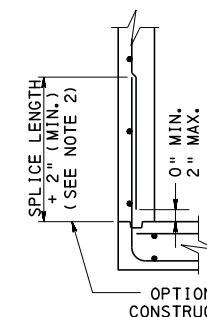


**WITH OUTSIDE FACE  
REINFORCEMENT**

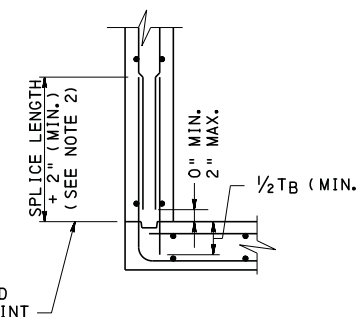


**WITH OUTSIDE FACE AND  
INSIDE FACE REINFORCEMENT**

**SPLICE IN BOTTOM SLAB**



**WITH OUTSIDE FACE  
REINFORCEMENT**



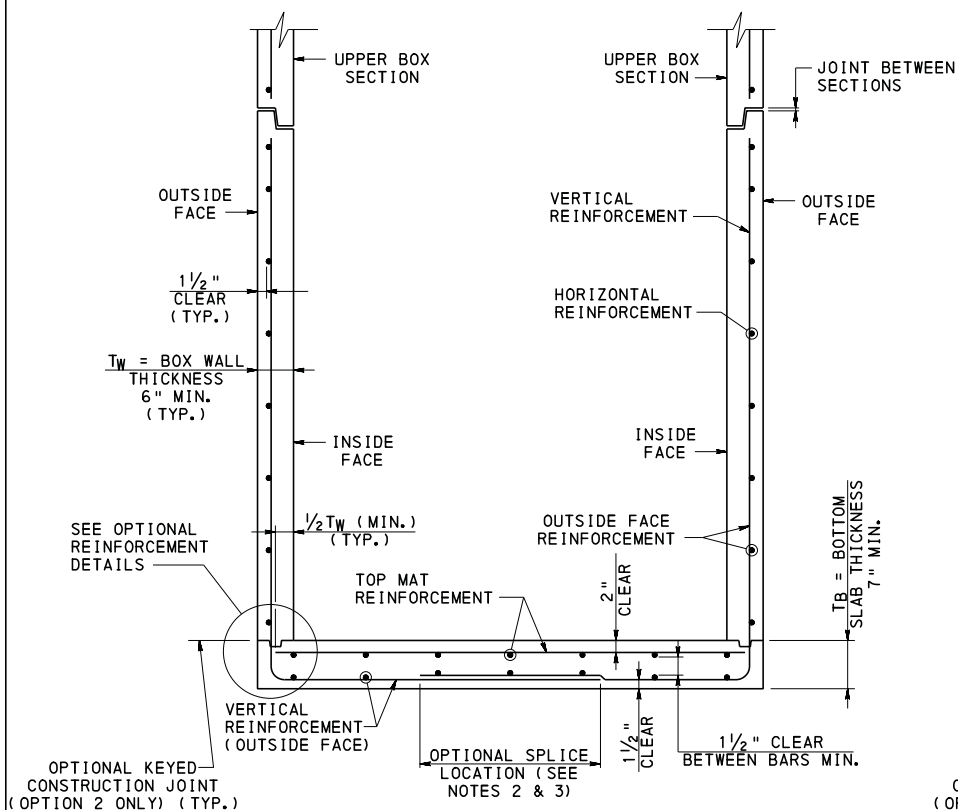
**WITH OUTSIDE FACE AND  
INSIDE FACE REINFORCEMENT**

**SPLICE IN WALLS**

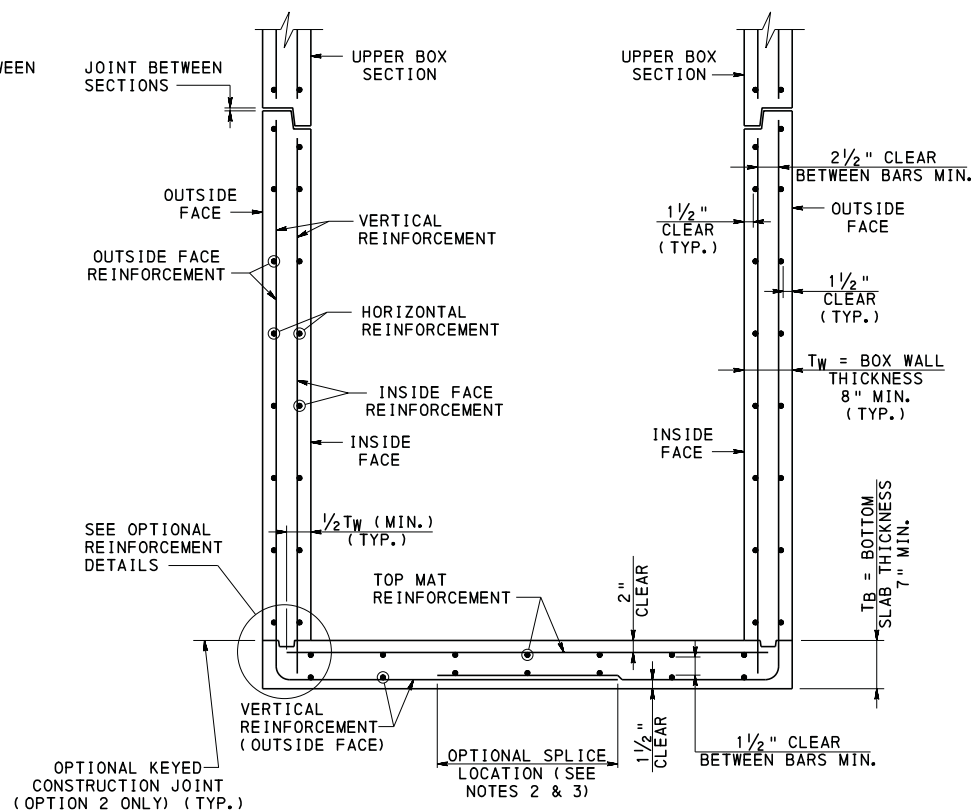
**OPTIONAL REINFORCEMENT DETAILS**

**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.



**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**

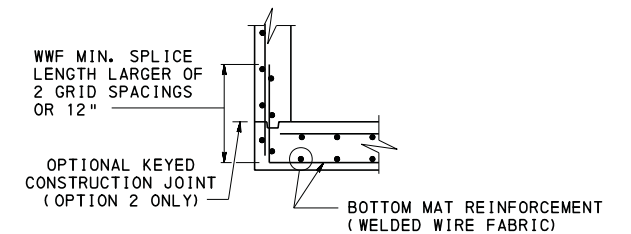
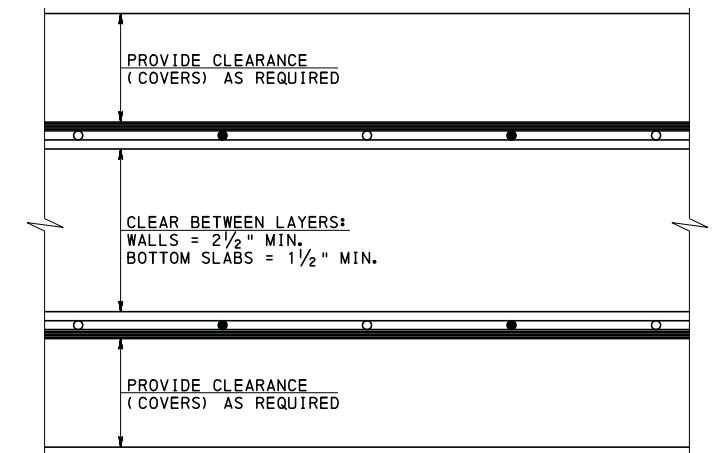
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BUREAU OF PROJECT DELIVERY

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

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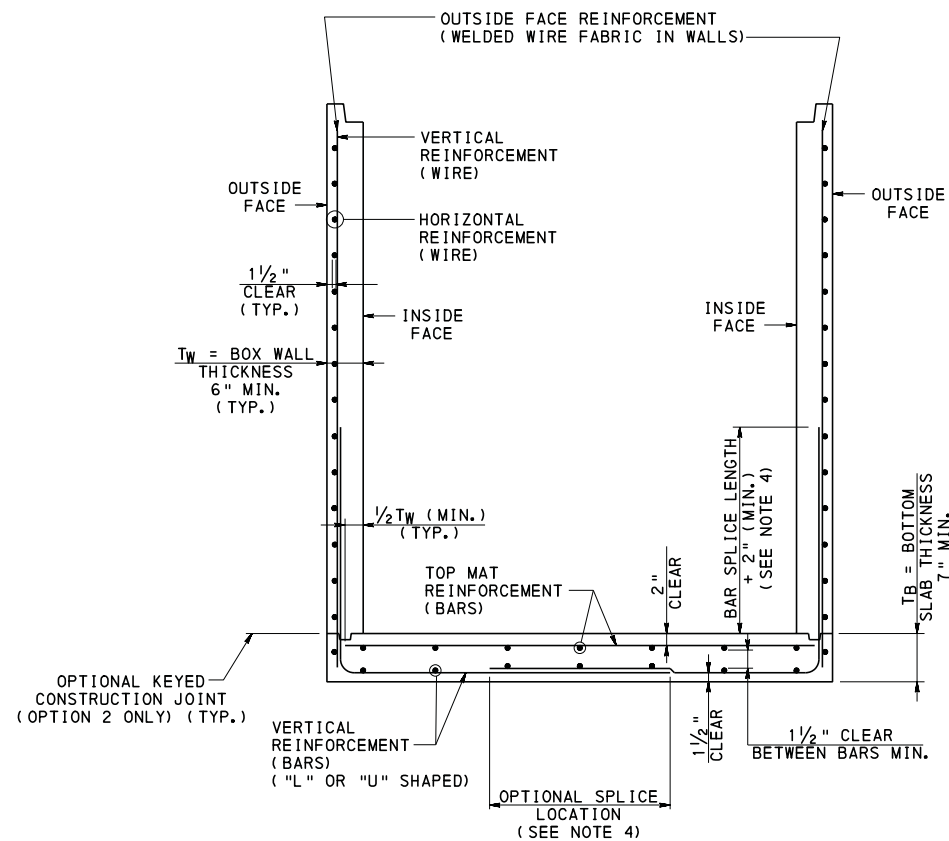
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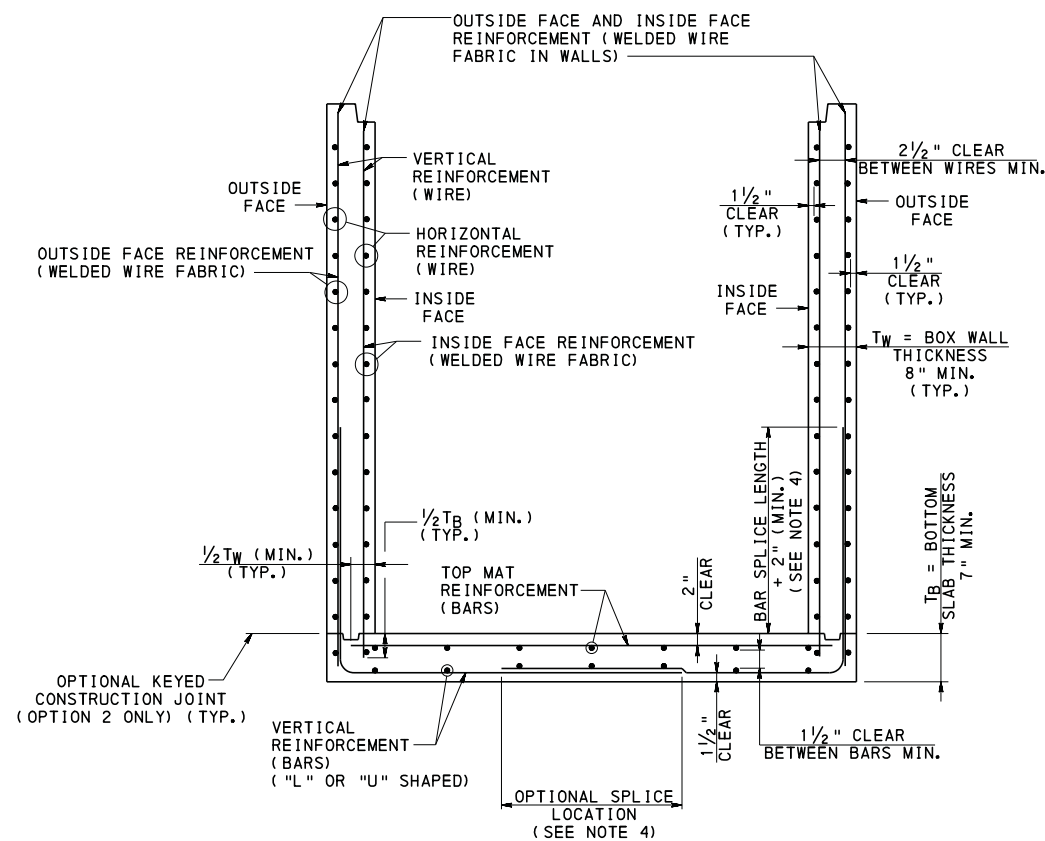


1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
3. FOR WWF DESIGN TABLES, SEE SHEETS 29 - 33.

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**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.

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INLET BOXES  
PRECAST INLET BOXES - 6  
(COMBINATION DETAILS)

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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	45¼	24	6	#3	9	#3	9	---	---	---	---
11.0	45¼	24	6	#3	6	#3	9	---	---	---	---
14.0	45¼	24	6	#4	9	#3	9	---	---	---	---
16.0	45¼	24	6	#3	4	#3	9	---	---	---	---
20.0	45¼	24	6	#4	6	#3	9	---	---	---	---
28.0	45¼	24	8	#4	12	#3	9	#4	12	#3	9

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 - 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 - 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	45¼	24	6	7	#3	9	#3	6	---	---	---	---	#3	6
11.0	45¼	24	6	7	#3	6	#3	6	---	---	---	---	#3	6
13.0	45¼	24	6	7	#4	9	#3	6	---	---	---	---	#3	6
16.0	45¼	24	6	7	#3	4	#3	6	---	---	---	---	#3	6
19.0	45¼	24	6	7	#4	6	#3	6	---	---	---	---	#3	6
30.0	45¼	24	8	7	#4	12	#3	6	#4	12	#4	12	#3	6

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														
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:

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

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CHIEF, HWY. DELIVERY DIVISION

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*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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 - 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 - 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 - 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														
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														
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)

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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			
				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 - 10											
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. )
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 - D-H											
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. )
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 - 9														
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. )
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														
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. )
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														
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. )
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:**
- 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 - 3  
( REINFORCEMENT BARS )

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-46M

PRECAST CONCRETE INLET BOX SUMMARY TABLE BOX TYPE - STANDARD														
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		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION
4.0	45¼	24	6	7	WWF 4x4-W4xW4	0.12	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
7.0	45¼	24	6	7	WWF 3x4-W4xW4	0.16	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
9.0	45¼	24	6	7	WWF 3x4-W5xW4	0.20	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
11.0	45¼	24	6	7	WWF 3x4-W6xW4	0.24	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
13.0	45¼	24	6	7	WWF 3x4-W7xW4	0.28	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
15.0	45¼	24	6	7	WWF 3x4-W8xW4	0.32	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
17.0	45¼	24	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
19.0	45¼	24	6	7	WWF 6x6-W20xW10	0.40	0.20	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	45¼	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>I</sub> ( IN. )	W <sub>I</sub> ( IN. )	T <sub>W</sub> ( IN. )	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )	
5.0	45¼	24	6	WWF 4x4-W4xW4	0.12	0.12	---	---	---
8.0	45¼	24	6	WWF 3x4-W4xW4	0.16	0.12	---	---	---
10.0	45¼	24	6	WWF 3x4-W5xW4	0.20	0.12	---	---	---
13.0	45¼	24	6	WWF 3x4-W7xW4	0.28	0.12	---	---	---
15.0	45¼	24	6	WWF 3x4-W8xW4	0.32	0.12	---	---	---
17.0	45¼	24	6	WWF 3x4-W9xW4	0.36	0.12	---	---	---
19.0	45¼	24	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
28.0	45¼	24	8	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxD  
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>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		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION
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>I</sub> ( IN. )	W <sub>I</sub> ( IN. )	T <sub>W</sub> ( IN. )	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )	
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 )

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD  
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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	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 )

RECOMMENDED FEB. 19, 2021  
*Chris L. Spill*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-46M



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-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL				
10.0	84	84	8	8	WWF 3×3-W6×W4	0.24	0.16	WWF 3×3-W6×W4	0.24	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W8×W8	0.32
12.0	84	84	8	9	WWF 3×3-W8×W4	0.32	0.16	WWF 3×3-W8×W4	0.32	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W10×W10	0.40
14.0	84	84	8	9	WWF 3×3-W10×W6	0.40	0.24	WWF 3×3-W10×W4	0.40	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W10×W10	0.40
16.0	84	84	8	9	WWF 3×3-W10×W8	0.40	0.32	WWF 3×3-W10×W4	0.40	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W10×W10	0.40
18.0	84	84	8	9	WWF 3×3-W12×W10	0.48	0.40	WWF 3×6-W12×W8	0.48	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W10×W10	0.40
21.0	84	84	8	10	WWF 4×3-W20×W12	0.60	0.48	WWF 4×6-W20×W8	0.60	0.16	WWF 3×3-W5×W5	0.20	WWF 3×3-W12×W12	0.48
24.0	84	84	10	10	WWF 4×3-W20×W12	0.60	0.48	WWF 4×6-W20×W10	0.60	0.20	WWF 4×4-W8×W8	0.24	WWF 4×4-W20×W20	0.60
26.0	84	84	10	10	WWF 4×3-W20×W12	0.60	0.48	WWF 4×6-W20×W10	0.60	0.20	WWF 4×4-W8×W8	0.24	WWF 4×4-W20×W20	0.60
28.0	84	84	10	11	WWF 4×3-W20×W12	0.60	0.48	WWF 4×6-W20×W10	0.60	0.20	WWF 4×4-W8×W8	0.24	WWF 4×4-W20×W20	0.60
30.0	84	84	12	11	WWF 4×3-W20×W12	0.60	0.48	WWF 4×4-W20×W8	0.60	0.24	WWF 4×4-W8×W8	0.24	WWF 4×4-W20×W20	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-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
8.0	84	84	8	WWF 3×4-W4×W4	0.16	0.12	WWF 3×3-W4×W4	0.16	0.16
10.0	84	84	8	WWF 3×4-W6×W4	0.24	0.12	WWF 3×3-W5×W4	0.20	0.16
13.0	84	84	8	WWF 3×4-W8×W4	0.32	0.12	WWF 3×3-W8×W4	0.32	0.16
16.0	84	84	8	WWF 3×4-W10×W4	0.40	0.12	WWF 3×3-W10×W4	0.40	0.16
19.0	84	84	8	WWF 3×12-W12×W12	0.48	0.12	WWF 3×6-W12×W8	0.48	0.16
22.0	84	84	8	WWF 4×12-W20×W12	0.60	0.12	WWF 4×6-W20×W8	0.60	0.16
24.0	84	84	10	WWF 3×12-W12×W12	0.48	0.12	WWF 3×6-W12×W10	0.48	0.20
28.0	84	84	10	WWF 4×12-W20×W12	0.60	0.12	WWF 4×6-W20×W10	0.60	0.20

\* SUGGESTED SIZE OF WELDED WIRE FABRIC

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

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. 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-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WC×WD	STEEL AREA ( IN. <sup>2</sup> /FT. )	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
10.0	96	96	8	WWF 3×4-W8×W4	0.32	0.12	WWF 3×3-W8×W4	0.32	0.16
13.0	96	96	8	WWF 3×4-W10×W4	0.40	0.12	WWF 3×3-W10×W4	0.40	0.16
15.0	96	96	8	WWF 3×12-W12×W12	0.48	0.12	WWF 3×6-W12×W8	0.48	0.16
18.0	96	96	8	WWF 4×12-W20×W12	0.60	0.12	WWF 4×6-W20×W10	0.60	0.20
23.0	96	96	10	WWF 4×12-W20×W12	0.60	0.12	WWF 4×6-W20×W10	0.60	0.20
27.0	96	96	12	WWF 4×12-W20×W12	0.60	0.12	WWF 4×6-W20×W12	0.60	0.24
28.0	96	96	14	WWF 4×12-W20×W12	0.60	0.12	WWF 4×3-W20×W8	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 )

RECOMMENDED FEB. 19, 2021  
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD  
A = SPACING OF HORIZONTAL WIRES ( SH ) , IN.  
B = SPACING OF VERTICAL WIRES ( Sv ) , IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

NOTES:

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

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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	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

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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	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  
DEPARTMENT OF TRANSPORTATION  
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INLET BOXES  
  
PRECAST INLET BOXES  
DESIGN TABLES - 4  
( WELDED WIRE FABRIC )

RECOMMENDED FEB. 19, 2021  
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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. ) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD	STEEL AREA ( IN. <sup>2</sup> /FT. )		WELDED WIRE FABRIC *WWF AxB-WCxD	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-WCxD  
A = SPACING OF HORIZONTAL WIRES (SH) , IN.  
B = SPACING OF VERTICAL WIRES (SV) , IN.  
C = HORIZONTAL WIRE SIZE  
D = VERTICAL WIRE SIZE

NOTES:

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

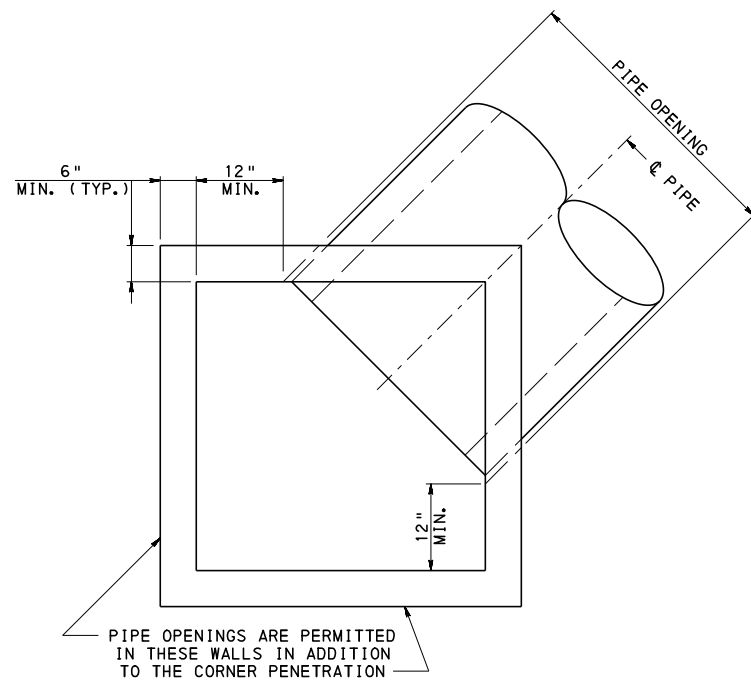
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

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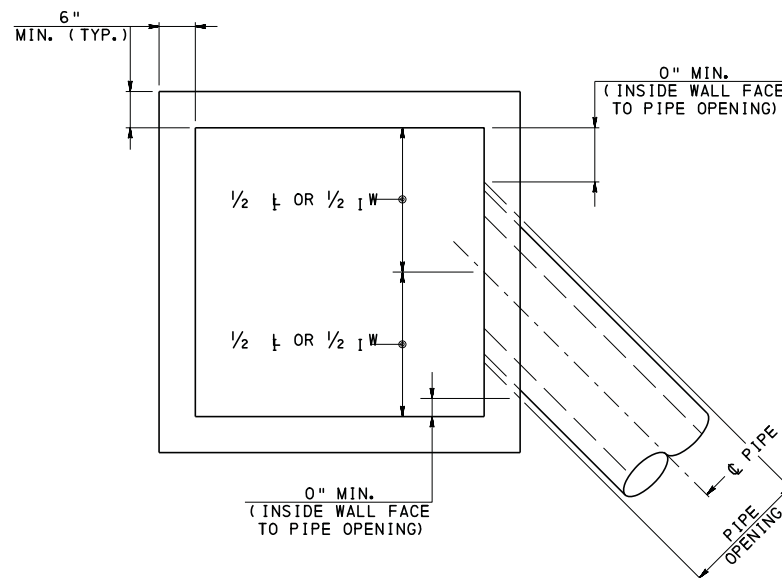
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RC-46M



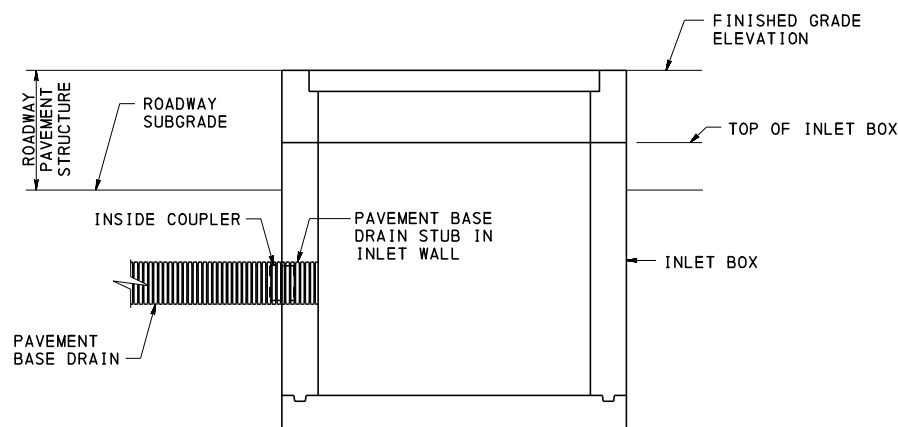
### DETAIL FOR CORNER PIPE

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

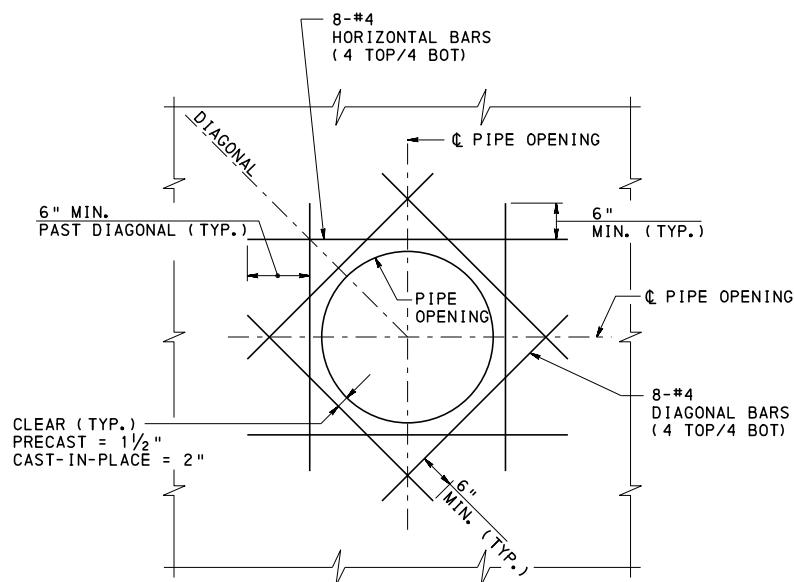


### DETAIL FOR SKEWED PIPE

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



### OPTIONAL CONNECTION DETAIL FOR PAVEMENT BASE DRAIN



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

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

### NOTES:

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

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INLET BOXES  
MISCELLANEOUS DETAILS

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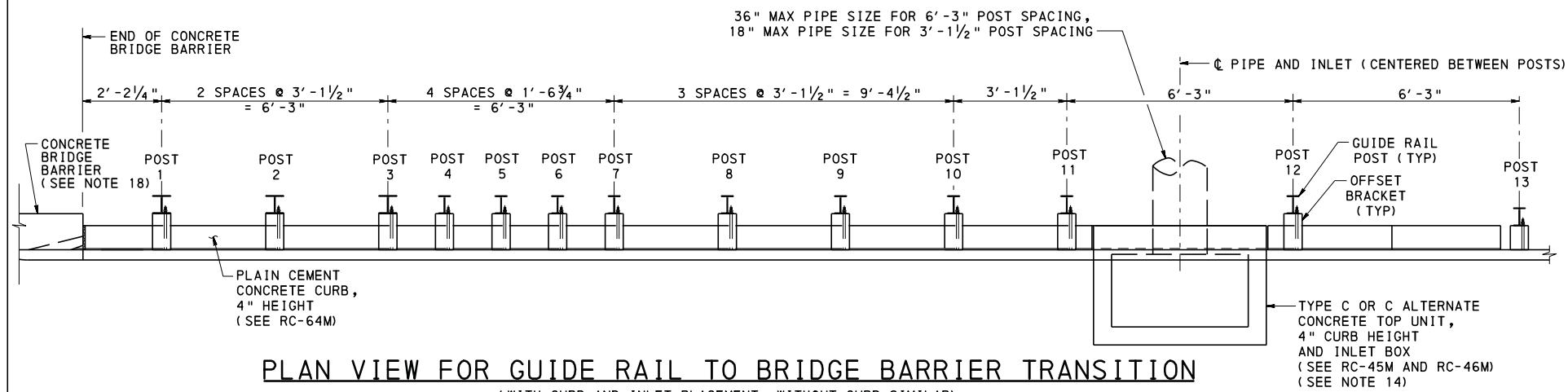
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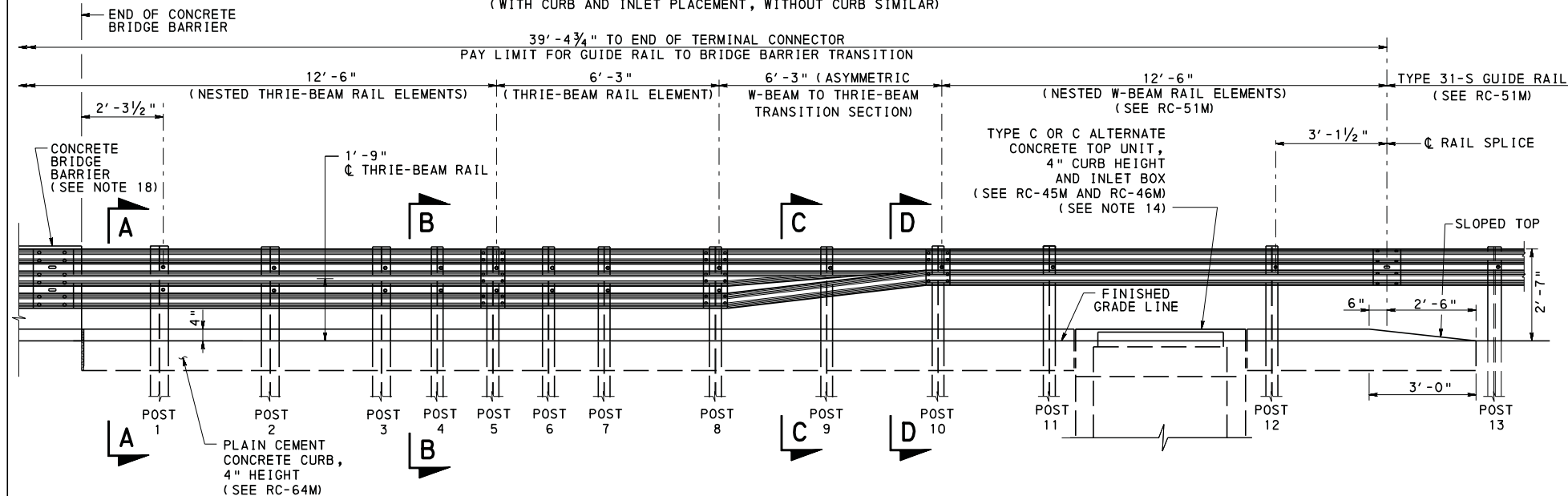
SHT 34 OF 34

RC-46M

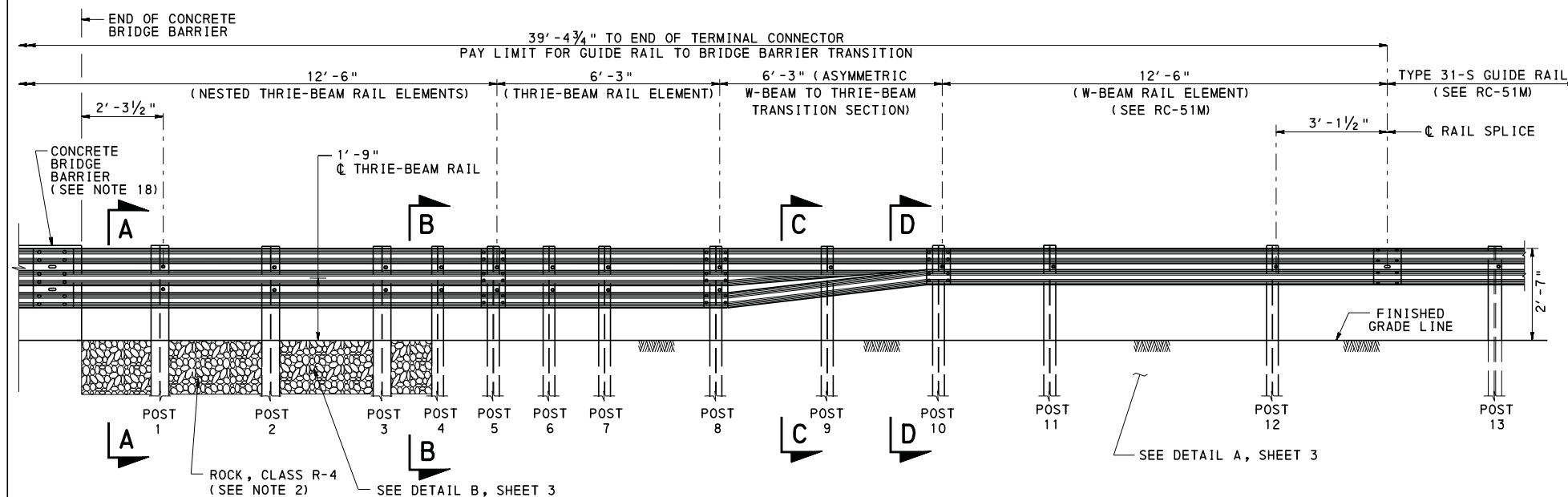


PLAN VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION

(WITH CURB AND INLET PLACEMENT, WITHOUT CURB SIMILAR)



ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITH CURB AND INLET



ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITHOUT CURB

NOTES:

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 620.
2. PLACE ROCK, CLASS R-4 WITH A NOMINAL THICKNESS OF 18" TO PROTECT EMBANKMENT MATERIAL FROM EROSION BEHIND GUIDE RAIL POSTS WITHOUT CURB.
3. THRIE-BEAM AND W-BEAM RAIL ELEMENTS ARE BOLTED TO ALL POSTS.
4. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
5. REINFORCED CONCRETE BARRIERS AND BRIDGE RAILINGS ARE BRIDGE ITEMS.
6. TERMINAL CONNECTOR MUST BE ATTACHED FLUSH WITH BRIDGE BARRIER.
7. GALVANIZE ALL HARDWARE, W-BEAM RAIL ELEMENTS, THRIE-BEAM RAIL ELEMENTS, W-BEAM TO THRIE-BEAM TRANSITION SECTION, TERMINAL CONNECTORS, ANGLES, PLATES, BOLTS AND ANY OTHER FABRICATED STEEL COMPONENTS.
8. SEE RC-51M FOR DETAILS AND HARDWARE NOT SHOWN.
9. PROVIDE STEEL POST SIZE AND LENGTH AS SHOWN IN TABLE A.
10. ON UNDIVIDED HIGHWAYS WITH TWO-LANE TRAFFIC, BOTH THE ADJACENT TRAFFIC AND OPPOSING TRAFFIC COULD IMPACT THE GUIDE RAIL ENDS. THEREFORE, IF EITHER OF THE ENDS ARE WITHIN THE CLEAR ZONE AND/OR LIKELY TO BE HIT BY AN ERRANT VEHICLE, A CRASHWORTHY END TREATMENT IS REQUIRED. REGARDLESS IF CRASHWORTHY END TREATMENTS ARE REQUIRED, BOTH GUIDE RAIL ENDS STILL REQUIRE APPROVED END TREATMENTS IN ORDER TO ANCHOR THE SYSTEM. ON DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF BARRIERS UNLESS WARRANTED BY THE LENGTH OF NEED OR OTHER OBSTRUCTIONS.
11. AN INSTALLATION HEIGHT TOLERANCE OF PLUS 1" FOR THE W-BEAM OR THRIE-BEAM GUIDE RAIL SECTIONS IS PERMITTED.
12. PAYMENT FOR THE GUIDE RAIL TO BRIDGE BARRIER TRANSITION, WITHOUT CURB, WITH CURB AND INLET OR WITH CURB AND INLET NEAR BRIDGE BARRIER, INCLUDES ALL RAIL ELEMENTS, FABRICATED STRUCTURAL STEEL, TERMINAL CONNECTION, BOLTS, POSTS, OFFSET BRACKETS, CLASS A CEMENT CONCRETE FOR CURB INCLUDING SLOPED END SECTION, AND ASSOCIATED HARDWARE. GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS ARE ROADWAY ITEMS.
13. PROVIDE CONNECTION PLATES IN ACCORDANCE WITH AASHTO M270 (ASTM A709) GRADE 36. PROVIDE BOLTS, NUTS AND WASHERS AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(c).
14. THE INLET TOP AND INLET BOX IS PERMITTED BETWEEN POSTS 7 & 8, 8 & 9, 9 & 10, AND 11 & 12. THE PREFERRED LOCATION IS BETWEEN POSTS 11 AND 12.
15. IF THE CURB IS REQUIRED BEYOND POST 4, THEN THE CURB MUST EXTEND 2'-6" BEYOND THE CENTERLINE OF THE RAIL SPLICE AT THE BEGINNING OF THE TYPE 31-S GUIDE RAIL.
16. THE INLET TOP AND INLET BOX IS PERMITTED BETWEEN POSTS 1 & 2 OR 2 & 3.
17. SEE SHEET 3 FOR SECTIONS A-A, B-B, C-C AND D-D.
18. CONCRETE BRIDGE BARRIER SHOWN. PA TYPE 10M BRIDGE BARRIER AND PA BRIDGE BARRIER SIMILAR.
19. IF SIDEWALK IS PROVIDED, BARRIER HEIGHT IS MEASURED FROM THE TOP OF THE SIDEWALK TO TOP OF THE BARRIER.

TABLE A		
POST	LENGTH	SIZE
1 THRU 3	7'-0"	W6x15
4 THRU 12	6'-0"	W6x9 OR W6x8.5

COMMONWEALTH OF PENNSYLVANIA  
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GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

GUIDE RAIL TRANSITIONS - 1

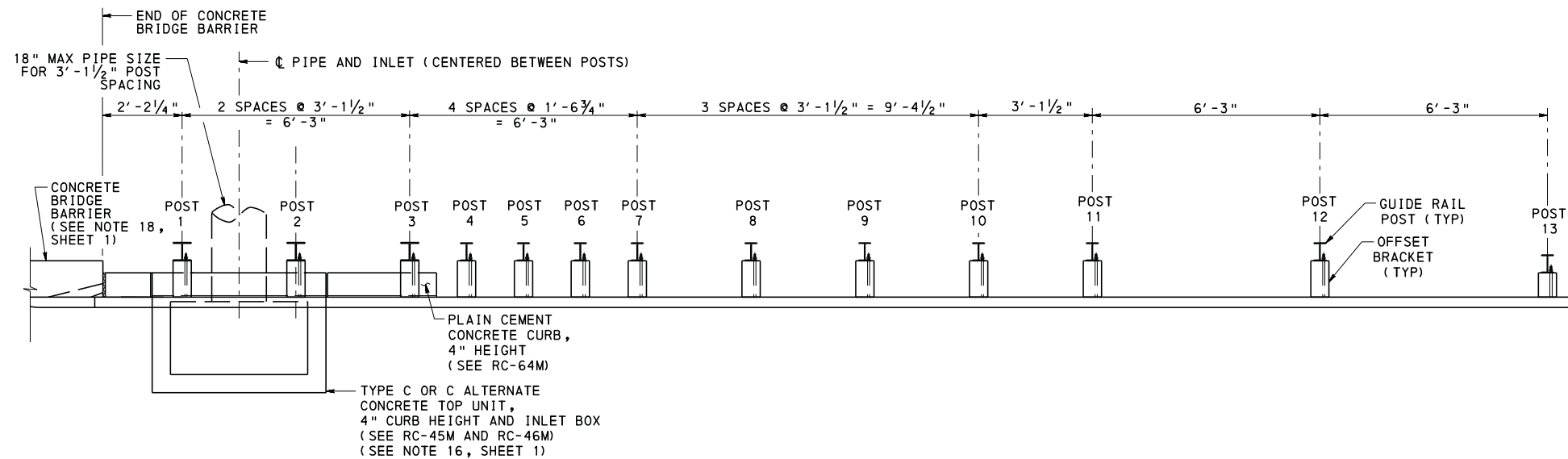
RC-45M	INLET TOPS, GRATES, AND FRAMES
RC-46M	INLET BOXES
RC-51M	TYPE 31 STRONG POST GUIDE RAIL
RC-64M	CURBS AND GUTTERS
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
REFERENCE DRAWINGS	

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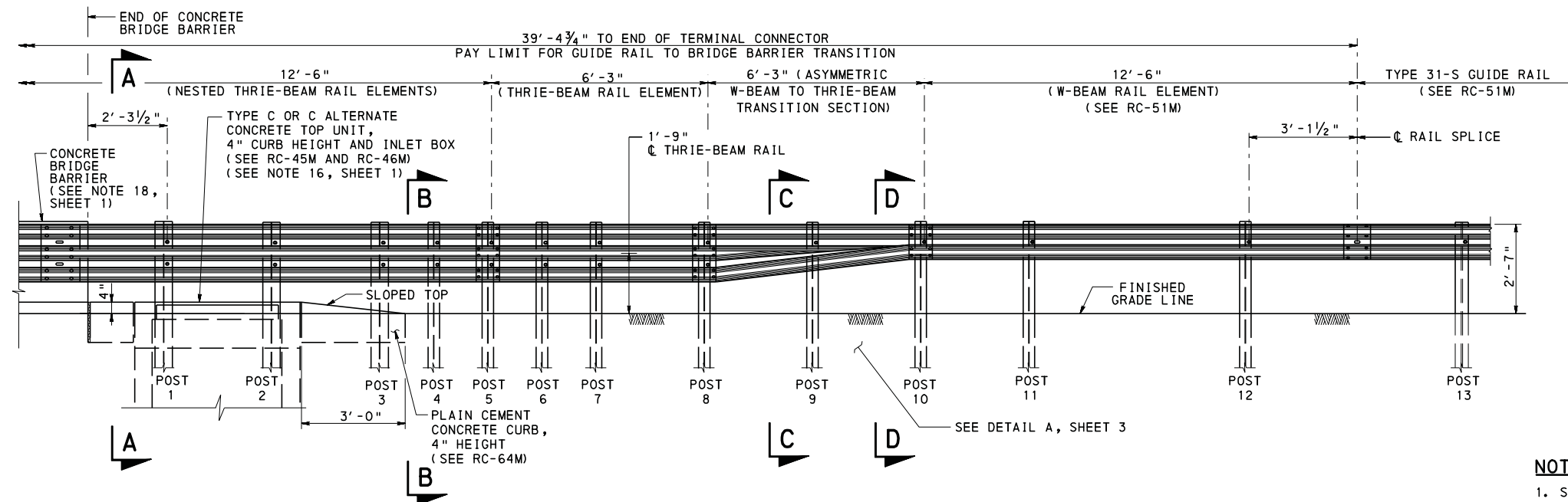
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SHT 1 OF 12

RC-50M



**PLAN VIEW FOR GUIDE RAIL TO BRIDGE BARRIER  
TRANSITION WITH CURB AND INLET NEAR BRIDGE BARRIER**

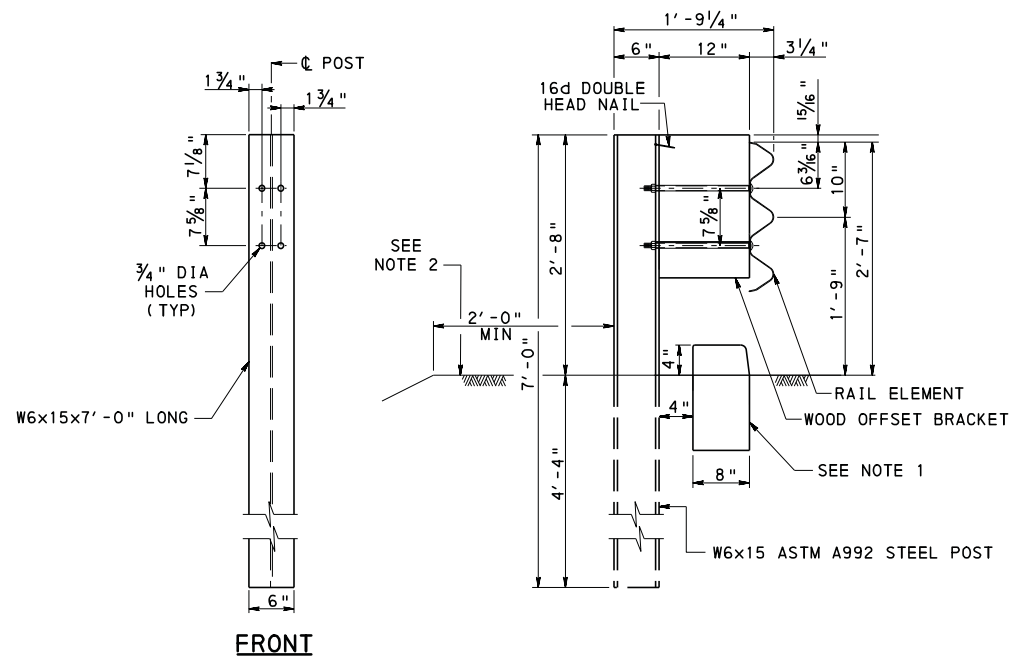


**ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER  
TRANSITION WITH CURB AND INLET NEAR BRIDGE BARRIER**

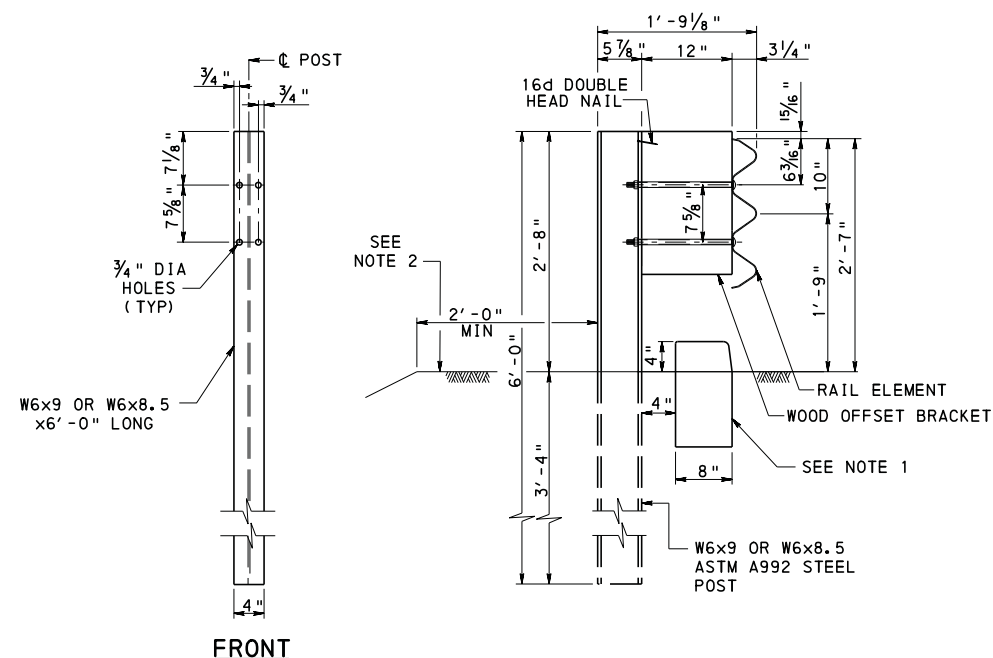
**NOTES:**

1. SEE SHEET 3 FOR SECTIONS A-A, B-B, C-C AND D-D.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

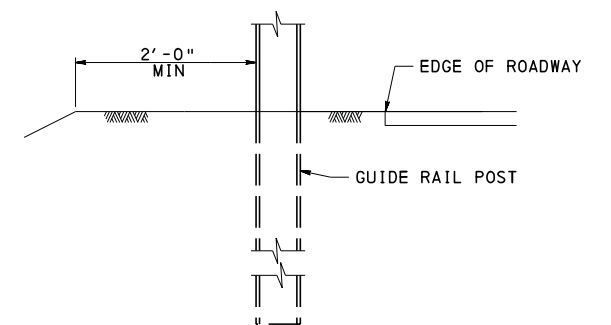
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS		
GUIDE RAIL TRANSITIONS - 2		
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**SECTION A-A**  
(POSTS 1-3) (W6x15)  
(ALSO SEE DETAIL B)

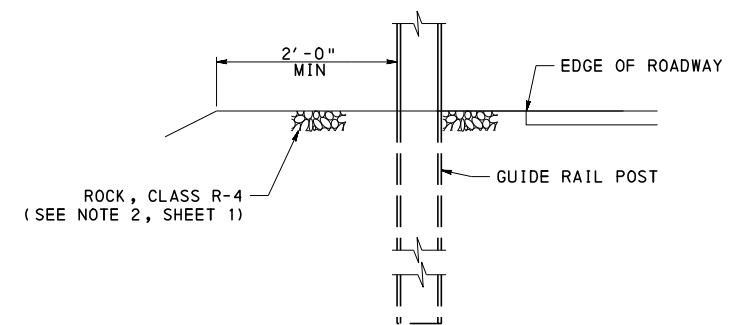


**SECTION B-B**  
(POSTS 4-8) (W6x9 OR W6x8.5)  
(ALSO SEE DETAIL A AND B)



**DETAIL A**  
(W6x9 OR W6x8.5)

(WITHOUT CURB/INLET PLACEMENT POSTS 9-12 OR BEYOND ALTERNATE INLET PLACEMENT)

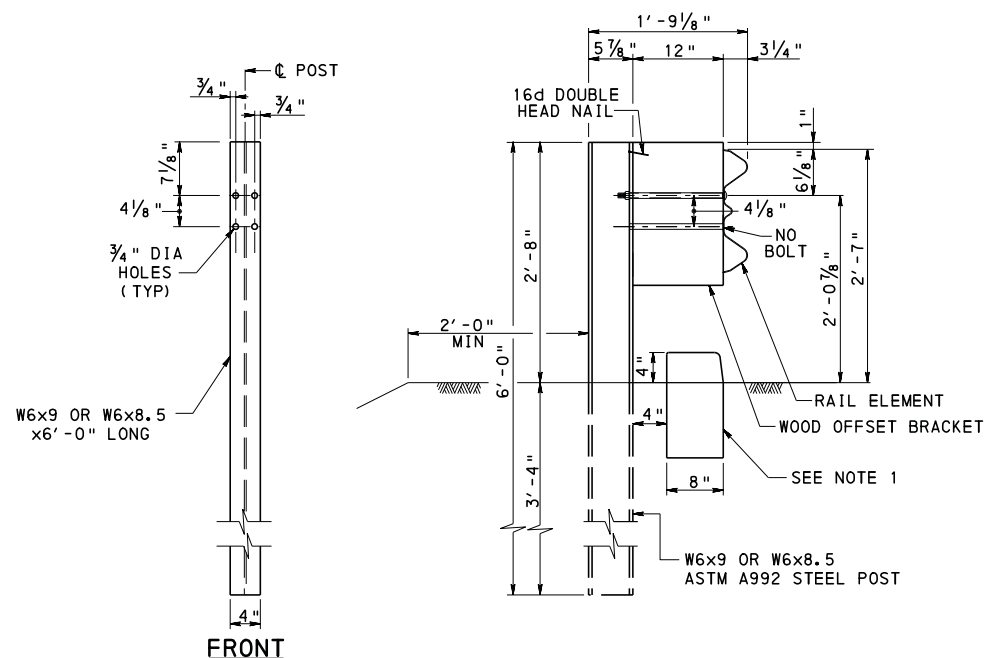


**DETAIL B**  
(W6x15, W6x9 OR W6x8.5)

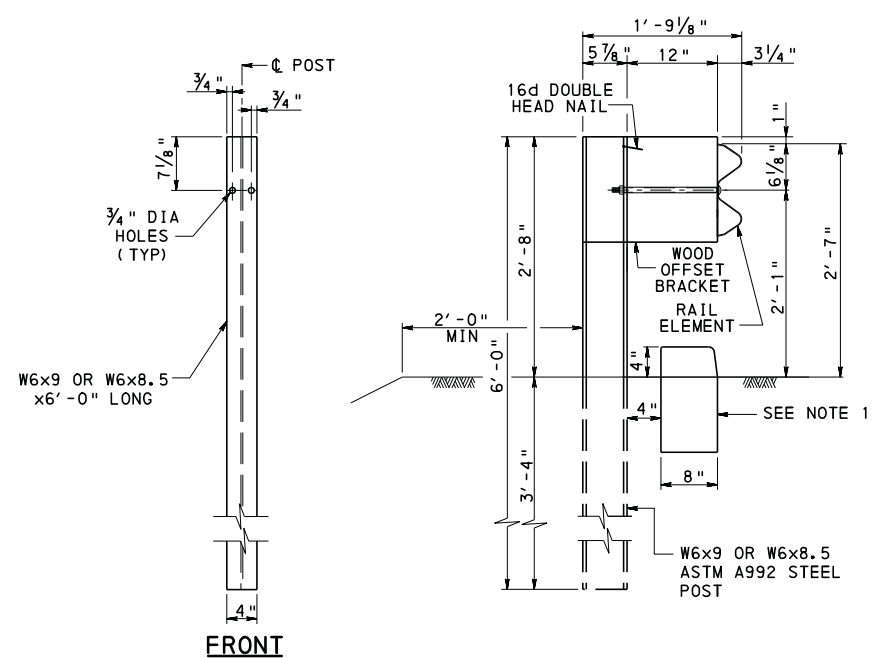
(WITHOUT CURB/INLET PLACEMENT POSTS 1-6)

**NOTES:**

1. PLAIN CEMENT CONCRETE CURB, 4" HEIGHT SHOWN. ONLY PROVIDE CURB IF REQUIRED.
2. PROVIDE ROCK, CLASS R-4 BEHIND GUIDE RAIL POSTS 1 THRU 6 WITHOUT CURB OR INLET PLACEMENT. SEE ELEVATION VIEW FOR GUIDE RAIL TO BRIDGE BARRIER TRANSITION WITHOUT INLET PLACEMENT, SHEET 1.
3. FOR SECTION A-A, B-B, C-C AND D-D LOCATION, SEE SHEETS 1 AND 2.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.



**SECTION C-C**  
(POST 9) (W6x9 OR W6x8.5)  
(ALSO SEE DETAIL A)



**SECTION D-D**  
(POSTS 10-12) (W6x9 OR W6x8.5)  
(ALSO SEE DETAIL A)

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

POST DETAILS

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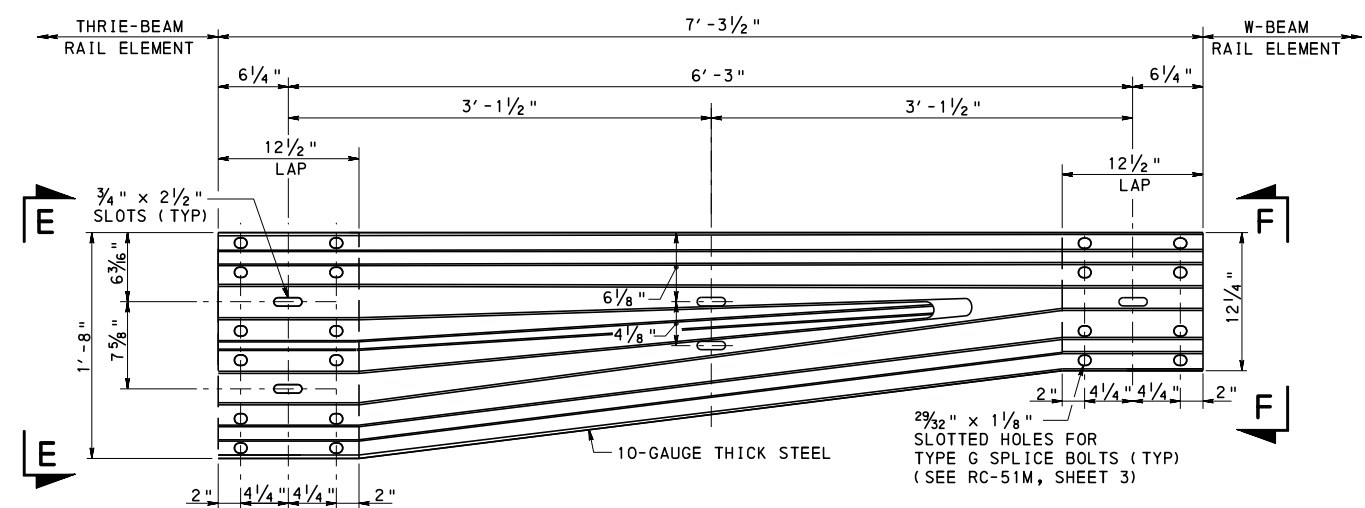
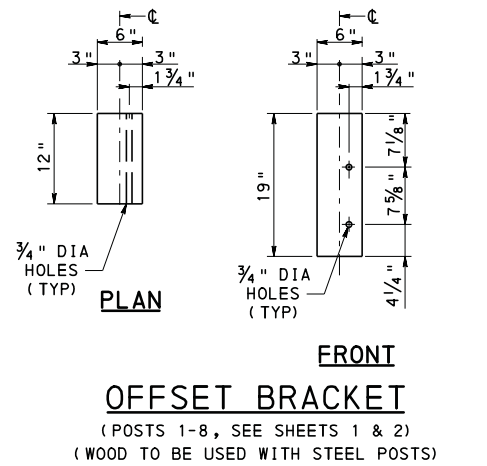
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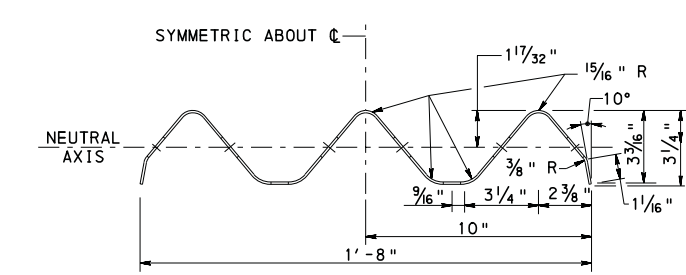
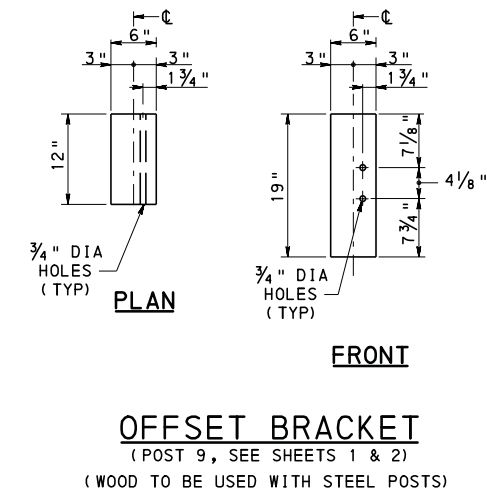
SHT 3 OF 12

RC-50M

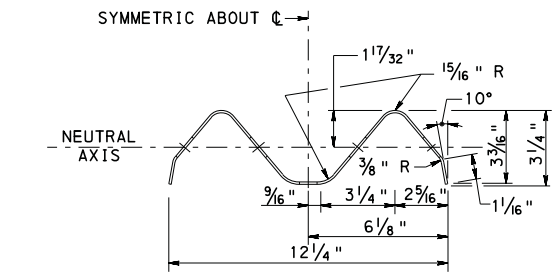




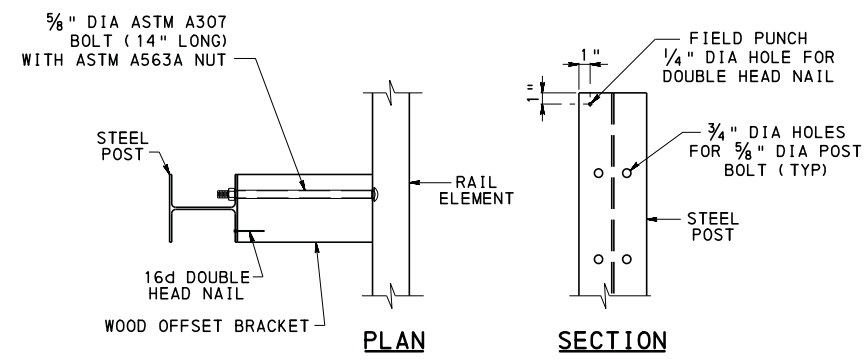
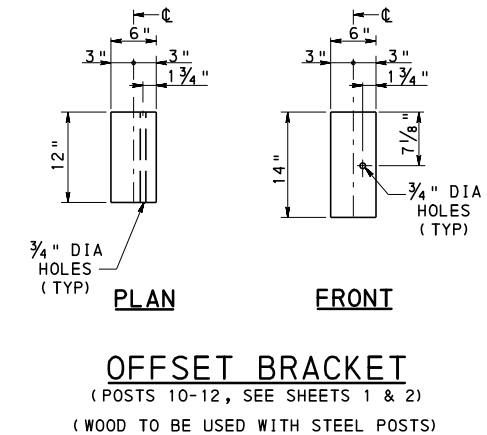
ASYMMETRIC W-BEAM TO THRIE-BEAM TRANSITION



THRIE-BEAM RAIL ELEMENT  
SECTION E-E

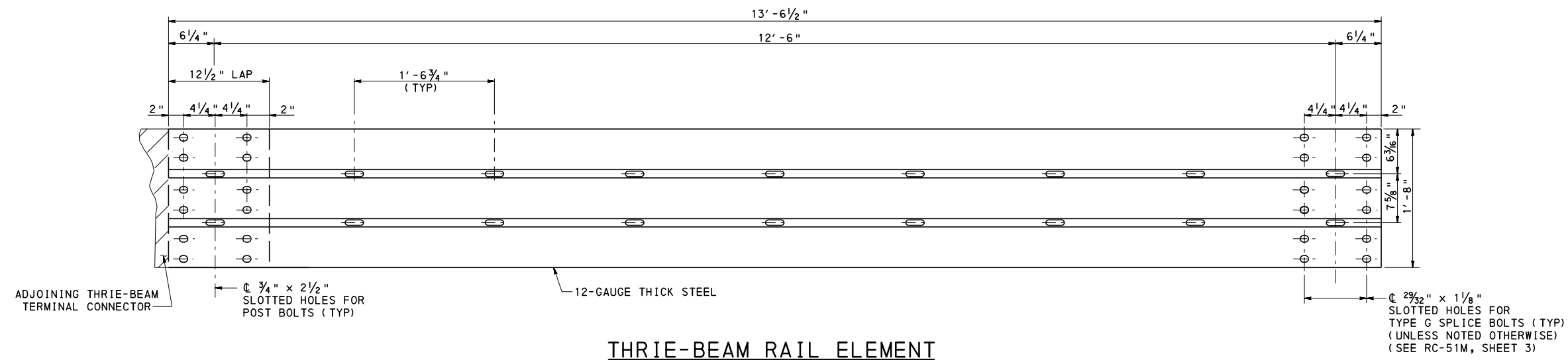


W-BEAM RAIL ELEMENT  
SECTION F-F

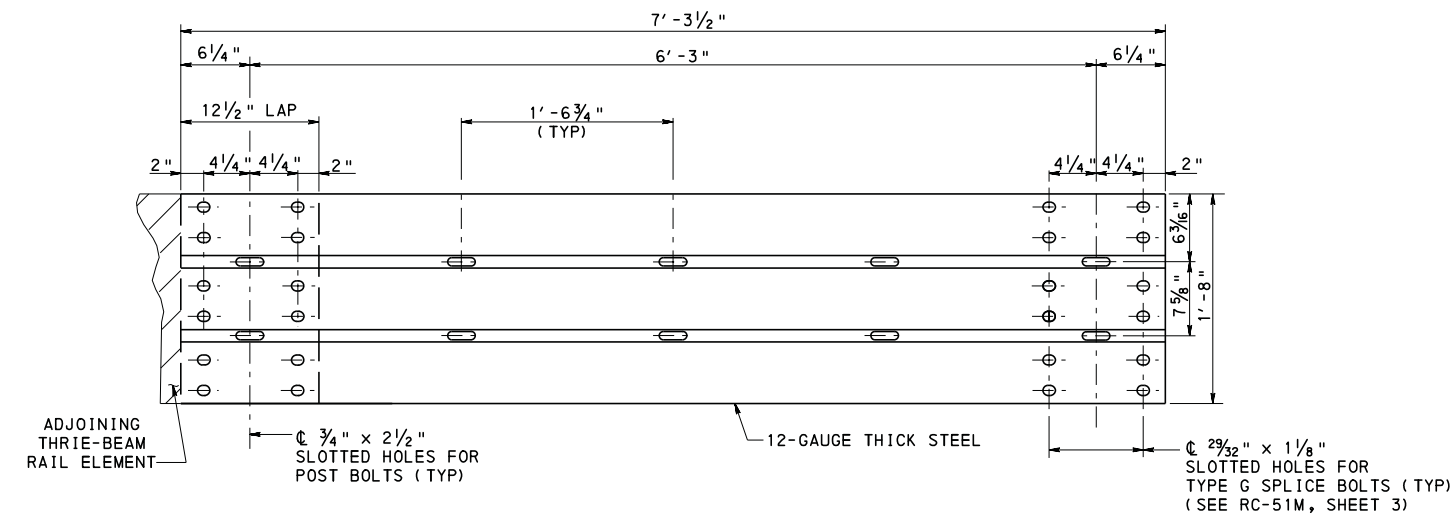


DETAIL OF POST, OFFSET BRACKET  
AND RAIL ELEMENT

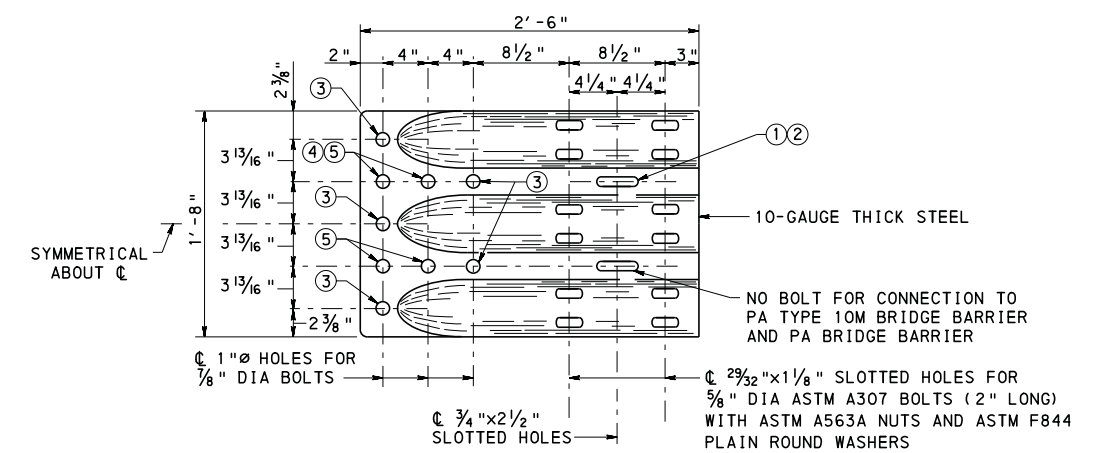
NOTES:  
1. FOR NOTES, SEE SHEET 1.



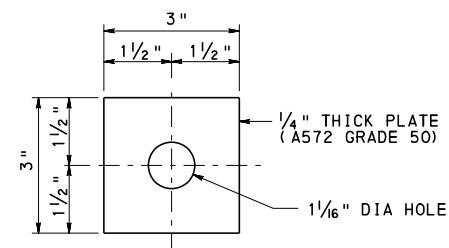
THRIE-BEAM RAIL ELEMENT



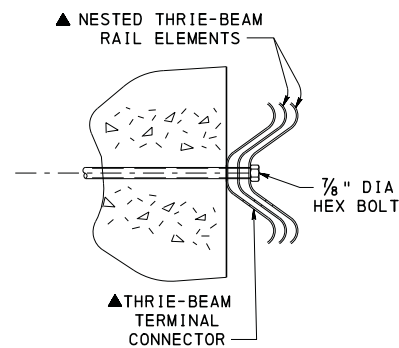
THRIE-BEAM RAIL ELEMENT



THRIE-BEAM TERMINAL CONNECTOR



SQUARE WASHER PLATE DETAIL



LAPPING OF THRIE-BEAM TERMINAL CONNECTOR

LAP THE TERMINAL CONNECTOR ON THE OUTSIDE OF THE NESTED THRIE-BEAM RAIL ELEMENTS FOR ATTACHMENTS ON THE TRAILING END OF A BRIDGE.

LEGEND:

- FOR PA TYPE 10M BRIDGE BARRIER, PROVIDE 5/8" DIA ASTM F3125 GRADE A325 BOLT WITH ASTM A563DH NUT. TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER BOLT IN THE SLOTTED HOLE.
- FOR PA BRIDGE BARRIER, PROVIDE 5/8" DIA TYPE G SPLICE BOLT (SEE RC-51M, SHEET 3) WITH LOCK NUT OR DOUBLE NUT. TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER BOLT IN SLOTTED HOLE.
- STANDARD HOLE LOCATIONS.
- ADDITIONAL HOLE FOR PA TYPE 10M BRIDGE BARRIER CONNECTION.
- ADDITIONAL HOLE FOR PA BRIDGE BARRIER CONNECTION.

NOTES:

- FOR NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

RAIL ELEMENT DETAILS

RECOMMENDED FEB. 19, 2021

CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

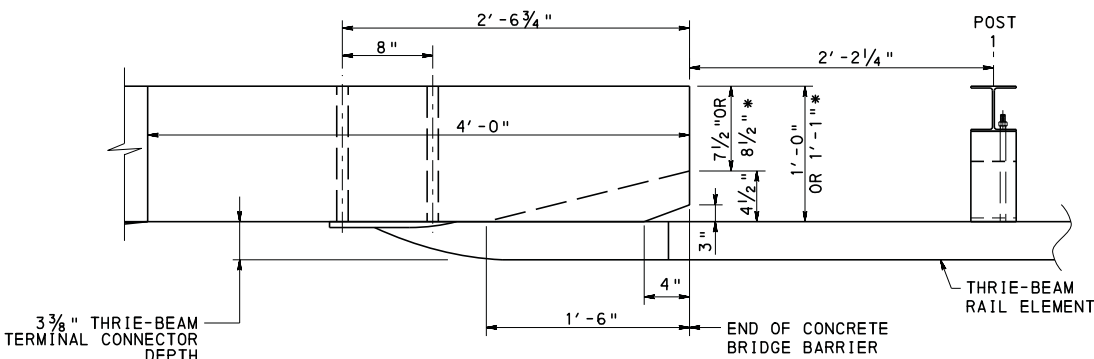
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 5 OF 12

RC-50M

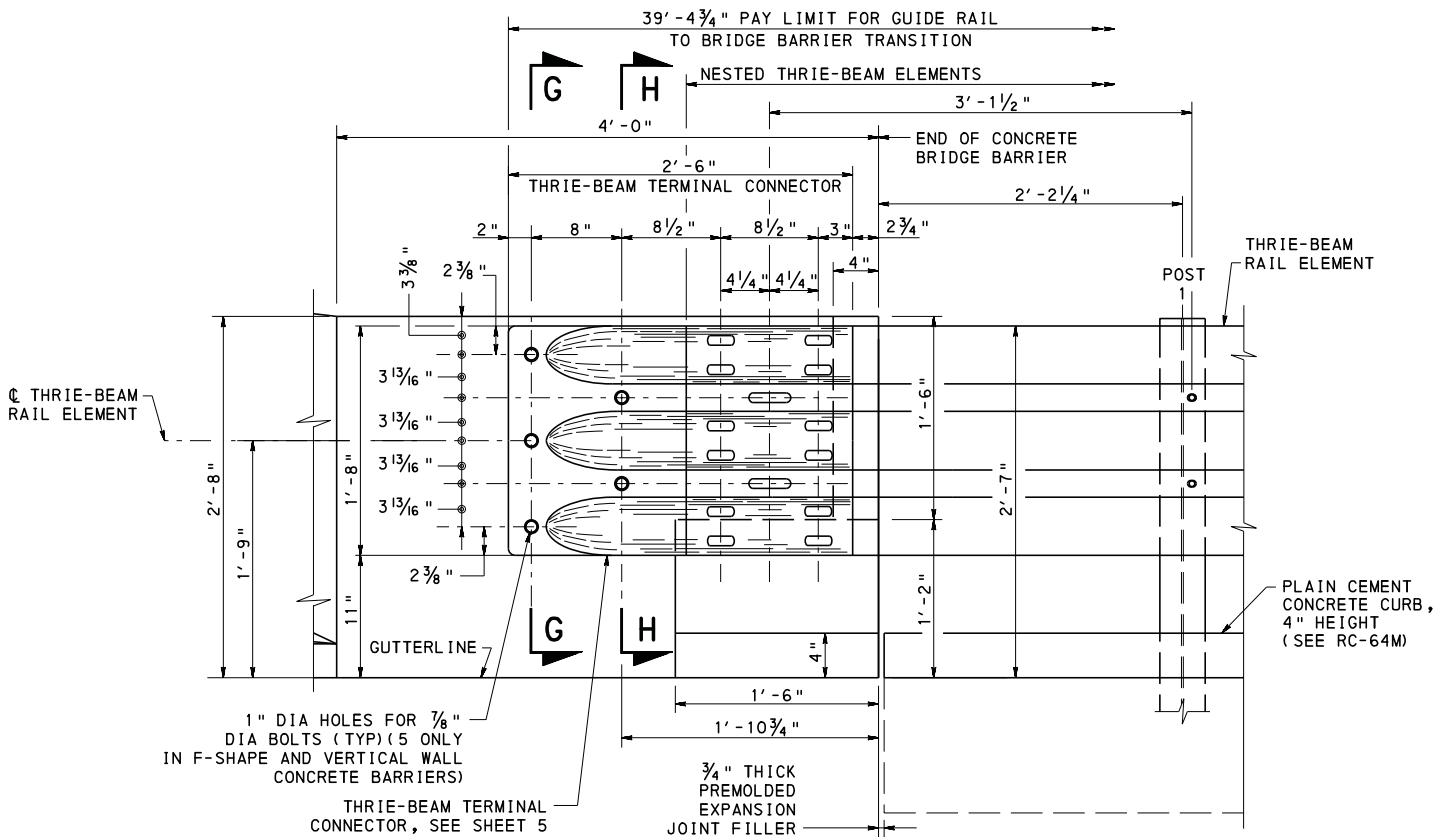


PLAN VIEW TERMINAL CONNECTOR DETAIL  
(FOR TERMINAL CONNECTOR DETAIL, SEE SHEET 5)

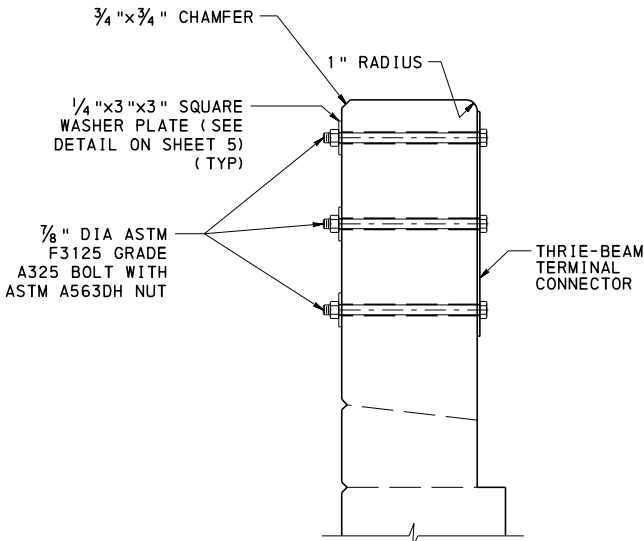


\* DIMENSIONS FOR 32" F-SHAPE CONCRETE BARRIER

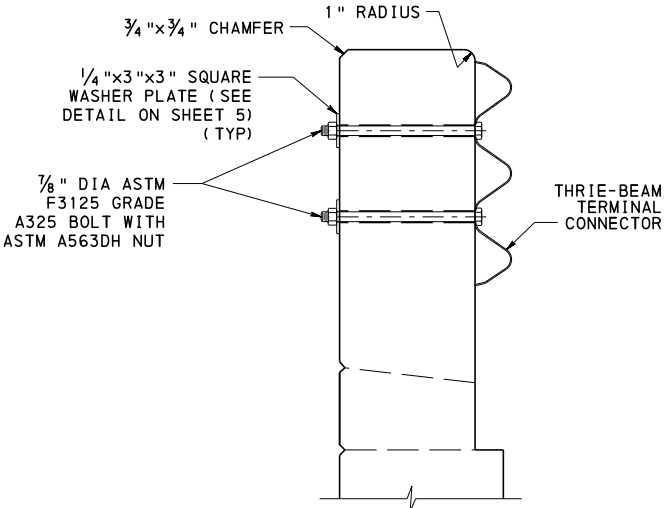
PLAN VIEW FOR THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER



ELEVATION VIEW FOR THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER  
(WITH CURB SHOWN, WITHOUT CURB SIMILAR)



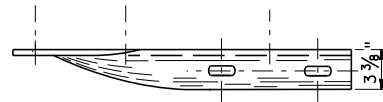
SECTION G-G



SECTION H-H

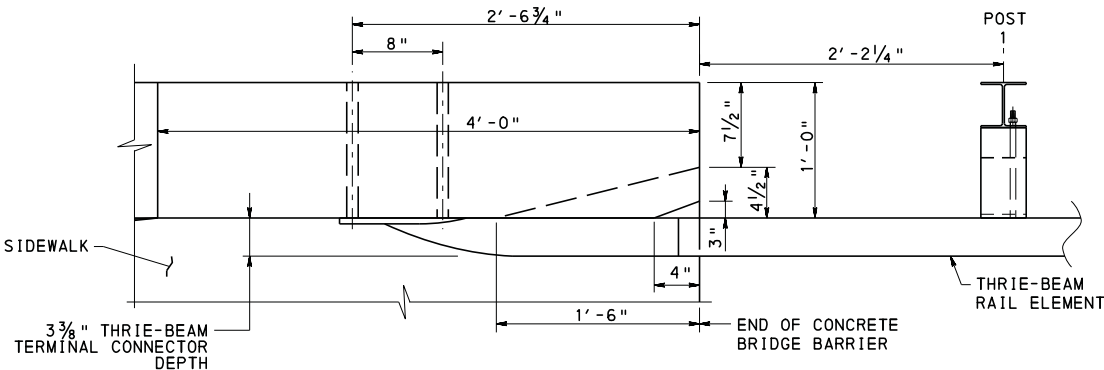
- NOTES:**
1. FOR TRANSITION POST DETAILS, SEE SHEET 3.
  2. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  THRIE-BEAM TO F-SHAPE AND VERTICAL WALL CONCRETE BRIDGE BARRIER DETAILS		
RECOMMENDED FEB. 19, 2021 <i>Chait &amp; Sp</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Burns &amp; Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 6 OF 12 RC-50M

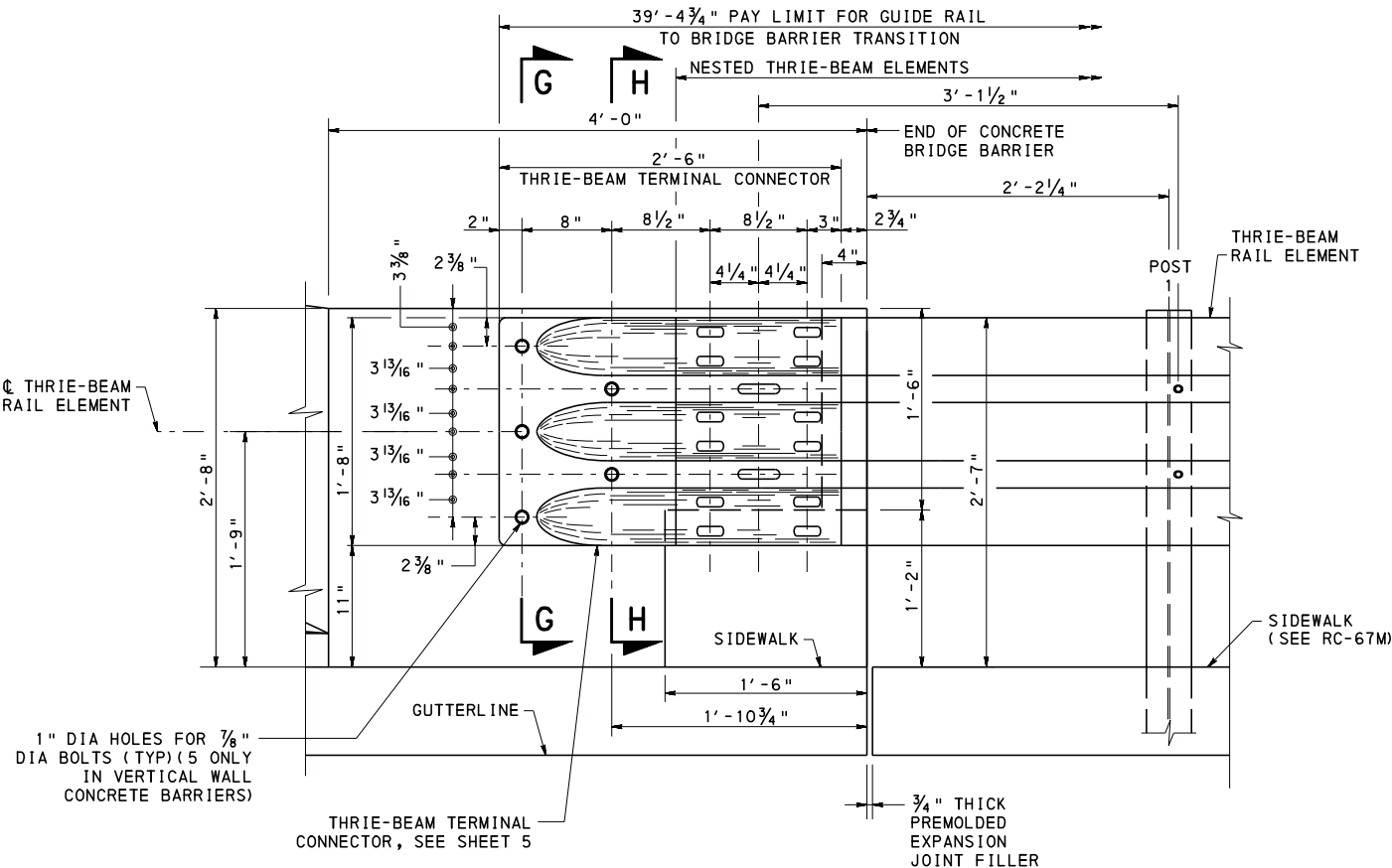


**PLAN VIEW TERMINAL CONNECTOR DETAIL**

(FOR TERMINAL CONNECTOR DETAIL, SEE SHEET 5)



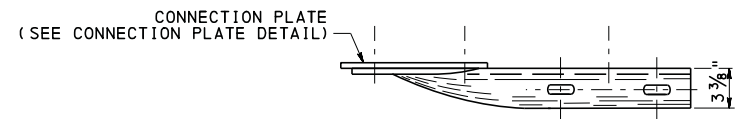
**PLAN VIEW FOR THRIE-BEAM TO 42" VERTICAL WALL  
CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK**



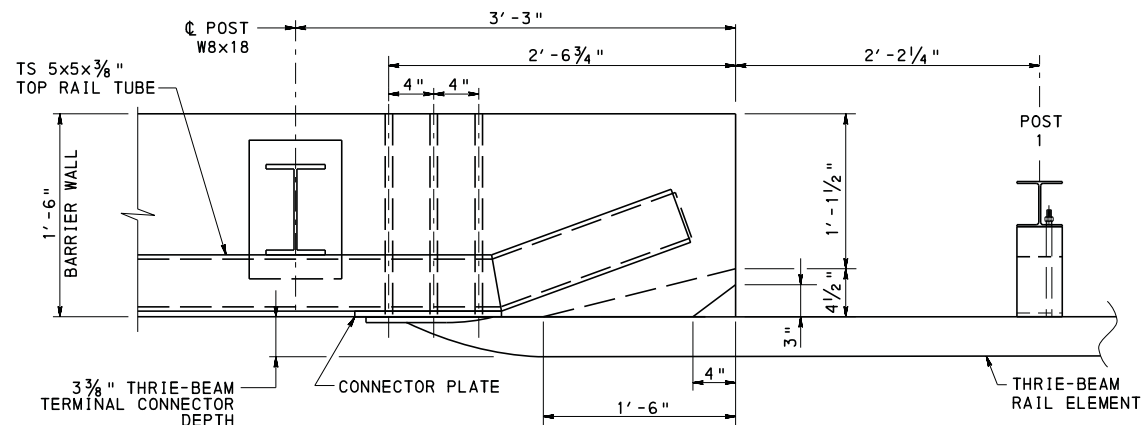
**ELEVATION VIEW FOR THRIE-BEAM TO 42" VERTICAL WALL  
CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK**

- NOTES:**
1. FOR TRANSITION POST DETAILS, SEE SHEET 3.
  2. FOR SECTION G-G AND H-H, SEE SHEET 6.
  3. FOR ADDITIONAL NOTES, SEE SHEET 1.

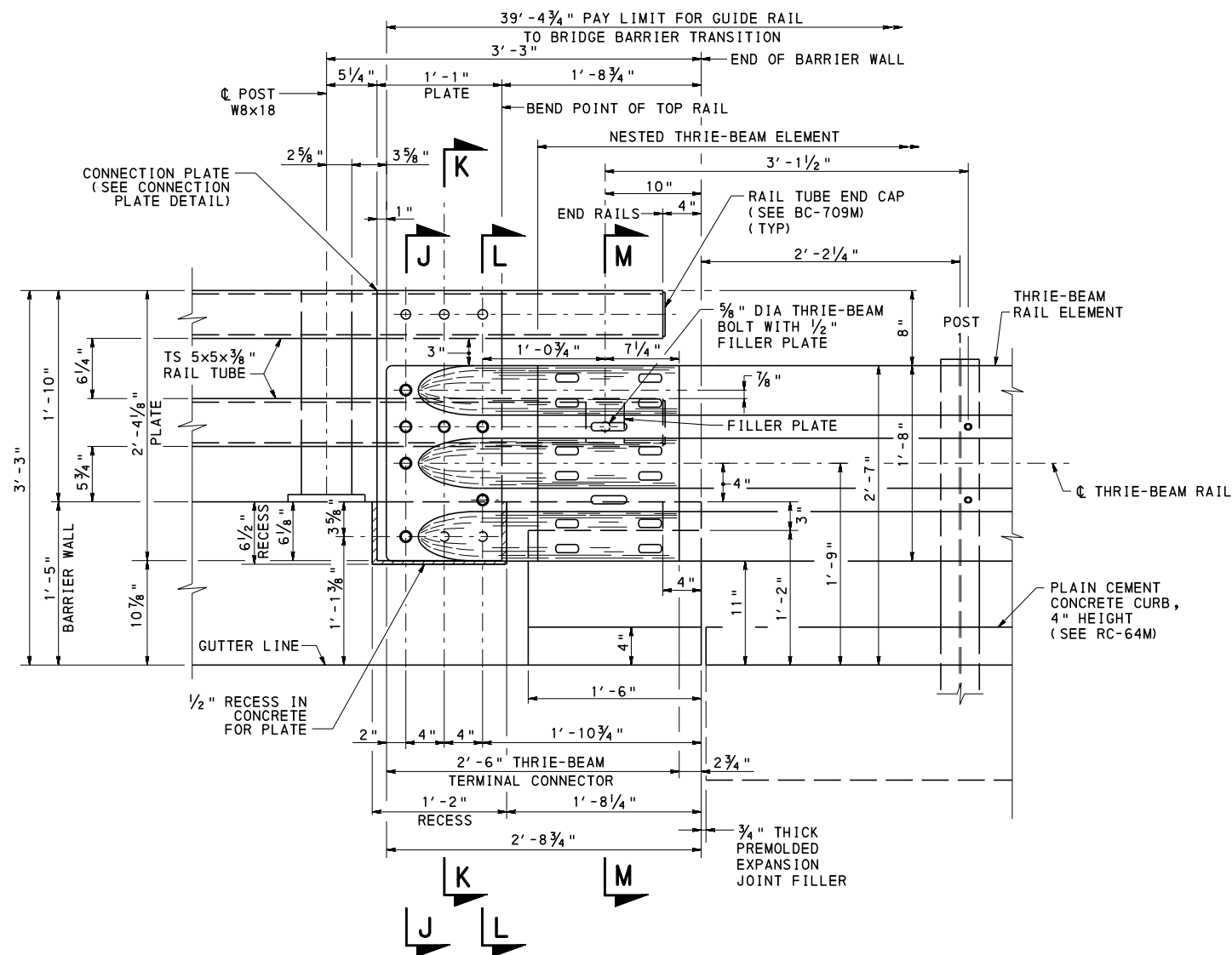
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS		
THRIE-BEAM TO 42" VERTICAL WALL CONCRETE BRIDGE BARRIER WITH ALTERNATE SIDEWALK DETAILS		
RECOMMENDED FEB. 19, 2021 <i>Chait &amp; Sp</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Burns &amp; Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 7 OF 12 RC-50M



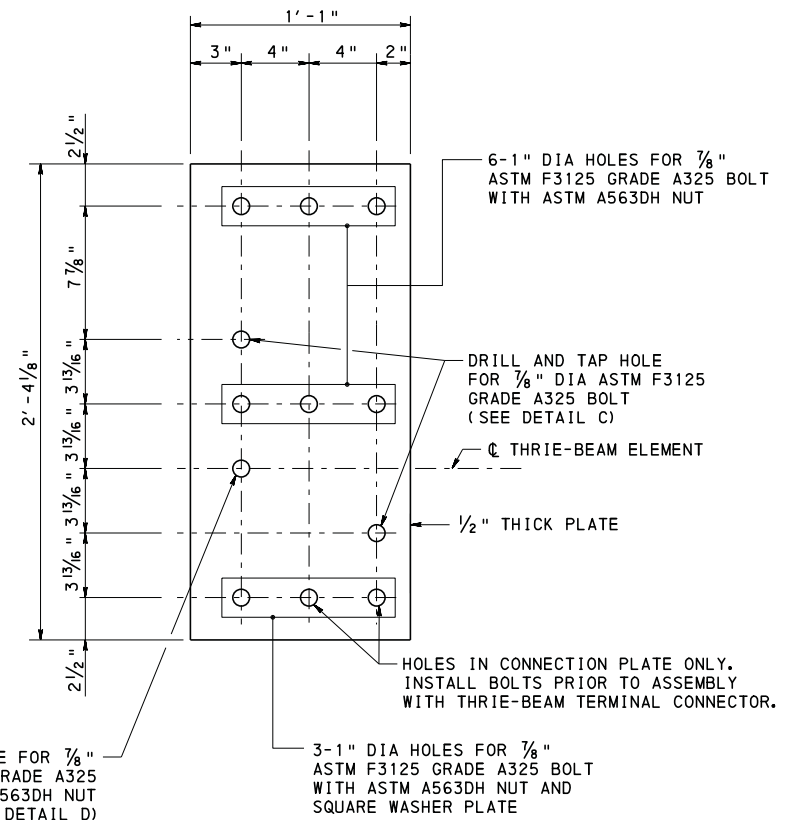
PLAN VIEW TERMINAL CONNECTOR DETAIL  
(FOR TERMINAL CONNECTOR DETAIL, SEE SHEET 5)



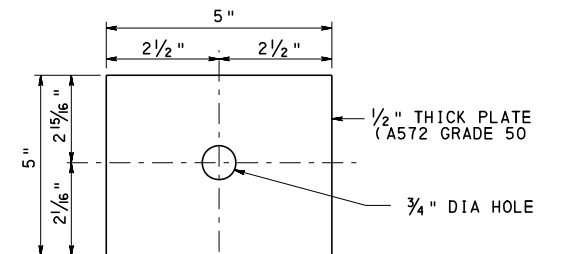
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



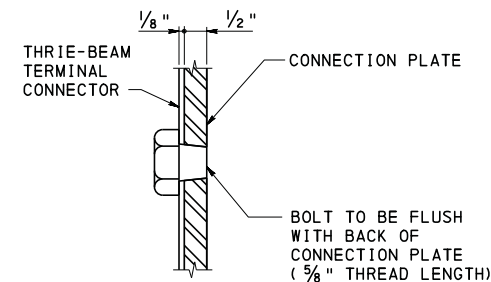
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER  
(WITH CURB SHOWN, WITHOUT CURB SIMILAR)



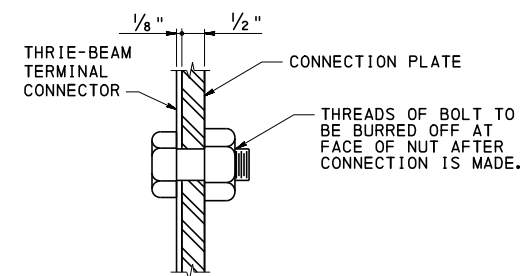
CONNECTION PLATE DETAIL



FILLER PLATE DETAIL



DETAIL C



DETAIL D

NOTES:

1. FOR TRANSITION POST DETAILS, SEE SHEET 3.
2. FOR SECTIONS J-J, K-K, L-L, M-M SEE SHEET 9.
3. SEE BC-709M FOR PA TYPE 10M BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
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 DETAILS

RECOMMENDED FEB. 19, 2021

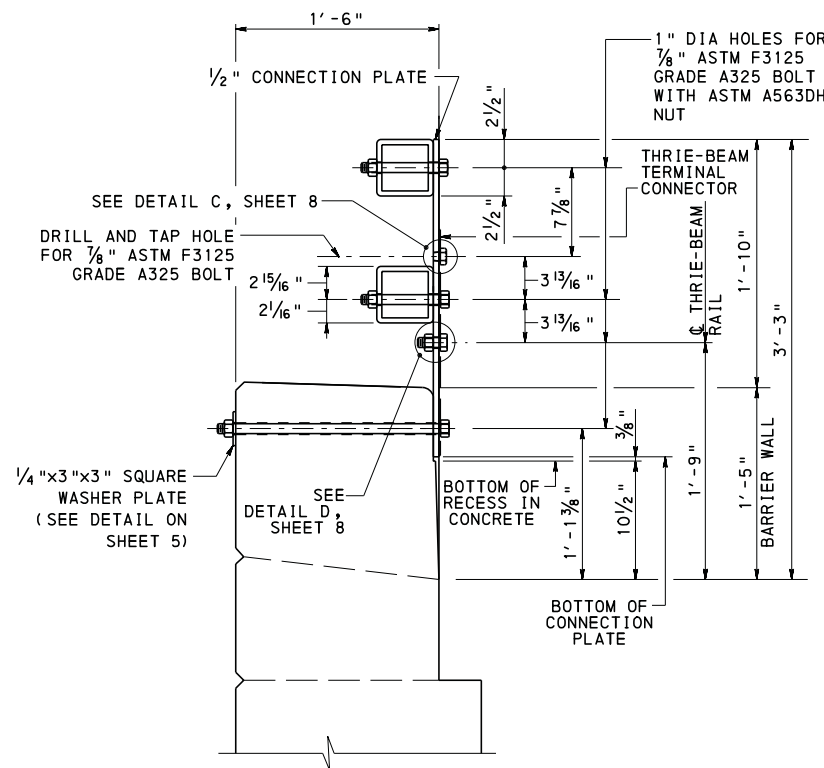
*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

*Burns & Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

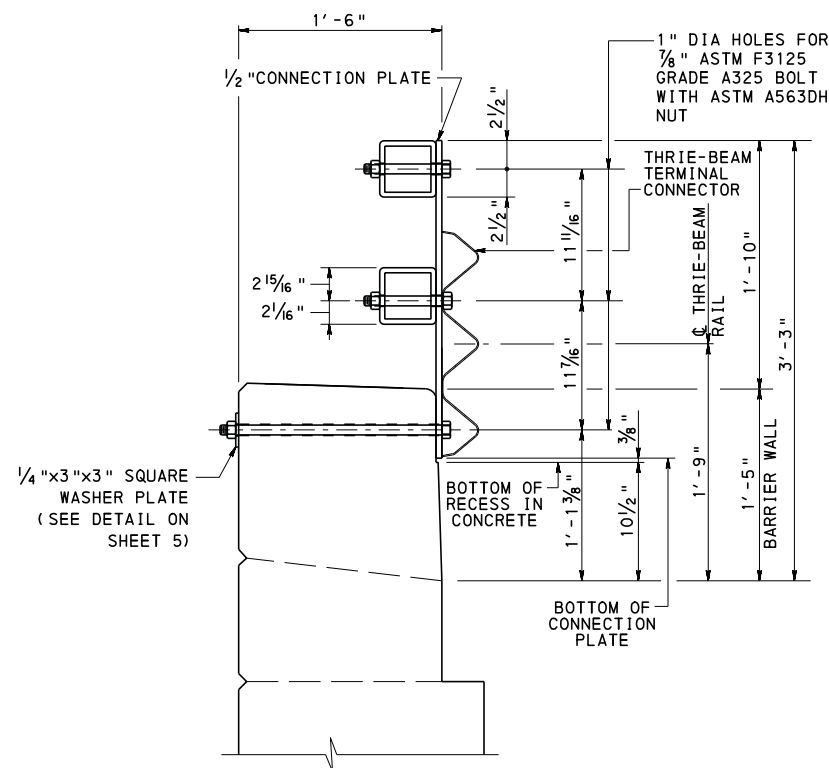
SHT 8 OF 12

RC-50M



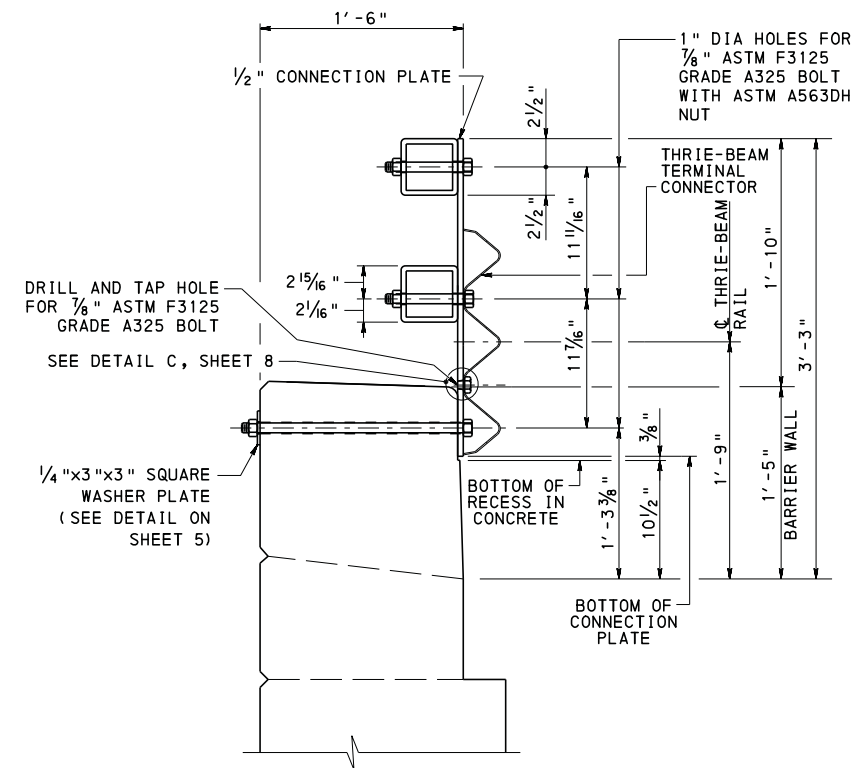
**SECTION J-J**

(CURB AND END CHAMFERS NOT SHOWN)



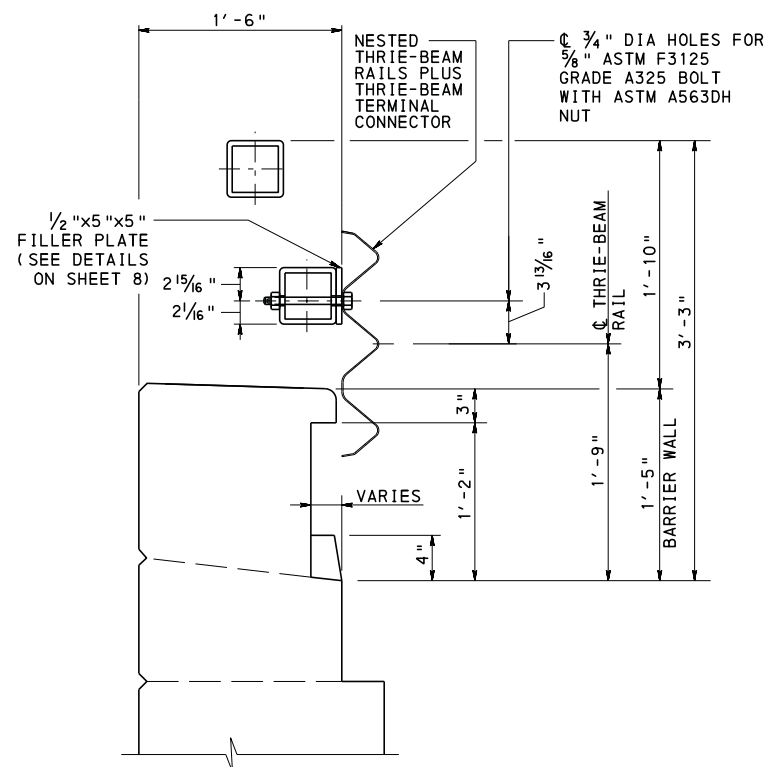
**SECTION K-K**

(CURB AND END CHAMFERS NOT SHOWN)



**SECTION L-L**

(CURB AND END CHAMFERS NOT SHOWN)



**SECTION M-M**

(WITH CURB SHOWN, WITHOUT CURB SIMILAR)

**NOTES:**

1. FOR SECTION J-J, K-K, L-L, M-M LOCATION, SEE SHEET 8.
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 DETAILS

RECOMMENDED FEB. 19, 2021

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CHIEF, HWY. DELIVERY DIVISION

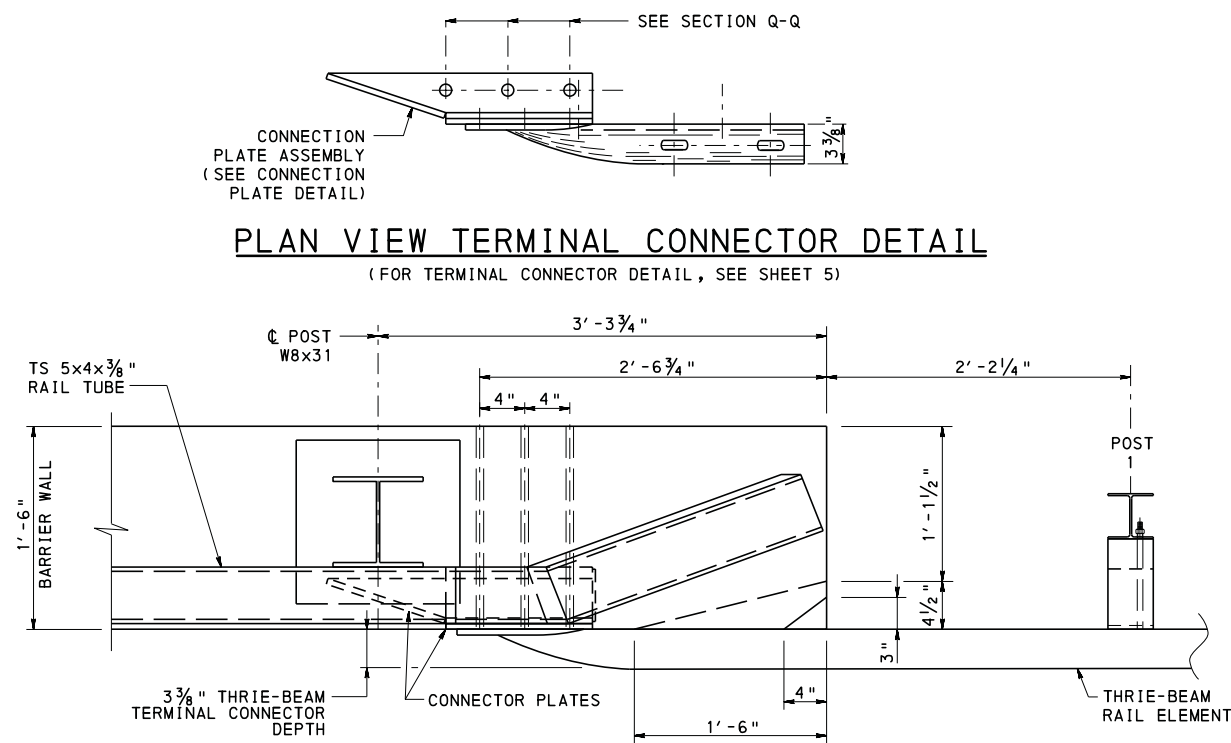
RECOMMENDED FEB. 19, 2021

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DIRECTOR, BUREAU OF PROJECT DELIVERY

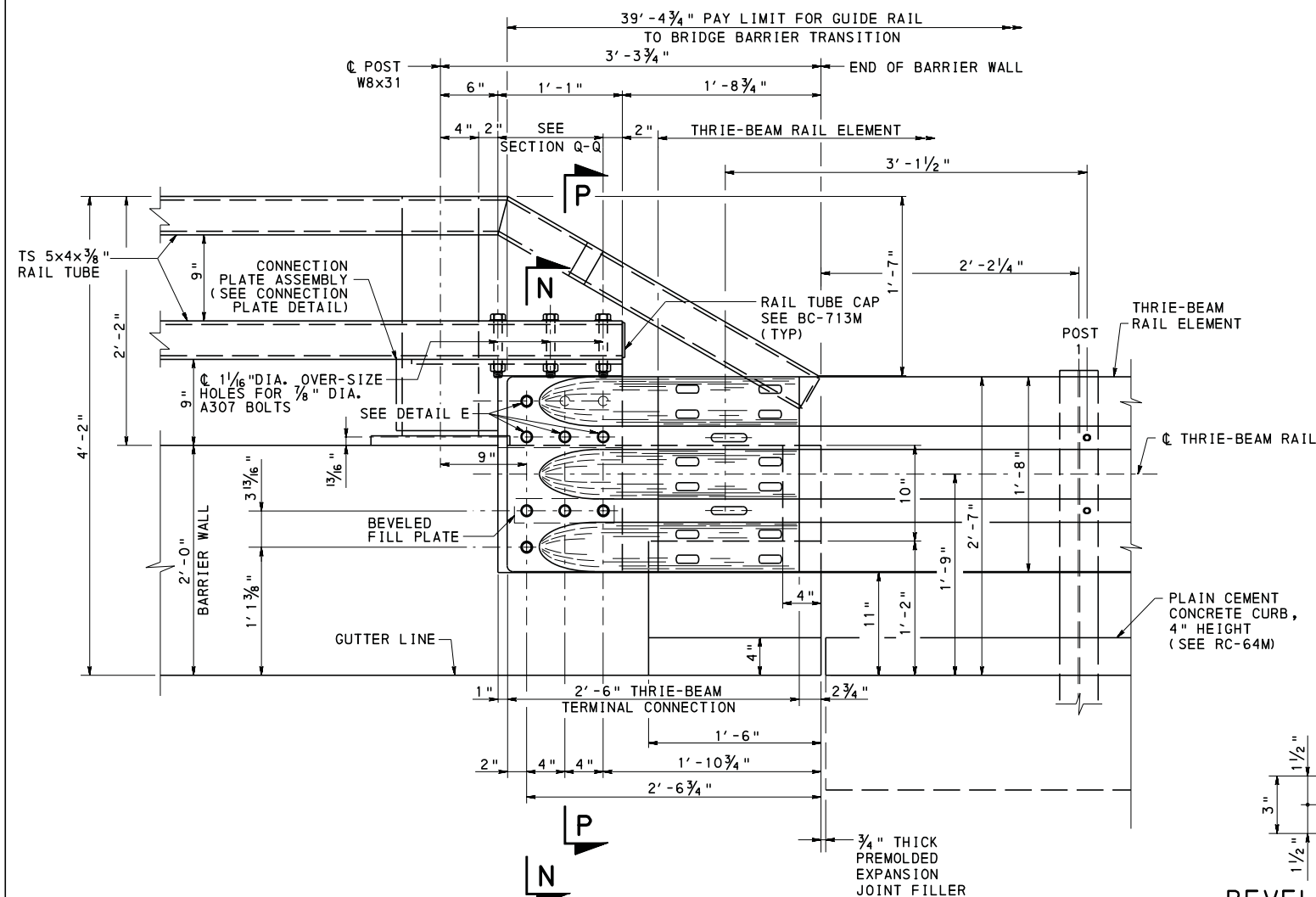
SHT 9 OF 12

RC-50M



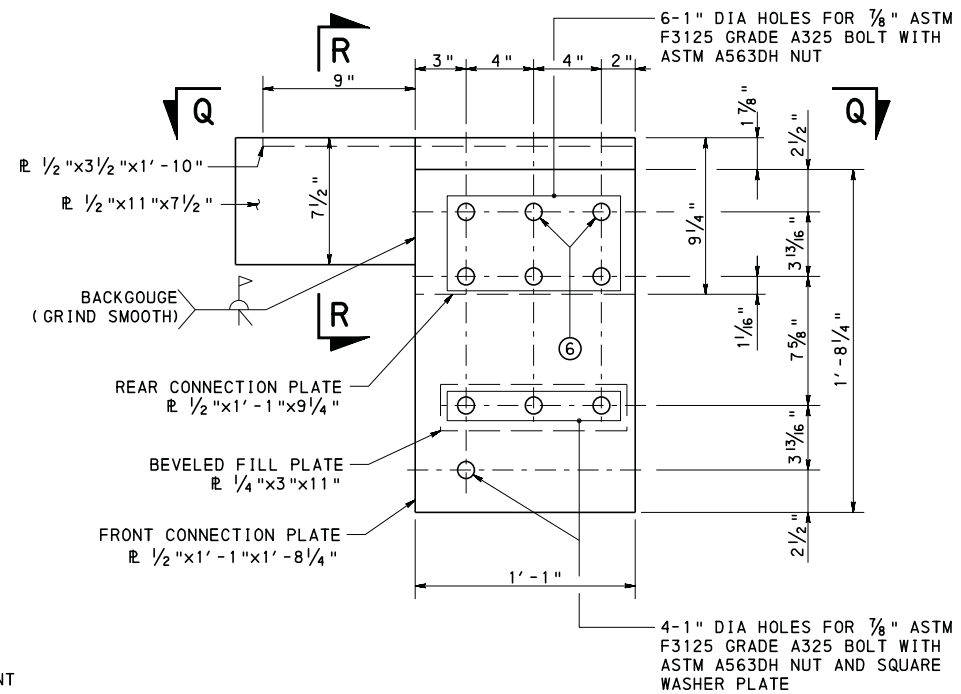


PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER



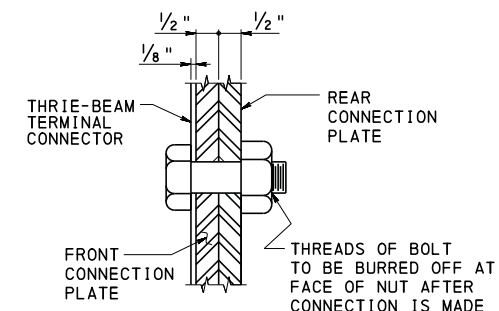
ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER

(WITH CURB SHOWN, WITHOUT CURB SIMILAR)

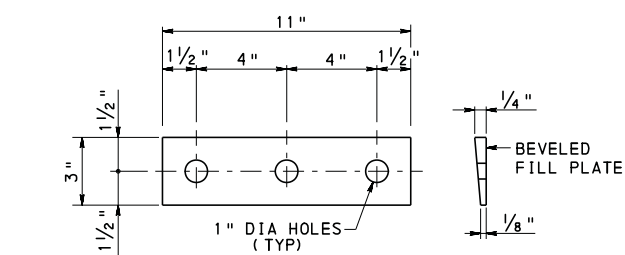


CONNECTION PLATE DETAIL

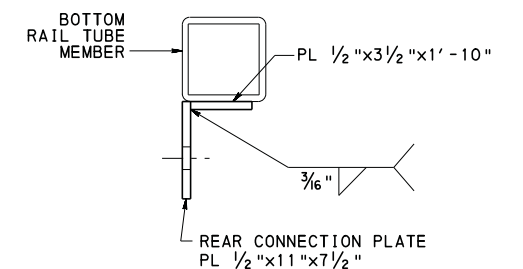
(RAIL TUBES NOT SHOWN FOR CLARITY)



DETAIL E



BEVELED FILL PLATE DETAIL



SECTION R-R

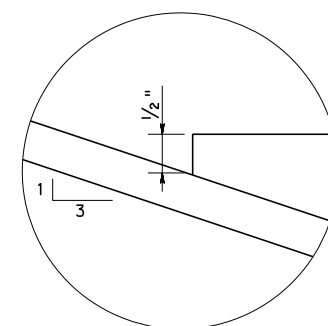
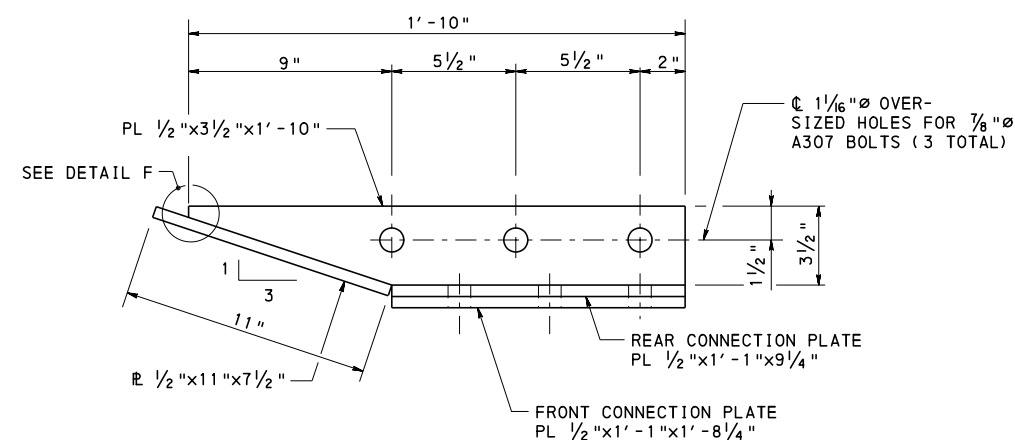
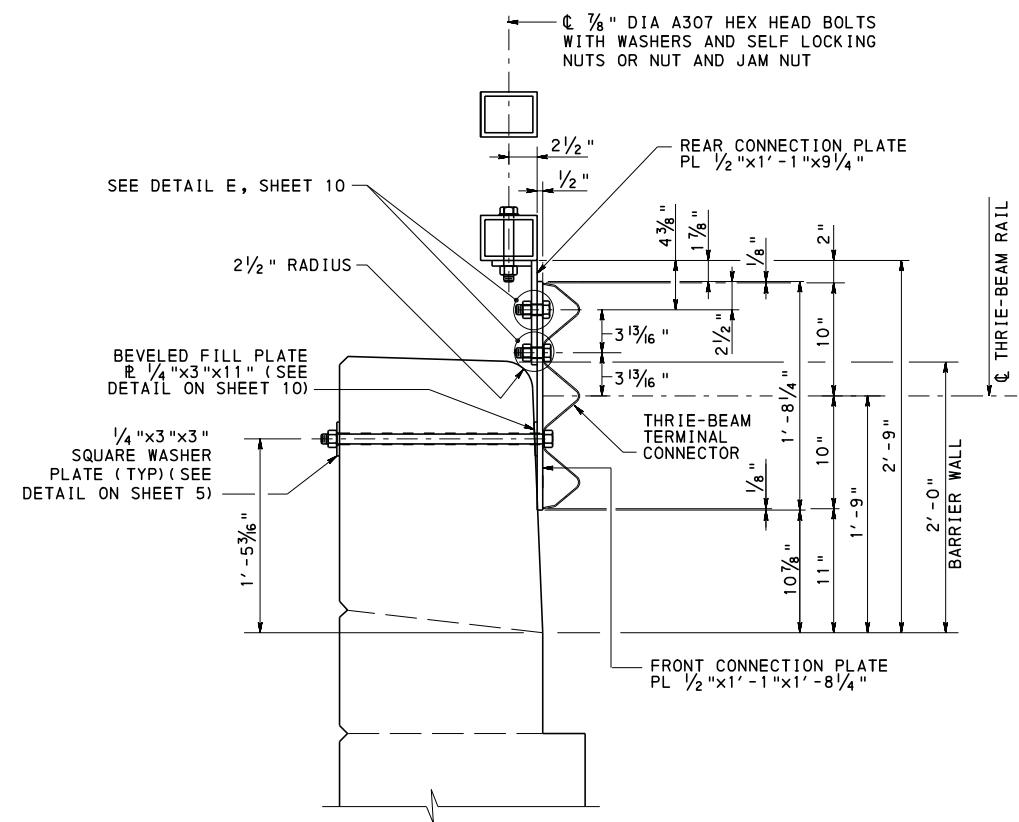
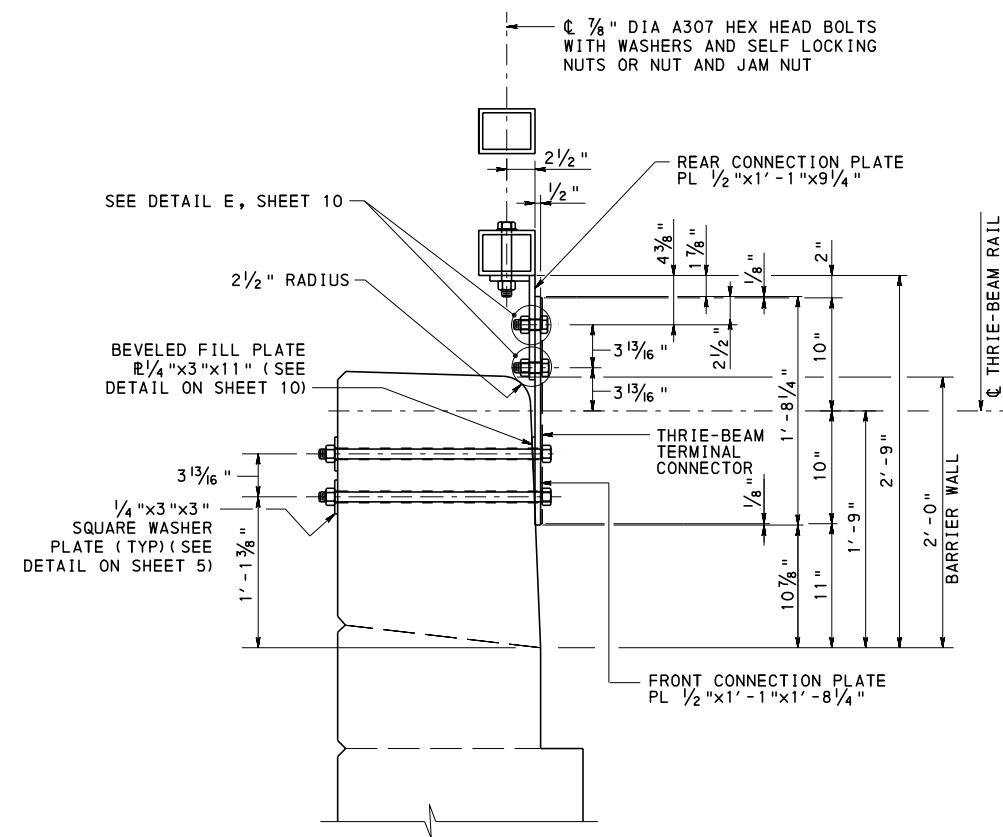
NOTES:

1. FOR TRANSITION POST DETAILS, SEE SHEET 3.
2. FOR SECTIONS N-N, P-P AND Q-Q SEE SHEET 11.
3. SEE BC-713M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

LEGEND:

- ⑥ HOLES IN CONNECTION PLATE ONLY. INSTALL BOLTS PRIOR TO ASSEMBLY WITH THRIE-BEAM TERMINAL CONNECTOR.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  THRIE-BEAM TO PA BRIDGE BARRIER DETAILS		
RECOMMENDED FEB. 19, 2021 <i>C. L. &amp; S. L.</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>B. M. &amp; T. M.</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 10 OF 12 RC-50M



#### NOTES:

1. FOR SECTION N-N, P-P AND Q-Q LOCATION, SEE SHEET 10.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

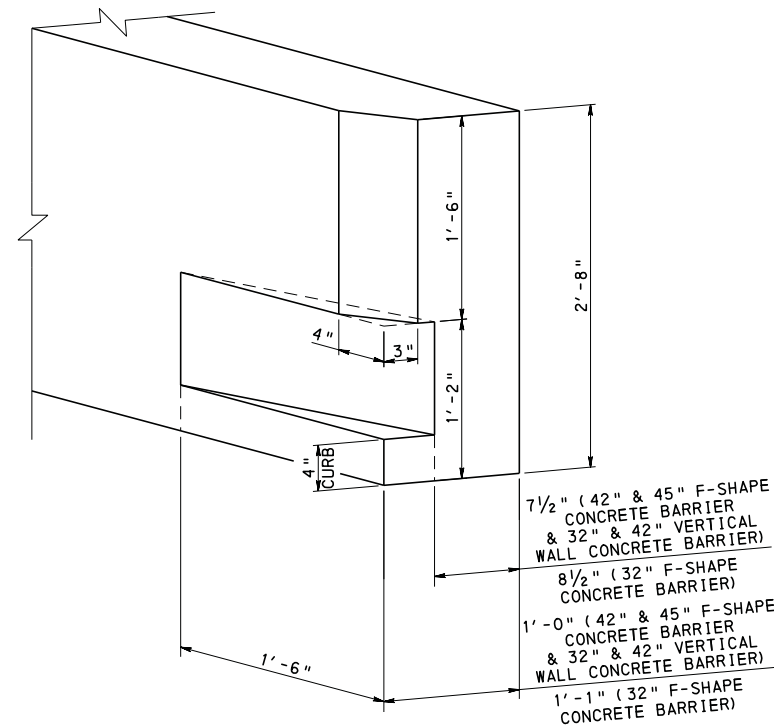
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

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

RECOMMENDED FEB. 19, 2021  
*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

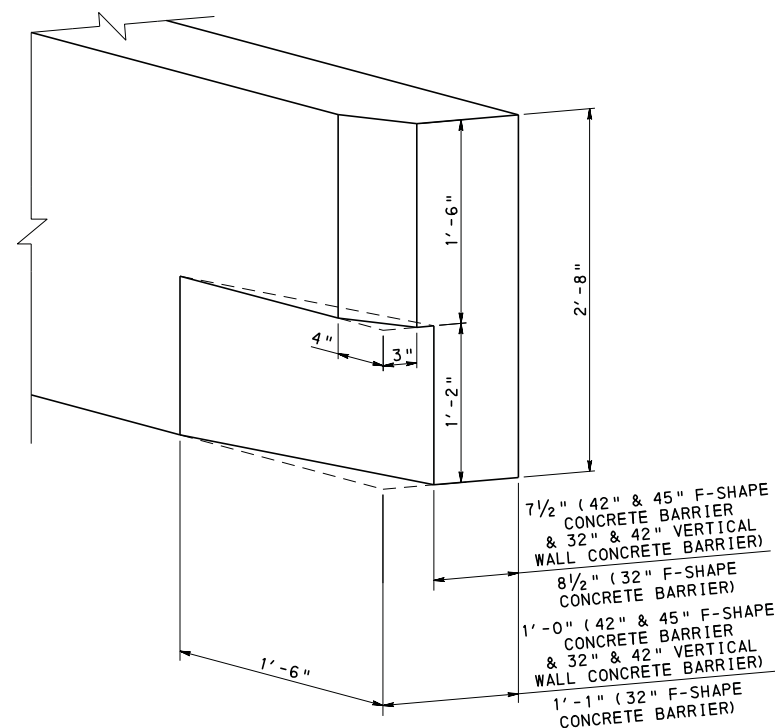
RECOMMENDED FEB. 19, 2021  
*Burns & Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-50M



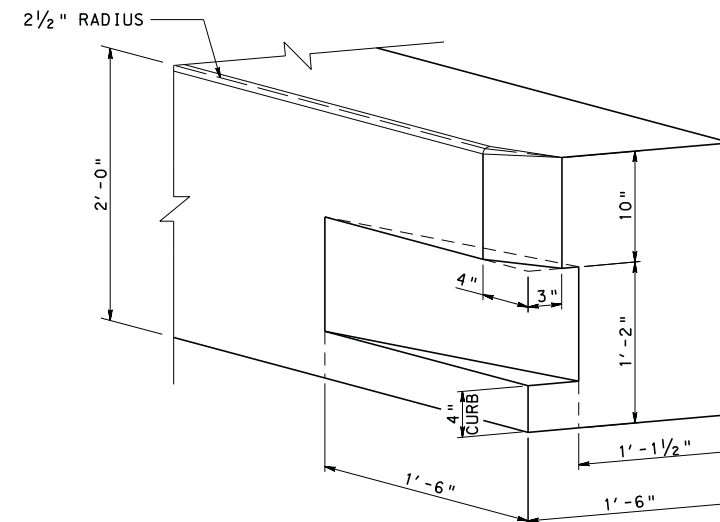
**F-SHAPE & VERTICAL WALL  
CONCRETE BARRIER END DETAIL**

(WITH CURB)



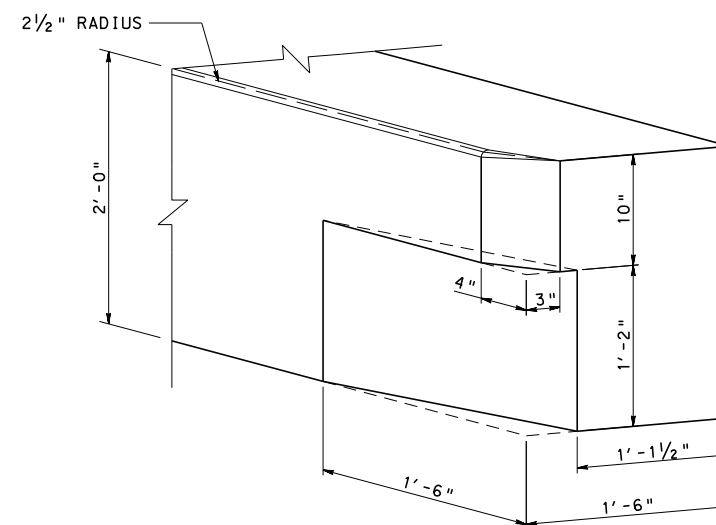
**F-SHAPE & VERTICAL WALL  
CONCRETE BARRIER END DETAIL**

(WITHOUT CURB)



**PA BRIDGE BARRIER  
END DETAIL**

(WITH CURB)

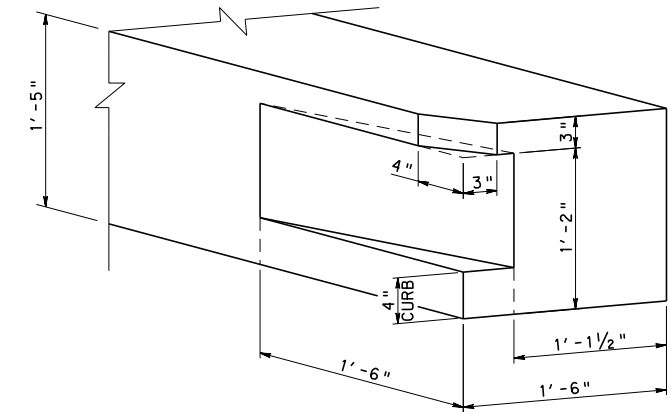


**PA BRIDGE BARRIER  
END DETAIL**

(WITHOUT CURB)

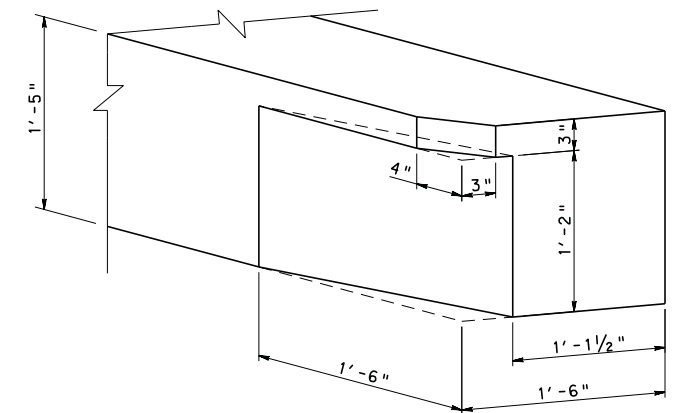
**BARRIER END TRANSITION IMAGES**

(CHAMFERS, RAILINGS, GUIDE RAIL, AND OTHER ATTACHMENTS NOT SHOWN FOR CLARITY)



**PA TYPE 10M BRIDGE BARRIER  
END DETAIL**

(WITH CURB)



**PA TYPE 10M BRIDGE BARRIER  
END DETAIL**

(WITHOUT CURB)

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

BARRIER END TRANSITION IMAGES

RECOMMENDED FEB. 19, 2021

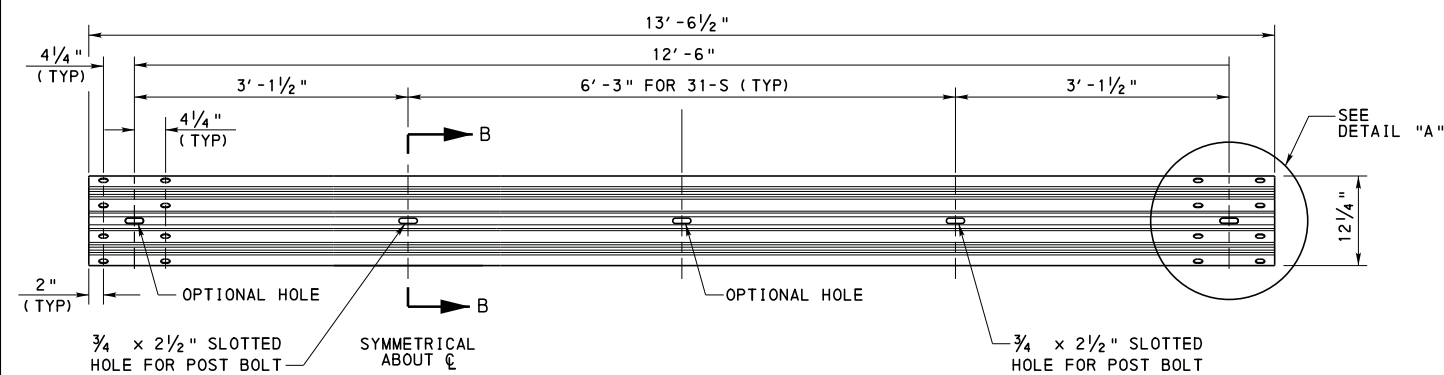
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

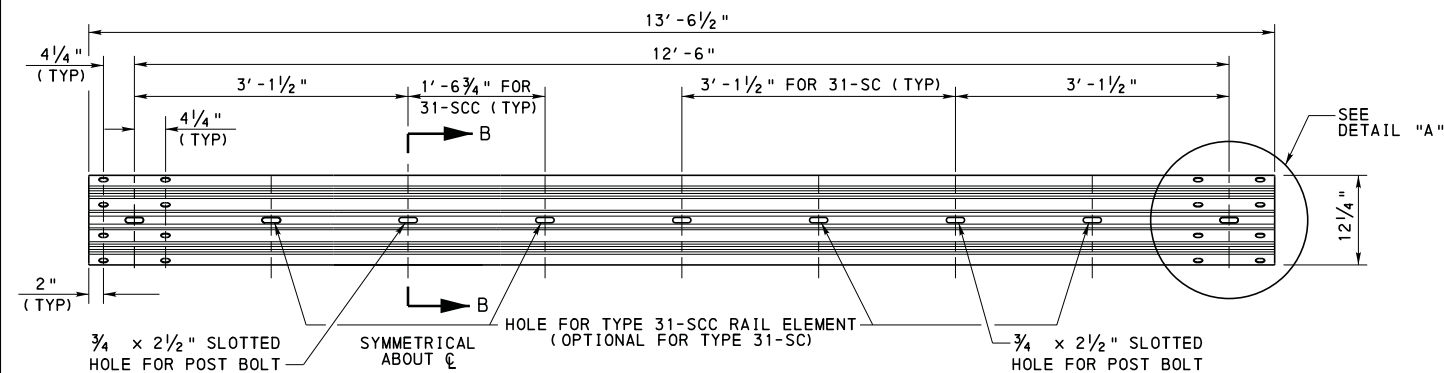
*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 12 OF 12

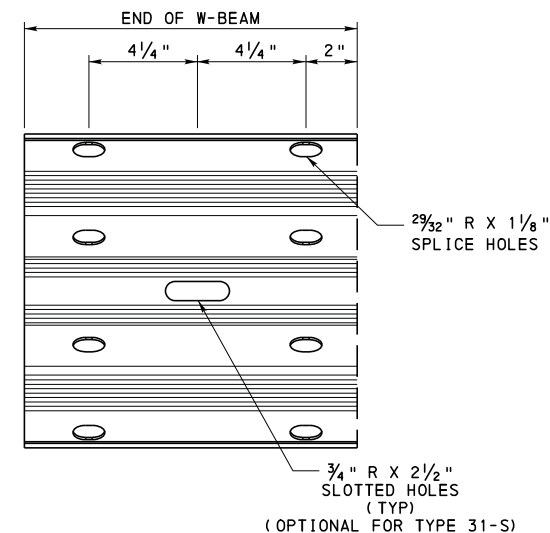
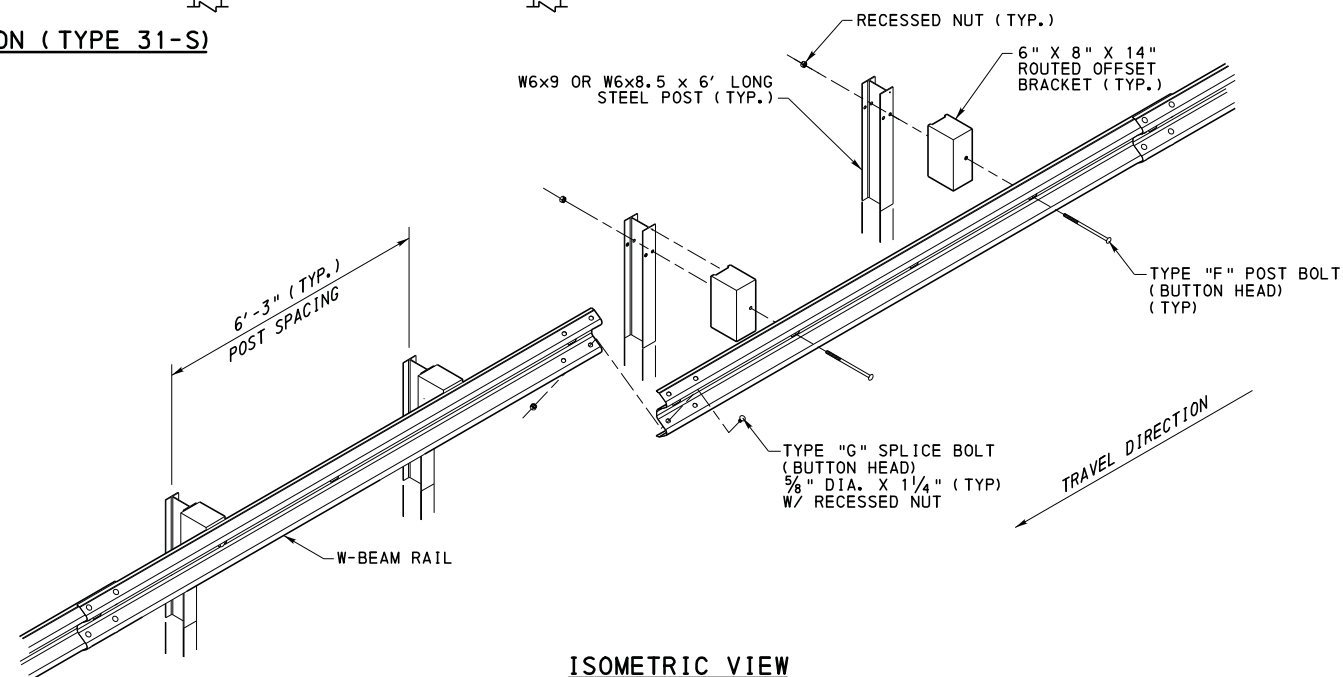
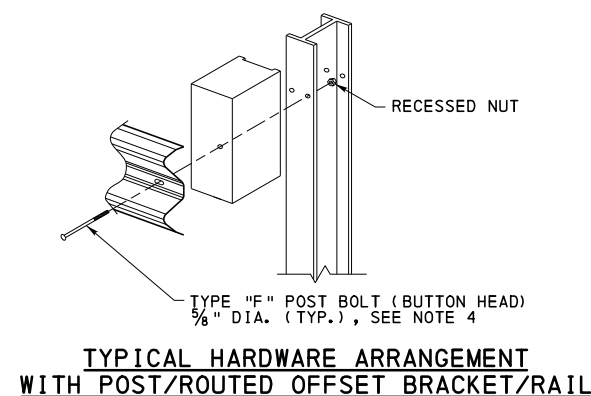
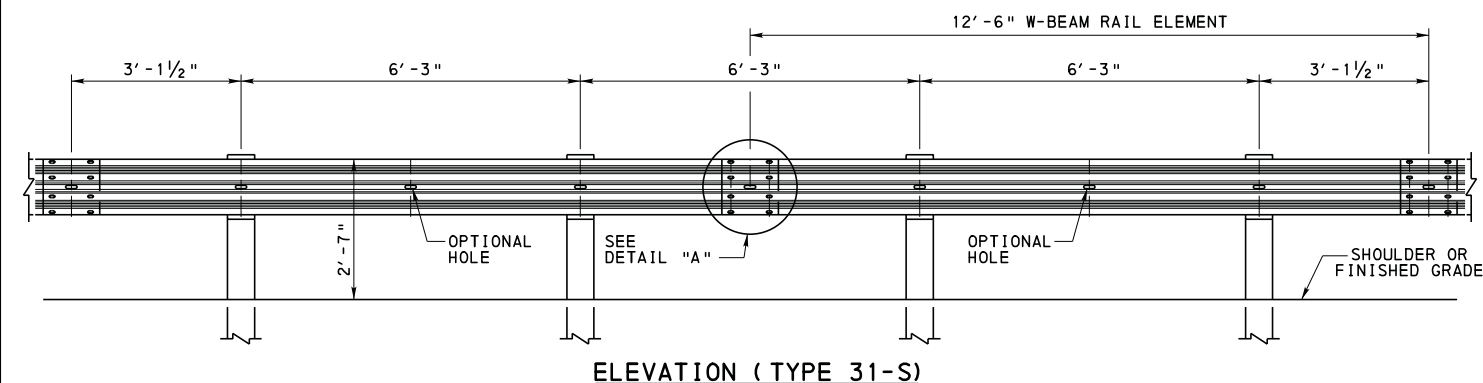
RC-50M



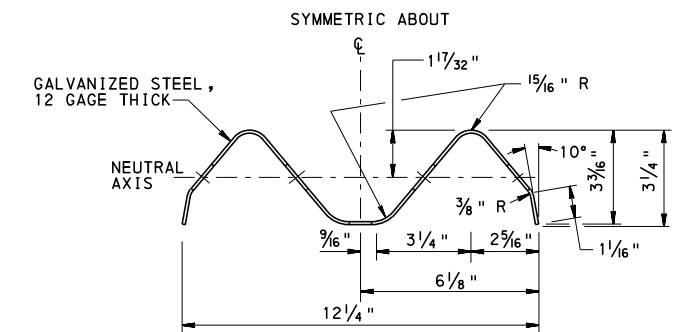
**12'-6" W-BEAM RAIL ELEMENT (TYPE 31-S)**



**12'-6" W-BEAM RAIL ELEMENT (TYPE 31-SC AND TYPE 31-SCC)**



- ### NOTES
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 620.
  2. PROVIDE STEEL I-BEAM POSTS (W6x9 OR W6x8.5) WITH ROUTED WOOD, PLASTIC, OR COMPOSITE OFFSET BRACKETS LISTED IN BULLETIN 15.
  3. ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS MID-SPAN ONLY AND LAP IN THE DIRECTION OF TRAFFIC.
  4. PROVIDE TYPE "F" POST BOLTS (BUTTON HEAD) (ASTM A307) OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND NOT MORE THAN 1" BEYOND. TYPE "G" SPLICE BOLTS (BUTTON HEAD) (ASTM A307) ARE 5/8" x 1 1/4" (OR TYPE "H" SPLICE BOLTS (BUTTON HEAD) 2" LONG AT TRIPLE RAIL SPLICES) WITH A 5/8" DOUBLE RECESSED NUT (ASTM A563). PROVIDE THRIE BEAM "CONNECTION" 5/8" DIA. (ASTM A325) HEX BOLTS OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE RAIL AND NUTS.
  5. FOR DELINEATOR PLACEMENT, SEE TC-8604, PUBLICATION 111.
  6. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE TERMINAL AND TRANSITION SECTIONS.
  7. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
  8. WHEN CONNECTING TO TYPE 2-S OR TYPE 2-W GUIDE RAIL, PROVIDE HEIGHT TRANSITION OVER A LENGTH OF 25'-0". REFER TO RC-53M FOR HEIGHT TRANSITION FROM TYPE 31-S GUIDE RAIL TO TYPE 2 WEAK POST GUIDE RAIL.
  9. THE INSTALLATION TOLERANCE IN THE 31" HEIGHT FOR TYPE 31 STRONG POST GUIDE RAIL RANGES FROM 0" TO +1".
  10. WHEN A STRONG GUIDE RAIL SYSTEM IS INSTALLED, A MINIMUM CLEARANCE OF 2'-0" SHOULD BE MAINTAINED FROM THE REAR FACE OF THE GUIDE RAIL POST TO THE FILL SLOPE BREAK POINT. HOWEVER, IF A CLEARANCE OF 2'-0" CANNOT BE MAINTAINED BECAUSE OF TOPOGRAPHY OR OTHER CONSTRAINTS, AN OFFSET DOWN TO 1'-0" IS ACCEPTABLE WITH A POST LENGTH OF 6'-0" FOR THE STRONG POST. IF A CLEARANCE OF EITHER 1'-0" OR 2'-0" CANNOT BE OBTAINED, INSTALL POSTS 7'-0" OR LONGER UP TO THE FILL SLOPE BREAK POINT. IF NEITHER OF THE ABOVE OPTIONS ARE AVAILABLE, AN 8'-0" LONG STRONG POST CAN BE INSTALLED ON THE SLOPE, WITH THE FRONT FACE OF THE STRONG POST LOCATED NO MORE THAN 1'-0" FROM THE SLOPE BREAK POINT. THIS APPLICATION IS APPLICABLE ONLY IF THE SLOPE IS 1V:2H OR FLATTER AND MUST BE USED AS A LAST RESORT.



COMMONWEALTH OF PENNSYLVANIA  
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TYPE 31 STRONG POST  
GUIDE RAIL

W-BEAM RAIL ELEMENT

RECOMMENDED FEB. 19, 2021

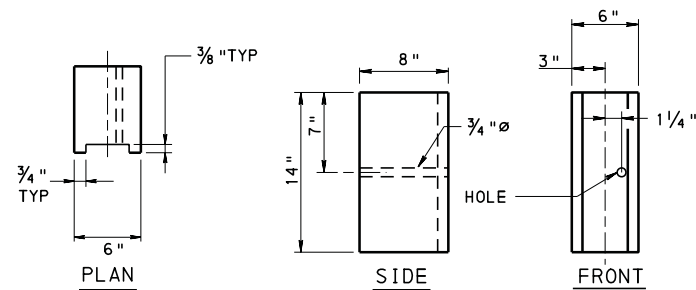
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

DIRECTOR, BUREAU OF PROJECT DELIVERY

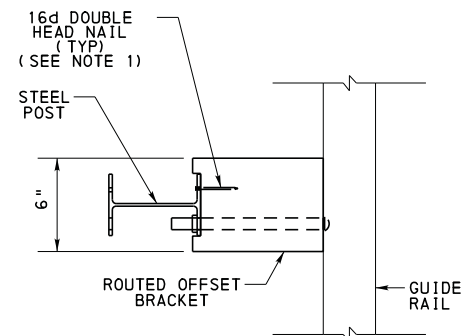
SHT 1 OF 15

RC-51M

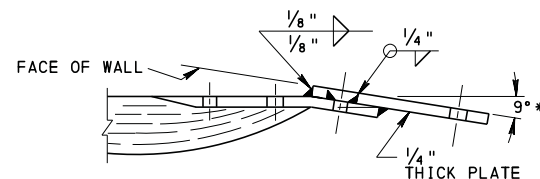


### ROUTED OFFSET BRACKET

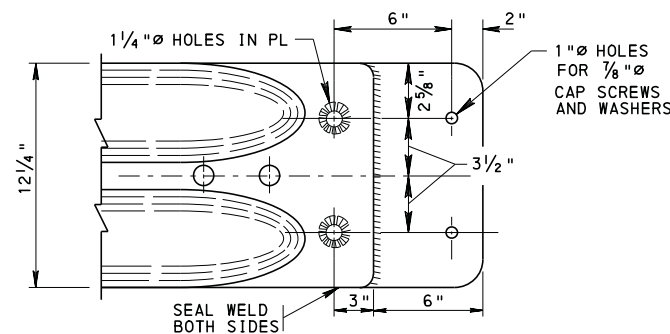
(WOOD, PLASTIC OR COMPOSITE)  
TO BE USED WITH STEEL POSTS



### PLAN



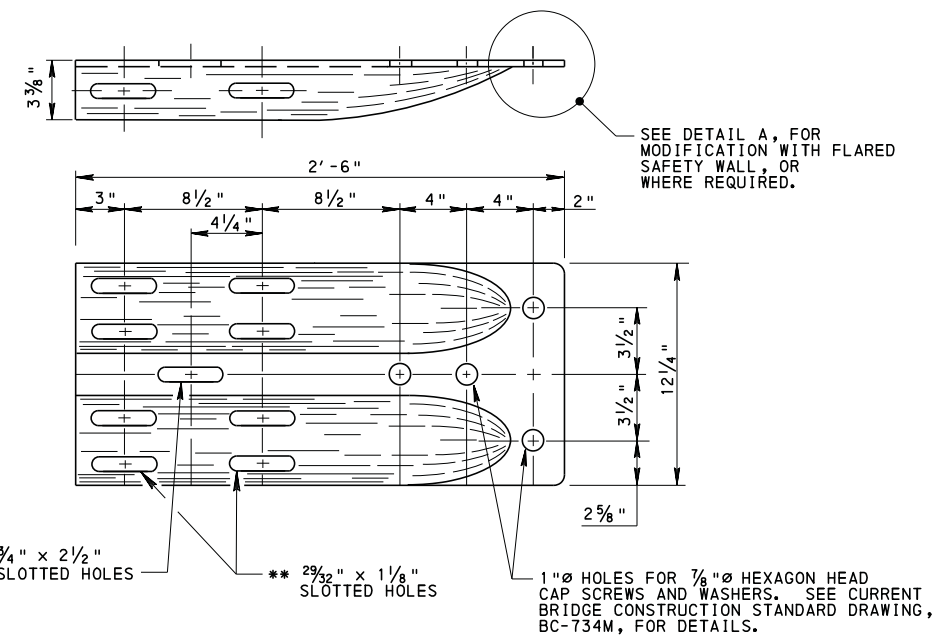
\* OR TO BE DETERMINED BY ENGINEER.



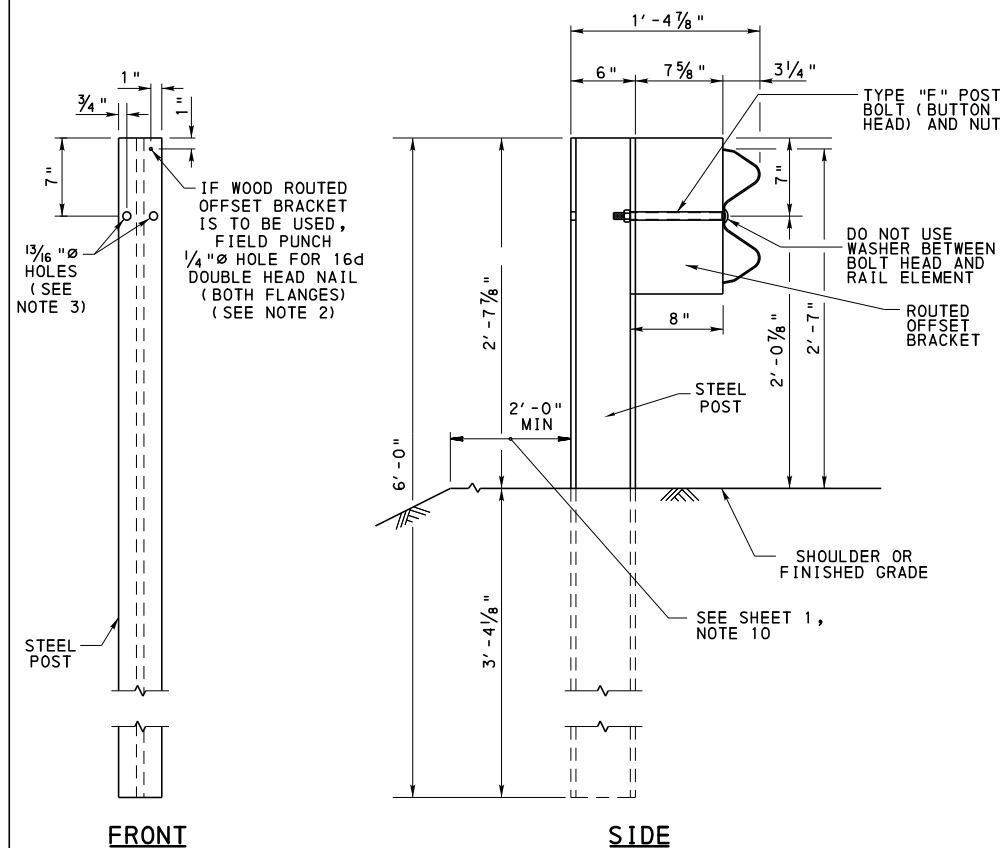
(TERMINAL CONNECTOR MODIFICATION  
MAY BE FABRICATED AS ONE PIECE  
TO ELIMINATE WELDING.)

### DETAIL A

\*\* PROVIDE 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.



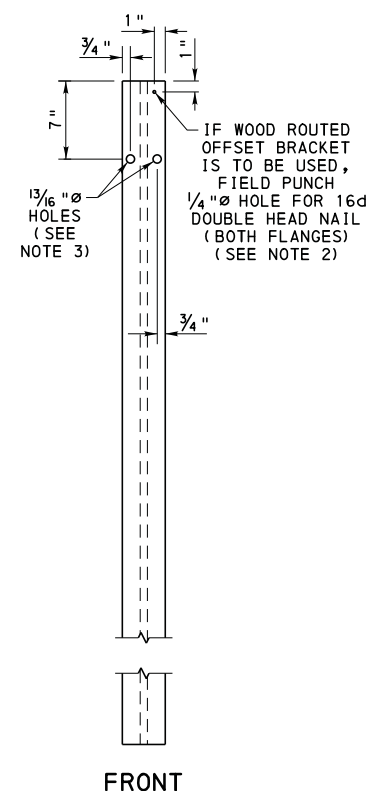
### W-BEAM TERMINAL CONNECTOR



### FRONT

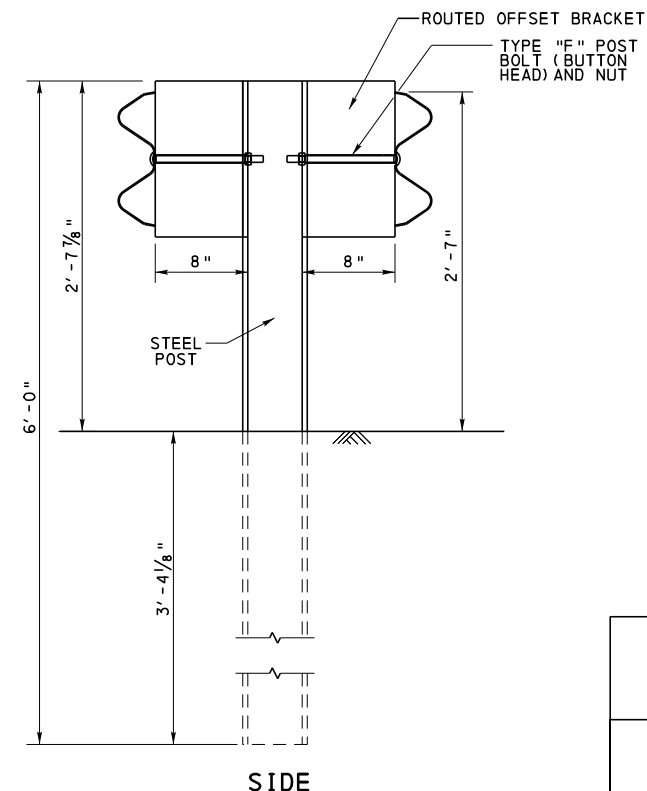
### SIDE

### W6X9 OR W6X8.5 POST DETAILS

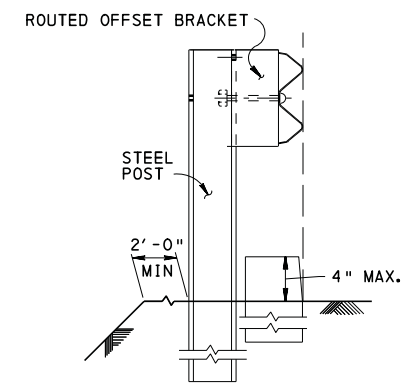


### FRONT

### TYPE 31-SM MEDIAN BARRIER W6X9 OR W6X8.5 POST DETAILS



### SIDE



### GUIDE RAIL WITH CURB

### NOTES

1. THE 16d DOUBLE HEAD NAIL IS FOR WOOD ROUTED OFFSET BRACKETS ONLY.
2. THE 1/4" DIAMETER HOLE IS NOT REQUIRED IF PLASTIC OR COMPOSITE ROUTED OFFSET BRACKETS ARE TO BE INSTALLED.
3. A 3/4" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.

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DEPARTMENT OF TRANSPORTATION  
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### TYPE 31 STRONG POST GUIDE RAIL

### POSTS ROUTED OFFSET BRACKETS TERMINAL CONNECTOR

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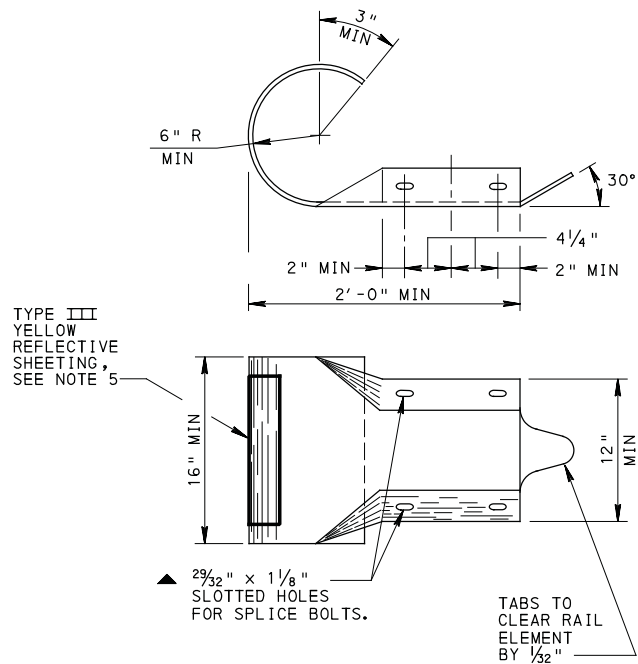
RECOMMENDED FEB. 19, 2021

DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 15

RC-51M

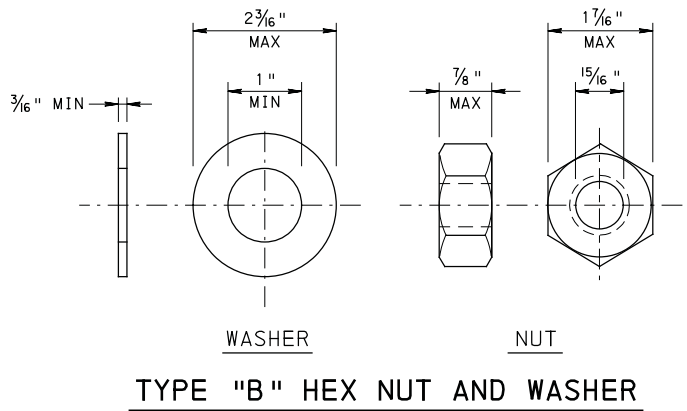




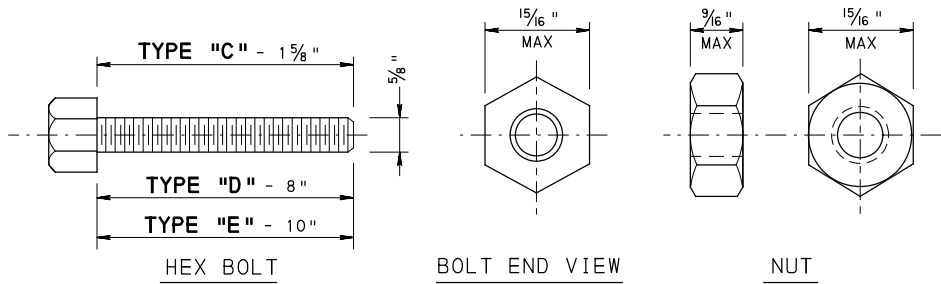
**TERMINAL SECTION TO BE PLACED  
ON FACE OF RAIL ELEMENT**  
REFER TO RC-54M, SHEET 10 FOR APPLICATIONS



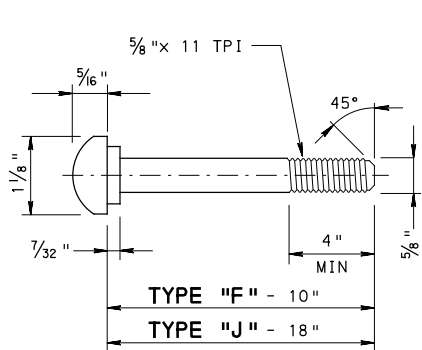
**TYPICAL NESTED PANEL  
MID-SPAN SPLICE**  
(SEE NOTES 2, 3, AND 4)



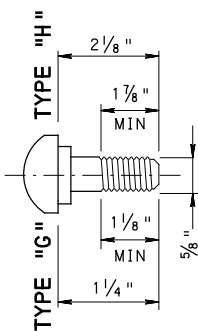
**TYPE "B" HEX NUT AND WASHER**



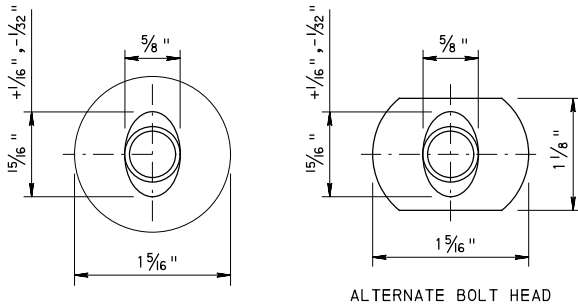
**TYPE "C", TYPE "D" AND TYPE "E"  
HEX BOLT DETAILS**



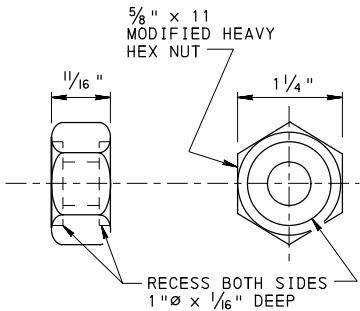
**POST BOLT**



**SPLICE BOLT**  
FOR DIMENSIONS NOT  
SHOWN, SEE POST BOLT

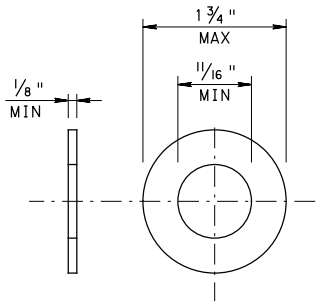


**TYPICAL END VIEW  
POST AND SPLICE BOLTS**



**RECESSED NUT**

**TYPE "F" AND TYPE "J" POST BOLT AND  
TYPE "G" AND TYPE "H" SPLICE BOLT AND NUT**



**TYPE "I"  
PLAIN ROUND WASHER**  
(WOOD POSTS ONLY)

**NOTES**

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 31-S GUIDE RAIL.
4. PROVIDE A MINIMUM OF 200' OF STRONG POST GUIDE RAIL BETWEEN NESTED RUNS.
5. FOR DELINEATOR PLACEMENT, SEE TC-8604, PUBLICATION 111.

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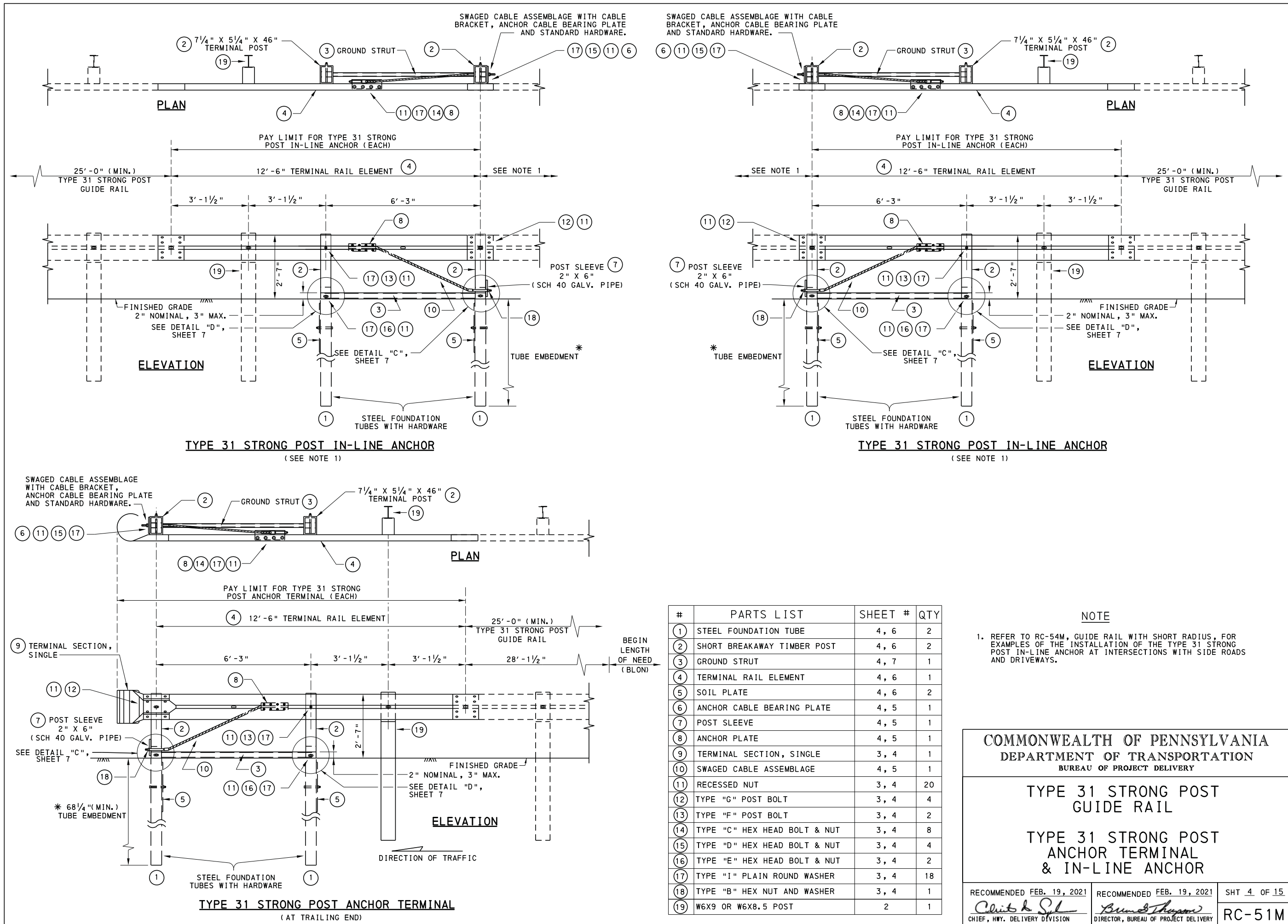
**TYPE 31 STRONG POST  
GUIDE RAIL**  
**TERMINAL SECTIONS  
BOLTS, NUTS AND WASHERS**

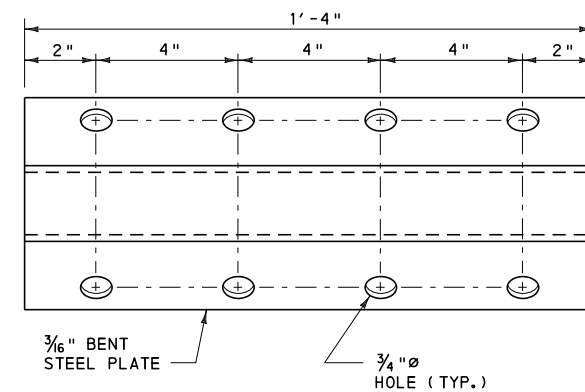
RECOMMENDED FEB. 19, 2021  
*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Burns & Thomas*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 15  
**RC-51M**

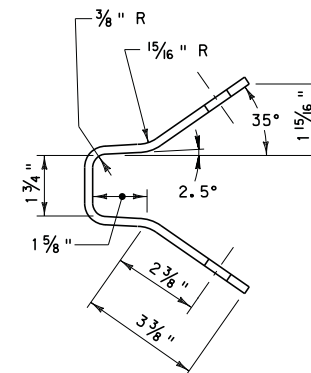




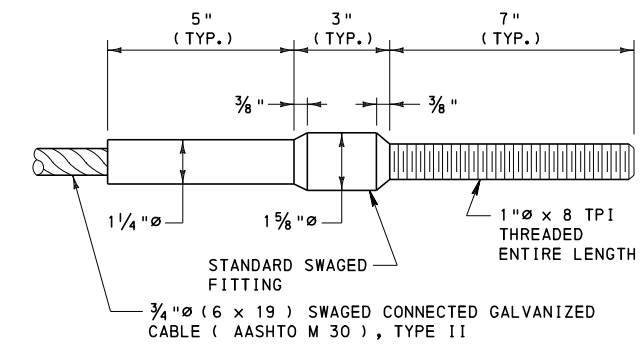


ELEVATION

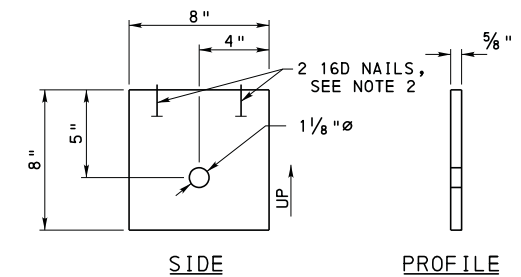
ANCHOR PLATE



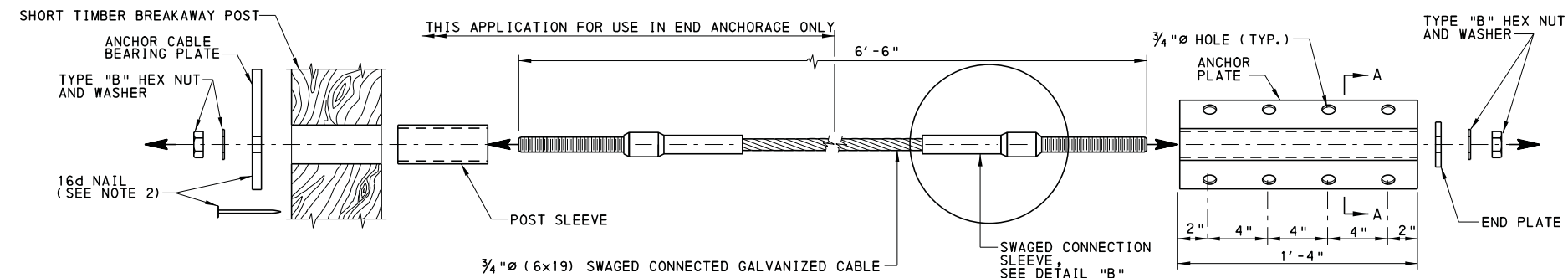
SECTION A-A



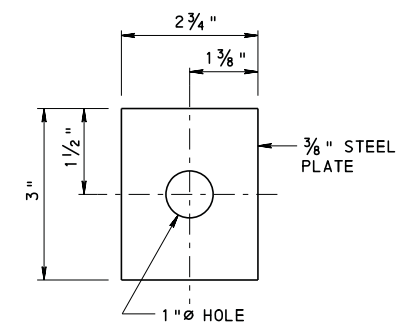
DETAIL "B"  
STANDARD SWAGED FITTING  
AND STUD CABLE ASSEMBLY



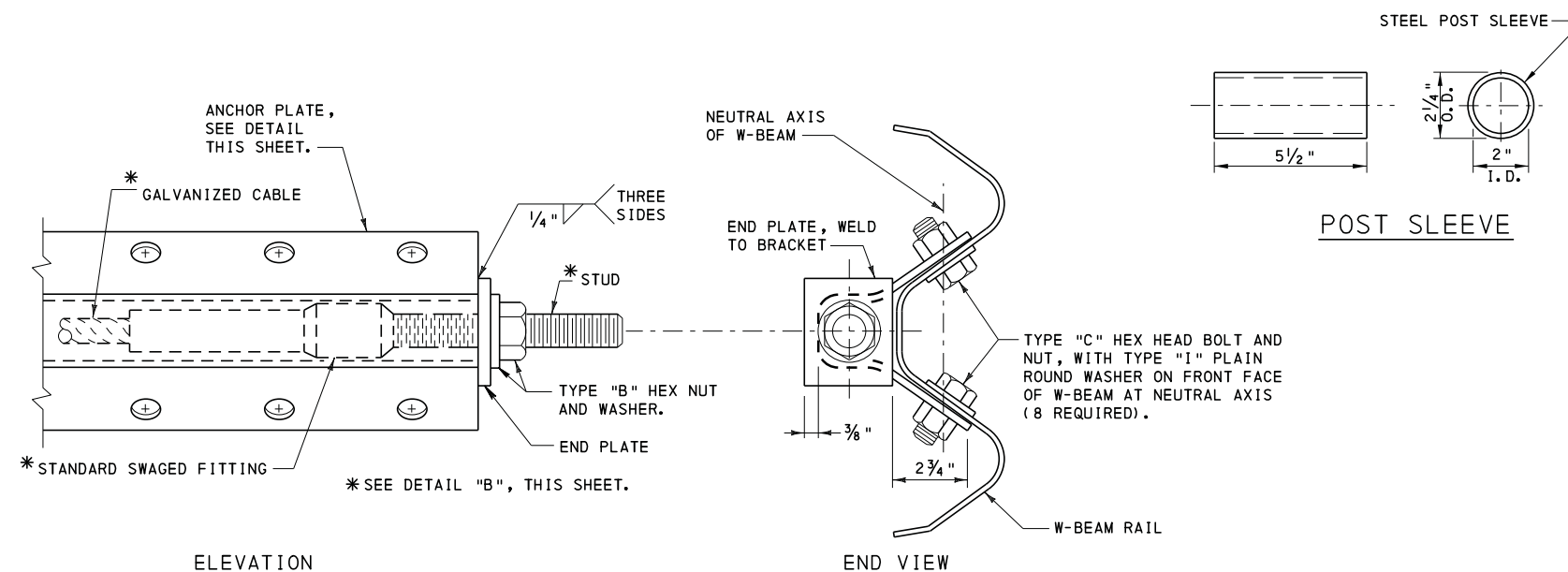
ANCHOR CABLE  
BEARING PLATE



SWAGED CABLE ASSEMBLAGE AND RELATED HARDWARE ASSEMBLY



END PLATE



ELEVATION  
BOLTS AND W-BEAM NOT  
SHOWN FOR CLARITY.

ANCHOR PLATE ASSEMBLY DETAIL

END VIEW

NOTES

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. DRIVE TWO 16d NAILS AND BEND OVER TO PREVENT PLATE ROTATION.

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TYPE 31 STRONG POST  
GUIDE RAIL

TYPE 31 STRONG POST  
ANCHOR TERMINAL  
SWAGED CABLE ASSEMBLY

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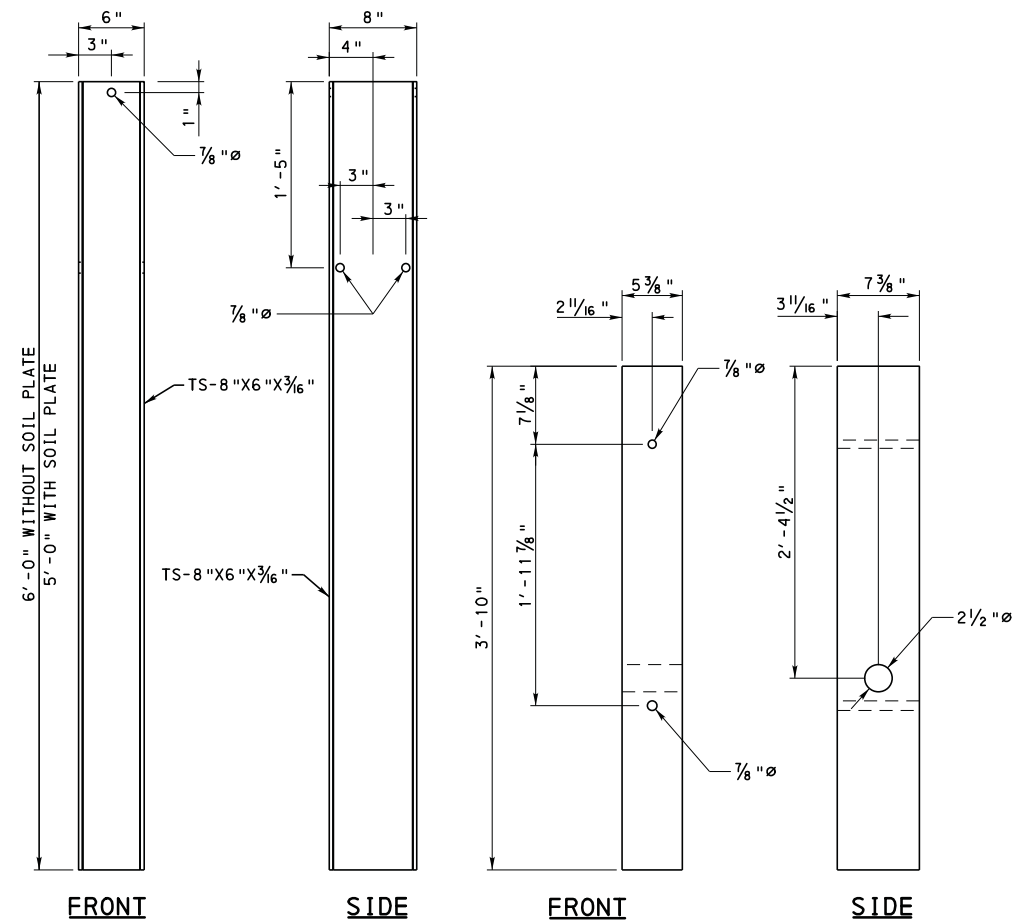
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

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*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

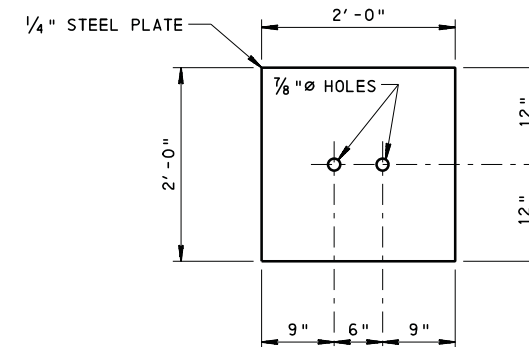
SHT 5 OF 15

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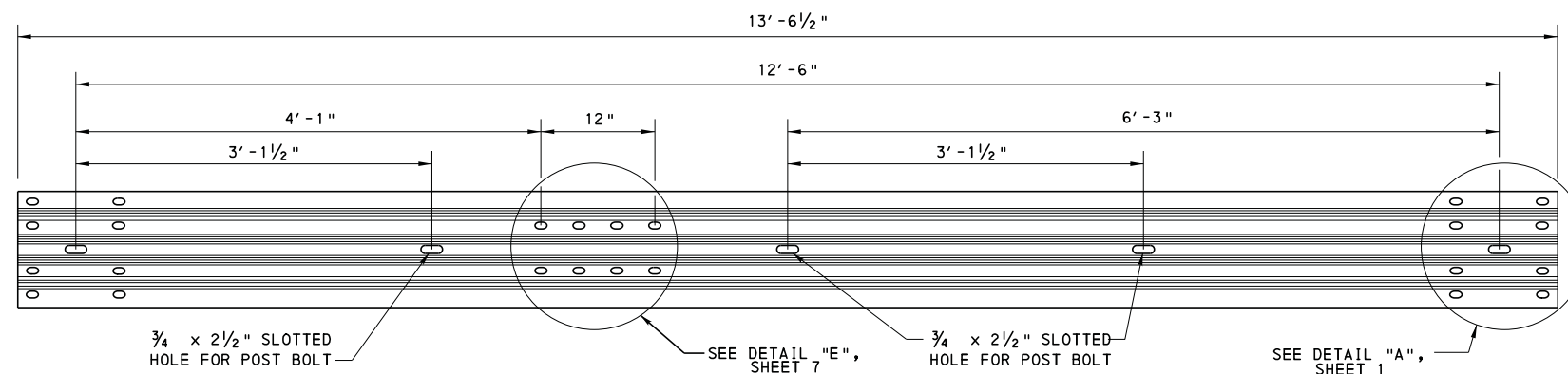


① STEEL FOUNDATION TUBE

SHORT BREAKAWAY ②  
TIMBER POST



⑤ SOIL PLATE



④ TERMINAL RAIL ELEMENT

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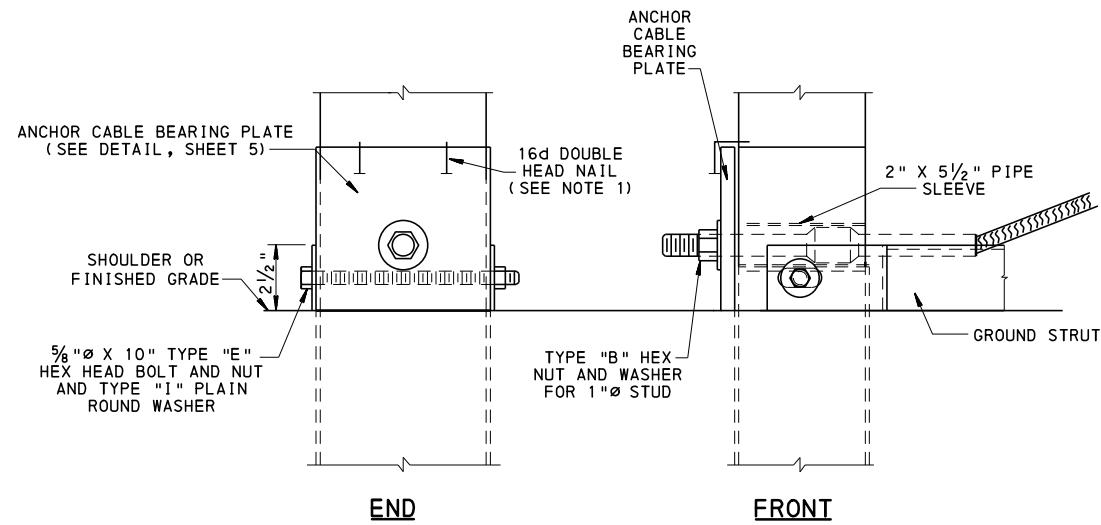
TYPE 31 STRONG POST  
GUIDE RAIL

TYPE 31 STRONG POST  
ANCHOR TERMINAL  
COMPONENT PARTS

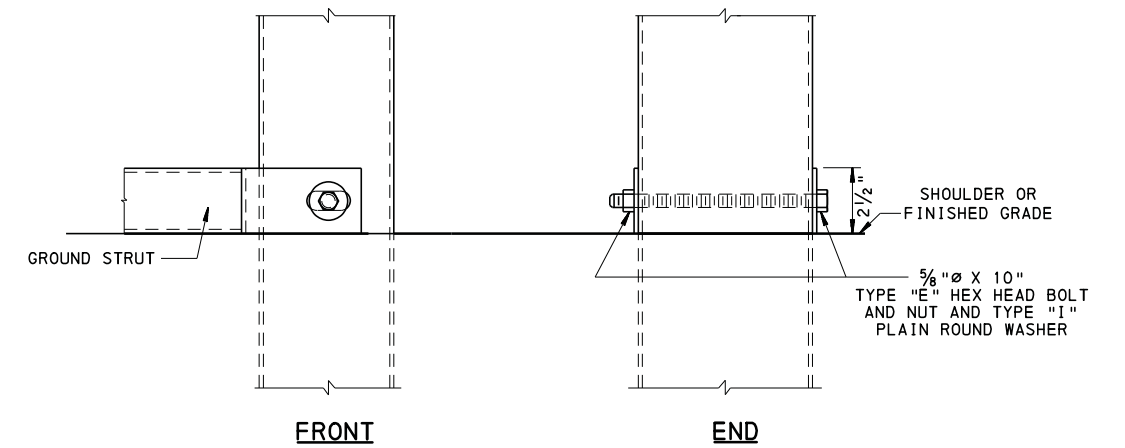
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*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

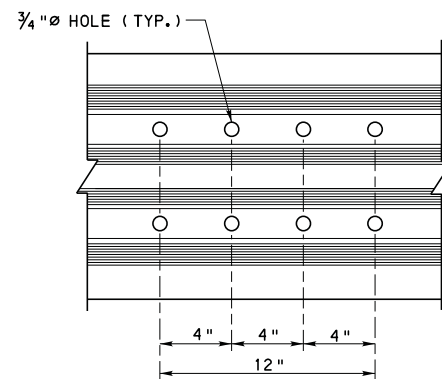
SHT 6 OF 15  
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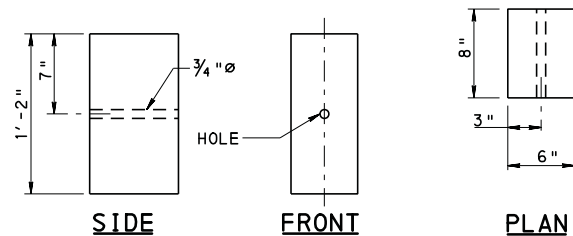
DETAIL "C"  
BEARING PLATE ASSEMBLY



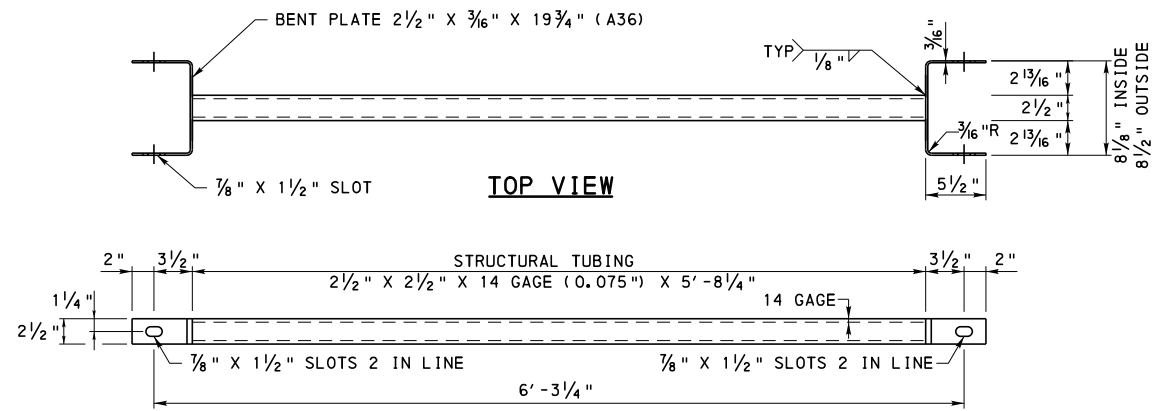
DETAIL "D"



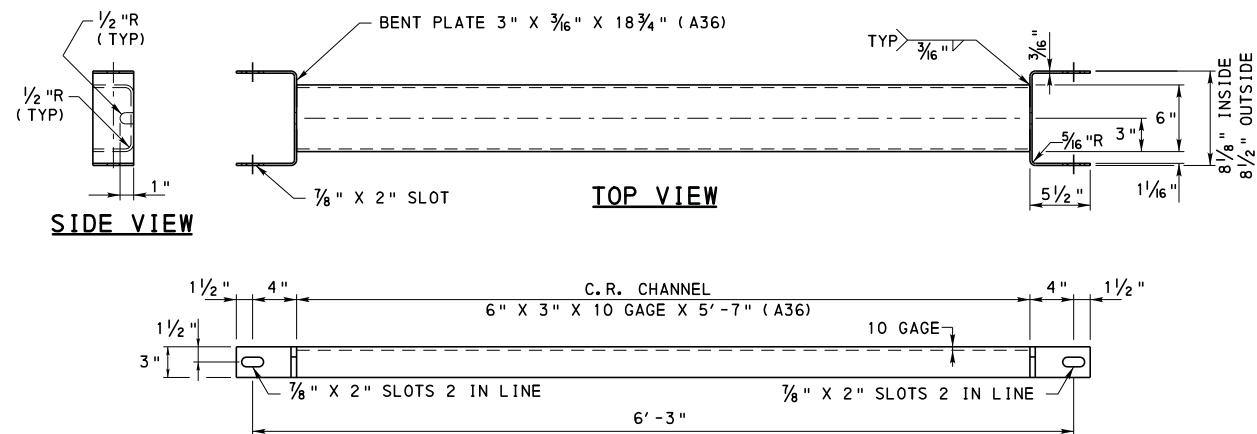
DETAIL "E"



NON-ROUTED OFFSET BRACKET  
WOOD, PLASTIC, OR COMPOSITE  
TO BE USED WITH WOOD POSTS



FRONT VIEW  
GROUND STRUT



FRONT VIEW  
GROUND STRUT (ALTERNATE)

NOTE

1. TOENAIL TO WOOD POST TO PREVENT PLATE ROTATION.

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BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST  
GUIDE RAIL

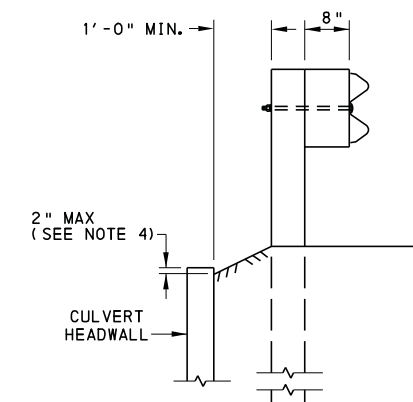
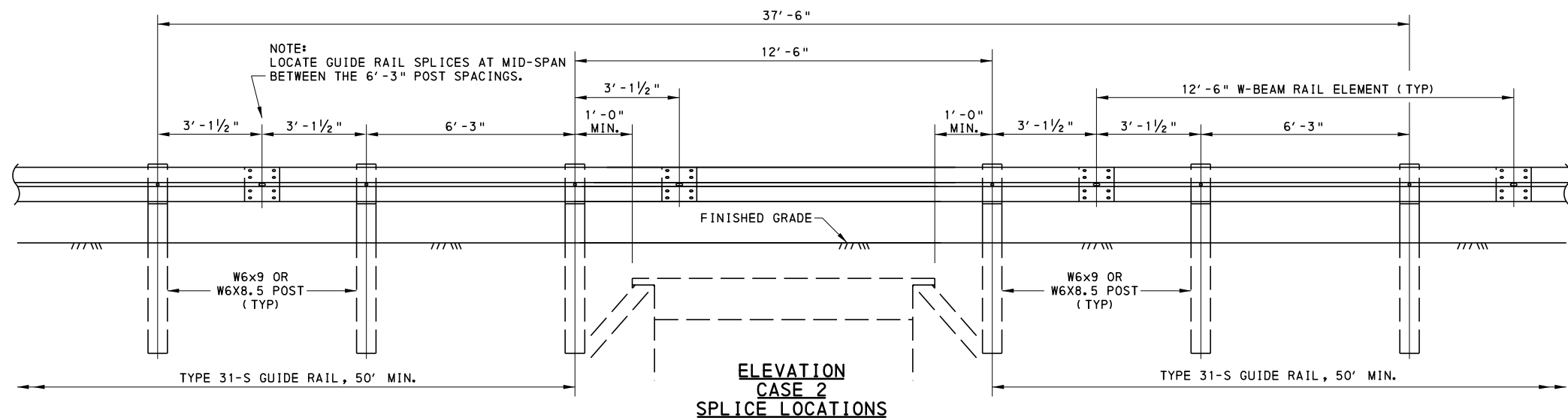
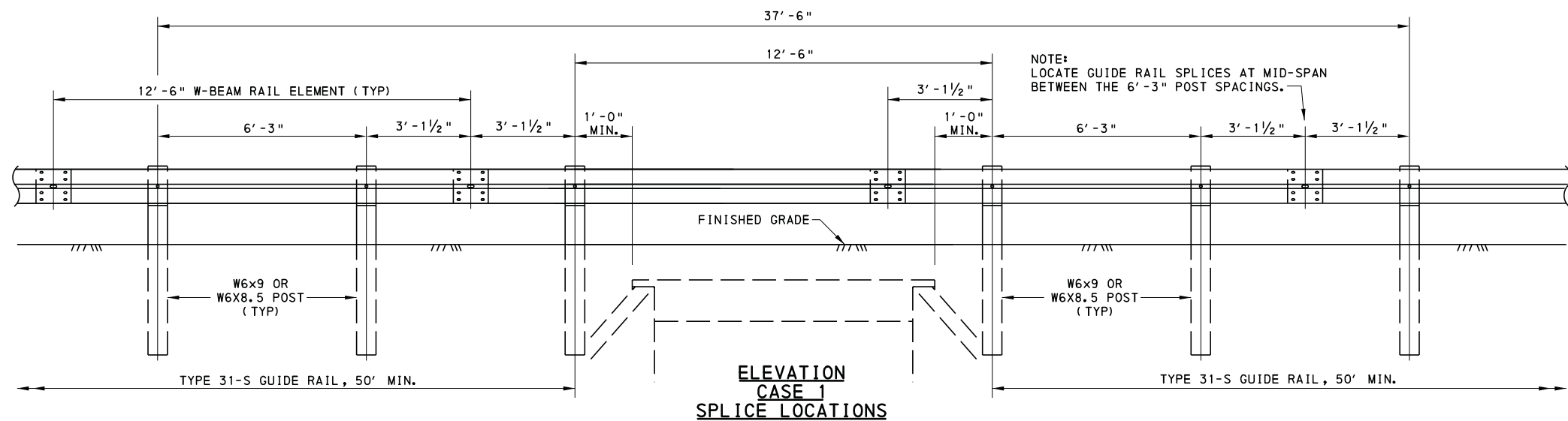
TYPE 31 STRONG POST  
ANCHOR TERMINAL  
COMPONENT PARTS

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DIRECTOR, BUREAU OF PROJECT DELIVERY

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**LATERAL OFFSET BETWEEN THE  
BACK OF POST AND A CULVERT HEADWALL**

**NOTES**

- DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
- BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
- FOR A 12'-6" LONG SPAN, WHEN ONLY ONE STEEL STRONG POST IS OMITTED, PROVIDE A MINIMUM UNOBSTRUCTED DISTANCE OF 5'-6" BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
- DO NOT EXTEND A CULVERT HEADWALL OR A CURB BEHIND THIS LONG SPAN SYSTEM MORE THAN 2" ABOVE THE GROUND SURFACE.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST GUIDE RAIL

LONG SPAN SYSTEMS  
ACROSS CULVERTS  
AND SMALL STRUCTURES  
12'-6" SPAN

RECOMMENDED FEB. 19, 2021

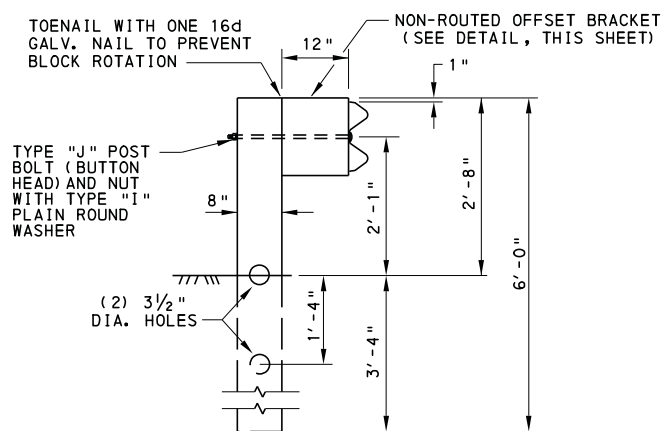
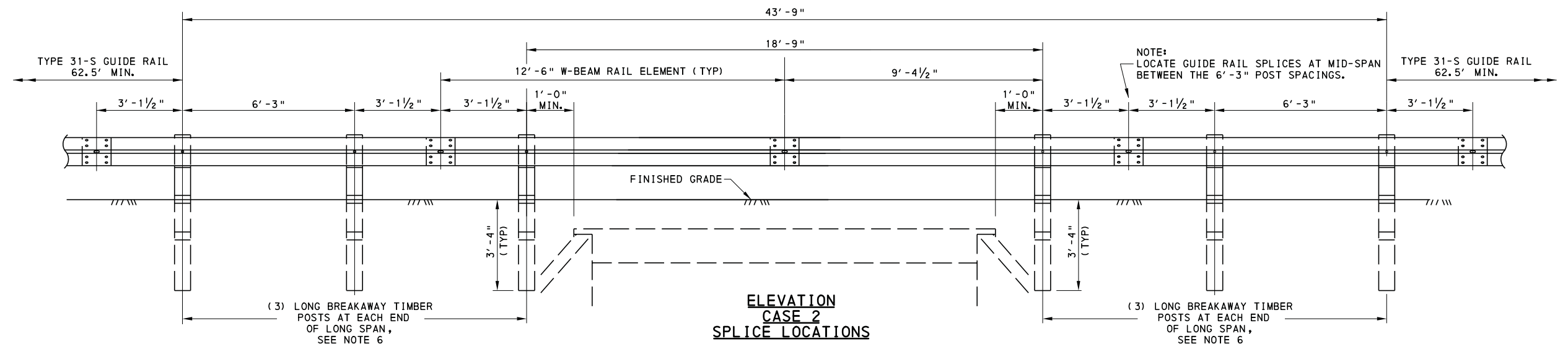
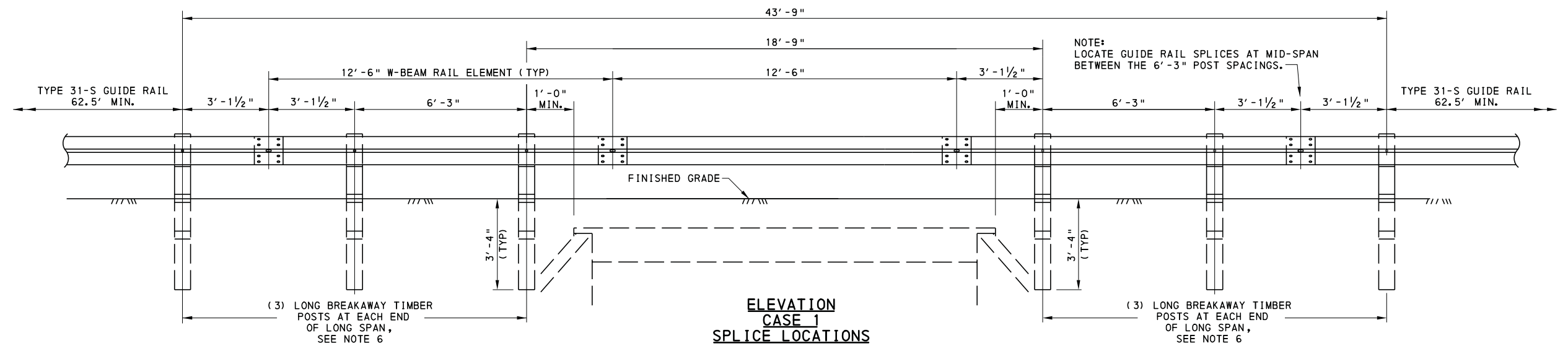
*Chris L. Sp...*  
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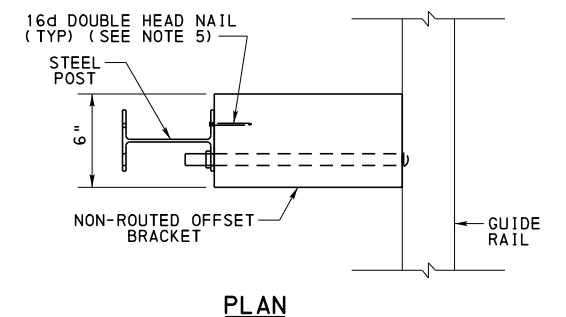
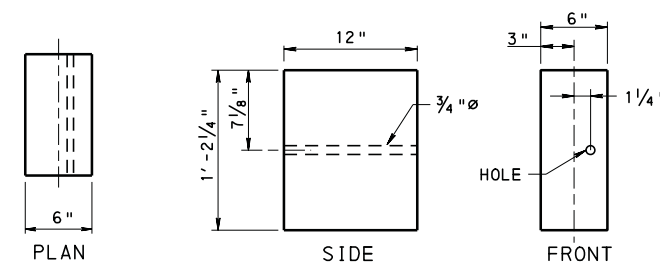
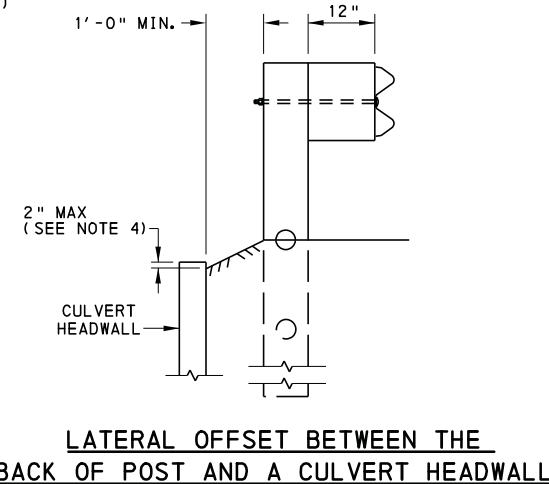
*Brian B. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 8 OF 15

RC-51M



(6) LONG BREAKAWAY POSTS REQUIRED.  
SEE ELEVATION DETAIL FOR LOCATIONS,  
SEE NOTE 6



### NOTES

- DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
- BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
- FOR THE 18'-9" SPAN, PROVIDE A MINIMUM UNOBSTRUCTED DISTANCE OF 6'-0" BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
- DO NOT EXTEND A CULVERT HEADWALL OR A CURB BEHIND THIS LONG SPAN SYSTEM MORE THAN 2" ABOVE THE GROUND SURFACE.
- THE 16d DOUBLE HEAD NAIL IS FOR WOOD NON-ROUTED OFFSET BRACKETS ONLY.
- FOR PLAN, SIDE, AND FRONT VIEWS OF LONG BREAKAWAY TIMBER POST, SEE SHEET 11.

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

**TYPE 31 STRONG POST GUIDE RAIL**

**LONG SPAN SYSTEMS  
ACROSS CULVERTS  
AND SMALL STRUCTURES  
18'-9" SPAN**

RECOMMENDED FEB. 19, 2021

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CHIEF, HWY. DELIVERY DIVISION

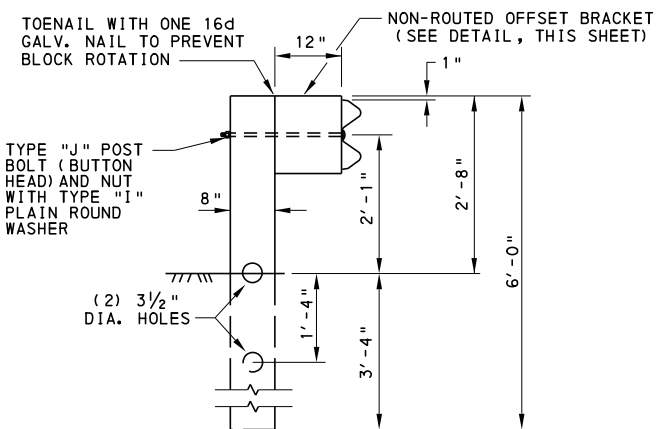
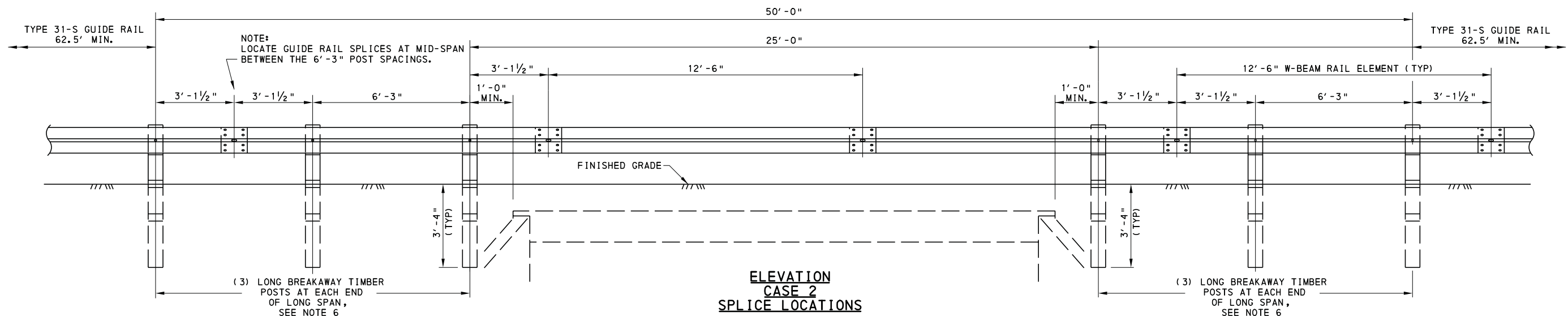
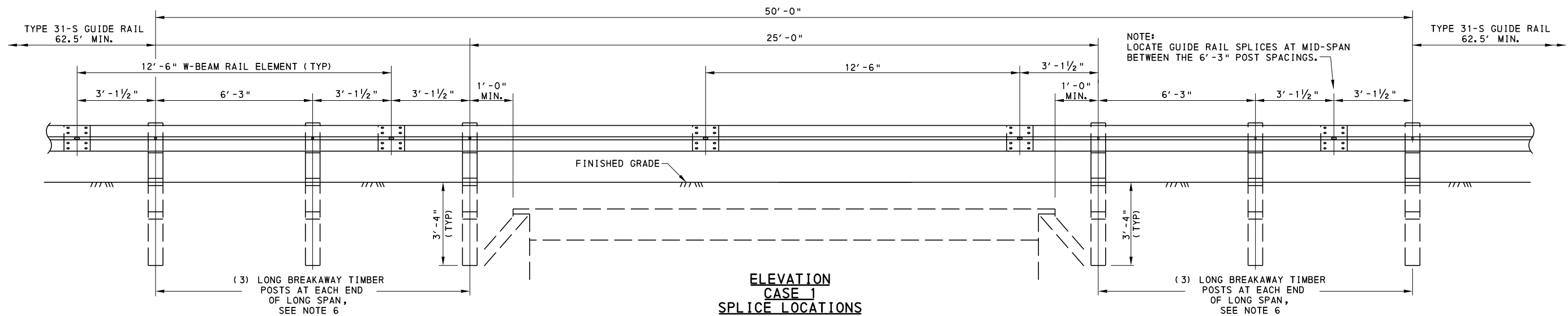
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DIRECTOR, BUREAU OF PROJECT DELIVERY

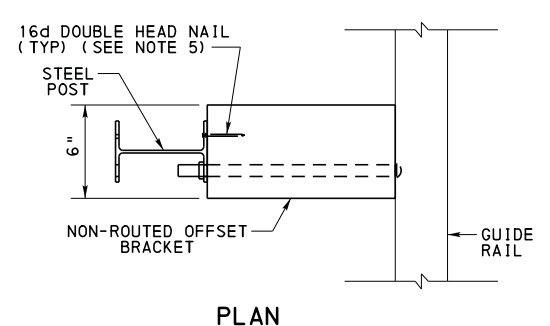
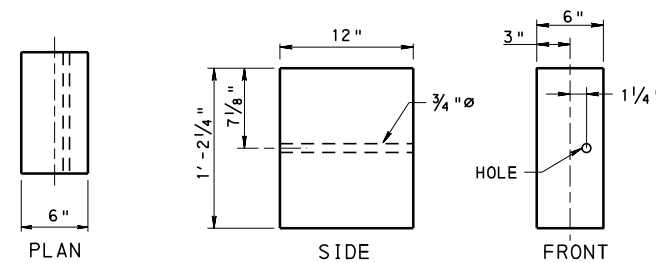
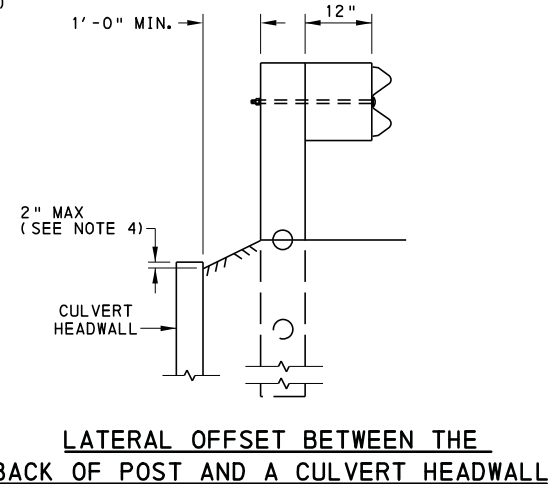
SHT 9 OF 15

**RC-51M**





(6) LONG BREAKAWAY POSTS REQUIRED.  
SEE ELEVATION DETAIL FOR LOCATIONS,  
SEE NOTE 6



## NOTES

- DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
- BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
- FOR THE 25'-0" SPAN, PROVIDE A MINIMUM UNOBSTRUCTED DISTANCE OF 6'-6" BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
- DO NOT EXTEND A CULVERT HEADWALL OR A CURB BEHIND THIS LONG SPAN SYSTEM MORE THAN 2" ABOVE THE GROUND SURFACE.
- THE 16d DOUBLE HEAD NAIL IS FOR WOOD NON-ROUTED OFFSET BRACKETS ONLY.
- FOR PLAN, SIDE, AND FRONT VIEWS OF LONG BREAKAWAY TIMBER POST, SEE SHEET 11.

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

**TYPE 31 STRONG POST GUIDE RAIL**

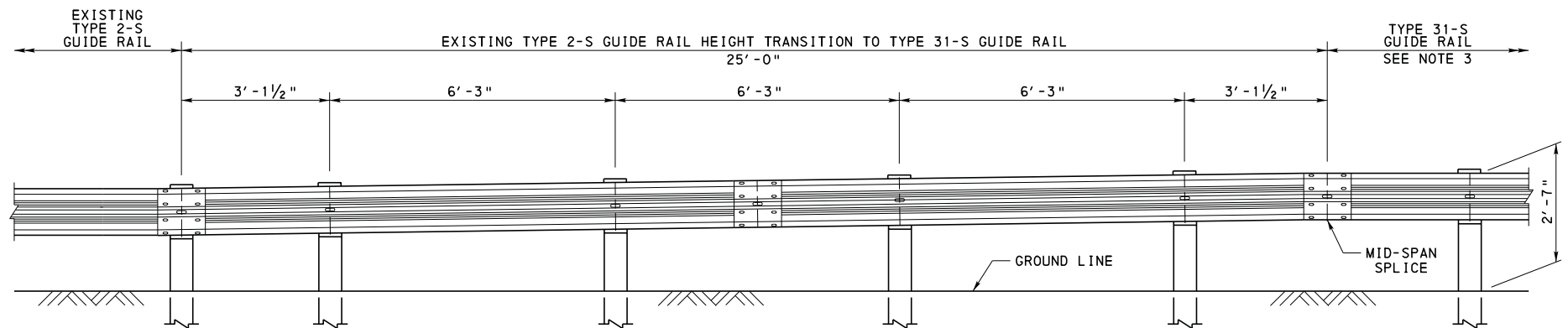
**LONG SPAN SYSTEMS  
ACROSS CULVERTS  
AND SMALL STRUCTURES  
25'-0" SPAN**

RECOMMENDED FEB. 19, 2021  
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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Burns & Thomas*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

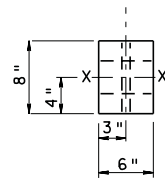
SHT 10 OF 15

**RC-51M**

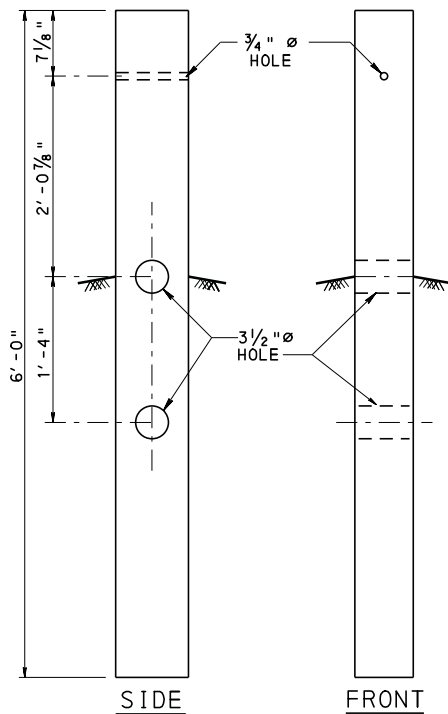


**ELEVATION**

# **EXISTING TYPE 2-S GUIDE RAIL HEIGHT TRANSITION TO TYPE 31-S GUIDE RAIL**



**PLAN**



## **LONG BREAKAWAY TIMBER POST**

(TO BE USED FOR LONG SPAN SYSTEMS  
ACROSS CULVERTS AND SMALL STRUCTURES,  
SEE SHEETS 9 AND 10)

### **NOTES**

1. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
2. THE HEIGHT TRANSITION DETAIL CAN BE USED FOR VARYING HEIGHTS OF EXISTING TYPE 2-S GUIDE RAIL.
3. A MASH COMPLIANT, TYPE II IMPACT ATTENUATING DEVICE, AS LISTED IN BULLETIN 15, IS PERMITTED TO TERMINATE EXISTING TYPE 2-S GUIDE RAIL IF THE EXISTING TYPE 2-S GUIDE RAIL HEIGHT TRANSITION TO TYPE 31-S GUIDE RAIL IS INSTALLED. CONNECT THE MASH COMPLIANT, TYPE II IMPACT ATTENUATING DEVICE TO TYPE 31-S GUIDE RAIL AS PER THE MANUFACTURER'S RECOMMENDATIONS.

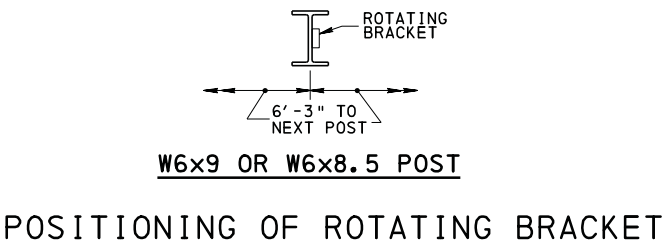
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TYPE 31 STRONG POST  
GUIDE RAIL  
HEIGHT TRANSITION  
AND LONG BREAKAWAY TIMBER POST

RECOMMENDED FEB. 19, 2021  
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CHIEF, HWY. DELIVERY DIVISION

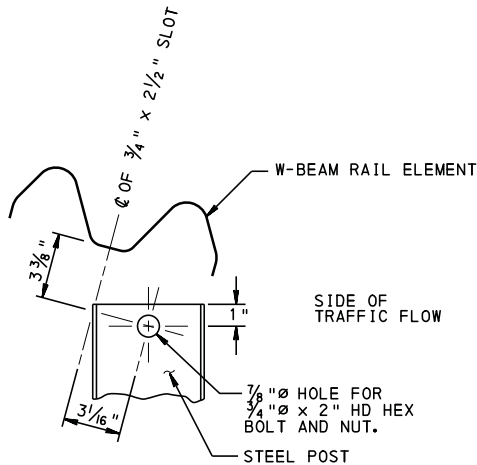
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SHT 11 OF 15  
RC-51M



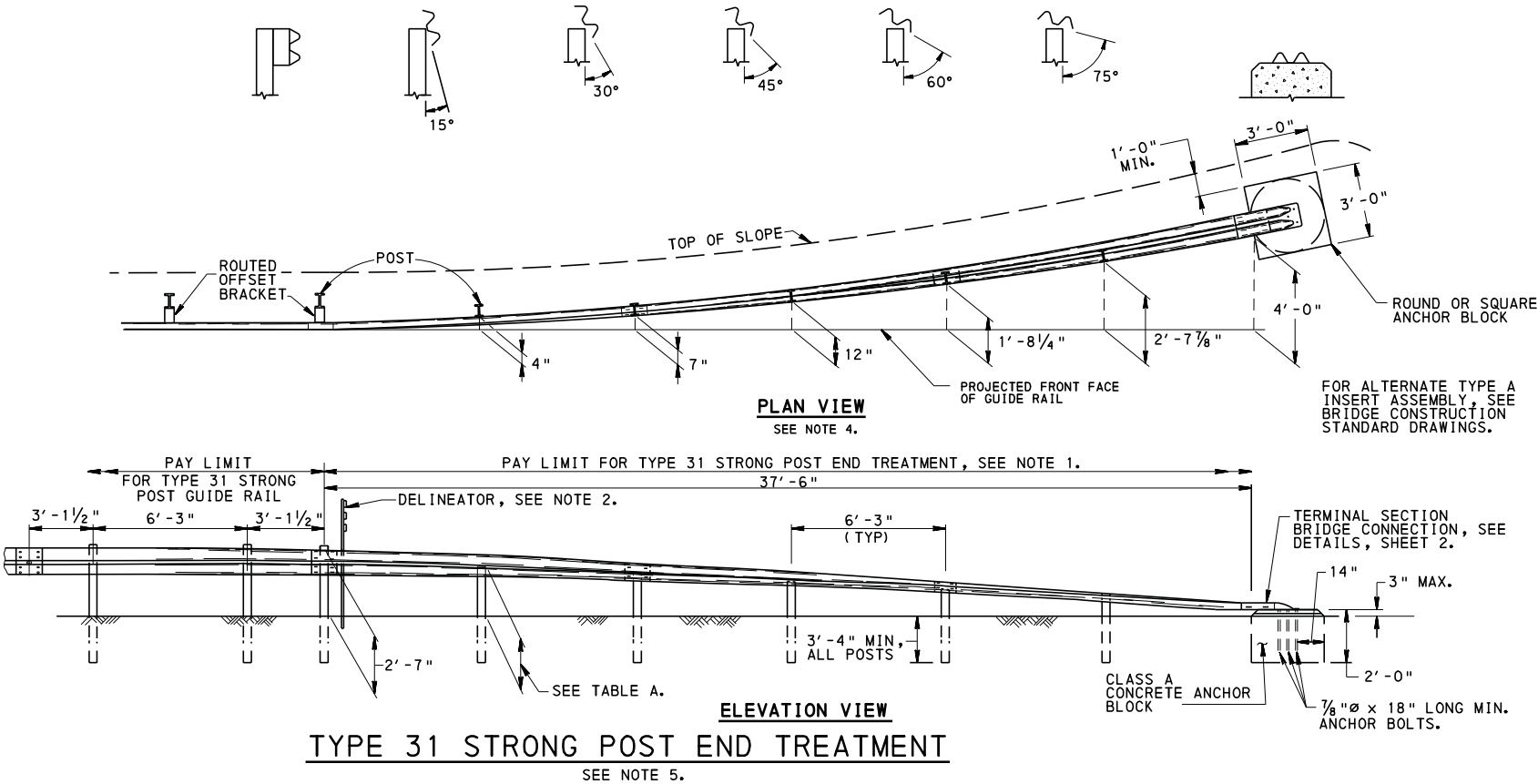
**TABLE A**

HEIGHT OF POST	19 3/4"	16 1/2"	13"	9 1/4"	4 3/4"
ROTATION ANGLES	15°	30°	45°	60°	75°



**NOTES**

- PAYMENT FOR TYPE 31 STRONG POST END TREATMENT INCLUDES 37'-6" OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
- INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-8604.
- ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
- MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
- TYPE 31 STRONG POST END TREATMENT OR "TURNDOWN" CAN BE USED AS FOLLOWS:
  - NHS. CAN BE USED ONLY ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
  - NON-NHS. CAN BE USED FOR DIVIDED AND NON-DIVIDED HIGHWAYS AS DESCRIBED BELOW.
    - DIVIDED HIGHWAYS. CAN BE USED ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
    - NON-DIVIDED HIGHWAYS. CAN BE USED WHEN ALL OF THE FOLLOWING APPLY:
      - THE POSTED SPEED LIMIT IS ≤ 45 MPH.
      - THE CURRENT TRAFFIC VOLUME IS ≤ 2000 VEHICLES PER DAY.
      - THE TURNDOWN IS NOT IN A HIGH CRASH LOCATION.

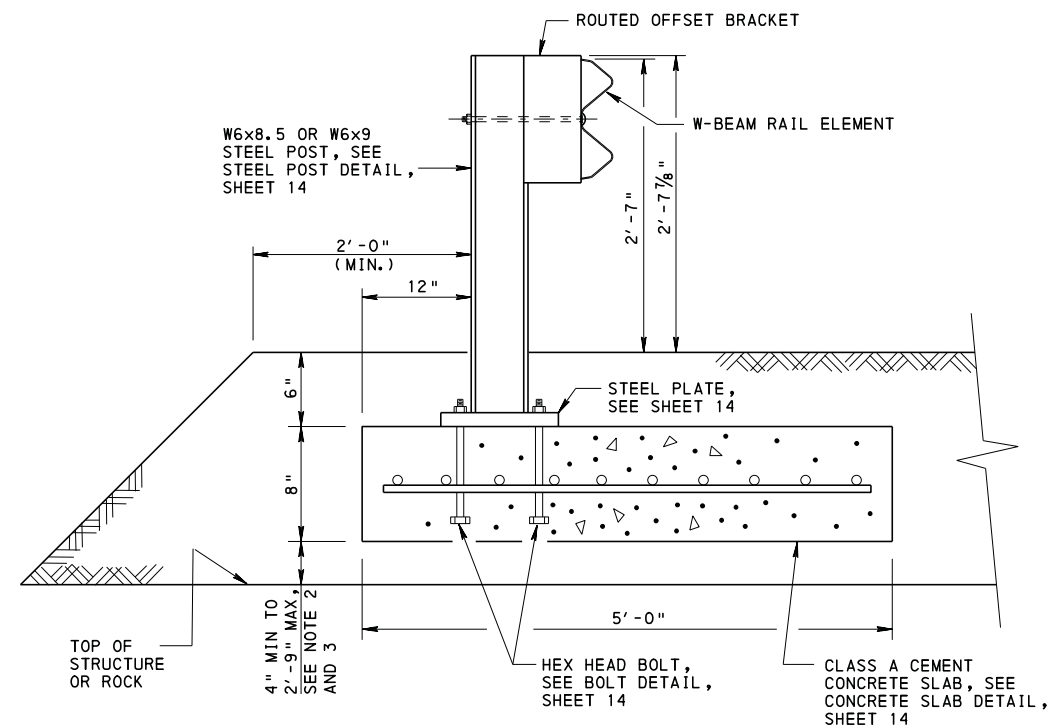
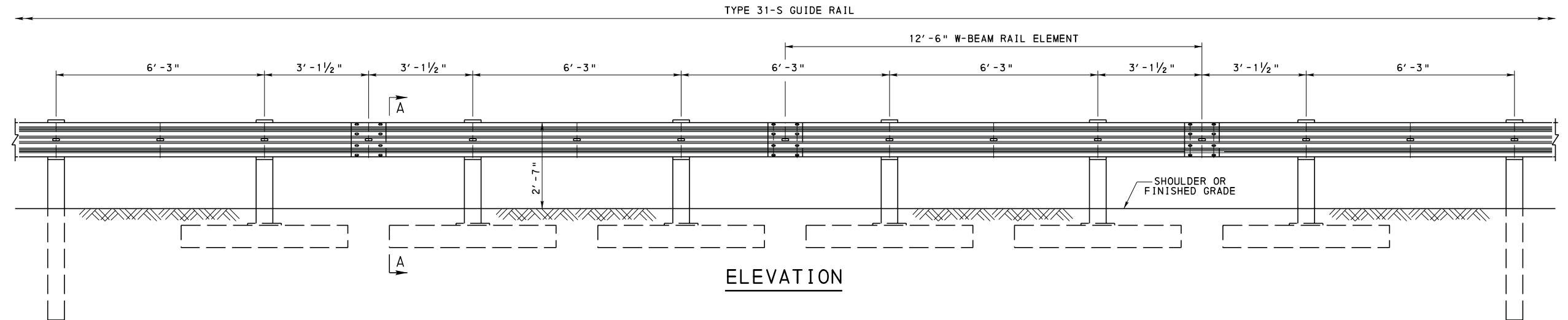


**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF PROJECT DELIVERY**

**TYPE 31 STRONG POST**  
**GUIDE RAIL**

**TYPE 31 STRONG POST**  
**END TREATMENTS "TURNDOWNS"**

RECOMMENDED FEB. 19, 2021 <i>Chris L. Sp...</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian S. Thomas</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 12 OF 15 <b>RC-51M</b>
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SECTION A-A  
SEE NOTES 4 AND 5

NOTES

1. FOR POSTS IN ROCK, SEE SHEET 15.
2. THE DIMENSION OF 4" MIN IS OVER CONCRETE CULVERTS.
3. A DIMENSION OF 2'-0" MIN APPLIES OVER METAL CULVERTS AND PLASTIC CULVERTS.
4. FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES, THE CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.
5. A MAXIMUM OF SIX CONSECUTIVE STEEL POSTS OVER UNDERGROUND STRUCTURES IS PERMITTED FOR AN INSTALLATION OF TYPE 31 STRONG POST GUIDE RAIL.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST  
GUIDE RAIL

STEEL POSTS OVER  
UNDERGROUND STRUCTURES

RECOMMENDED FEB. 19, 2021

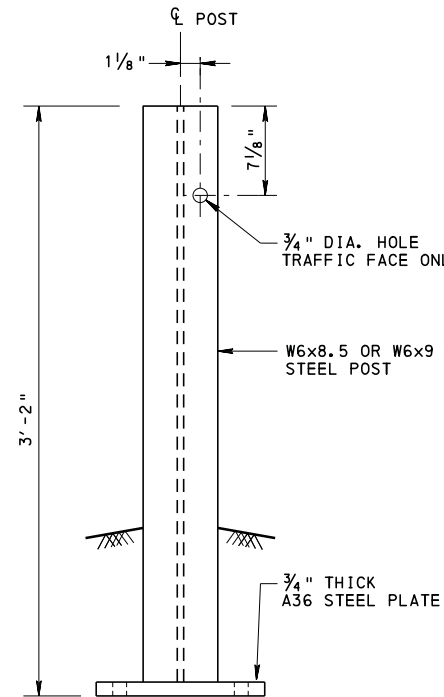
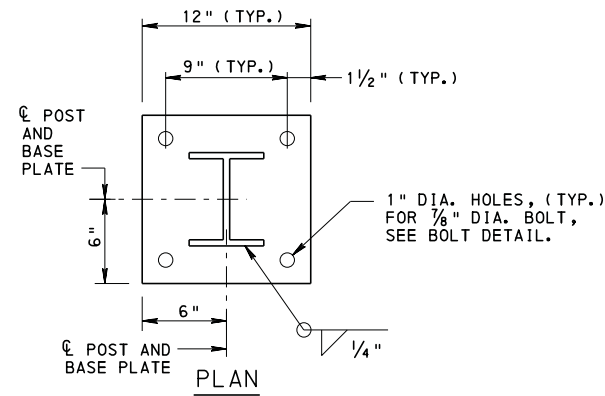
*Chris L. Sp...*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

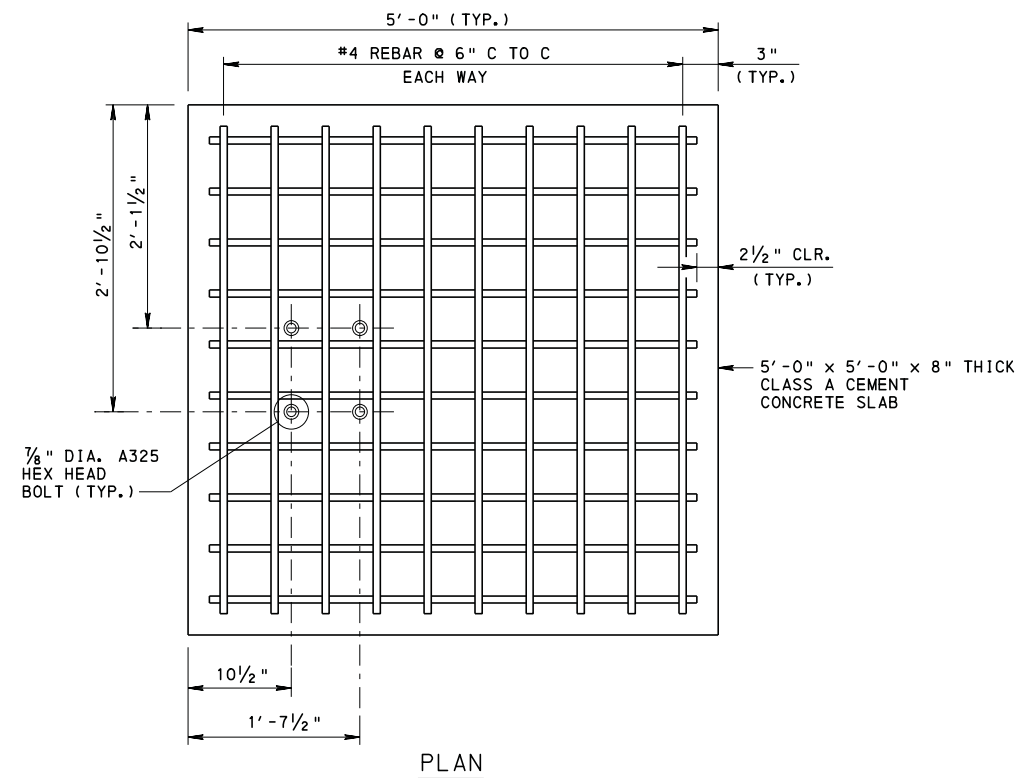
*Brian B. Thomas*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 13 OF 15

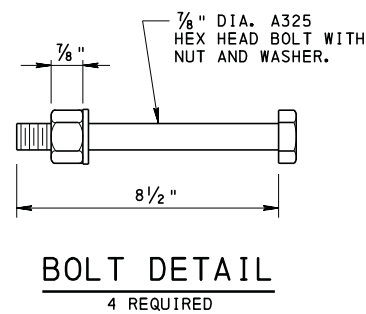
RC-51M



STEEL POST DETAIL



CONCRETE SLAB DETAIL  
STEEL POST NOT SHOWN FOR CLARITY



NOTES

- FOR NOTES, SEE SHEET 13 OF 15.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

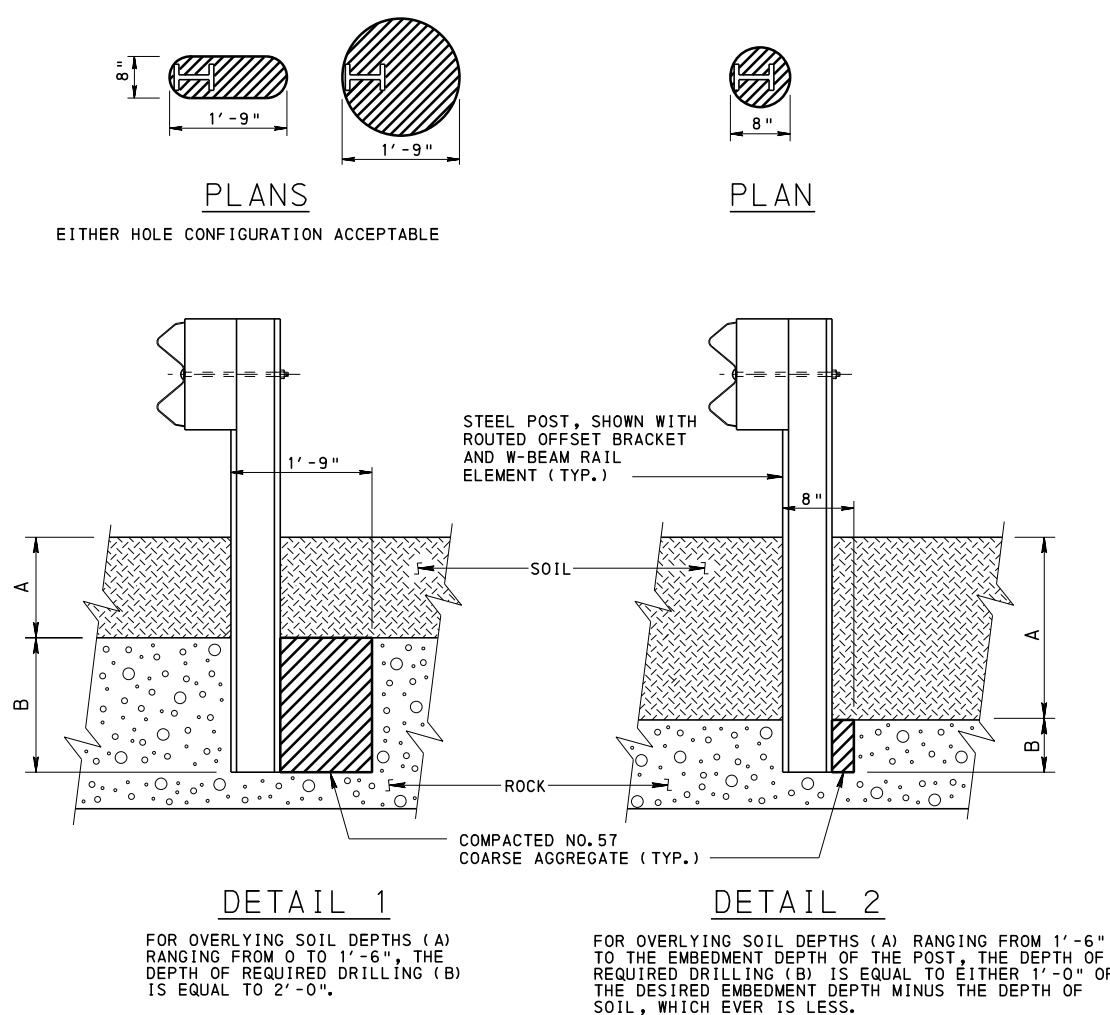
TYPE 31 STRONG POST  
GUIDE RAIL

STEEL POSTS OVER  
UNDERGROUND STRUCTURES

RECOMMENDED FEB. 19, 2021  
*Chris L. Spill*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Brian S. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

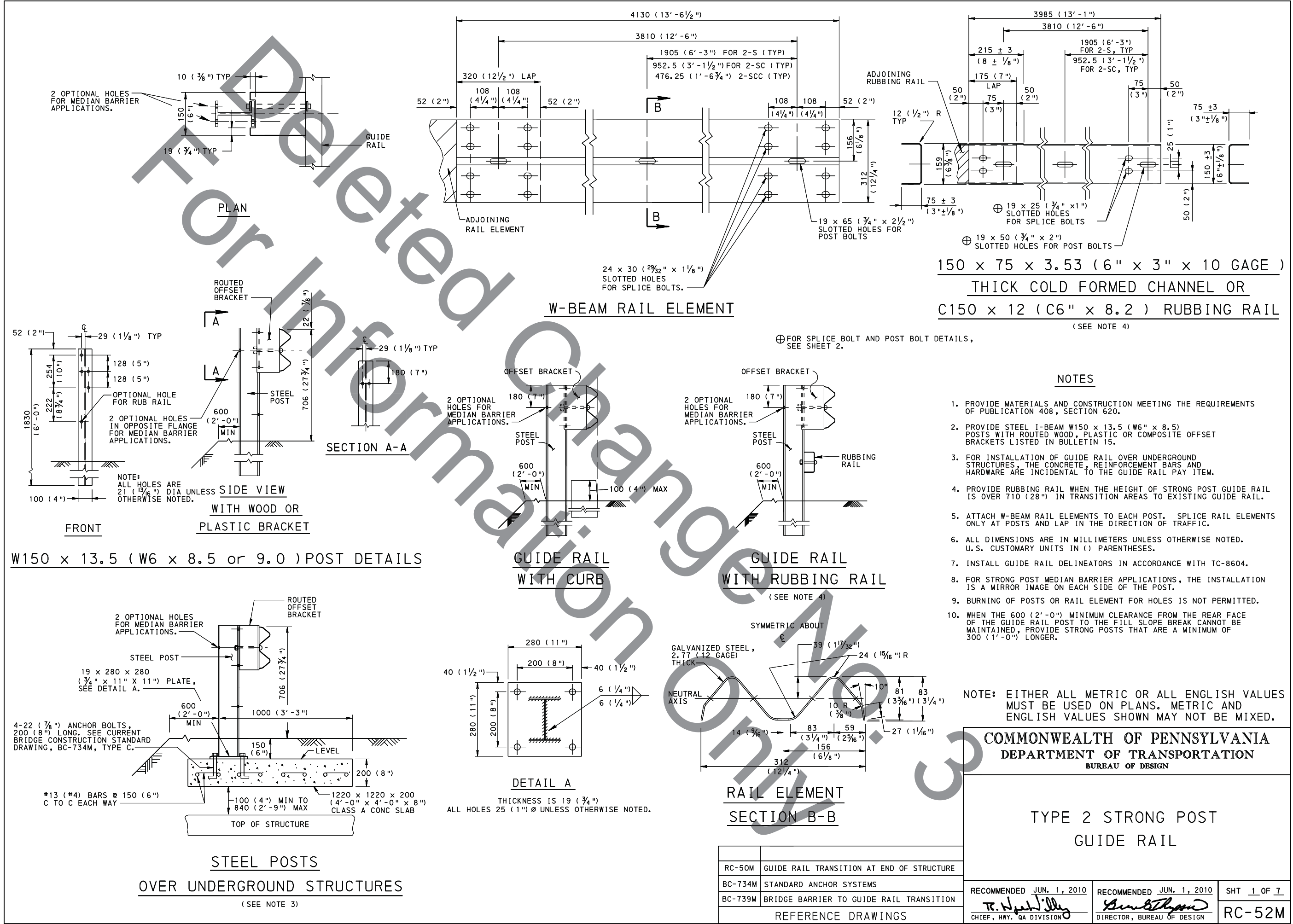
SHT 14 OF 15  
RC-51M

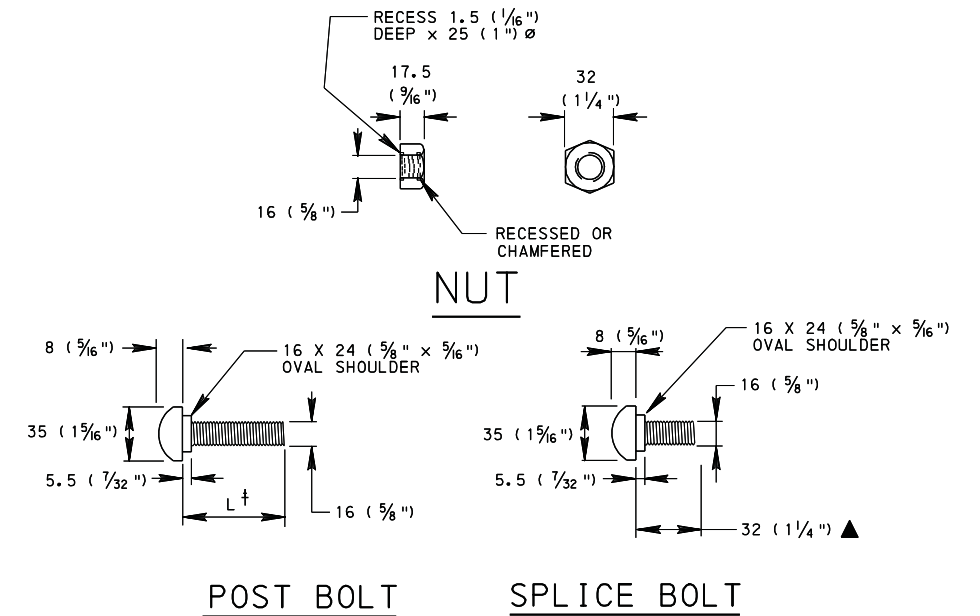
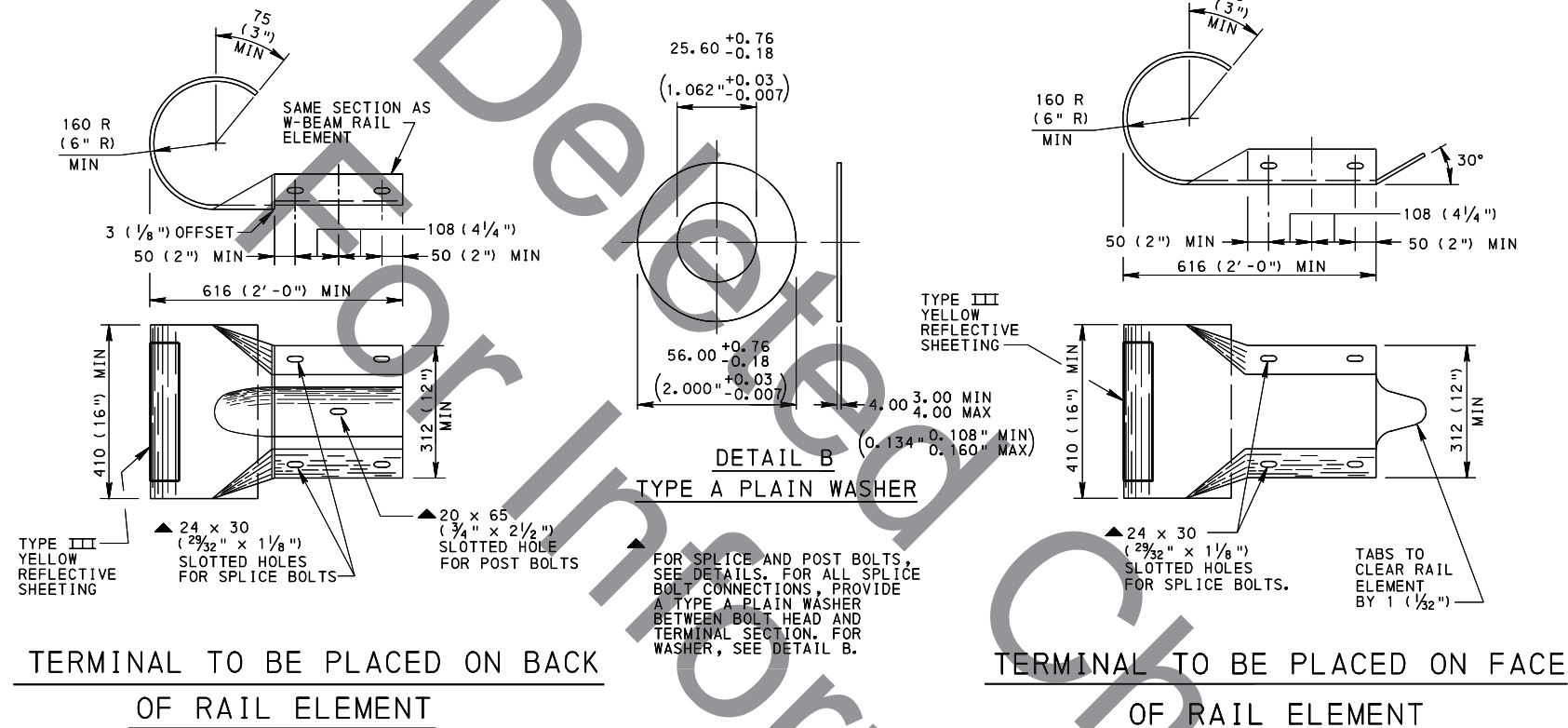


POSTS IN ROCK

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
TYPE 31 STRONG POST GUIDE RAIL  STEEL POSTS IN ROCK		
RECOMMENDED FEB. 19, 2021 <i>Chris L. Spill</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Brian J. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SH1 15 OF 15  RC-51M



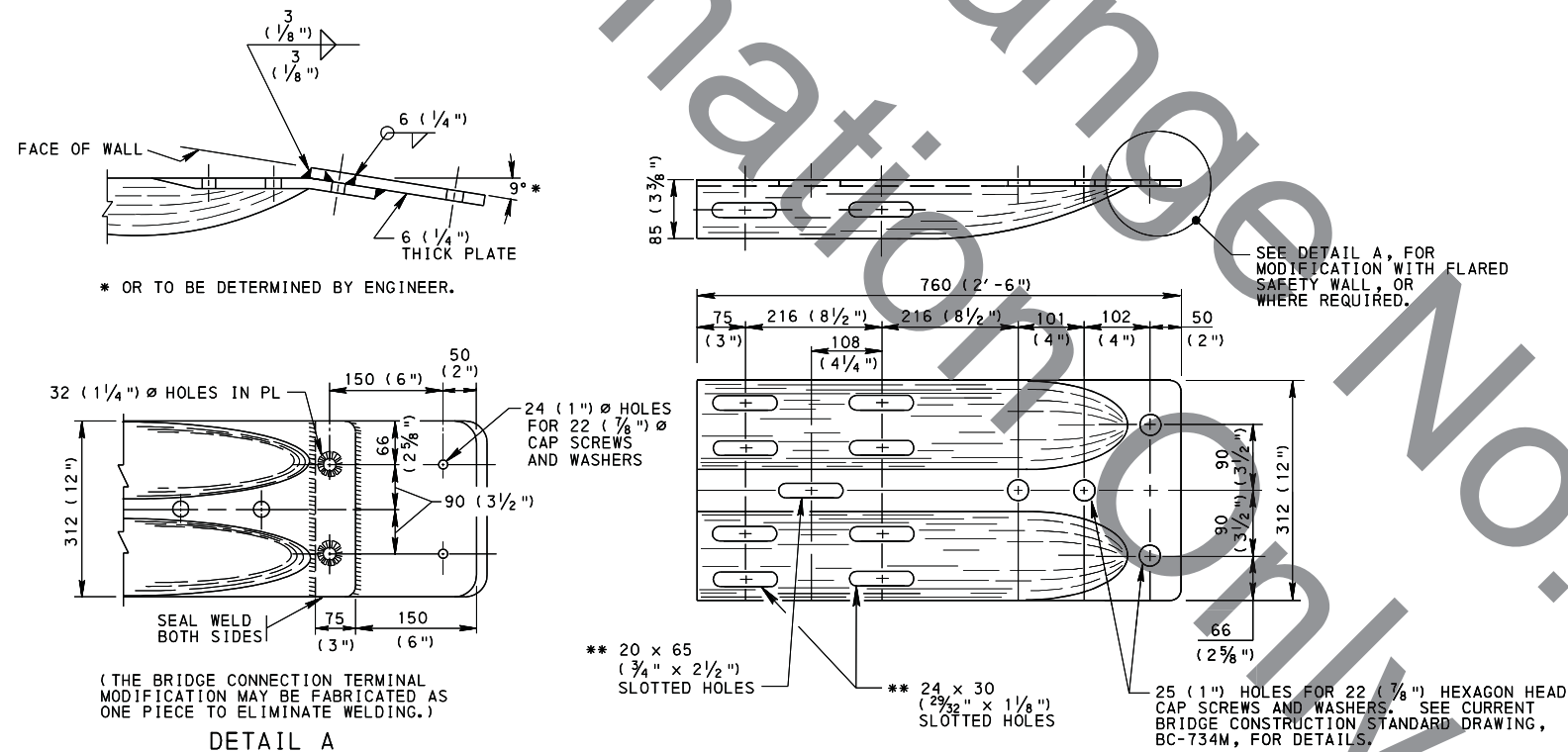




† USE L = 115 (4 1/2") FOR ALL RUBBING RAIL TO GUIDE RAIL POST CONNECTIONS AND USE L = 255 (10") FOR ALL W-BEAM RAIL ELEMENT TO GUIDE RAIL POST AND ROUTED OFFSET BRACKET CONNECTIONS.

▲ FOR FOUR (4) PANEL NESTED RAIL ELEMENT USE 54 (2 7/8") SPLICE BOLT.

### ALTERNATE TERMINAL SECTIONS



### NOTES

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. PROVIDE TERMINAL SECTION BRIDGE CONNECTION, WITH WELDED PLATE FOR SAFETY, AS AN INCIDENTAL ITEM.
3. USE SLOTTED ROUND-HEADED BOLTS TO PROVIDE FOR WRENCH OR SCREWDRIVER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

### TYPE 2 STRONG POST GUIDE RAIL

RECOMMENDED JUN. 1, 2010

CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010

DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 7

RC-52M

For Deleted Information Only

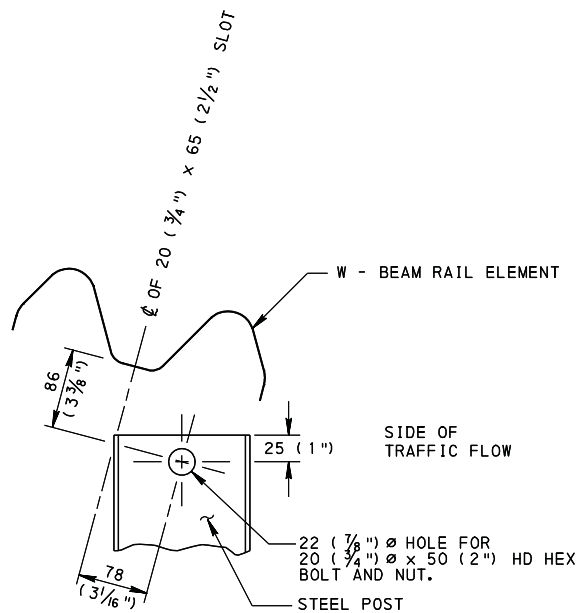
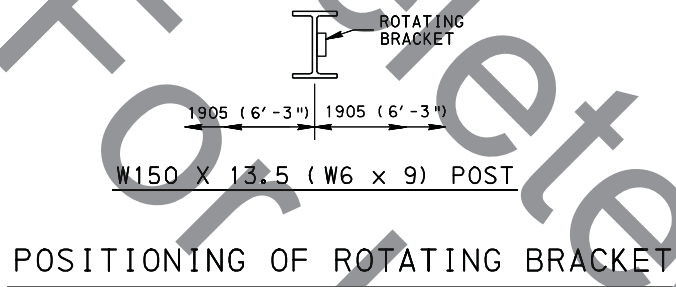
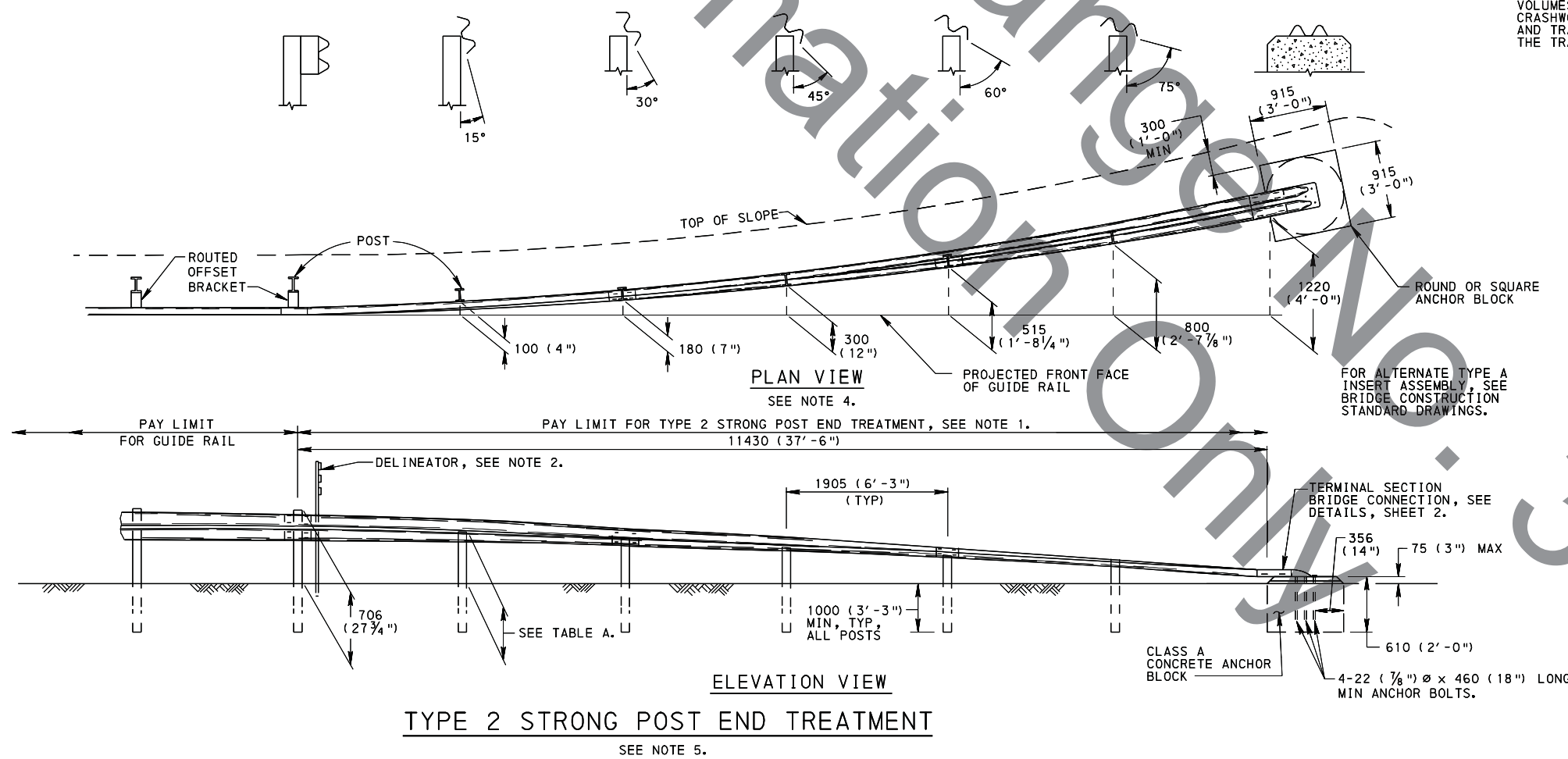


TABLE A

HEIGHT OF POST	430 (17")	370 (14 1/2")	300 (11 3/4")	215 (8 1/2")	115 (4 1/2")
ROTATION ANGLES	15°	30°	45°	60°	75°

- NOTES
1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 11430 (37'-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
  2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-8604.
  3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
  4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
  5. TYPE 2 STRONG POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF - a) ANY GUIDE RAIL ON THE NHS, or b) ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL NHS ROUTES AND ON NON-NHS ROADWAYS WITH TRAFFIC VOLUMES 4000 VEHICLES PER DAY & ABOVE. ON 2-LANE ROADWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. TYPE 2 STRONG POST END TREATMENTS MAY BE USED ON THE TRAILING END OF GUIDE RAIL FOR HIGH SPEED NHS DIVIDED ROADWAYS.

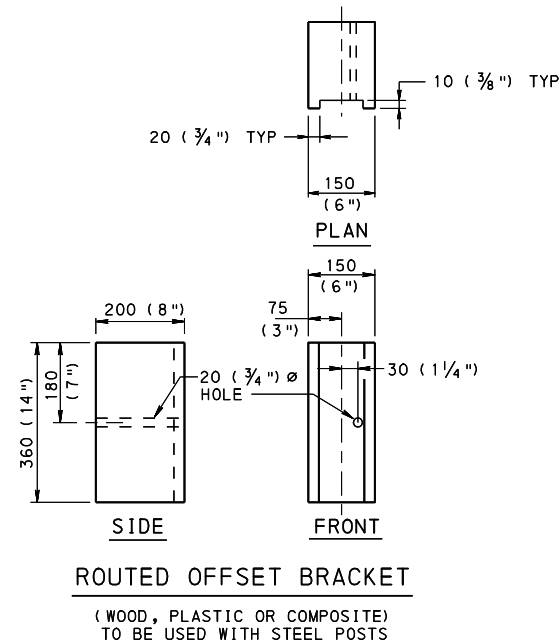
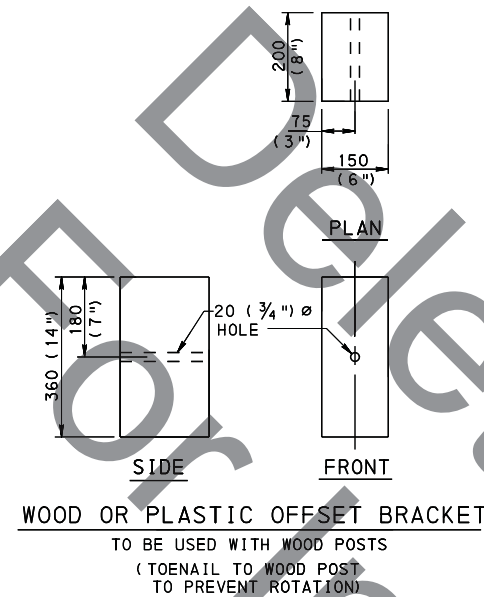


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

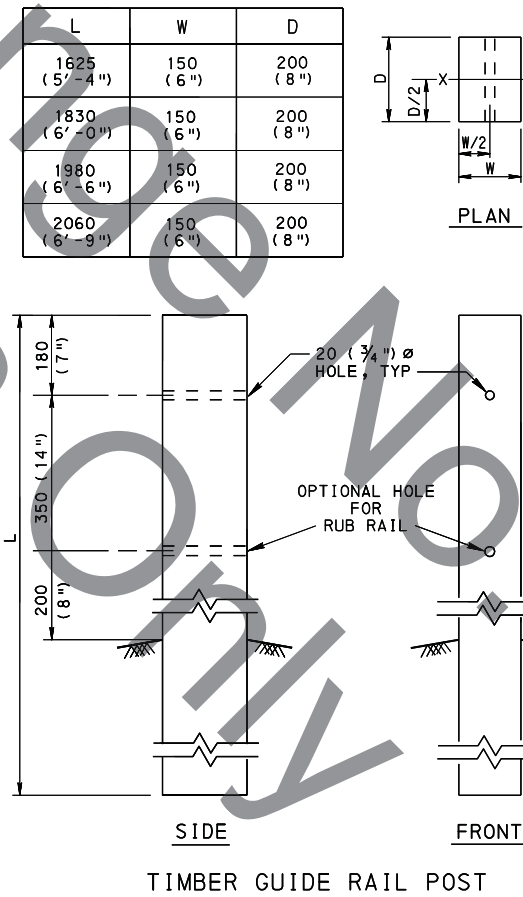
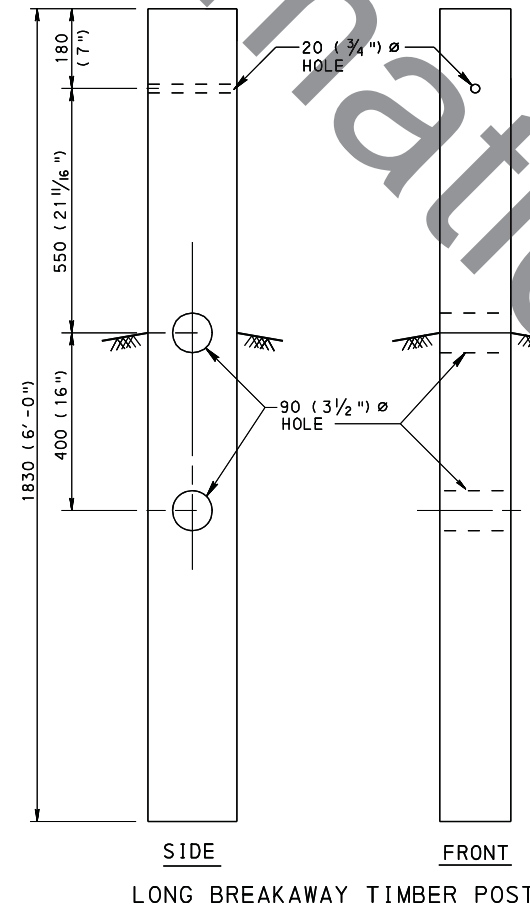
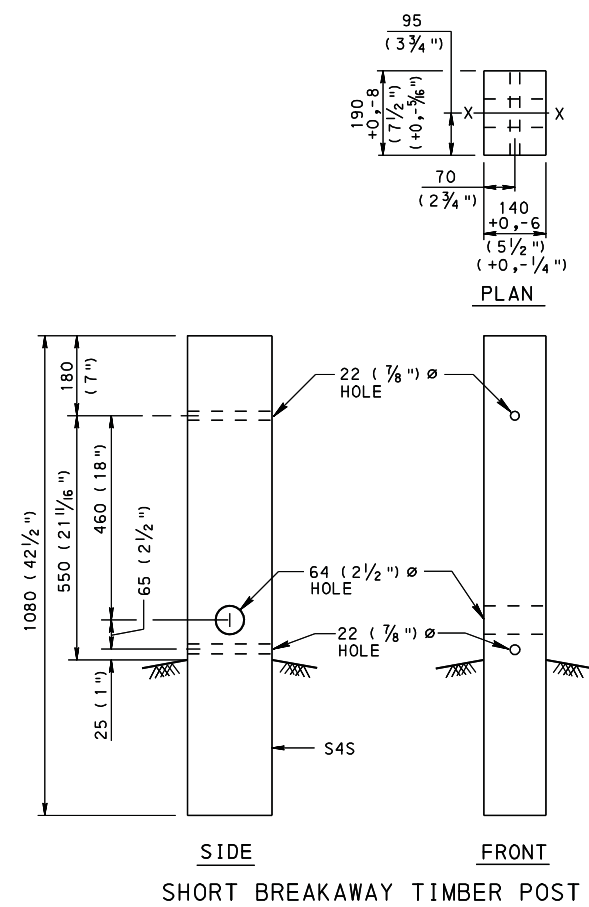
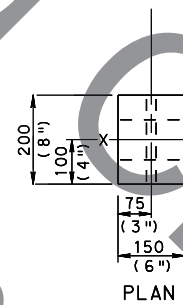
TYPE 2 STRONG POST  
GUIDE RAIL  
END TREATMENTS

RECOMMENDED JUN. 1, 2010 R. N. N. N. N. CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 R. N. N. N. N. DIRECTOR, BUREAU OF DESIGN	SHT 3 OF 7 RC-52M
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# NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. WOOD POSTS ARE TO BE USED FOR END TREATMENTS AND SPECIAL CONDITIONS ON A CASE BY CASE BASIS. THEY ARE NOT TO BE USED AS ALTERNATES TO STEEL POSTS FOR GUIDE RAIL.



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

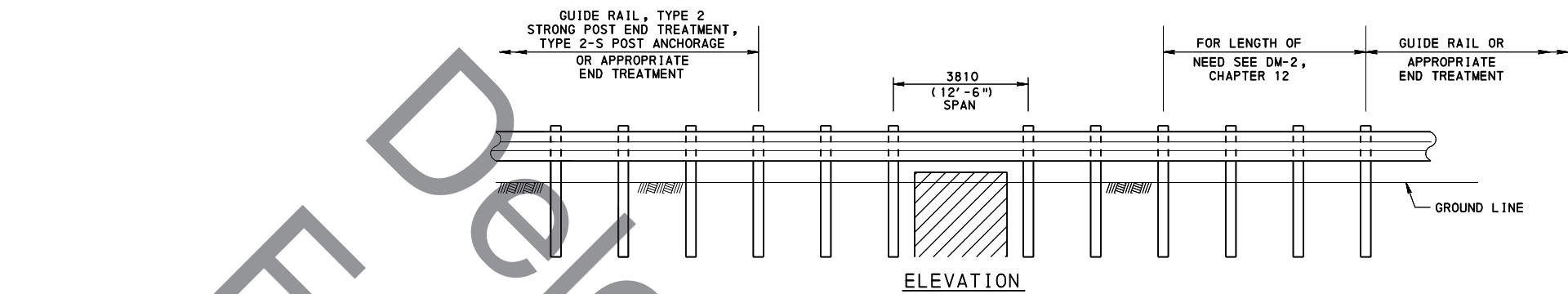
**TYPE 2 STRONG POST**  
**GUIDE RAIL**  
**POSTS AND OFFSET BRACKETS**

RECOMMENDED JUN. 1, 2010  
*R. H. [Signature]*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*[Signature]*  
DIRECTOR, BUREAU OF DESIGN

SHT 4 OF 7  
RC-52M

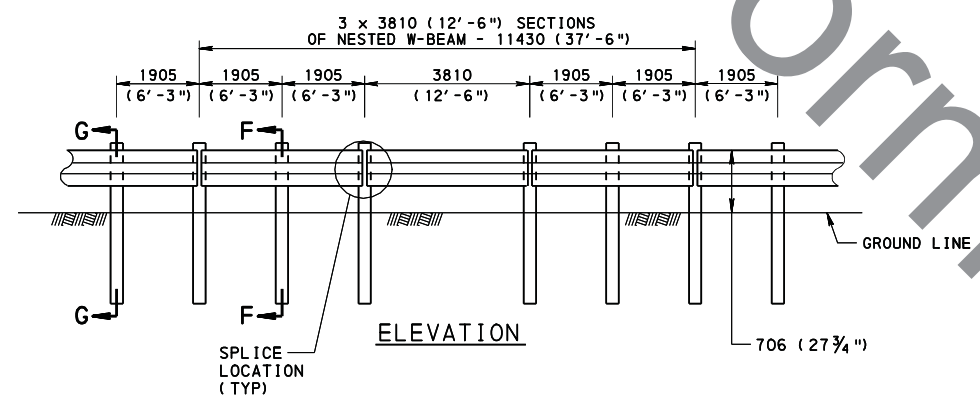
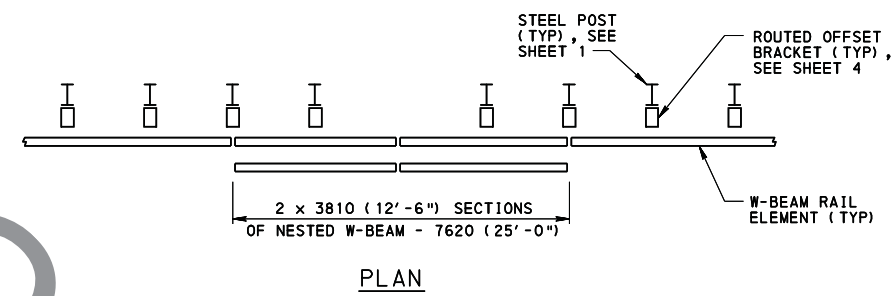
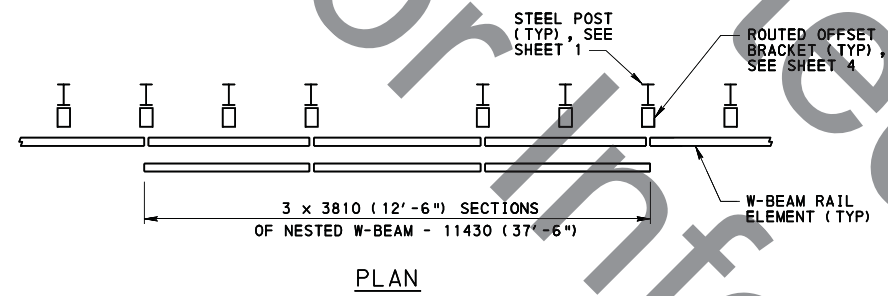




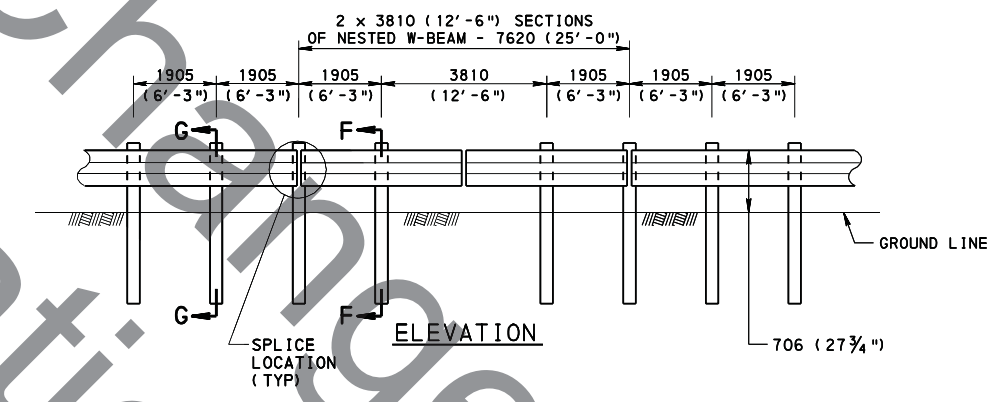
**3810 (12'-6") SPAN NESTED W-BEAM (TYPE 2-S) GUIDE RAIL  
ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES**

**NOTES**

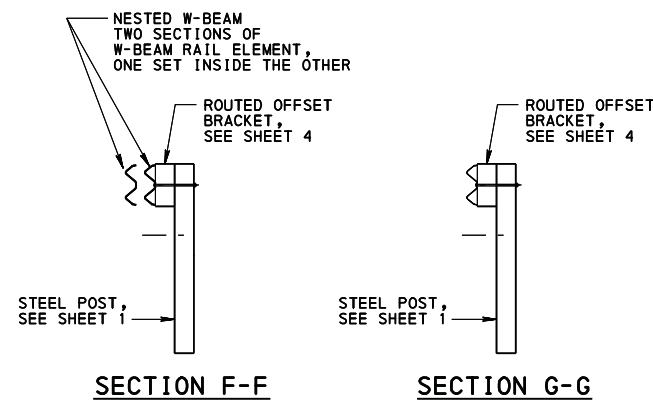
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 3810 (12'-6") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 900 (3'-0") MUST BE PROVIDED BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2 1/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER METER (LINEAR FOOT) OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60900 (200') OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



**CASE 1  
3 NESTED PANELS**



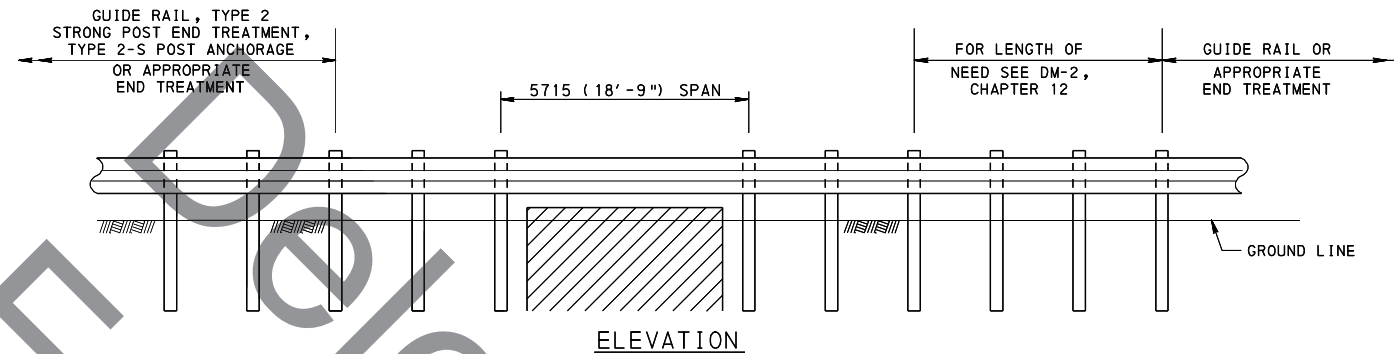
**CASE 2  
2 NESTED PANELS**



**TYPICAL NESTED PANEL  
MID-SPAN SPLICE**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

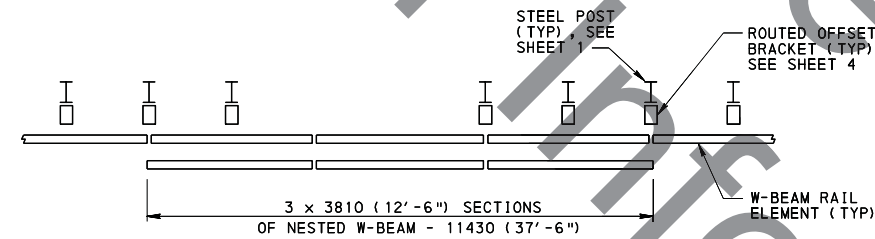
<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF DESIGN		
<b>TYPE 2 STRONG POST</b> <b>GUIDE RAIL</b> <b>ACROSS CULVERTS AND SMALL STRUCTURES</b> <b>3810 (12'-6") SPAN</b>		
RECOMMENDED JUN. 1, 2010 <i>R. N. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>David Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 5 OF 7 <b>RC-52M</b>



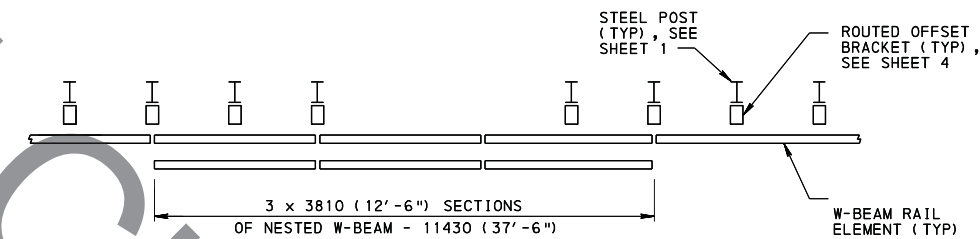
**5715 (18'-9") SPAN NESTED W-BEAM (TYPE 2-S) GUIDE RAIL  
ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES**

**NOTES**

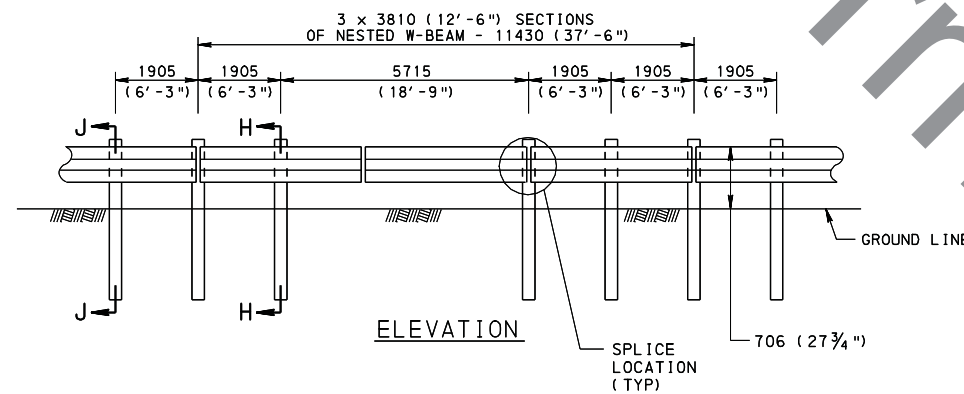
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 5715 (18'-9") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 1050 (3'-6") MUST BE PROVIDED BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2 1/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER METER (LINEAR FOOT) OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60900 (200') OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



**PLAN**

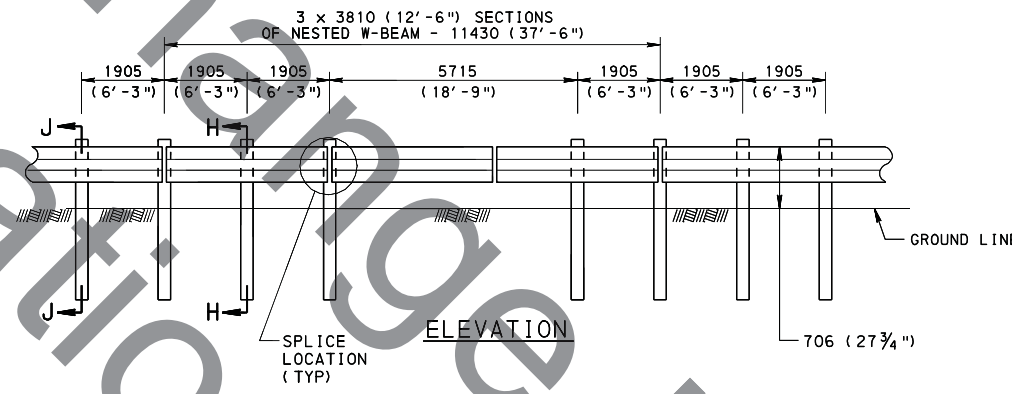


**PLAN**



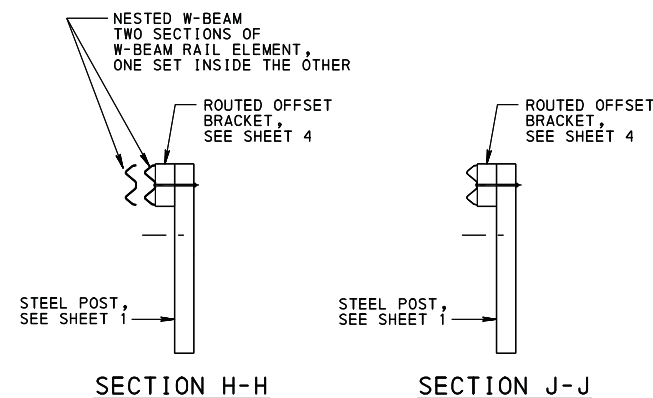
**ELEVATION**

**CASE 1  
SPLICE LOCATIONS**



**ELEVATION**

**CASE 2  
SPLICE LOCATIONS**



**SECTION H-H**

**SECTION J-J**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**TYPE 2 STRONG POST  
GUIDE RAIL  
ACROSS CULVERTS AND SMALL STRUCTURES  
5715 (18'-9") SPAN**

RECOMMENDED JUN. 1, 2010  
*R. W. Willy*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*Sam B. Thompson*  
DIRECTOR, BUREAU OF DESIGN

SHT 6 OF 7  
**RC-52M**

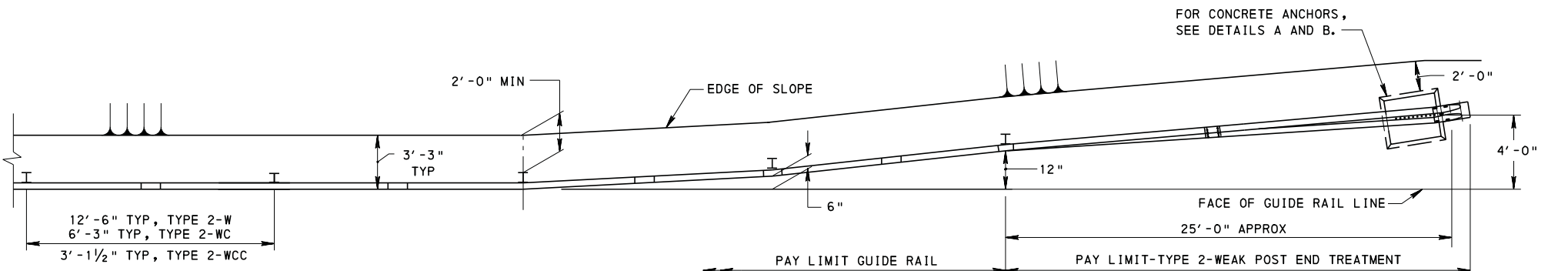




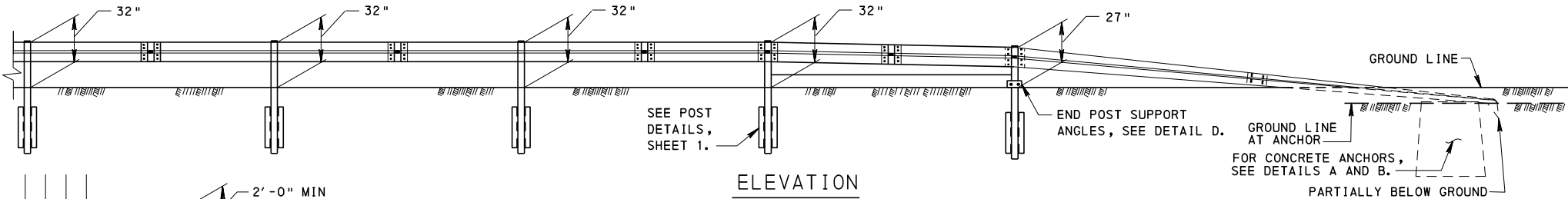


NOTES

1. TYPE 2 WEAK POST END TREATMENTS OR "TURNDOWN" CAN BE USED AS FOLLOWS:
- a. NHS. CAN BE USED ONLY ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
- b. NON-NHS. CAN BE USED FOR DIVIDED AND NON-DIVIDED HIGHWAYS AS DESCRIBED BELOW.
- (1) DIVIDED HIGHWAYS. CAN BE USED ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
- (2) NON-DIVIDED HIGHWAYS. CAN BE USED WHEN ALL OF THE FOLLOWING APPLY:
- (a) THE POSTED SPEED LIMIT IS  $\leq 45$  MPH.
- (b) THE CURRENT TRAFFIC VOLUME IS  $\leq 2000$  VEHICLES PER DAY.
- (c) THE TURNDOWN IS NOT IN A HIGH CRASH LOCATION.
2. IF CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST GUIDE RAIL MUST BE TRANSITIONED WITH A 50'-0" STRONG POST GUIDE RAIL SECTION TO ANCHOR THE TYPE 2-W GUIDE RAIL PRIOR TO THE ATTACHMENT OF A CRASHWORTHY END TREATMENT.



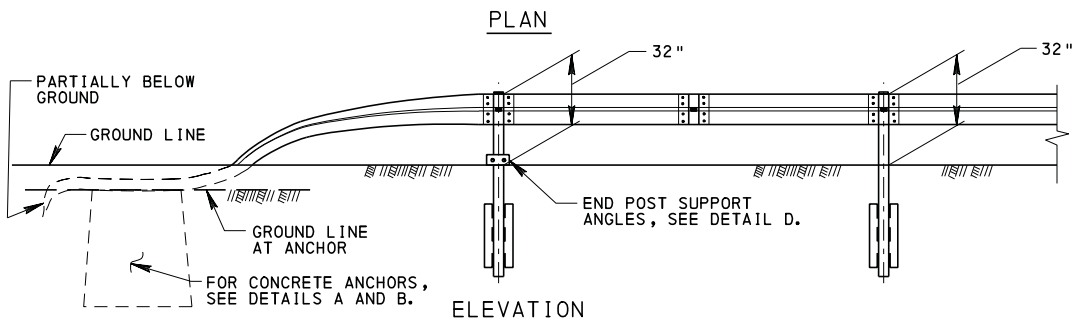
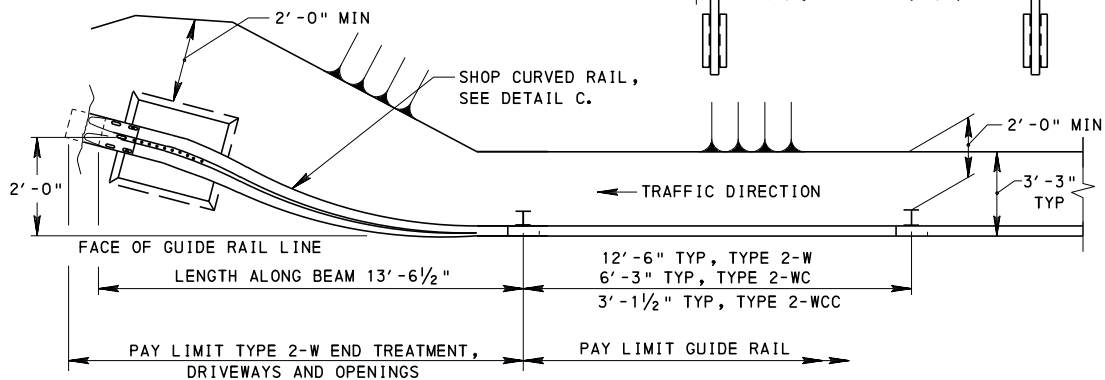
PLAN



ELEVATION

TYPE 2-WEAK POST END TREATMENT

(SEE NOTE 1)

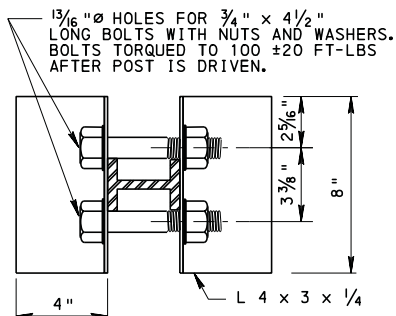


PLAN

ELEVATION

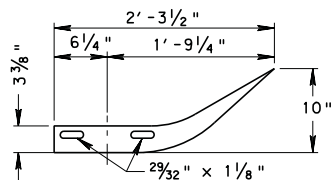
TYPE 2-W END TREATMENT,  
DRIVEWAYS & OPENINGS

(USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS)



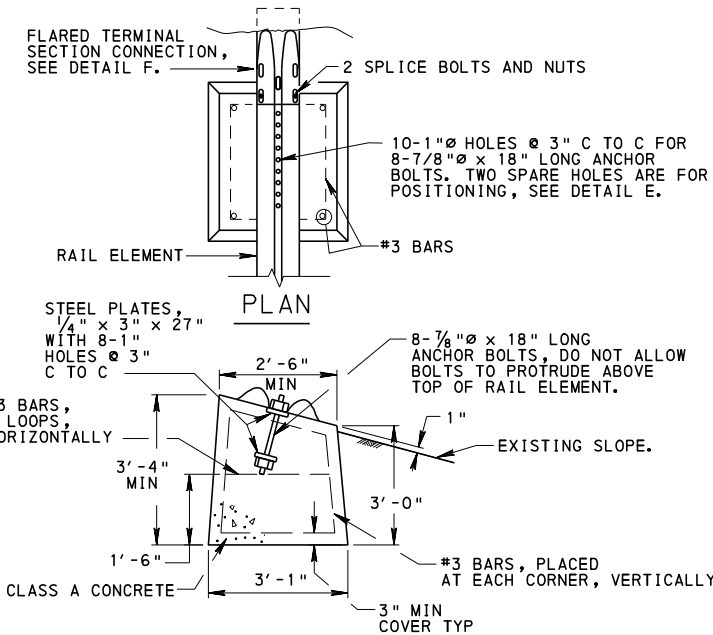
DETAIL D

END POST SUPPORT ANGLES



DETAIL F

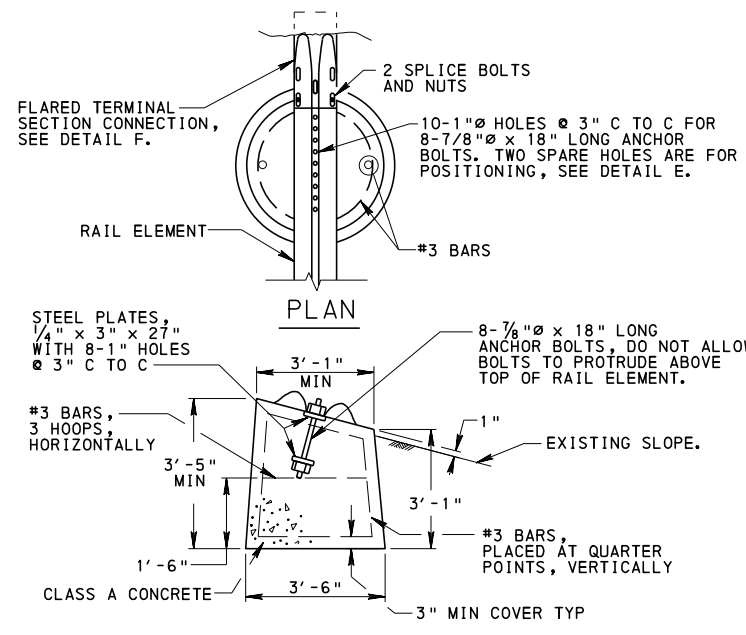
FLARED TERMINAL SECTION



ELEVATION

DETAIL A

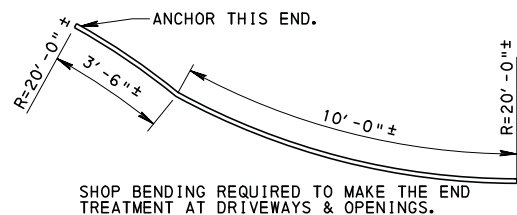
CONCRETE ANCHOR



PLAN

ELEVATION

DETAIL B (ALTERNATE)



DETAIL C

SHOP CURVED RAIL

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

TYPE 2 WEAK POST  
GUIDE RAIL  
END TREATMENTS

RECOMMENDED DEC. 17, 2019

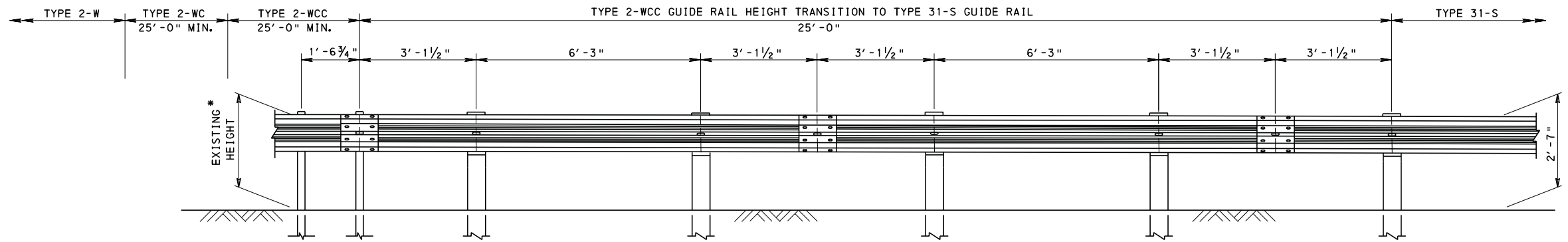
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 3

RC-53M



\* OR 32" HEIGHT FOR NEW CONSTRUCTION

ELEVATION

TYPE 2-WCC GUIDE RAIL HEIGHT TRANSITION TO TYPE 31-S GUIDE RAIL

NOTES

- 1. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
- 2. THE HEIGHT TRANSITION DETAIL CAN BE USED FOR VARYING HEIGHTS OF EXISTING TYPE 2-W GUIDE RAIL.
- 3. THE HEIGHT TRANSITION IS LINEAR OVER THE LENGTH OF 25'-0".

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

TYPE 2 WEAK POST  
GUIDE RAIL  
HEIGHT TRANSITION

RECOMMENDED DEC. 17, 2019

*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 3

RC-53M

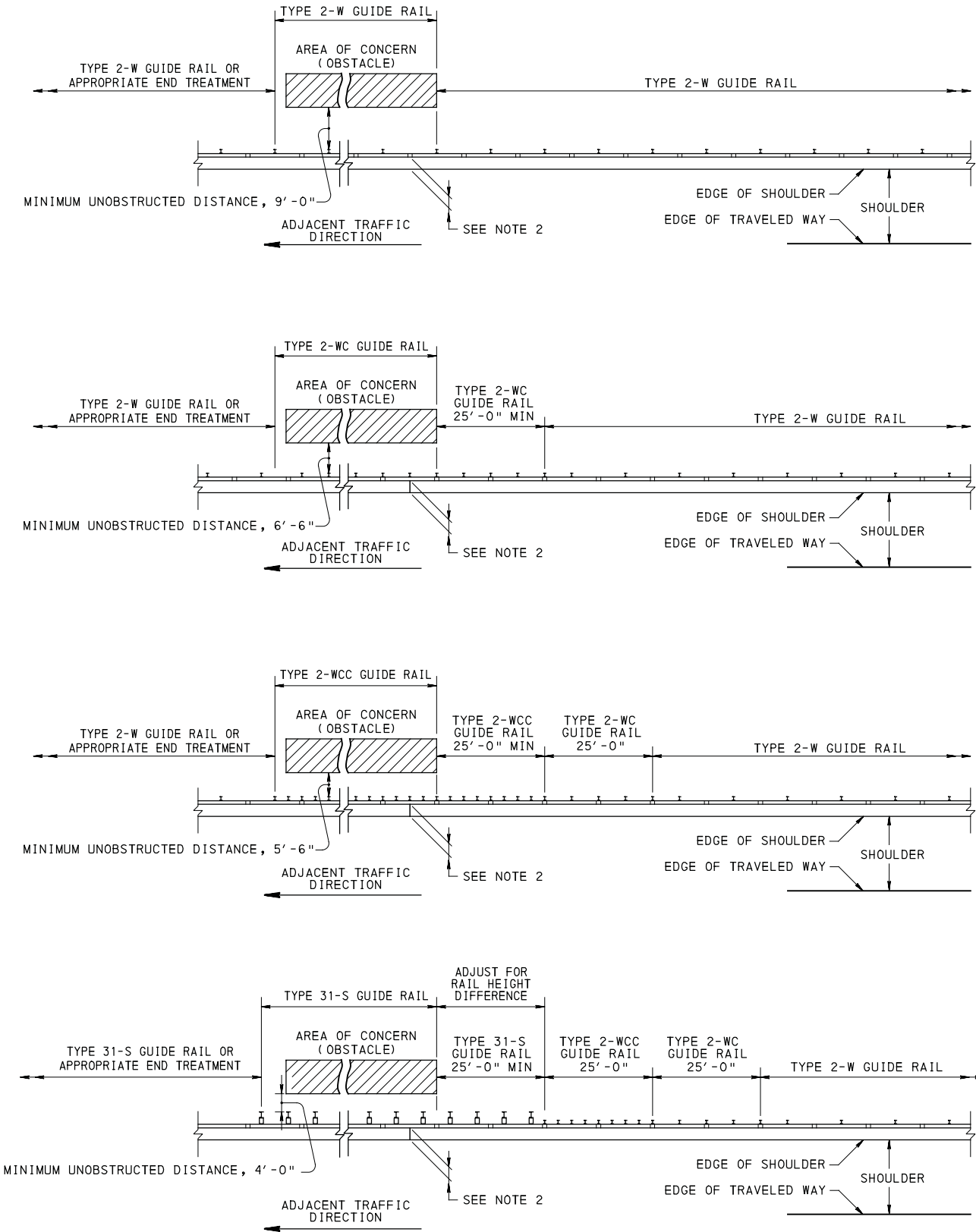
NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATION OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).



TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS  
FOR VARIOUS UNOBSTRUCTED DISTANCES

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

BARRIER PLACEMENT  
AT OBSTRUCTIONS  
  
TYPICAL TYPE 2 WEAK POST  
GUIDE RAIL TREATMENTS

RECOMMENDED DEC. 17, 2019  
*Phil J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*Melissa J. Butch*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 12  
RC-54M

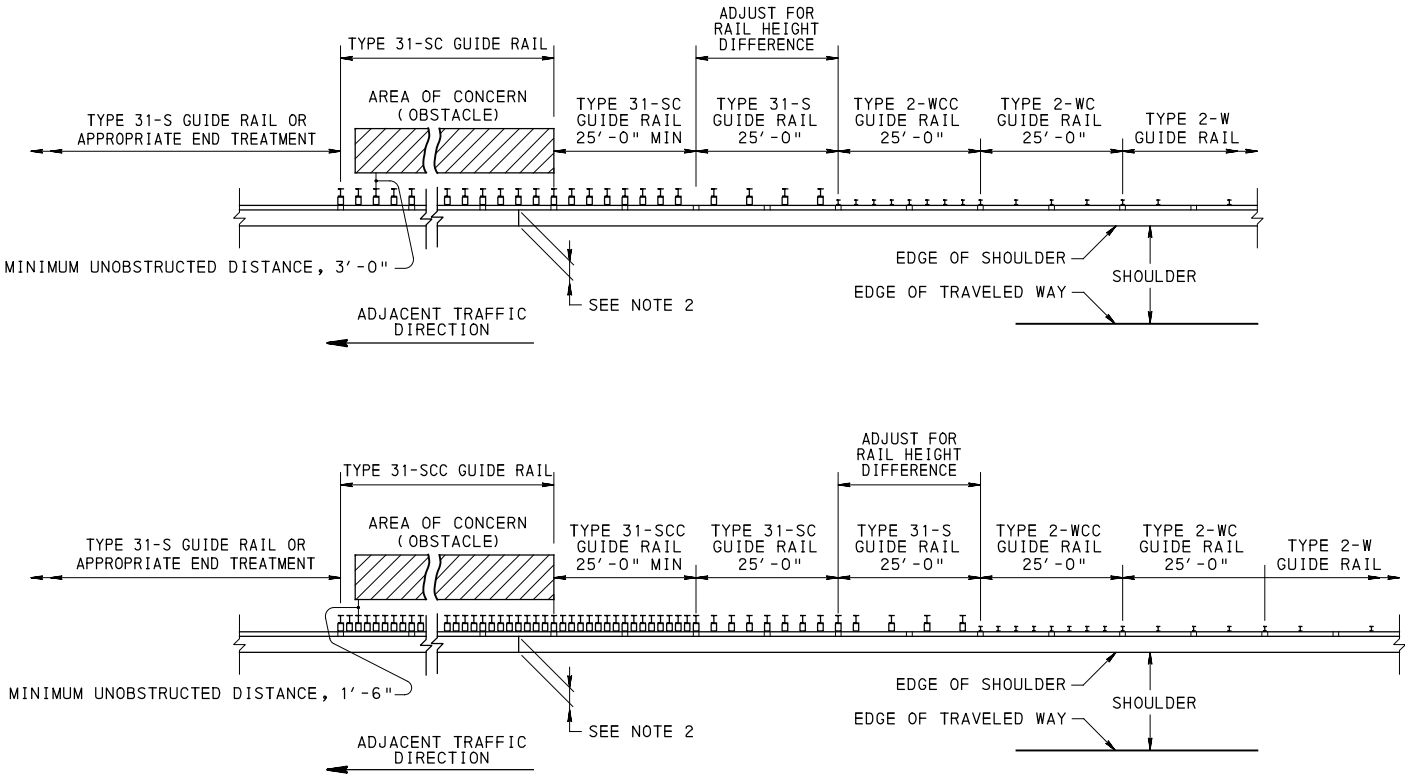
NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATION OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).



TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS  
FOR VARIOUS UNOBSTRUCTED DISTANCES

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

BARRIER PLACEMENT  
AT OBSTRUCTIONS

TYPICAL TYPE 2 WEAK POST  
GUIDE RAIL TREATMENTS

RECOMMENDED DEC. 17, 2019

*Philip J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

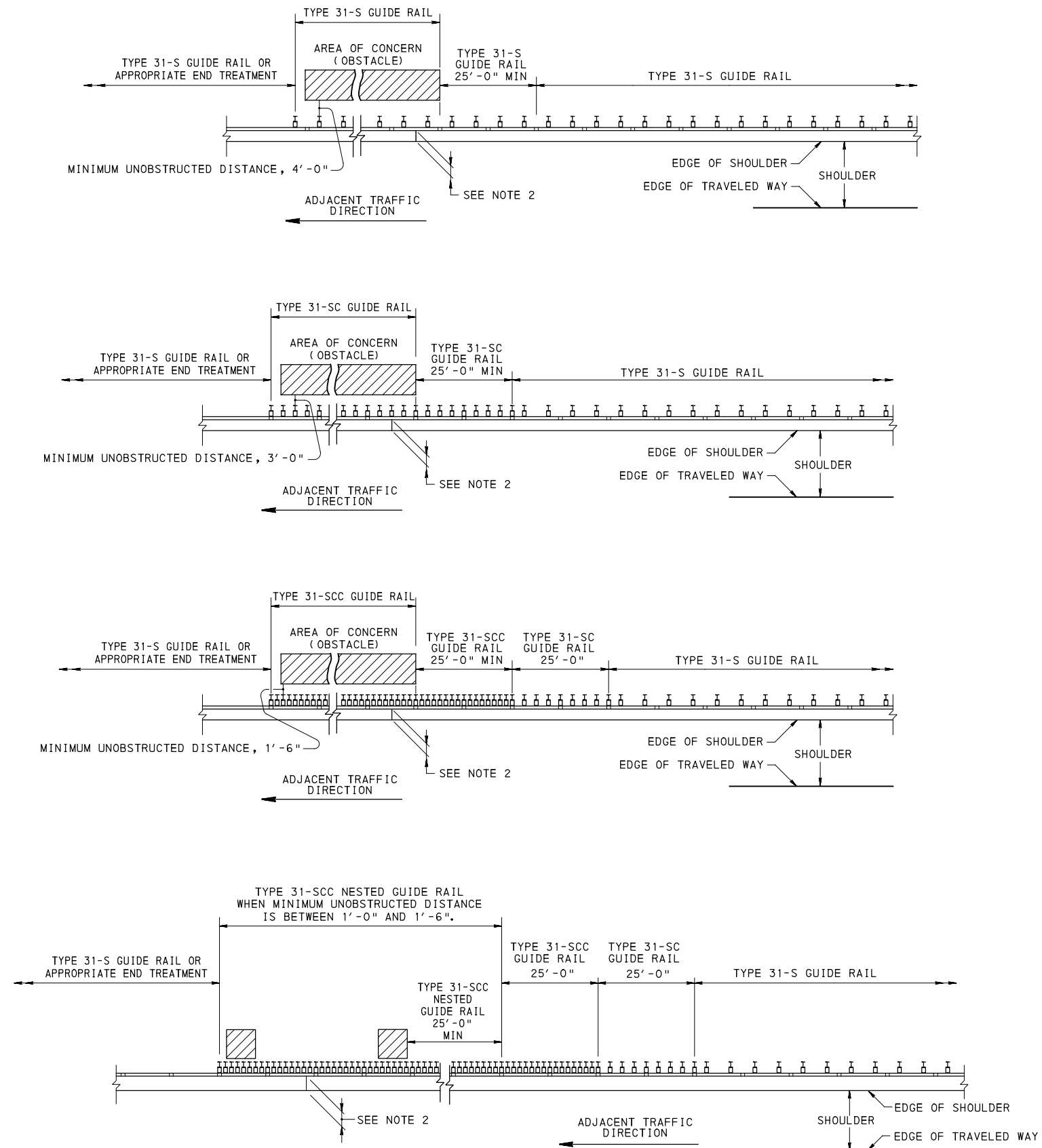
RECOMMENDED DEC. 17, 2019

*Melissa J. Batale*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 12

RC-54M





TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS  
FOR VARIOUS UNOBSTRUCTED DISTANCES

NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATION OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

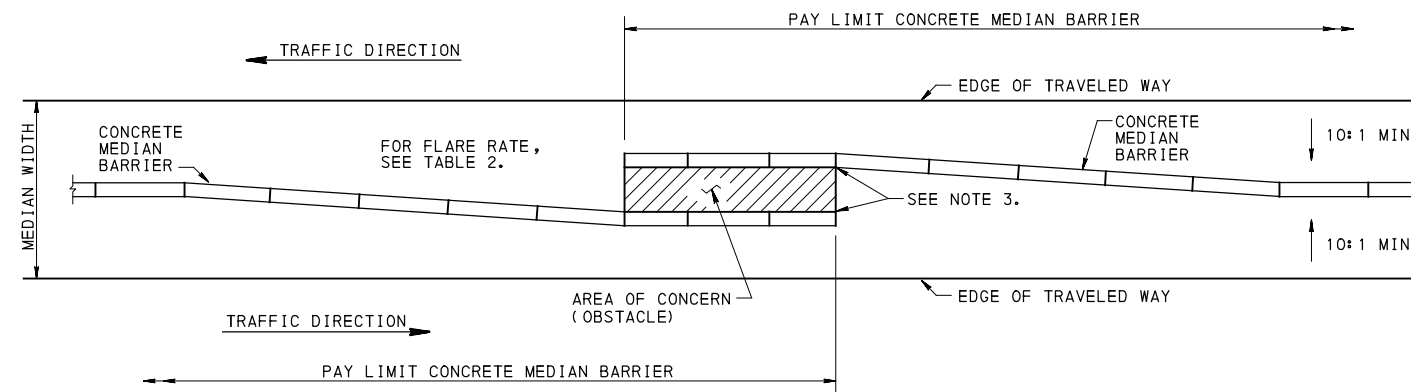
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

BARRIER PLACEMENT  
AT OBSTRUCTIONS  
  
TYPICAL TYPE 31 STRONG POST  
GUIDE RAIL TREATMENTS

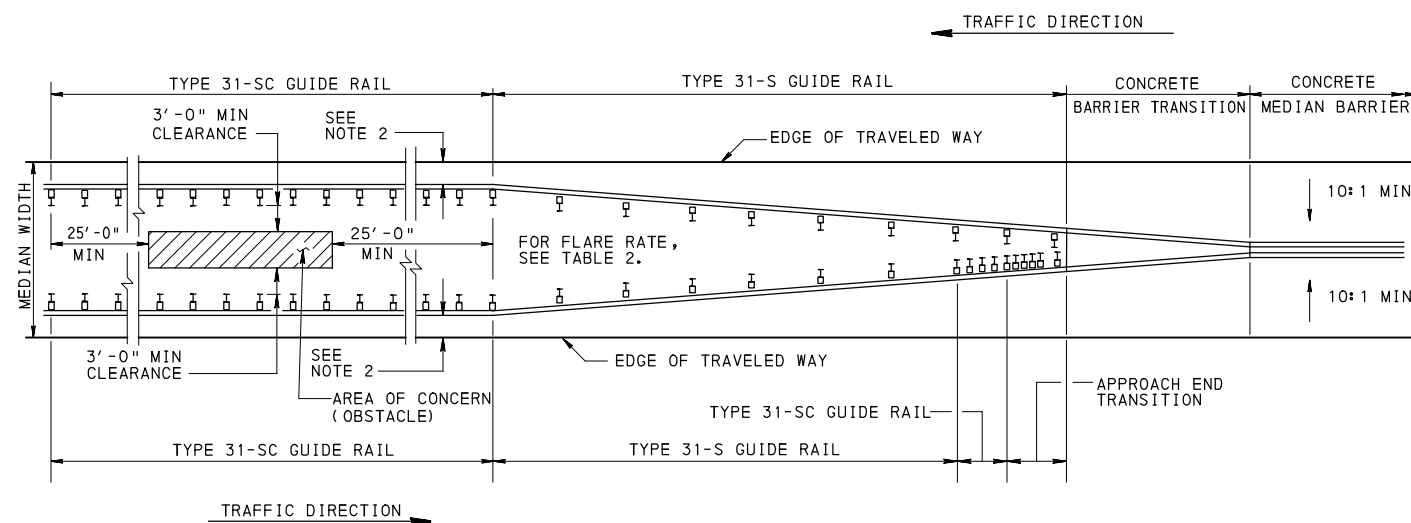
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*[Signature]*  
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RECOMMENDED DEC. 17, 2019  
*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-54M



**TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 20'  
OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED**



**TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF  
20' TO 30' WHERE CONTINUOUS BARRIER IS REQUIRED**

**TABLE 1**

TYPE OF GUIDE RAIL	MINIMUM <sup>†</sup> UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1' - 0"
31-SCC	1' - 6"
31-SC	3' - 0"
31-S	4' - 0"
2-WCC	5' - 6"
2-WC	6' - 6"
2-W	9' - 0"

<sup>†</sup> FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

**TABLE 2  
FLARE RATES FOR BARRIER DESIGN**

DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
mph		
70	20 ± 1	15 ± 1
65	19 ± 1	15 ± 1
60	18 ± 1	14 ± 1
55	16 ± 1	12 ± 1
50	14 ± 1	11 ± 1
45	12 ± 1	10 ± 1
40	11 ± 1	9 ± 1
35	10 ± 1	8 ± 1
30	8 ± 1	7 ± 1

**NOTES**

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW RECOMMENDED GUIDELINES IN DESIGN MANUAL, PART 2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. PROVIDE SINGLE FACE CONCRETE BARRIER THROUGH THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-58M.

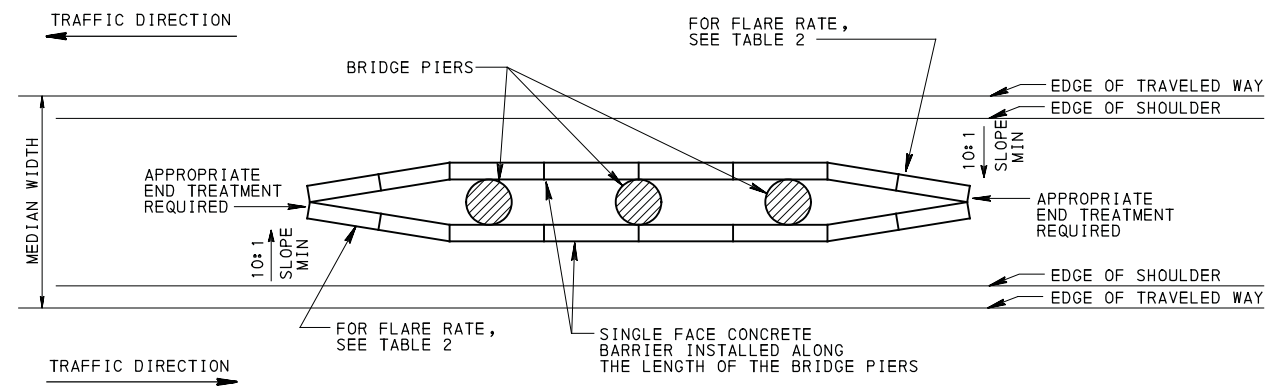
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**BARRIER PLACEMENT  
AT OBSTRUCTIONS  
MEDIAN TREATMENTS**

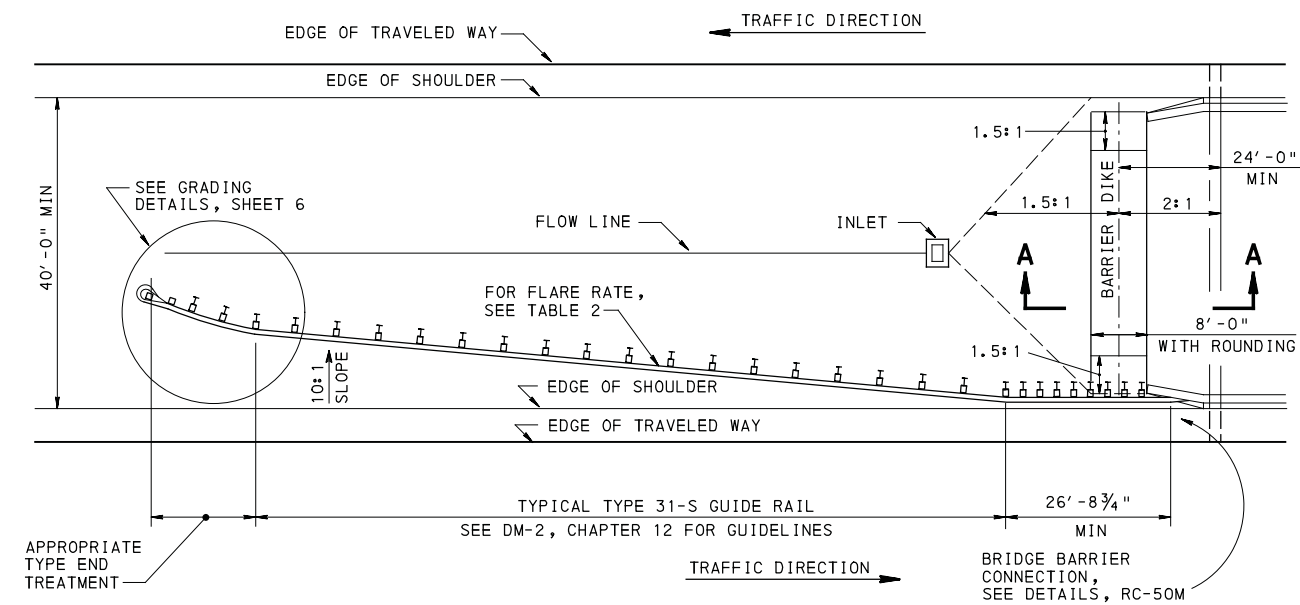
RECOMMENDED DEC. 17, 2019  
*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

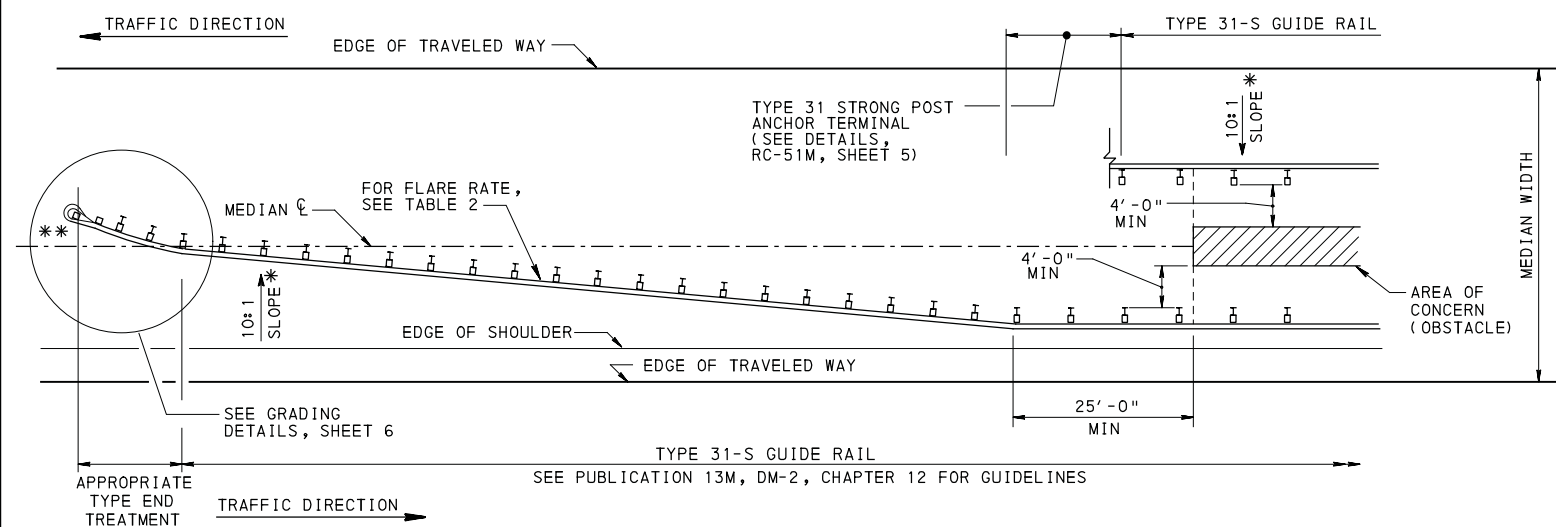
SHT 4 OF 12  
RC-54M



**TREATMENT AT OBSTRUCTIONS FOR  
MEDIAN WIDTHS GREATER THAN 20'-0"  
WHERE CONTINUOUS BARRIER IS NOT REQUIRED**



**MEDIAN TREATMENT AT DUAL STRUCTURES**



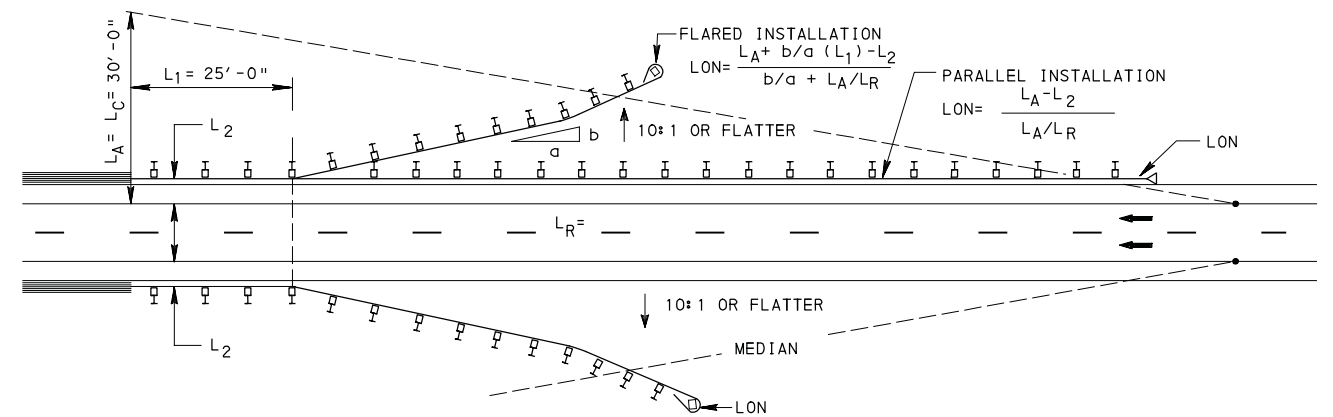
**TREATMENT AT OBSTRUCTIONS FOR  
MEDIAN WIDTHS GREATER THAN 30'-0"  
WHERE CONTINUOUS BARRIER IS NOT REQUIRED**

\* A 10:1 SLOPE MINIMUM IS REQUIRED IN FRONT OF THE BARRIER, IF ANY PORTION OF THE BARRIER IS LOCATED WITHIN 12'-0" FROM THE EDGE OF SHOULDER (HINGE POINT). BARRIER MUST NOT BE PLACED ON SLOPES STEEPER THAN 6:1.

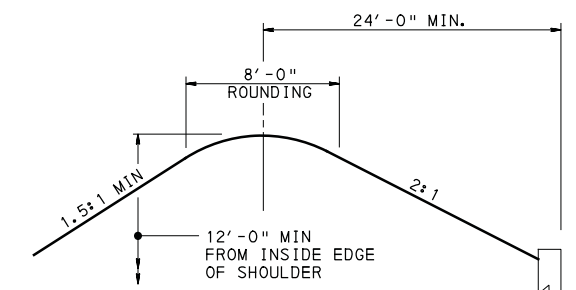
\*\* DO NOT INSTALL END TREATMENT WITHIN 3'-0" FROM MEDIAN C.

NOTE:

FOR FURTHER END TREATMENT DETAILS, SEE DM-2, CHAPTER 12 FOR GUIDELINES.



**LENGTH OF BARRIER NEED (LON)**  
SEE PUBLICATION DM-2, CHAPTER 12 FOR GUIDELINES



**SECTION A-A**  
MEDIAN TREATMENT AT DUAL STRUCTURE

**TABLE 2  
FLARE RATES FOR BARRIER DESIGN**

DESIGN SPEED mph	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

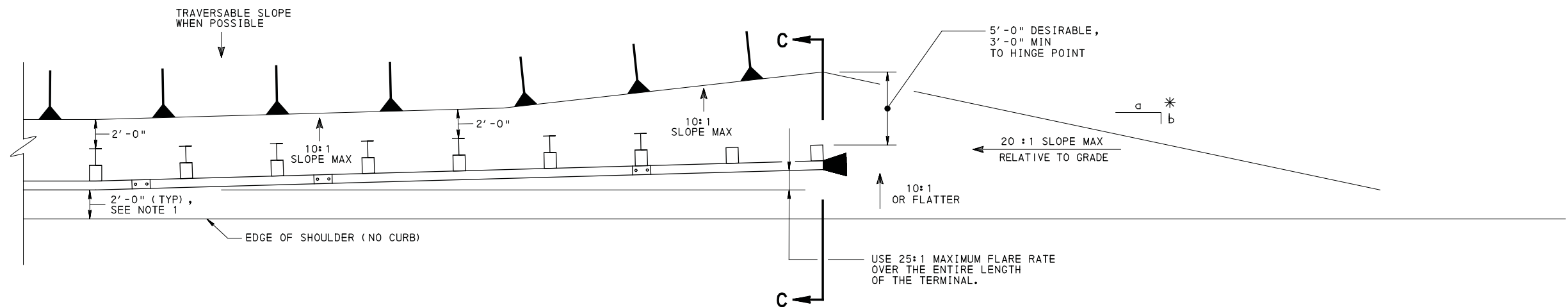
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**BARRIER PLACEMENT  
AT OBSTRUCTIONS  
MEDIAN TREATMENTS**

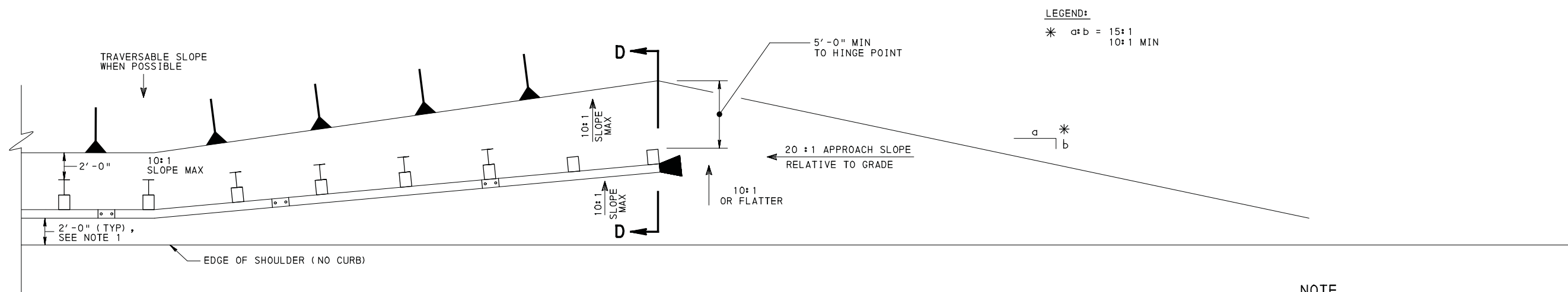
RECOMMENDED DEC. 17, 2019  
*Michael J. Butcher*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*Michael J. Butcher*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 5 OF 12  
RC-54M



**GRADING DETAIL FOR TANGENT TERMINALS**

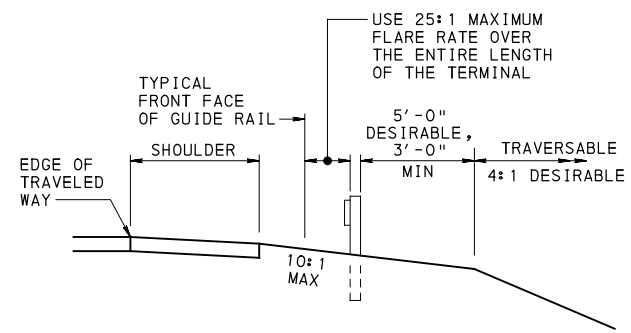


**LEGEND:**  
 \* a:b = 15:1  
 10:1 MIN

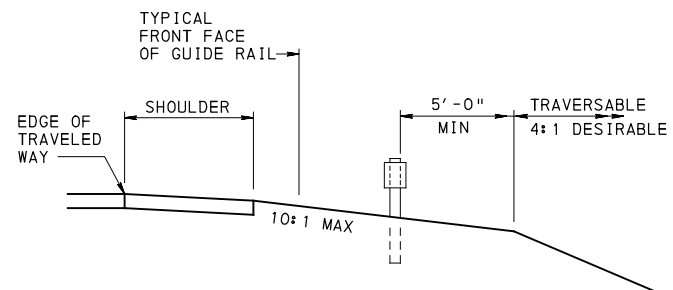
**GRADING DETAIL FOR FLARED TERMINALS**

**NOTE**

1. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".



**SECTION C-C**



**SECTION D-D**

**TABLE 1**

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

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

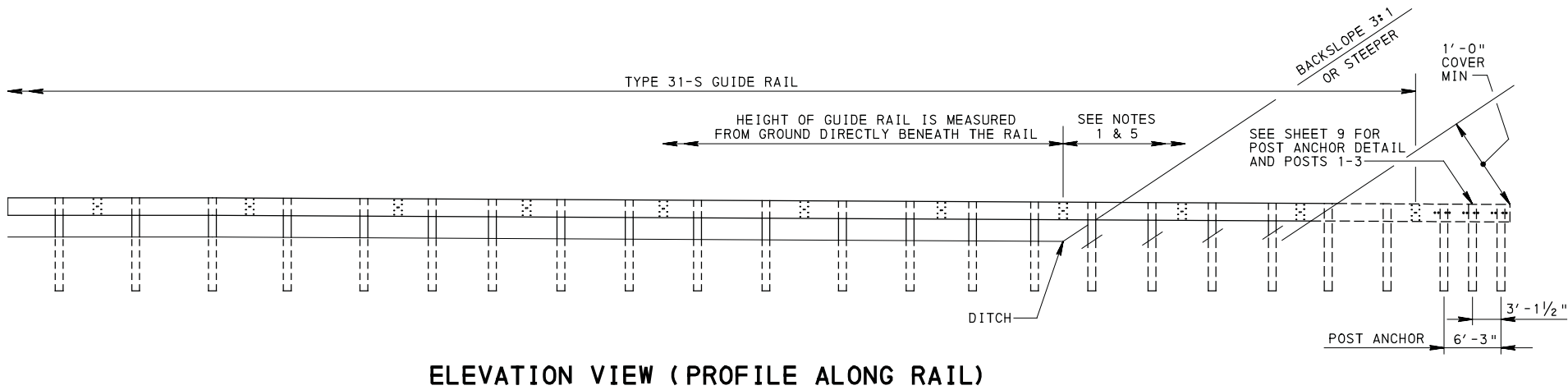
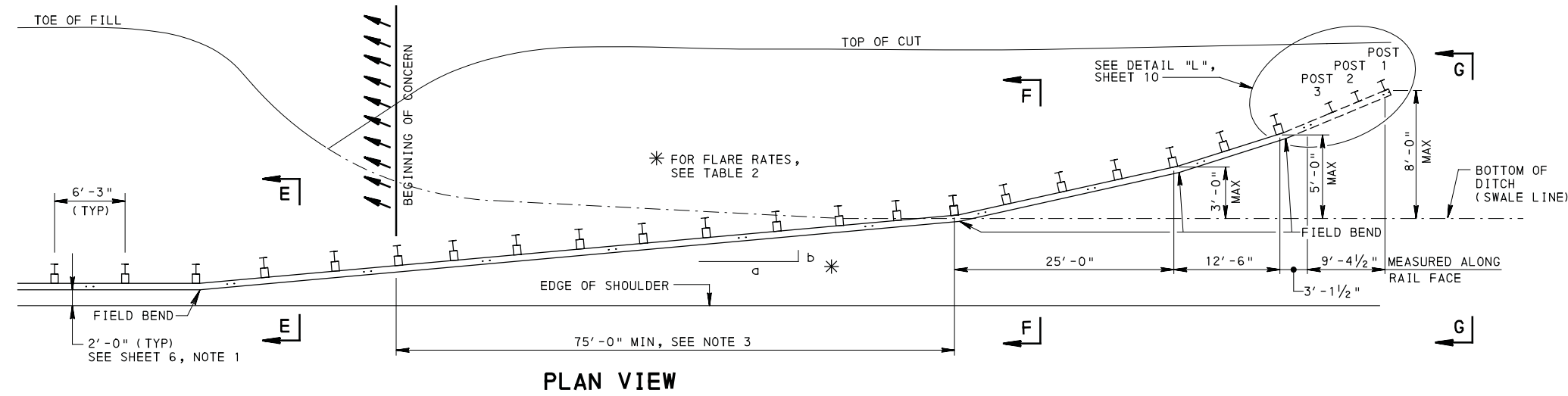
**BARRIER PLACEMENT  
AT OBSTRUCTIONS**

**GRADING DETAILS**

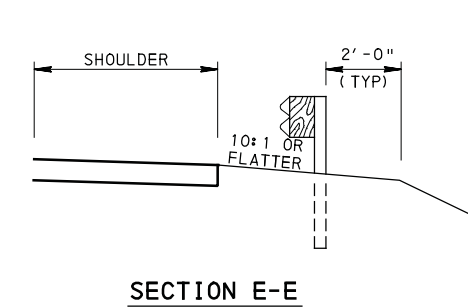
RECOMMENDED DEC. 17, 2019  CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED DEC. 17, 2019  DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 6 OF 12 <b>RC-54M</b>
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NOTES

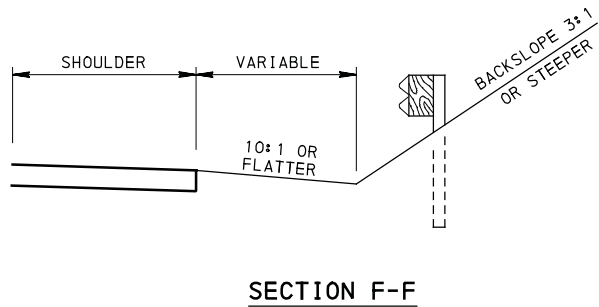
1. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 1'-0" OF COVER MINIMUM OVER POST 1.
2. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
3. PROVIDE 75'-0" MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE BOTTOM OF DITCH (SWALE LINE) TO THE BEGINNING OF THE CONCERN.
4. BURIED-IN-BACKSLOPE TERMINALS MUST BE USED WITH TYPE 31 STRONG POST GUIDE RAIL.
5. THE POSTS IN ROCK DETAIL ON RC-51M, SHEET 14 IS NOT APPLICABLE FOR POSTS BETWEEN POST 1 AND THE BOTTOM OF DITCH.



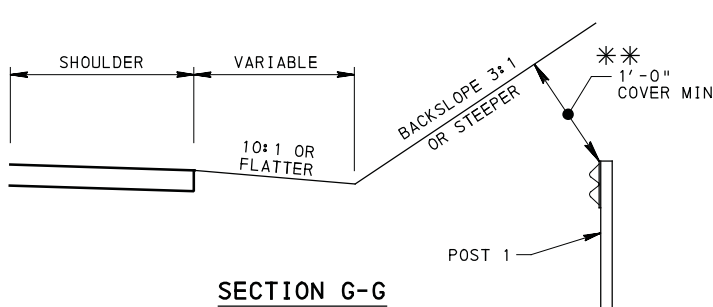
TYPICAL BURIED-IN-BACKSLOPE TERMINAL  
SINGLE RAIL



SECTION E-E



SECTION F-F



SECTION G-G

TABLE 2  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
mph		
70	20 ± 1	15 ± 1
65	19 ± 1	15 ± 1
60	18 ± 1	14 ± 1
55	16 ± 1	12 ± 1
50	14 ± 1	11 ± 1
45	12 ± 1	10 ± 1
40	11 ± 1	9 ± 1
35	10 ± 1	8 ± 1
30	8 ± 1	7 ± 1

\*\* PLACEMENT INTO ROCK DOES NOT REQUIRE THE 1'-0" BURIAL.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

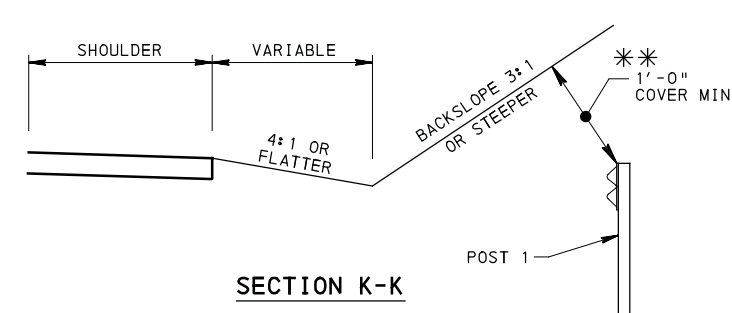
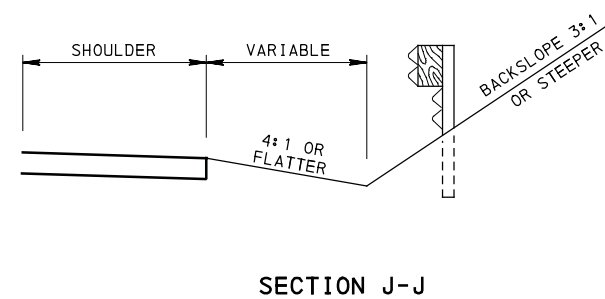
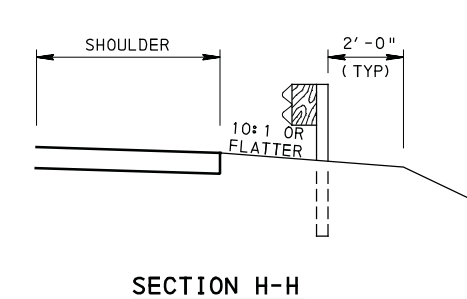
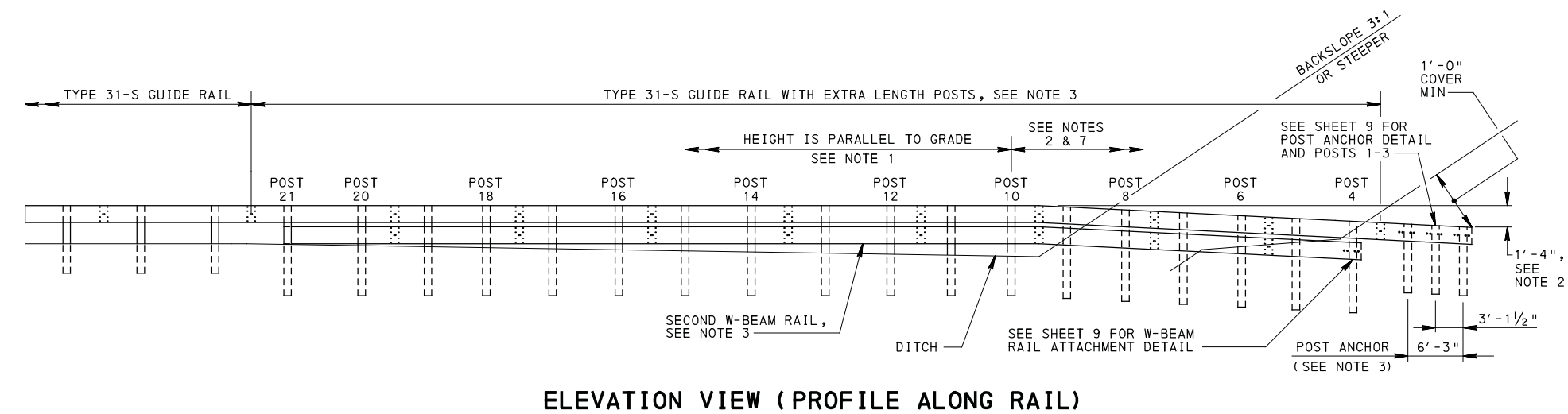
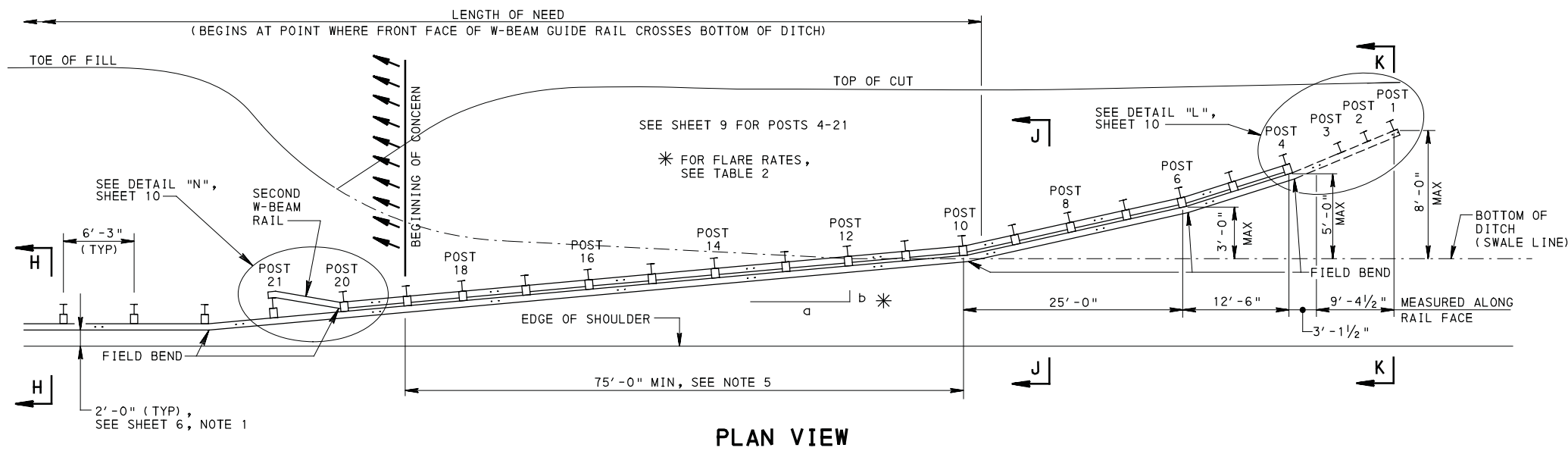
BARRIER PLACEMENT  
AT OBSTRUCTIONS  
  
BURIED-IN-BACKSLOPE TERMINAL  
SINGLE RAIL

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 7 OF 12  
RC-54M





**TABLE 2  
FLARE RATES FOR BARRIER DESIGN**

DESIGN SPEED mph	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

\*\* PLACEMENT INTO ROCK DOES NOT REQUIRE THE 1'-0" BURIAL.

**NOTES**

1. THE HEIGHT OF THE TOP OF THE W-BEAM RAIL, BEGINNING AT POST 10, IS HELD AT A CONSTANT 2'-7" RELATIVE TO THE EDGE OF SHOULDER.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 1'-0" OF COVER MINIMUM OVER POST 1.
3. USE 8'-0" LONG POSTS FOR ALL POST LOCATIONS WITH A DOUBLE RAIL. POSTS 1-3 FOR THE BURIED-IN-BACKSLOPE TERMINAL ARE 6'-0" LONG. THE SECOND W-BEAM RAIL ELEMENT IS A SEPARATE PAY ITEM.
4. WHEN THE GUIDE RAIL LENGTH OF NEED IS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO USE THE BURIED-IN-BACKSLOPE SYSTEM.
5. PROVIDE 75'-0" MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE BOTTOM OF DITCH (SWALE LINE) TO THE BEGINNING OF THE CONCERN.
6. BURIED-IN-BACKSLOPE TERMINALS MUST BE USED WITH TYPE 31 STRONG POST GUIDE RAIL.
7. THE POSTS IN ROCK DETAIL ON RC-51M, SHEET 14 IS NOT APPLICABLE FOR POSTS BETWEEN POST 1 AND THE BOTTOM OF DITCH.

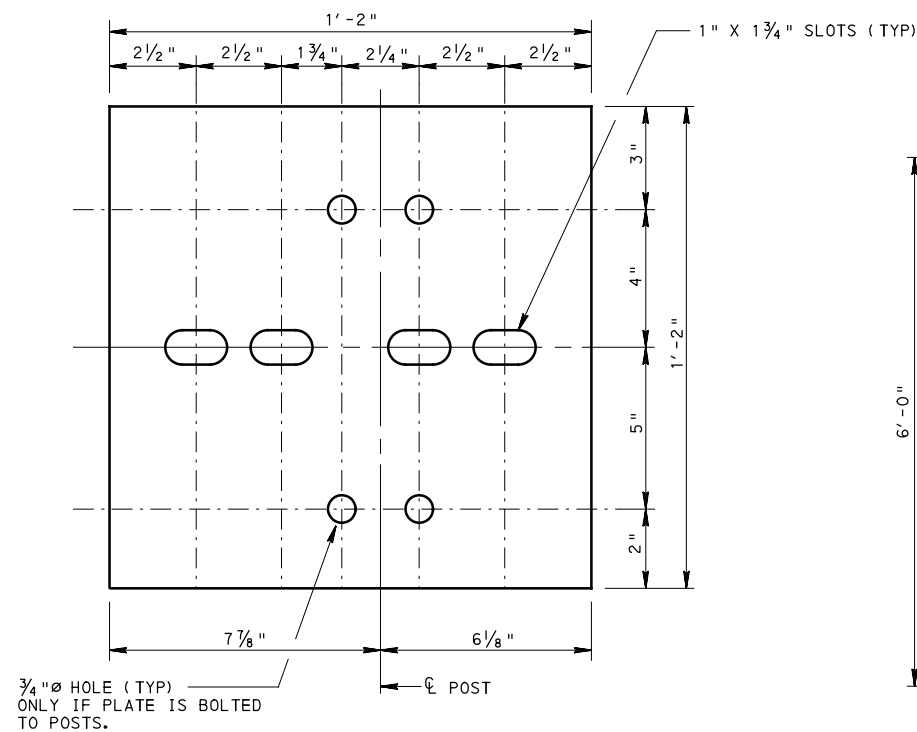


**TYPICAL BURIED-IN-BACKSLOPE TERMINAL  
DOUBLE RAIL**

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

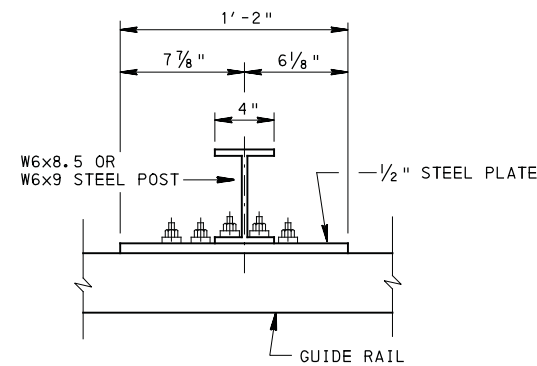
**BARRIER PLACEMENT  
AT OBSTRUCTIONS  
  
BURIED-IN-BACKSLOPE TERMINAL  
DOUBLE RAIL**



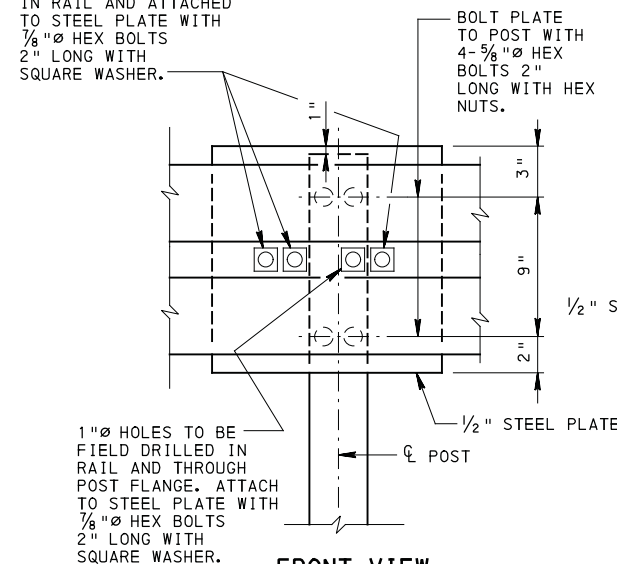


**STEEL PLATE - 1/2"**

GALVANIZED  
WELDED OR BOLTED TO POST



3-1" Ø HOLES TO  
BE FIELD DRILLED  
IN RAIL AND ATTACHED  
TO STEEL PLATE WITH  
7/8" Ø HEX BOLTS  
2" LONG WITH  
SQUARE WASHER.

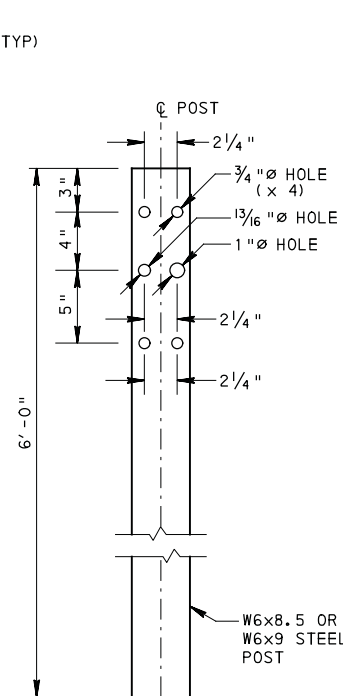


**FRONT VIEW**

**ELEVATION**

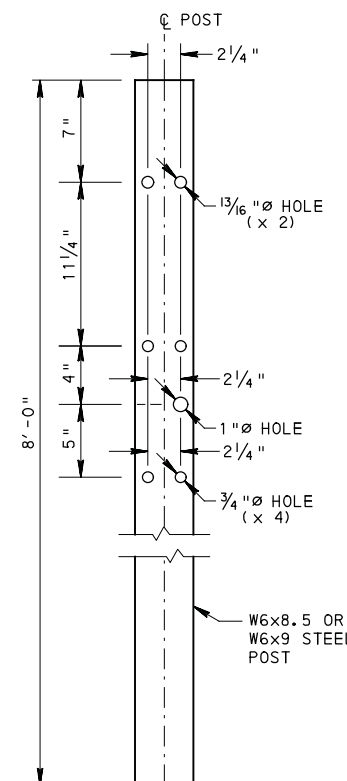
**POST ANCHOR DETAIL (POSTS 1-3)**

DIMENSIONS ARE TYPICAL



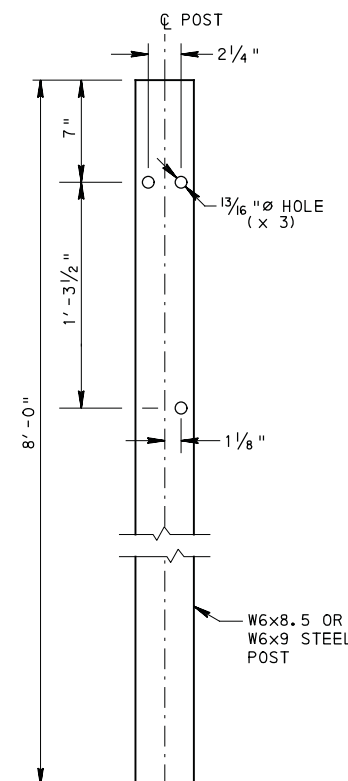
**POSTS 1-3**

(SEE NOTE 2)



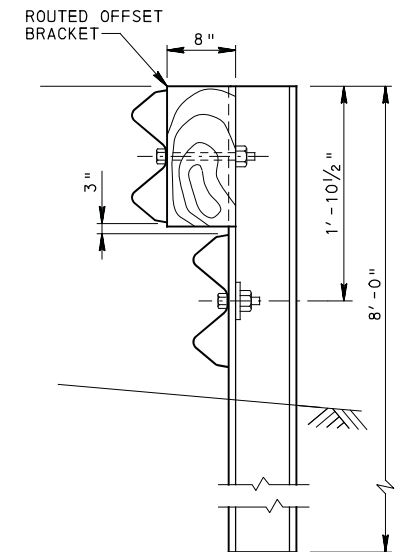
**POST 4**

(SEE NOTE 3)



**POSTS 5-21**

(SEE NOTE 3)

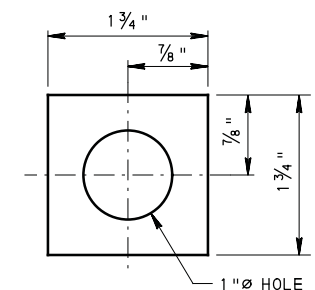


**TYPICAL ELEVATION**

**W6x8.5 OR W6x9 STEEL POSTS  
POSTS 5-20**

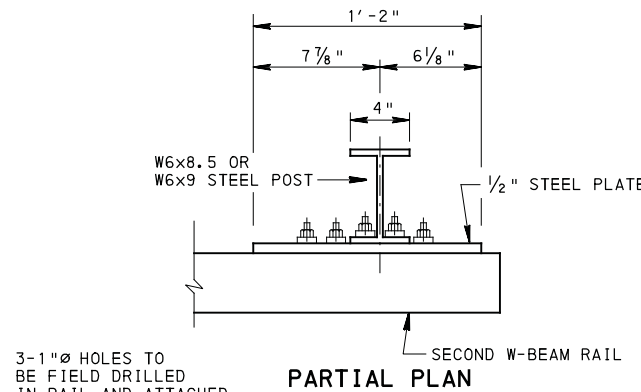
**NOTES**

1. FOR ROUTED OFFSET BRACKET DETAIL, SEE RC-51M, SHEET 2.
2. FOR LOCATIONS OF POSTS 1-3, SEE SHEETS 7 AND 8.
3. FOR LOCATIONS OF POST 4 AND POSTS 5-21, SEE SHEET 8.

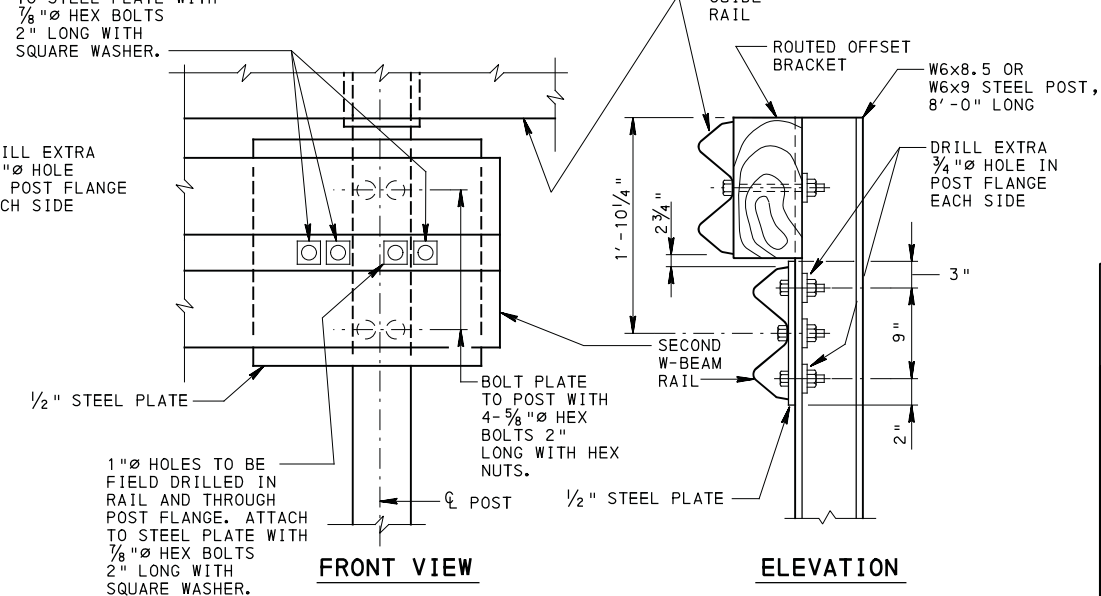


**SQUARE WASHER**

3/16" THICK - GALVANIZED



3-1" Ø HOLES TO  
BE FIELD DRILLED  
IN RAIL AND ATTACHED  
TO STEEL PLATE WITH  
7/8" Ø HEX BOLTS  
2" LONG WITH  
SQUARE WASHER.



**FRONT VIEW**

**ELEVATION**

**W-BEAM RAIL ATTACHMENT (POST 4)**

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**BARRIER PLACEMENT  
AT OBSTRUCTIONS**

**BURIED-IN-BACKSLOPE TERMINAL  
END ANCHORAGE DETAILS**

RECOMMENDED DEC. 17, 2019

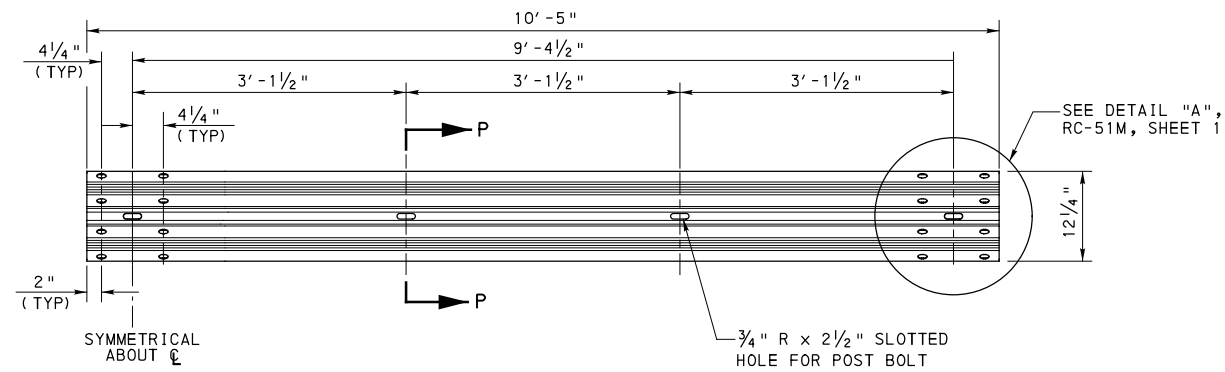
*Michael J. Butcher*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

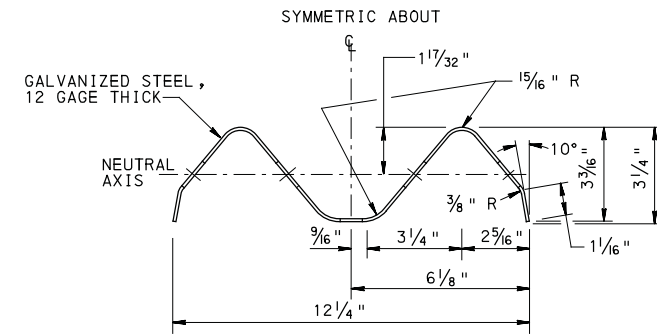
*Michael J. Butcher*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 9 OF 12

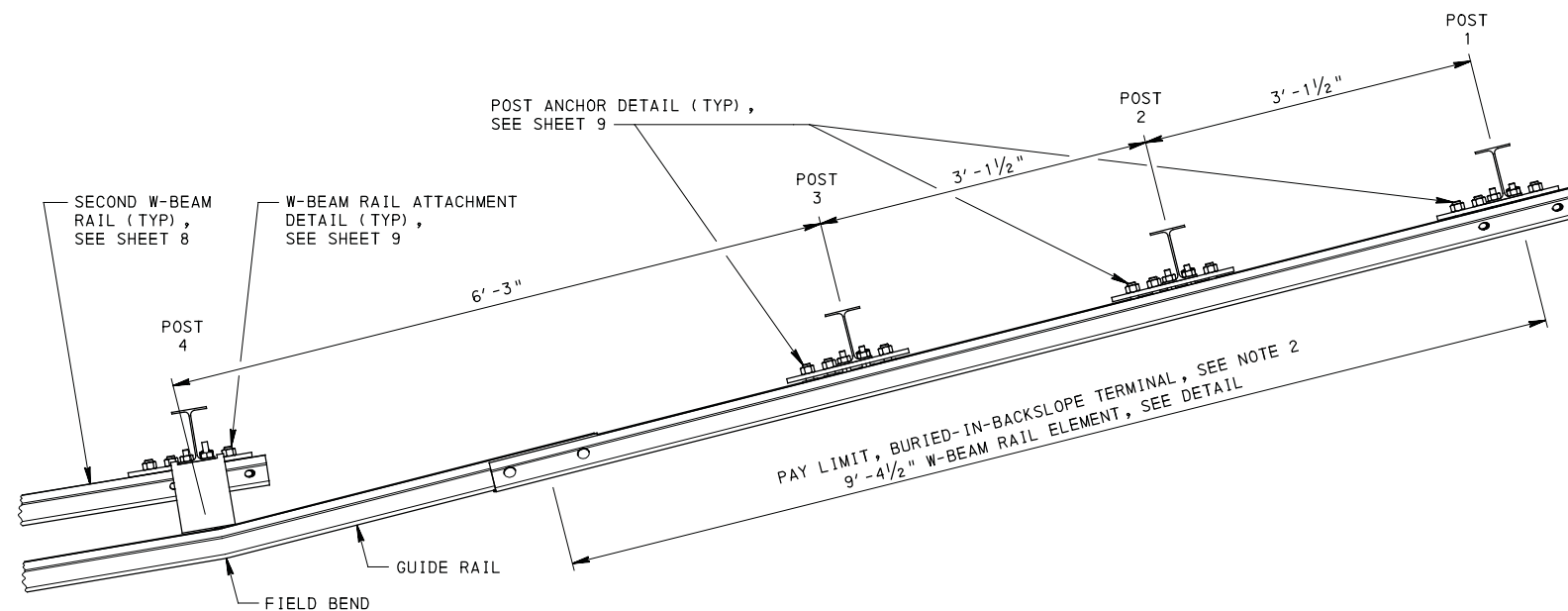
RC-54M



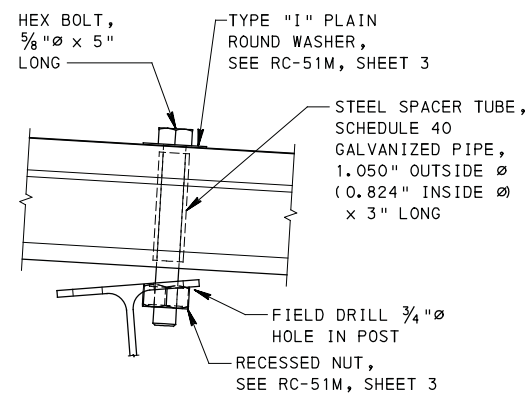
**9'-4 1/2" W-BEAM RAIL ELEMENT**



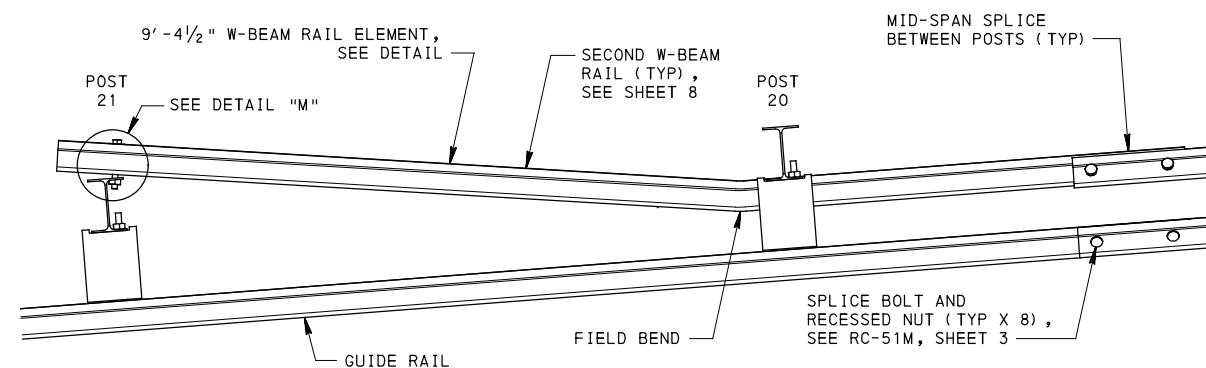
**RAIL ELEMENT  
SECTION P-P**



**DETAIL "L"**



**DETAIL "M"**



**DETAIL "N"**

**NOTES**

1. FOR ROUTED OFFSET BRACKET DETAIL, SEE RC-51M, SHEET 2.
2. BURIED-IN-BACKSLOPE TERMINAL PAY LIMIT INCLUDES 9'-4 1/2" OF W-BEAM RAIL ELEMENT, 1/2" STEEL PLATE, POSTS 1, 2, AND 3, AND ASSOCIATED HARDWARE.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**BARRIER PLACEMENT  
AT OBSTRUCTIONS**

**BURIED-IN-BACKSLOPE TERMINAL  
END ANCHORAGE DETAILS**

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 10 OF 12  
**RC-54M**

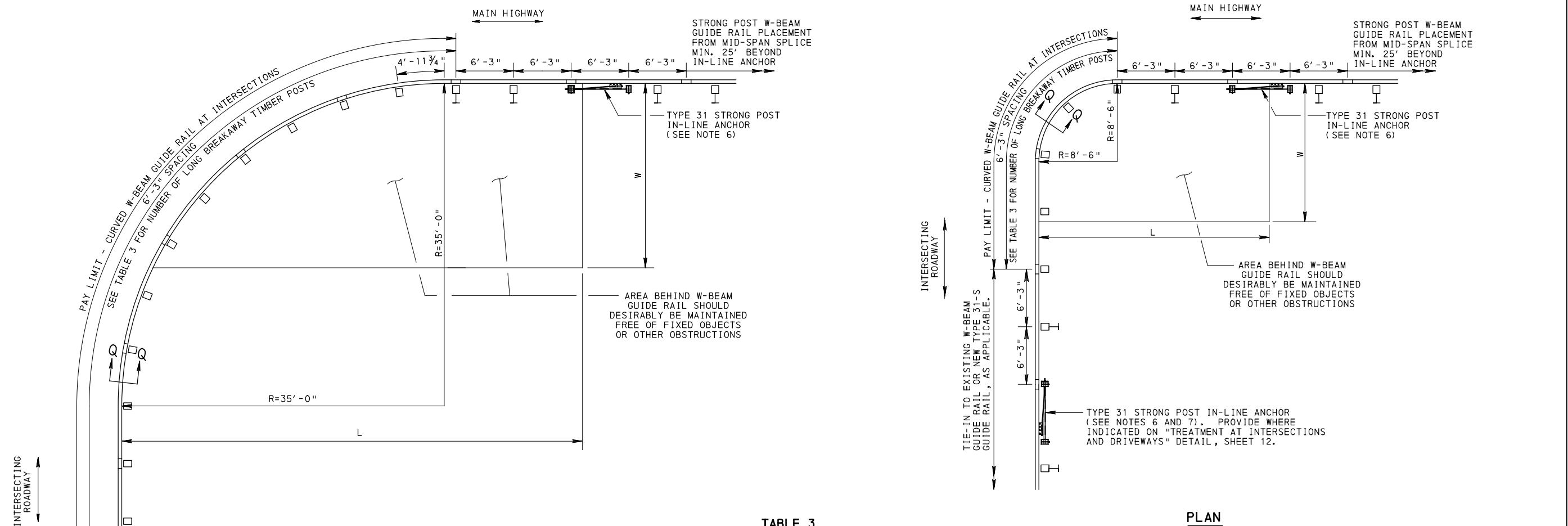
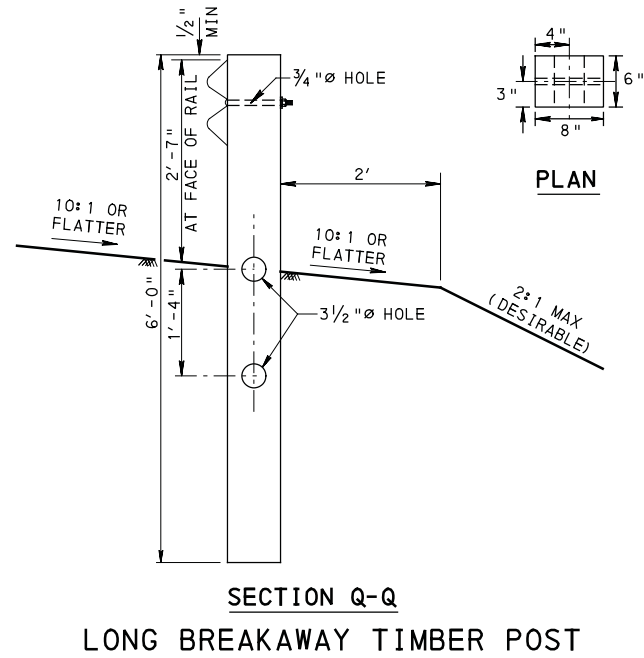


TABLE 3

GUIDE RAIL RADIUS (R)	TYPICAL NUMBER OF LONG BREAKAWAY TIMBER POSTS	MIN. DESIRED AREA FREE OF FIXED OBJECTS
		L x W
8'-6" *	5	25' x 15'
17'-0"	6	30' x 15'
25'-6"	8	40' x 20'
35'-0" **	11	50' x 20'

\* SEE NOTE 1  
\*\* SEE NOTE 5

### CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS



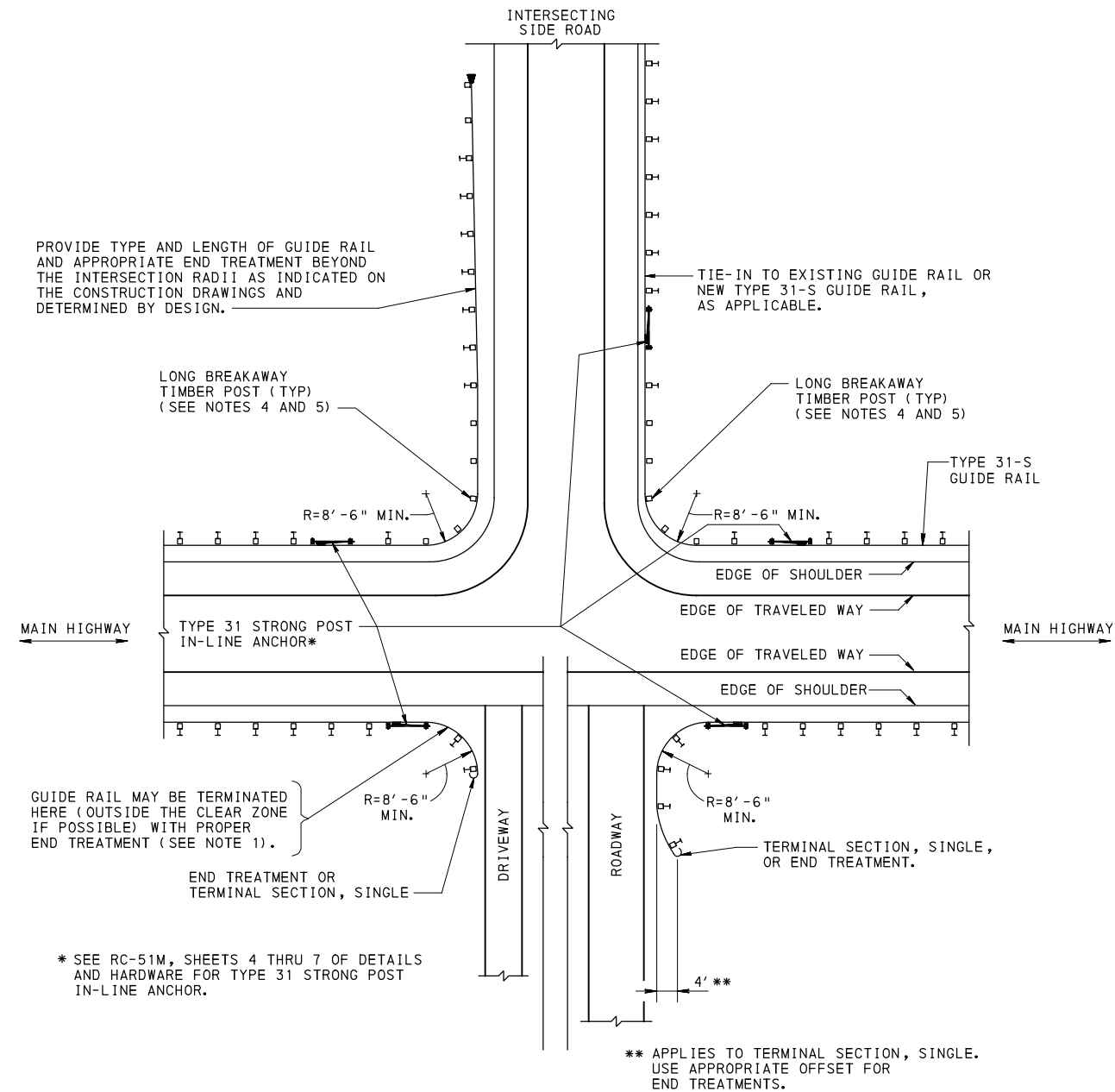
### NOTES

- ON THE 8'-6" RADIUS SYSTEM IN THE CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS DETAIL, THE RAIL IS NOT TO BE BOLTED TO THE CENTER POST.
- RADIUS PANELS MUST BE SHOP BENT ONLY.
- DO NOT USE ANY WASHERS ON THE RAIL SIDE OF THE LONG BREAKAWAY POSTS.
- FOR GUIDE RAIL TERMINATED ON THE MAIN HIGHWAY, USE A PROPER END TREATMENT IN PLACE OF AN IN-LINE ANCHOR.
- LONG BREAKAWAY TIMBER POSTS ARE NOT NEEDED AT INTERSECTION WITH GUIDE RAIL RADIUS > 35'.
- SEE RC-51M, SHEETS 4 THRU 7 OF DETAILS AND HARDWARE FOR TYPE 31 STRONG POST IN-LINE ANCHOR.
- ALONG THE INTERSECTING ROADWAY, AN APPROPRIATE END TREATMENT OR TERMINAL SECTION, SINGLE, AS INDICATED ON SHEET 12, MAY BE USED IN PLACE OF THE TYPE 31 STRONG POST IN-LINE ANCHOR.

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### BARRIER PLACEMENT AT OBSTRUCTIONS

### GUIDE RAIL WITH SHORT RADIUS



## TREATMENT AT INTERSECTIONS AND DRIVEWAYS

### NOTES

- FOR GUIDE RAIL TERMINATED ON THE MAIN HIGHWAY, USE A PROPER END TREATMENT IN PLACE OF AN IN-LINE ANCHOR.
- A TERMINAL SECTION, SINGLE MAY BE USED AT DRIVEWAYS AND ACCESS POINTS AND FOR LOCAL AND MINOR COLLECTOR ROADWAYS COMING TO A STOP CONDITION, EXCLUDING SIGNALS, WITH AN AVERAGE DAILY TRAFFIC (ADT)  $\leq$  2000 VEHICLES PER DAY AND CANNOT BE USED BEYOND THE IMMEDIATE INTERSECTION.
- A TYPE 31 STRONG POST END TREATMENT OR "TURNDOWN" MAY BE USED ON NON-NHS HIGHWAYS COMING TO A STOP CONDITION WHEN ALL OF THE FOLLOWING APPLY:
  - THE POSTED SPEED LIMIT IS  $\leq$  45 MPH.
  - THE ADT IS  $\leq$  2000 VEHICLES PER DAY.
  - THE TURNDOWN IS NOT IN A HIGH CRASH LOCATION.
- LONG BREAKAWAY TIMBER POSTS ARE NOT NEEDED AT INTERSECTIONS WITH GUIDE RAIL RADIUS  $>$  35'.
- FOR CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS WITH LONG BREAKAWAY TIMBER POSTS, REFER TO SHEET 11 FOR ADDITIONAL DETAILS.

COMMONWEALTH OF PENNSYLVANIA  
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## BARRIER PLACEMENT AT OBSTRUCTIONS

GUIDE RAIL WITH SHORT RADIUS

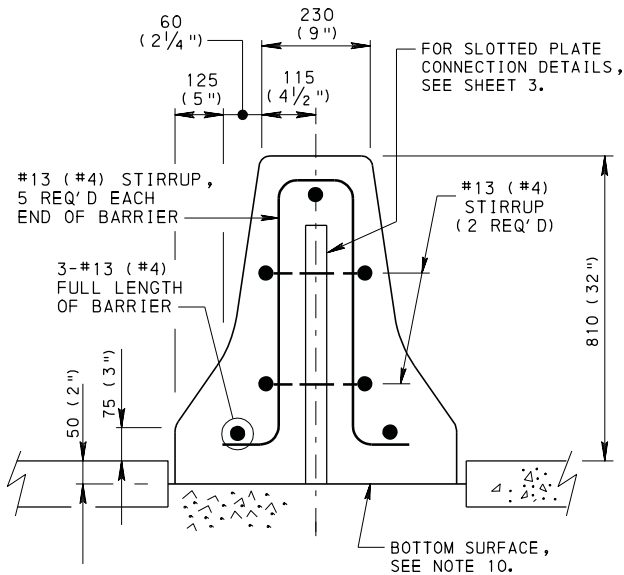
RECOMMENDED DEC. 17, 2019  
*Phil J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019  
*Malcolm D. Betcher*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 12 OF 12  
RC-54M

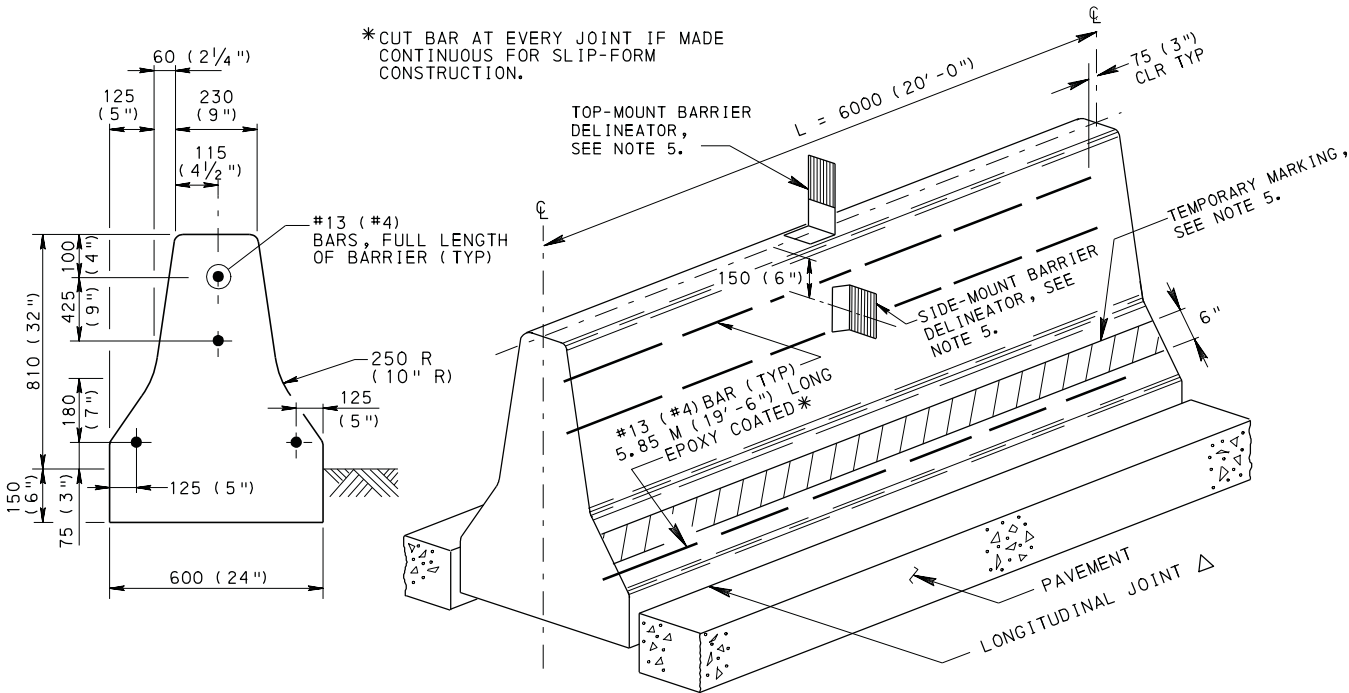
NOTES

1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.
  - A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
3. FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREMOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.
4. CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT REQUIRES SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. FOR DELINEATOR PLACEMENT, SEE TC-8604.
6. COMPACT NO. 2A OR NO. OGS MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 350. A LAYER 25 (1") THICK OF NON-SHRINK MORTAR MAY BE USED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES. A RIGID BASE MAY BE USED INSTEAD OF SUBBASE.
7. PROVIDE PRECAST CONCRETE MEDIAN BARRIER FOR USE AS TEMPORARY (MPT) AND IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
8. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
9. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
10. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
12. MINOR VARIATIONS IN TOP WIDTH DIMENSIONS OF PRECAST BARRIER SEGMENTS OF UP TO PLUS 10 (1/2"), BOTTOM WIDTH DIMENSIONS OF UP TO MINUS 10 (1/2"), AND SIDE TAPER DIMENSIONS OF PLUS OR MINUS 5 (1/4") ARE PERMITTED TO ACCOUNT FOR VARIATIONS IN FORMING EQUIPMENT PRODUCED WITH PREVIOUS STANDARD DRAWINGS FOR F-SHAPE BARRIER.
13. PLACE PRECAST BARRIER SEGMENTS FORMED USING THE SAME FORMS AND FORM TOGETHER IN CONTINUOUS STRINGS. MINIMIZE THE NUMBER OF LOCATIONS WHERE BARRIER SEGMENTS FROM DIFFERENT SOURCES OR FORMING EQUIPMENT ARE PLACED.
14. INSTALL CONCRETE MEDIAN BARRIER WITH THE VERTICAL CENTERLINE TO NOT BE OUT OF PLUMB BY MORE THAN 6 (1/4").

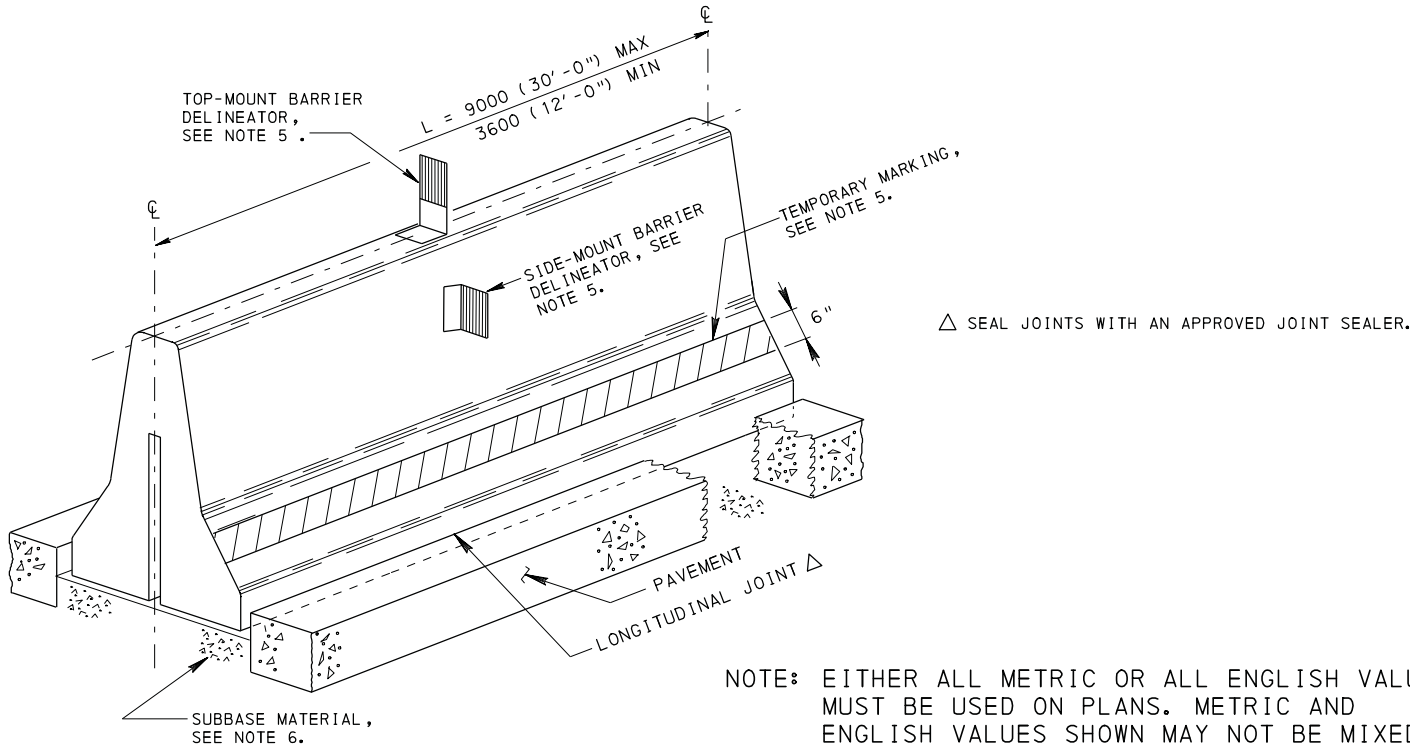


TYPICAL PRECAST BARRIER

FOR DIMENSIONS AND DETAILS, SEE REMAINING SHEETS OF THIS STANDARD.



TYPICAL CAST-IN-PLACE BARRIER



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

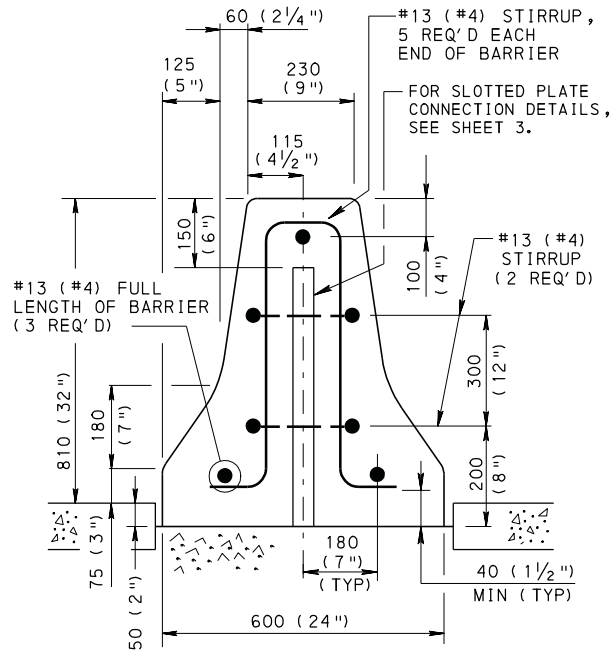
△ SEAL JOINTS WITH AN APPROVED JOINT SEALER.

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BUREAU OF DESIGN

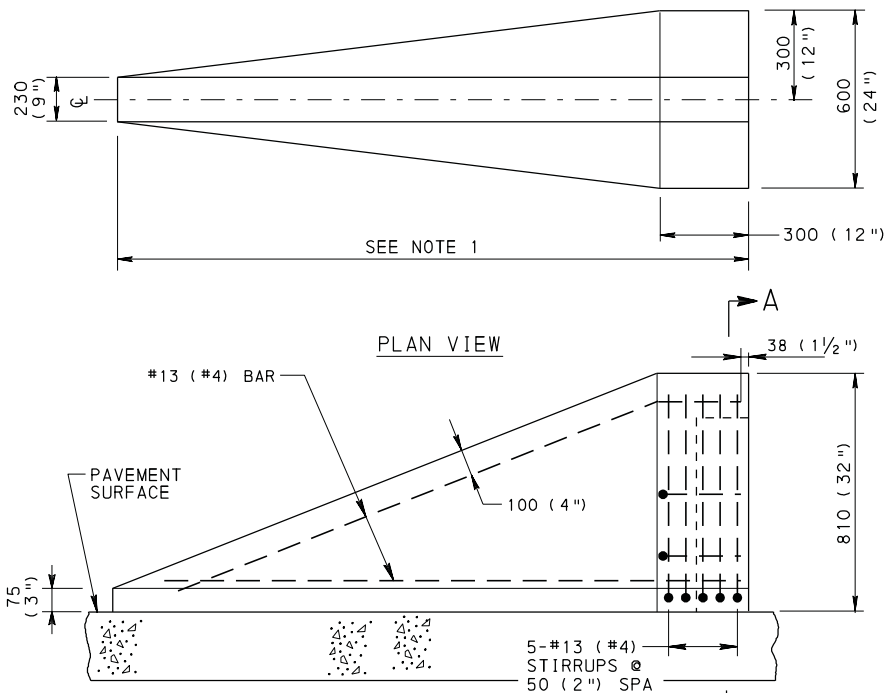
CONCRETE MEDIAN BARRIER  
F-SHAPE

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

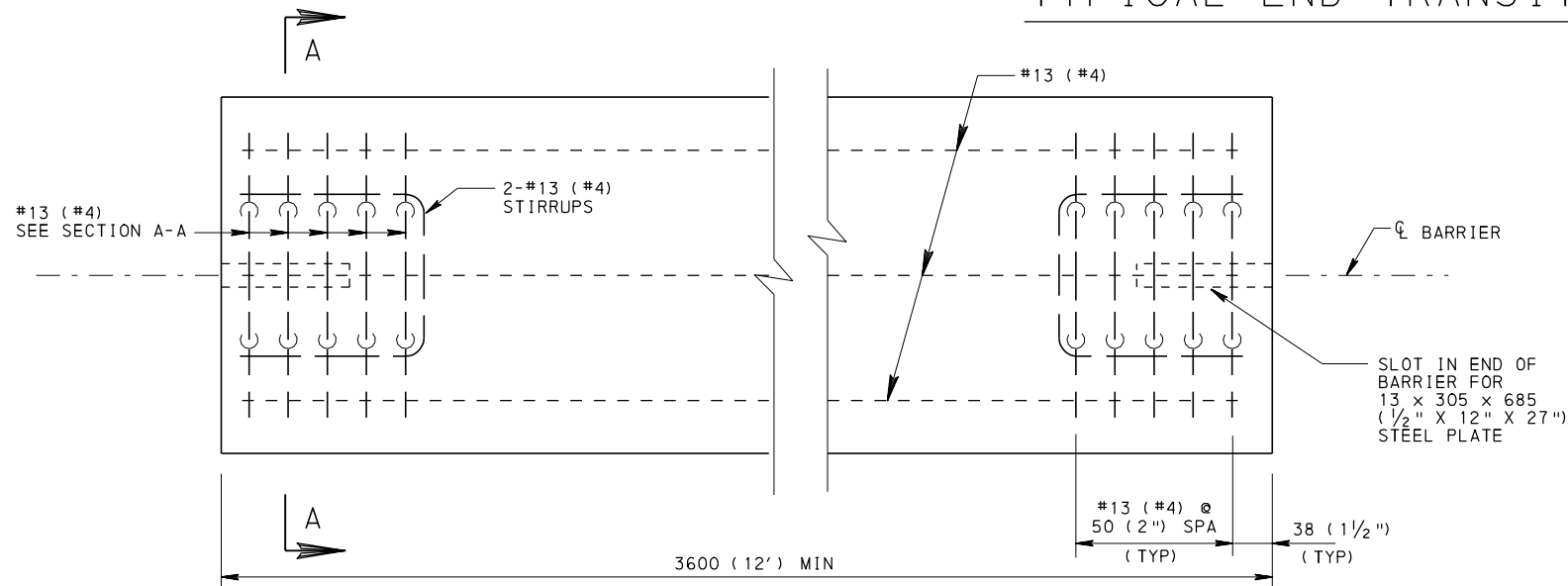
RECOMMENDED JUN. 1, 2010 <i>R. N. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>Sam B. Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 6 RC-57M
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SECTION A-A



TYPICAL END TRANSITION

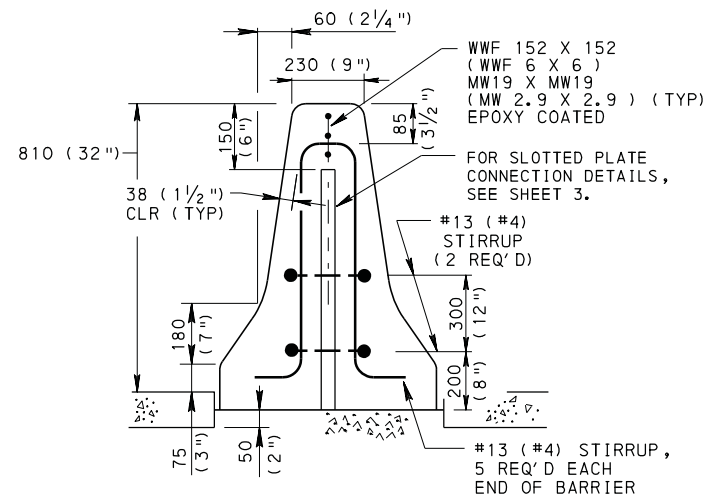


TYPICAL BARRIER PLAN

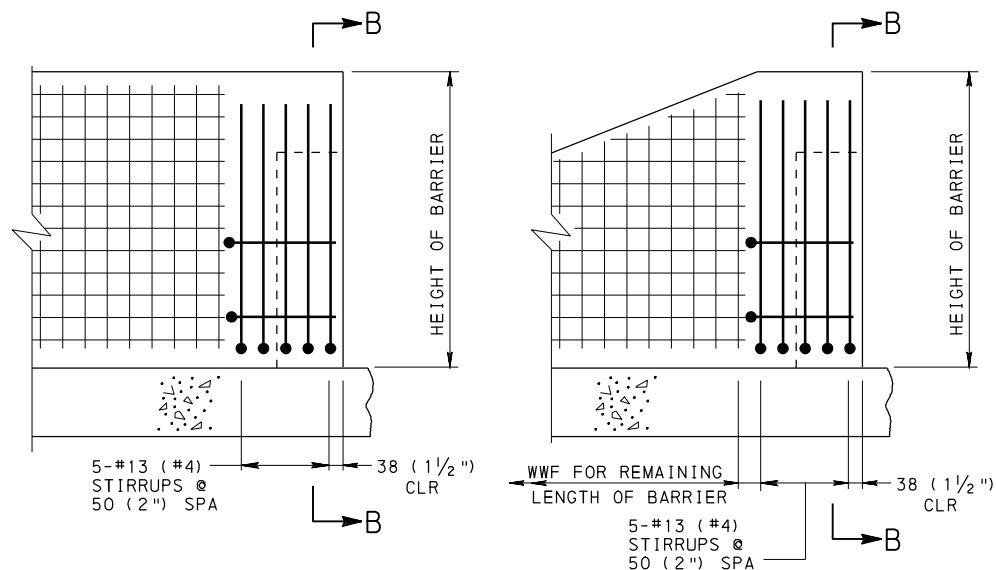
BOTH ENDS OF BARRIER ARE TYPICAL.

NOTES

1. REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.
2. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(d).
3. PROVIDE REINFORCEMENT STEEL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2'').
4. EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE MEDIAN BARRIER IS TO BE USED IN TEMPORARY INSTALLATION ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(d).
5. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1'') EXCEPT AS SHOWN.



SECTION B-B



TYPICAL BARRIER ELEVATION

END TRANSITION ELEVATION

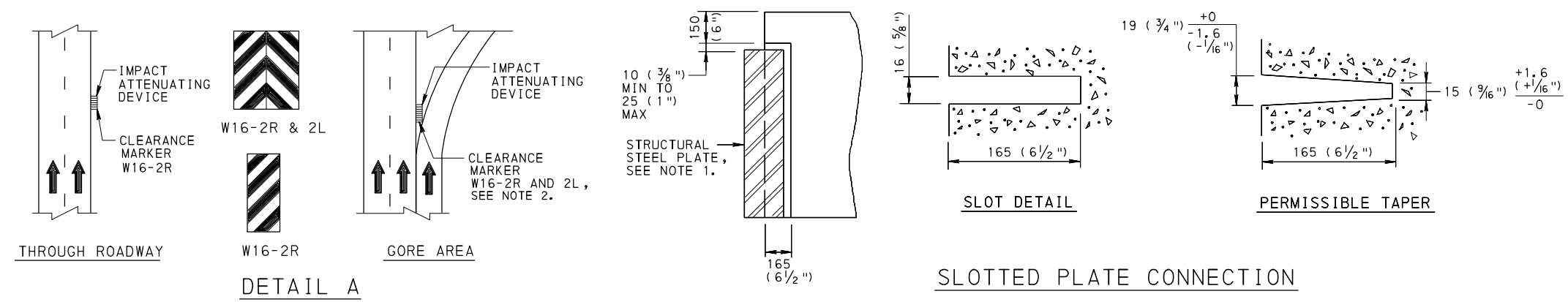
ALTERNATE WWF REINFORCEMENT DETAILS

WWF REPLACES THE #13 (#4) FULL LENGTH REBARS USED IN THE REBAR ALTERNATE. ALL OTHER DIMENSIONS ARE TYPICAL TO THE REBAR ALTERNATE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

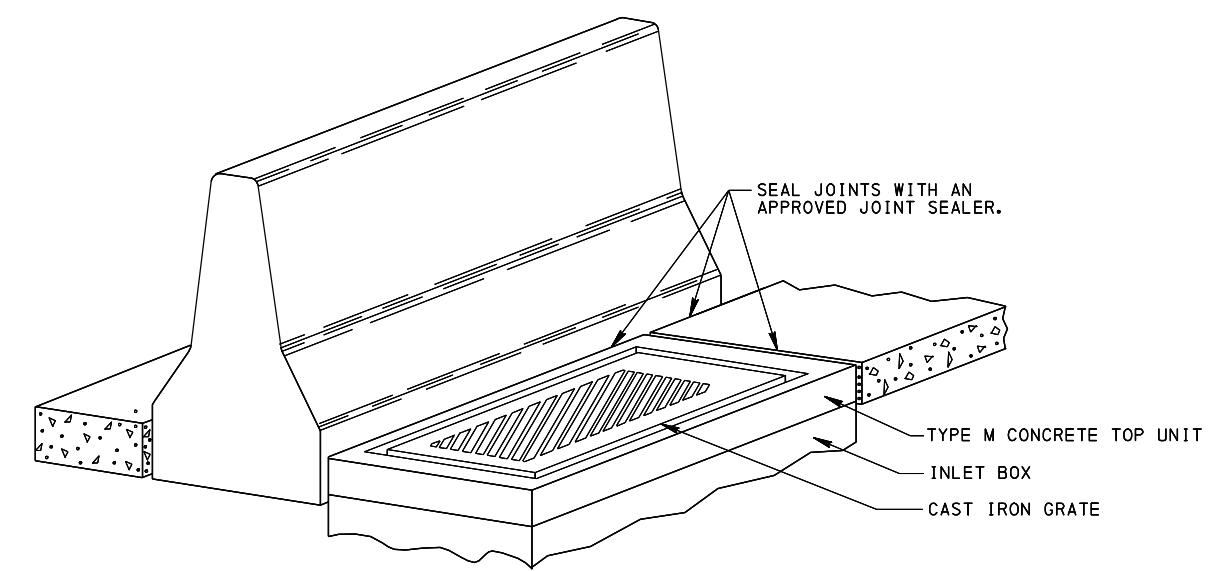
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED JUN. 1, 2010 <i>R. H. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>David Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 6 RC-57M





DELINEATION OF IMPACT ATTENUATING DEVICES

- NOTES
1. PROVIDE STRUCTURAL STEEL PLATES, 13 X 305 X 685 (1/2" X 12" X 27" ), MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. FOR PERMANENT BARRIER, GALVANIZE THE STRUCTURAL STEEL PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(6). FOR TEMPORARY BARRIER, DO NOT GALVANIZE THE STRUCTURAL STEEL PLATES.
  2. PROVIDE VERTICAL RECTANGLE, STANDARD ALUMINUM, PRESSURE SENSITIVE CLEARANCE MARKERS, W16-2R AND/OR W16-2L, FABRICATED FROM CLASS II SHEETING MATERIAL, FOR DELINEATION OF IMPACT ATTENUATING DEVICES AS PRESENTED IN DETAIL A. ATTACH MARKERS DIRECTLY TO THE LEADING END OF IMPACT ATTENUATING DEVICES. ON INERTIAL BARRIERS (SAND BARRELS), PROVIDE SENSITIVE SHEETING, WITHOUT RIGID BACKING, DIRECTLY TO BARRIER FRONT OR NOSE SECTION. DO NOT POST-MOUNT MARKERS IN FRONT OF IMPACT ATTENUATING DEVICES. MARKERS ARE PROVIDED IN TWO SIZES: 305 X 914 (12" X 36") AND 457 X 914 (18" X 36"). WHEN ONE MARKER IS REQUIRED, USE 457 X 914 (18" X 36"). WHEN TWO MARKERS ARE REQUIRED SIDE BY SIDE, USE 305 X 914 (12" X 36"). PROVIDE COLOR FOR CLEARANCE MARKERS AS FOLLOWS:  
(A) MESSAGE : BLACK STRIPES (NON-REFLECTORIZED)  
(B) FIELD : YELLOW (REFLECTORIZED)  
ORANGE (REFLECTORIZED) , CONSTRUCTION ZONES



TYPICAL INLET PLACEMENT AT CONCRETE MEDIAN BARRIER

TABLE 1  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20± 1	15± 1
105	65	19± 1	15± 1
100	60	18± 1	14± 1
90	55	16± 1	12± 1
80	50	14± 1	11± 1
70	45	12± 1	10± 1
65	40	11± 1	9± 1
60	35	10± 1	8± 1
50	30	8± 1	7± 1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER  
F-SHAPE

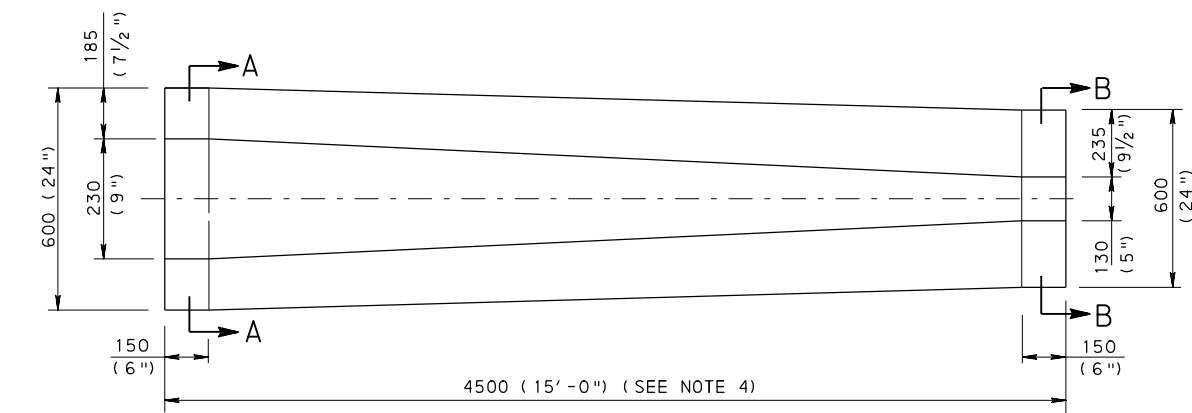
RECOMMENDED JUN. 1, 2010  
*R. N. W. W. W.*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*R. N. W. W. W.*  
DIRECTOR, BUREAU OF DESIGN

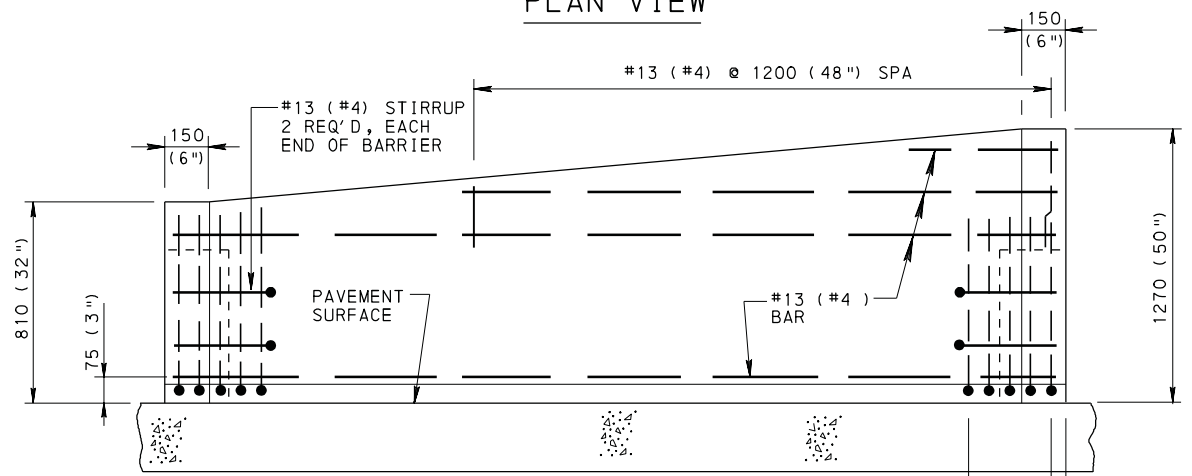
SHT 3 OF 6  
RC-57M



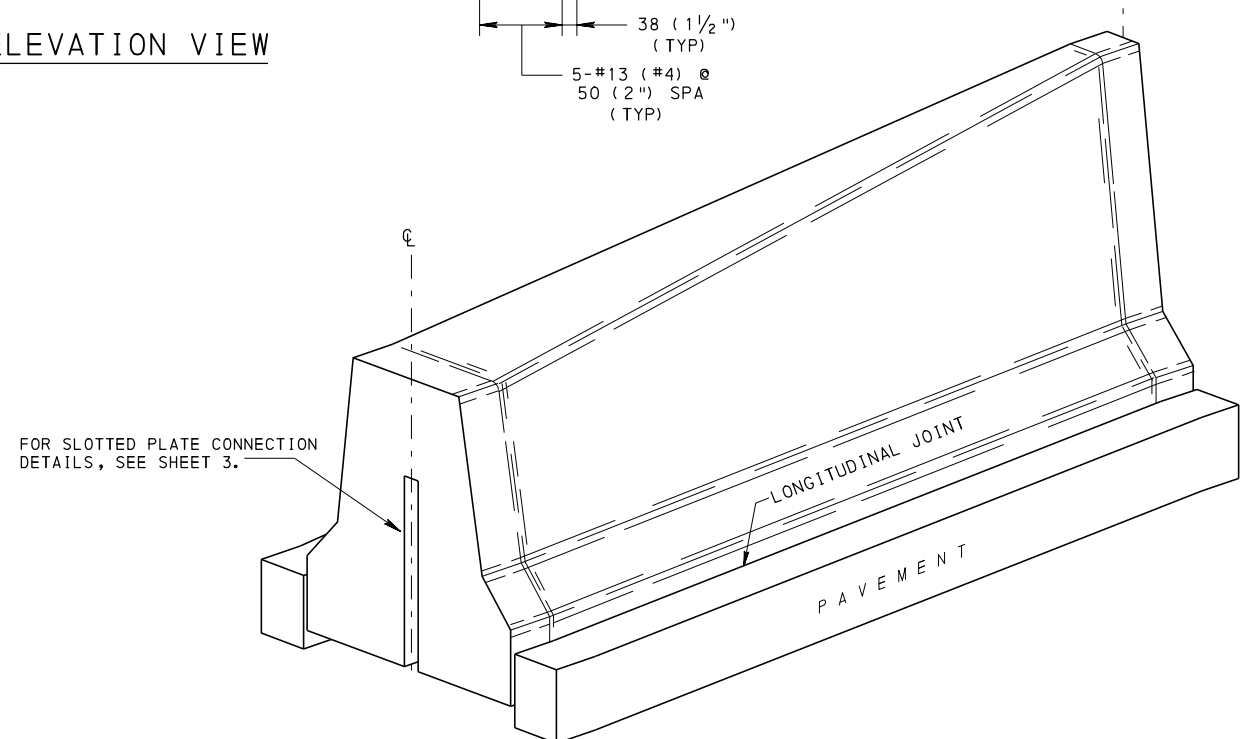




PLAN VIEW

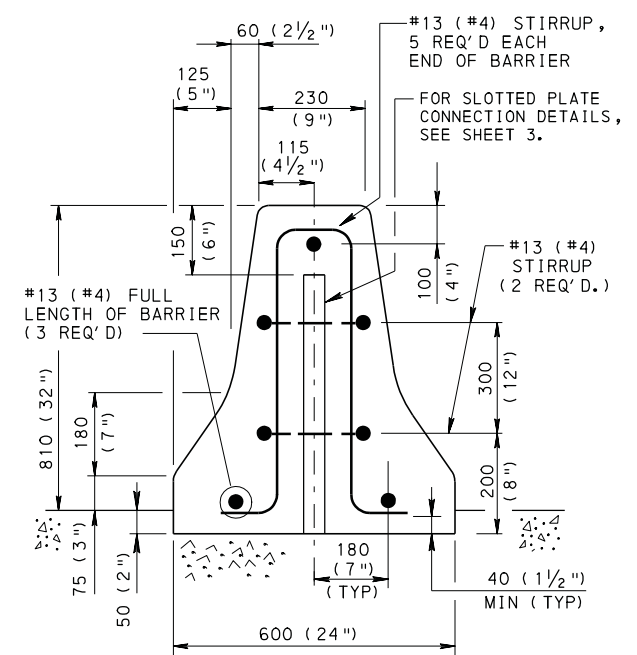


ELEVATION VIEW

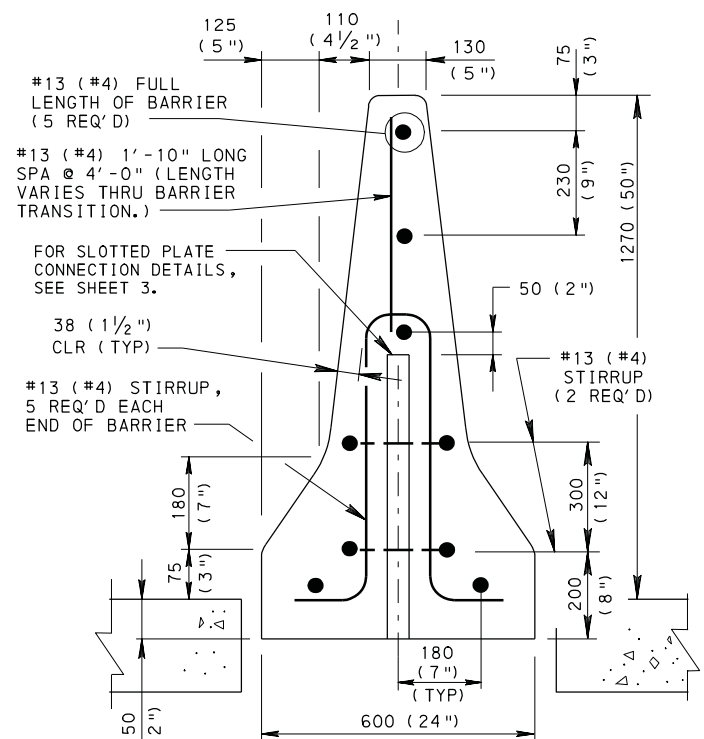


ORTHOGRAPHIC VIEW

TYPICAL 810 TO 1270 (32" TO 50") HIGHWAY TRANSITION



SECTION A-A



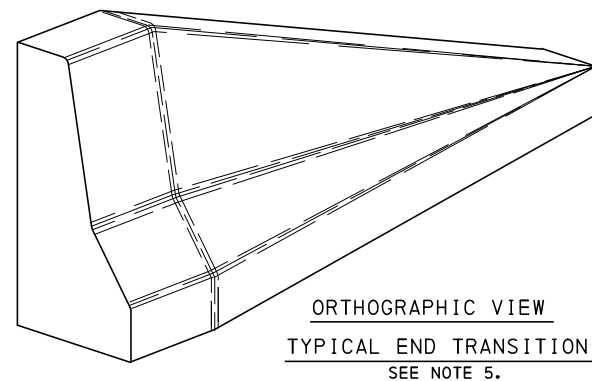
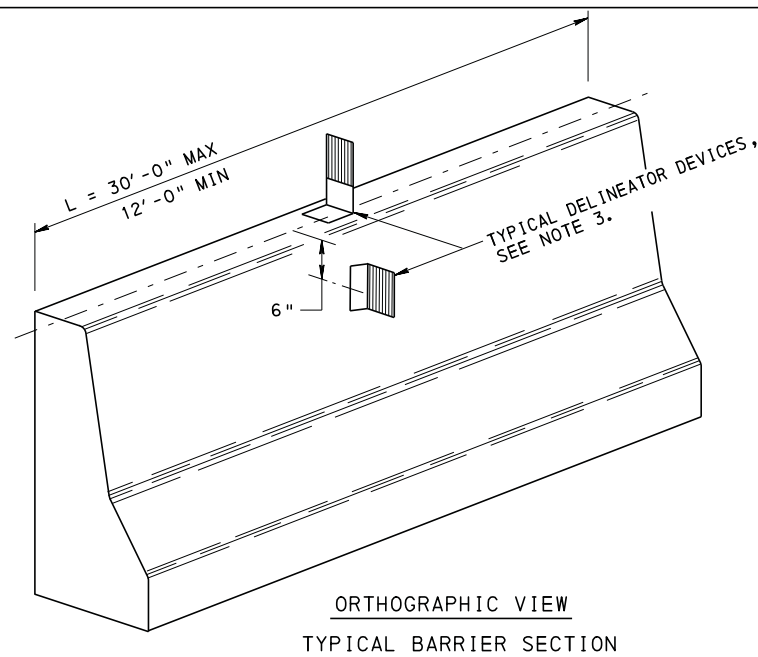
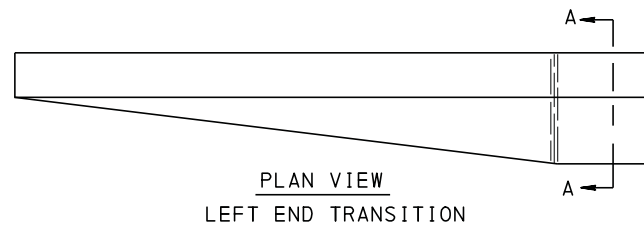
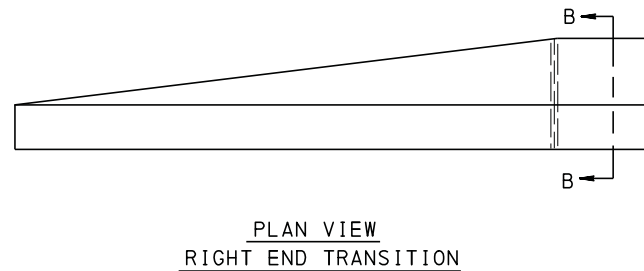
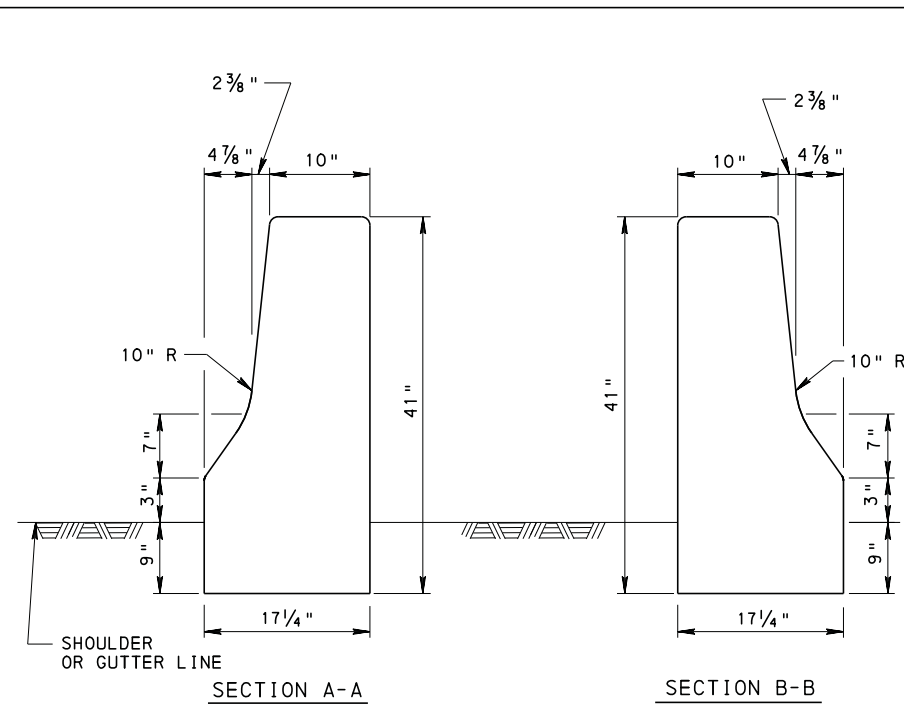
SECTION B-B

NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED JUN. 1, 2010 <i>R. H. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>David Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 6 OF 6 RC-57M



NOTES

1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.  
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON TC-8604.
4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 2.
5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57M.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 1" EXCEPT AS SHOWN.
7. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
8. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 1/8" IN DEPTH.
9. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(g).

TYPICAL PRECAST OR CAST-IN-PLACE SINGLE FACE CONCRETE BARRIER

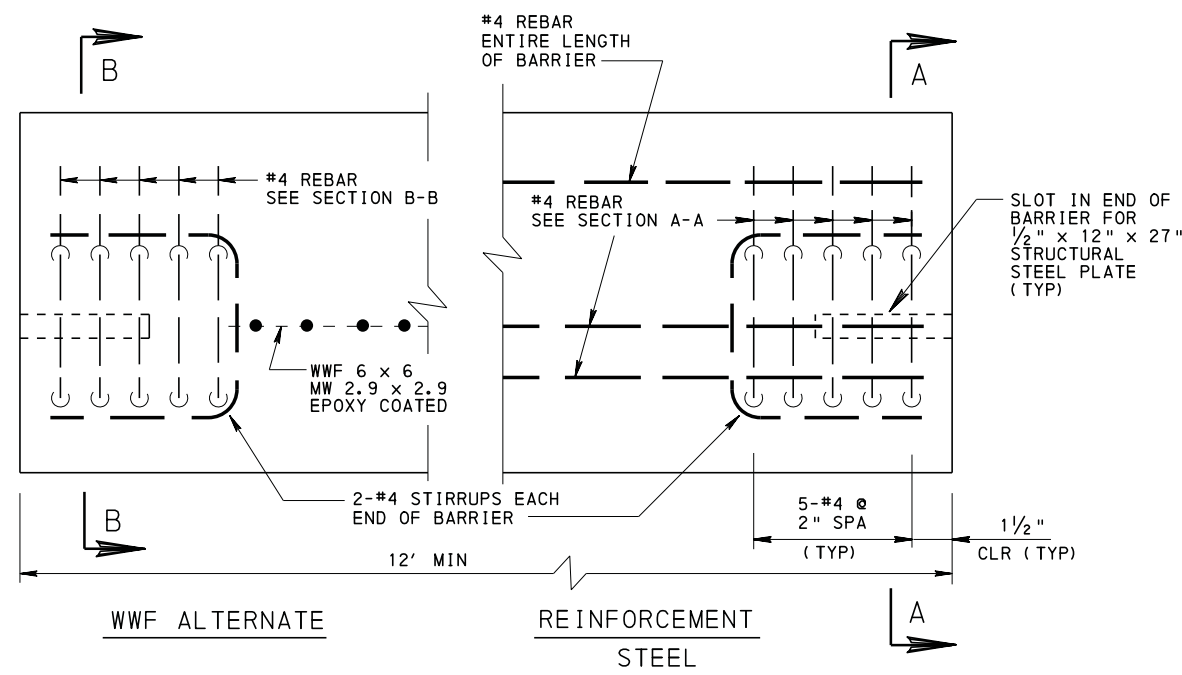
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SINGLE FACE CONCRETE BARRIER

RECOMMENDED AUG. 4, 2017 <i>Melissa D. Betuk</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED AUG. 4, 2017 <i>Ben E. Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 4
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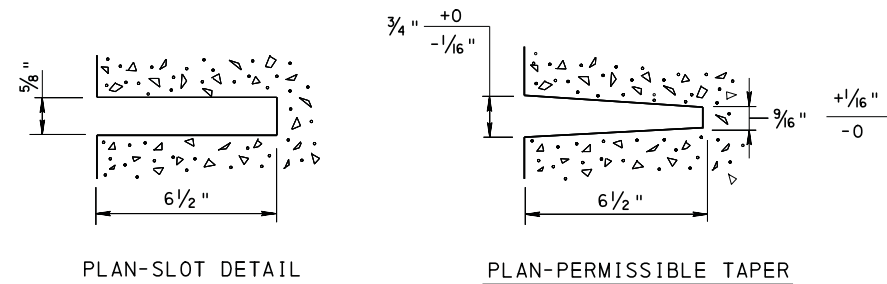
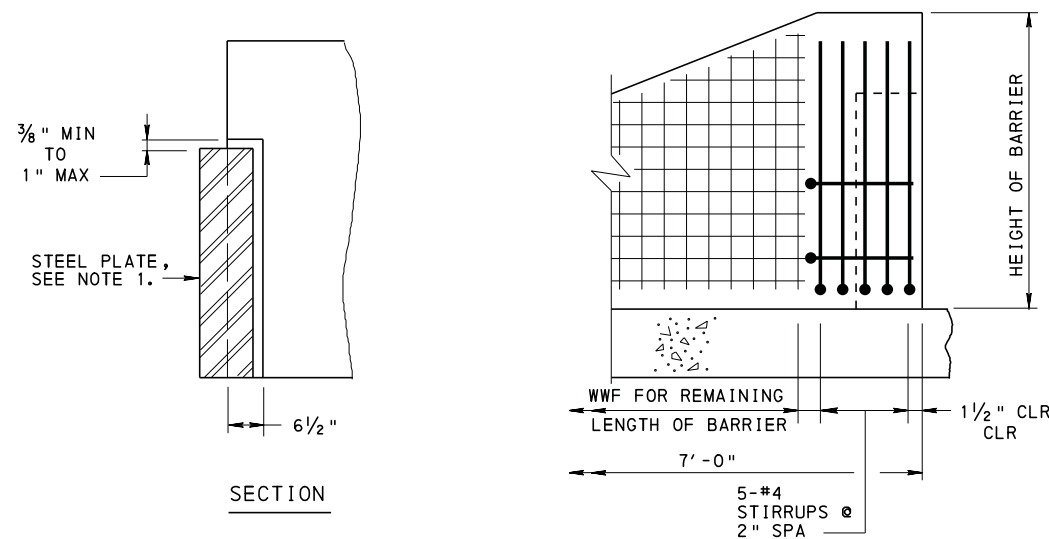
RC-58M

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	



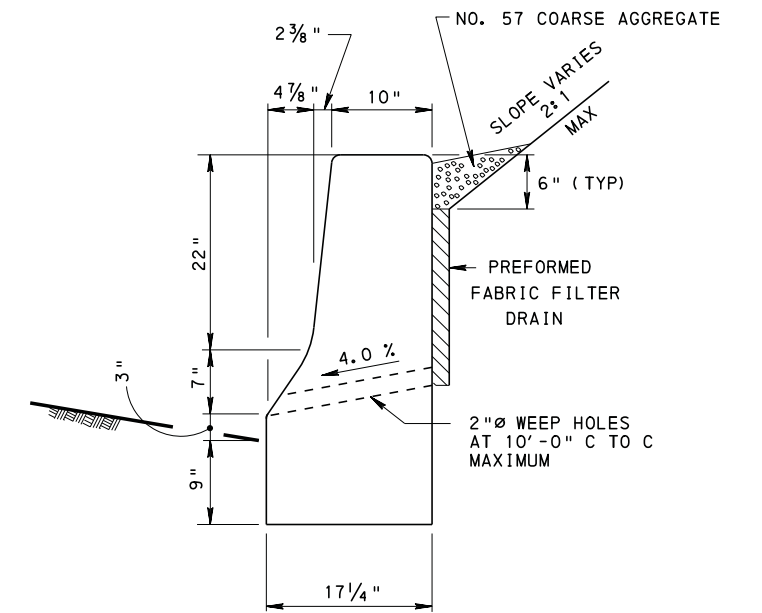
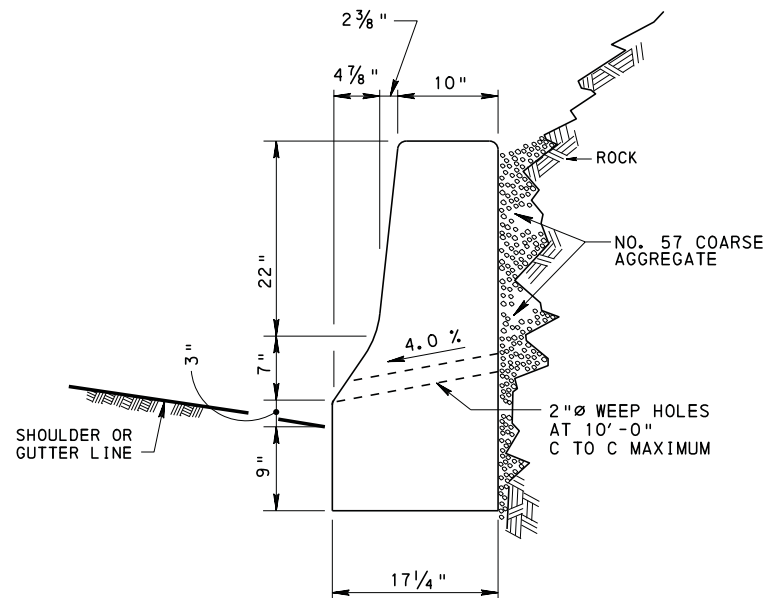
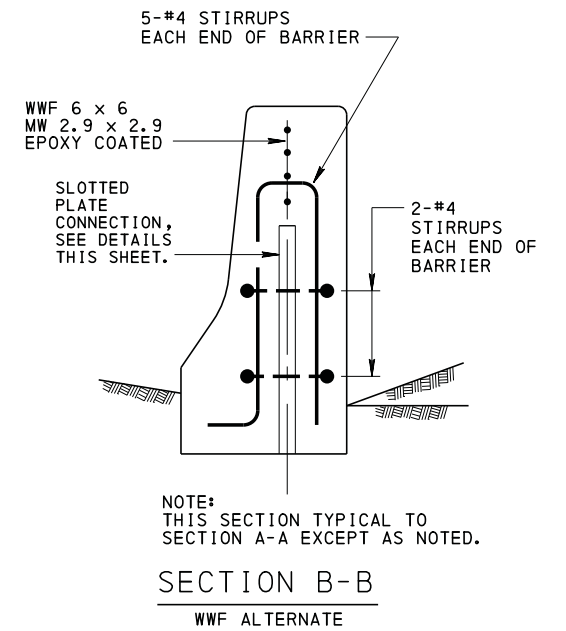
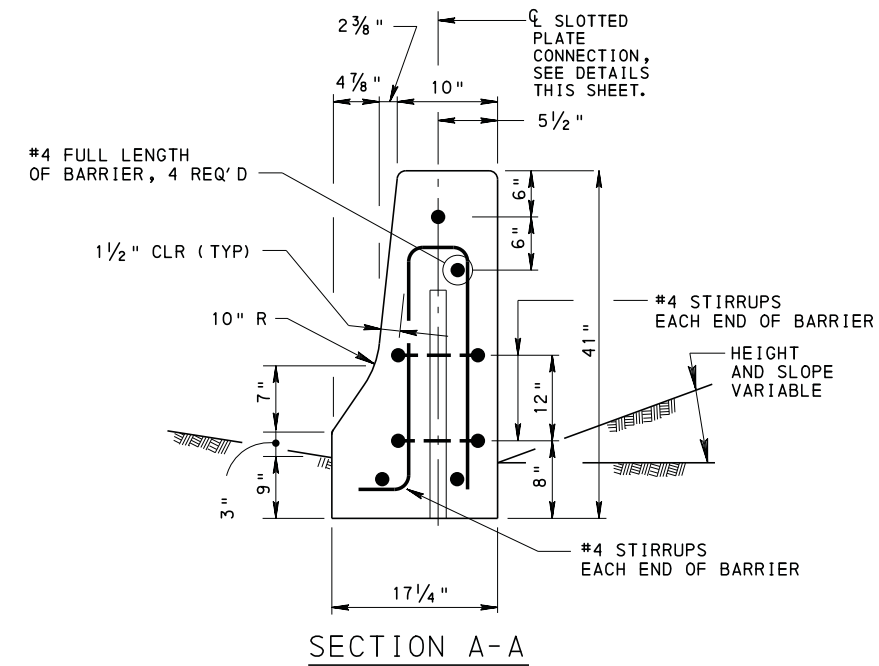
## BARRIER PLAN

SHOWN WITH WWF ALTERNATE ON LEFT END OF BARRIER FOR DETAILING PURPOSES. BOTH ENDS OF BARRIER ARE TYPICAL.



## SLOTTED PLATE CONNECTION

## TYPICAL SINGLE FACE BARRIER SECTIONS



## NOTES

1. PROVIDE STRUCTURAL STEEL PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. FOR PERMANENT BARRIER, GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s). ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN. FOR TEMPORARY BARRIER, DO NOT GALVANIZE THE STRUCTURAL STEEL PLATES.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. CHECK STABILITY OF BARRIER USED AS A RETAINING WALL AND PROVIDE COMPUTATION WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 1" EXCEPT AS SHOWN.

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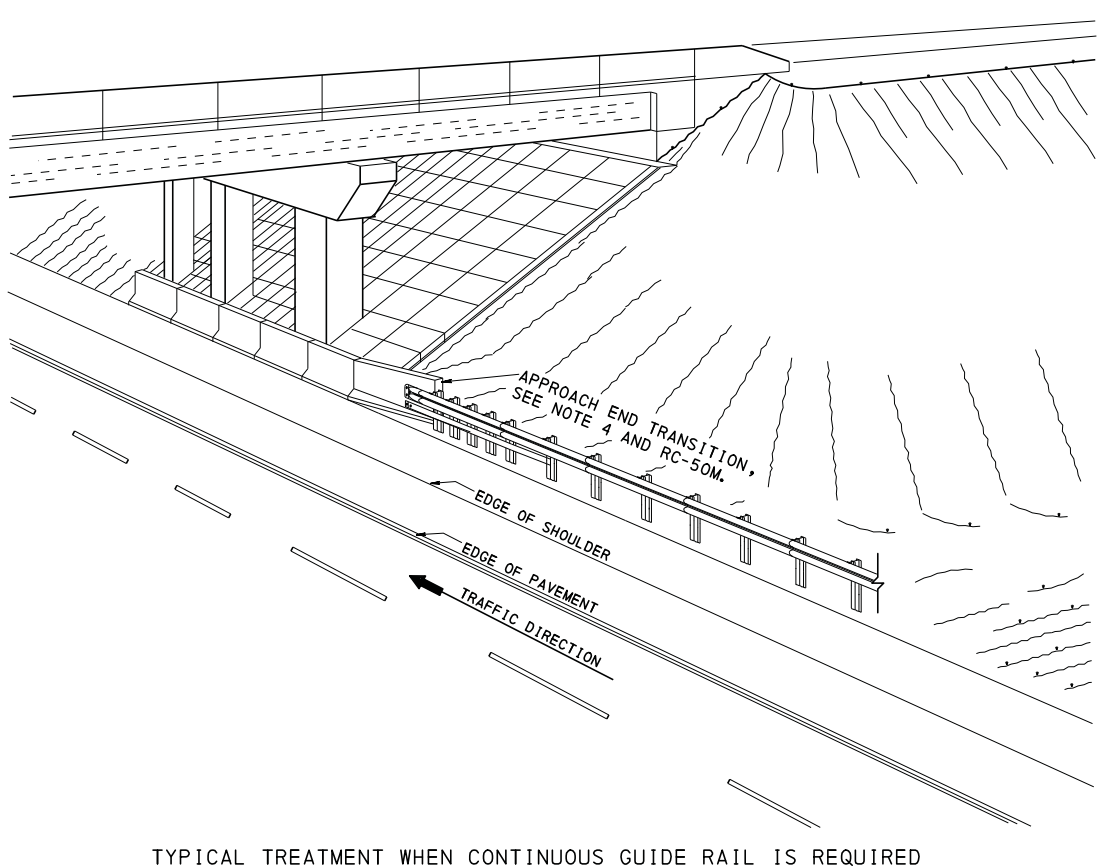
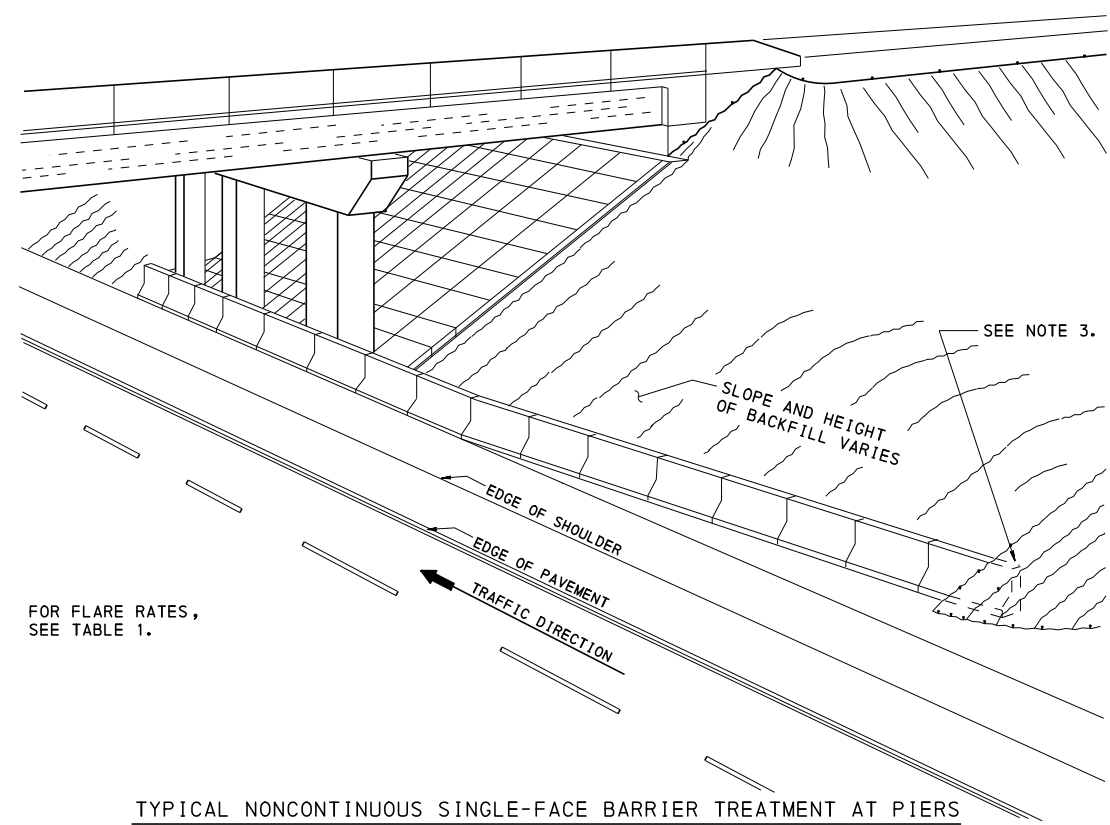
SINGLE FACE CONCRETE BARRIER  
F-SHAPE

RECOMMENDED AUG. 4, 2017  
*Melissa D. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED AUG. 4, 2017  
*Brian J. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

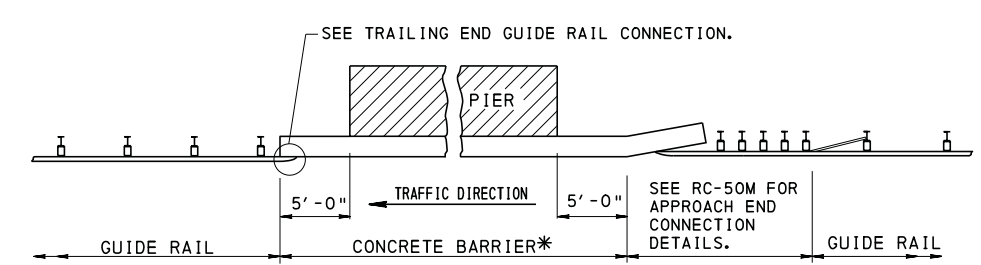
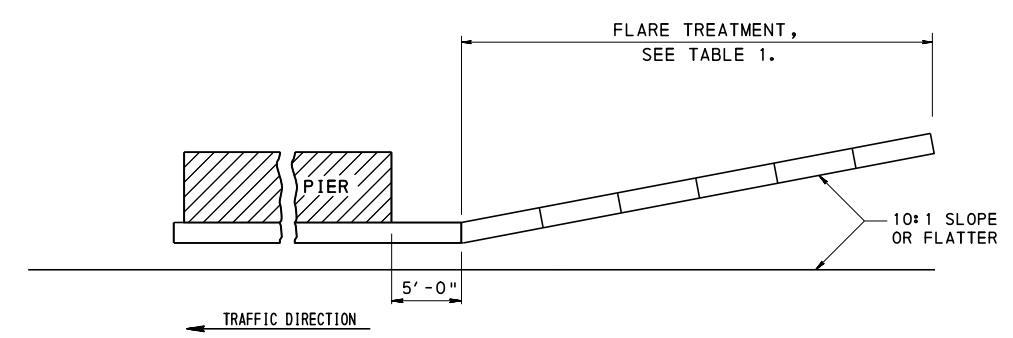
SHT 2 OF 4  
RC-58M





# NOTES

1. PROVIDE SINGLE FACE CONCRETE BARRIER AND GUIDE RAIL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 620 AND 623.
2. THE TREATMENTS SHOWN ARE FOR FOUR-LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT ON BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
3. IF THE CONCRETE BARRIER IS TERMINATED WITHIN THE CLEAR ZONE, BURY IT INTO THE EXISTING SLOPE, PREFERABLY 2:1, 1'-0" DEEP. OTHERWISE, USE AN IMPACT ATTENUATING DEVICE.
4. THIS TRANSITION IS APPROPRIATE FOR CONNECTION TO A VERTICAL CONCRETE SHAPE AND SHOULD NOT BE CONNECTED DIRECTLY TO A CONCRETE SAFETY SHAPE. CONCRETE SAFETY SHAPES SHOULD BE TRANSITIONED TO A VERTICAL SHAPE AT THE GUIDE RAIL CONNECTION.
5. THE VIEWS ON THIS SHEET ARE ONLY PICTORIAL REPRESENTATIONS OF GUIDE RAIL TO CONCRETE BARRIER TRANSITIONS. RC-50M MUST BE USED FOR ALL GUIDE RAIL TO BARRIER CONNECTION DETAILS AND HARDWARE.



\* IF ADEQUATE DEFLECTION DISTANCE IS PROVIDED (RC-54M, SHEET 1, TABLE 1) BETWEEN THE BACK OF THE GUIDE RAIL POST AND FRONT OF OBSTRUCTION, DO NOT USE CONCRETE BARRIER; CONTINUE THE GUIDE RAIL.

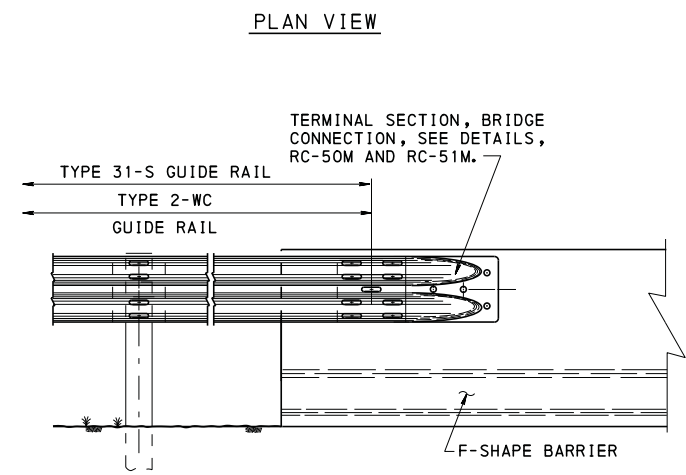


TABLE 1  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED mph	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20:1	15:1
65	19:1	15:1
60	18:1	14:1
55	16:1	12:1
50	14:1	11:1
45	12:1	10:1
40	11:1	9:1
35	10:1	8:1
30	8:1	7:1

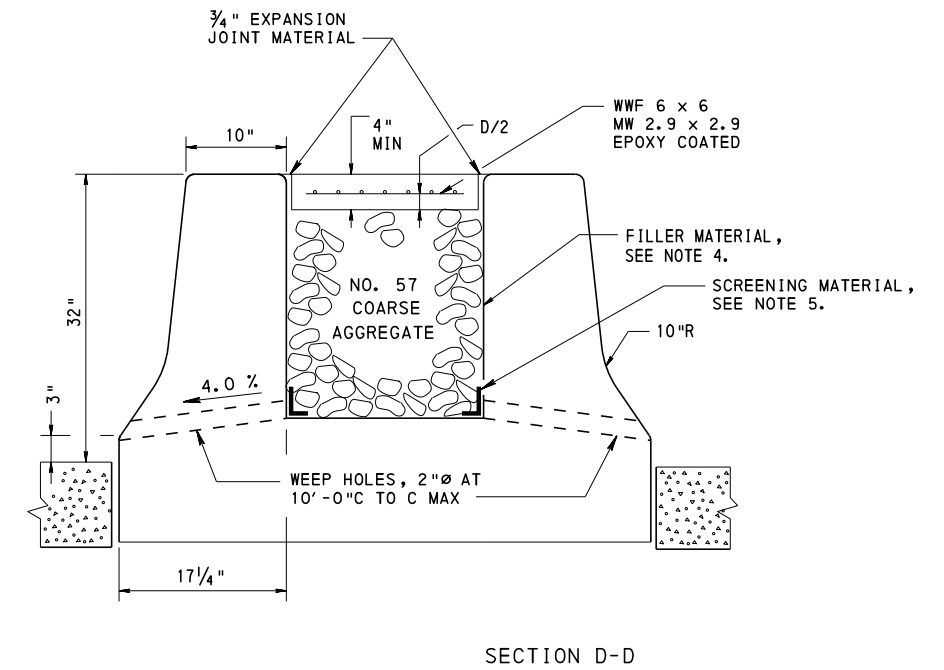
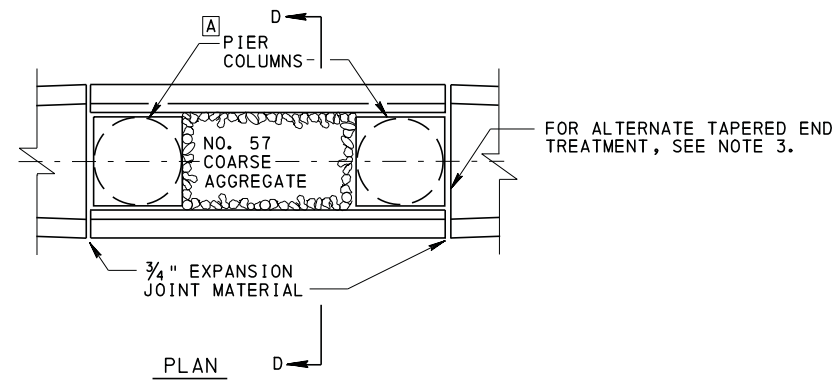
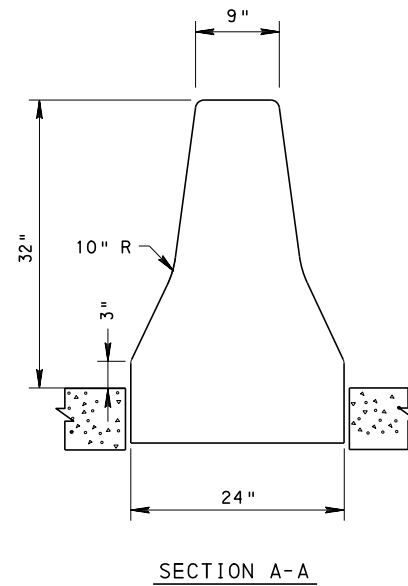
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SINGLE FACE CONCRETE BARRIER  
F-SHAPE  
PLACEMENT AT SHOULDER PIERS

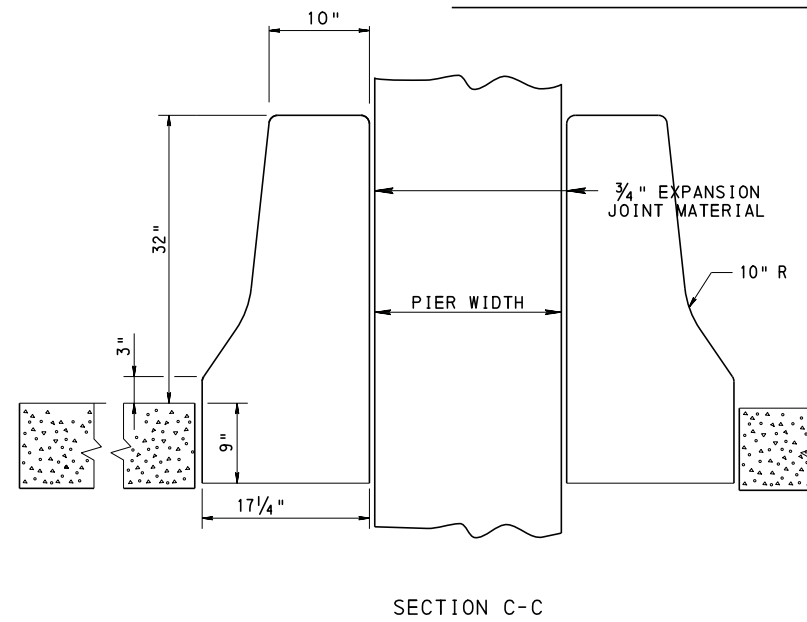
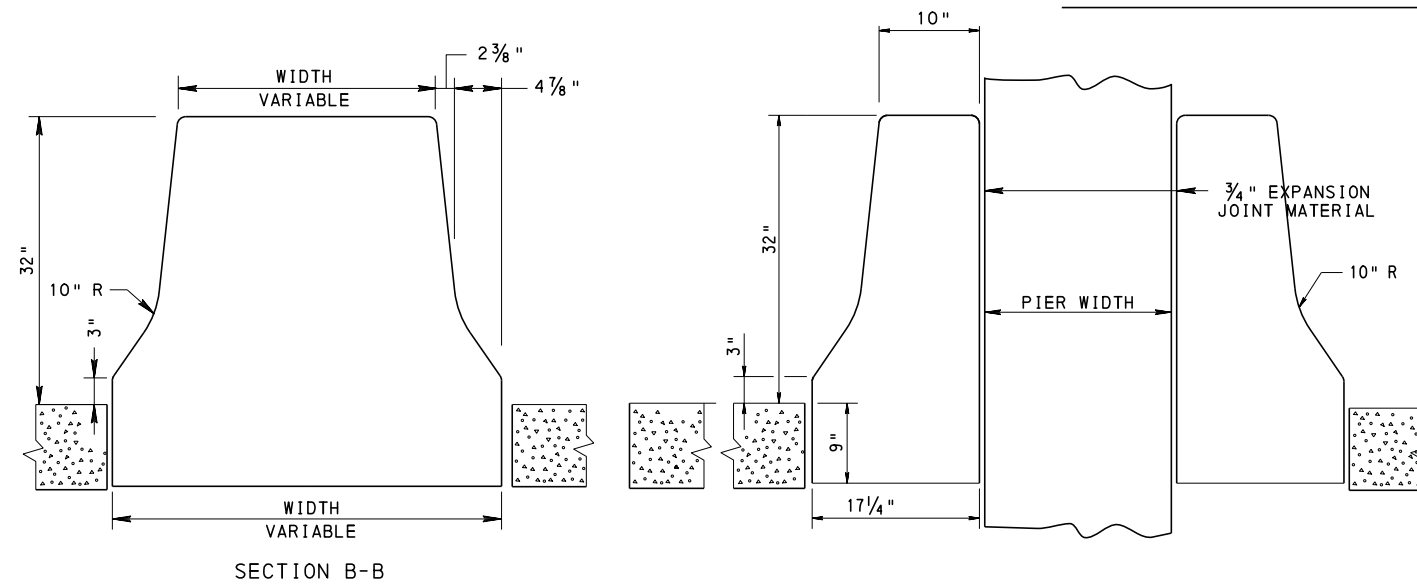
RECOMMENDED AUG. 4, 2017  
*Melissa D. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED AUG. 4, 2017  
*Brian J. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 4  
RC-58M

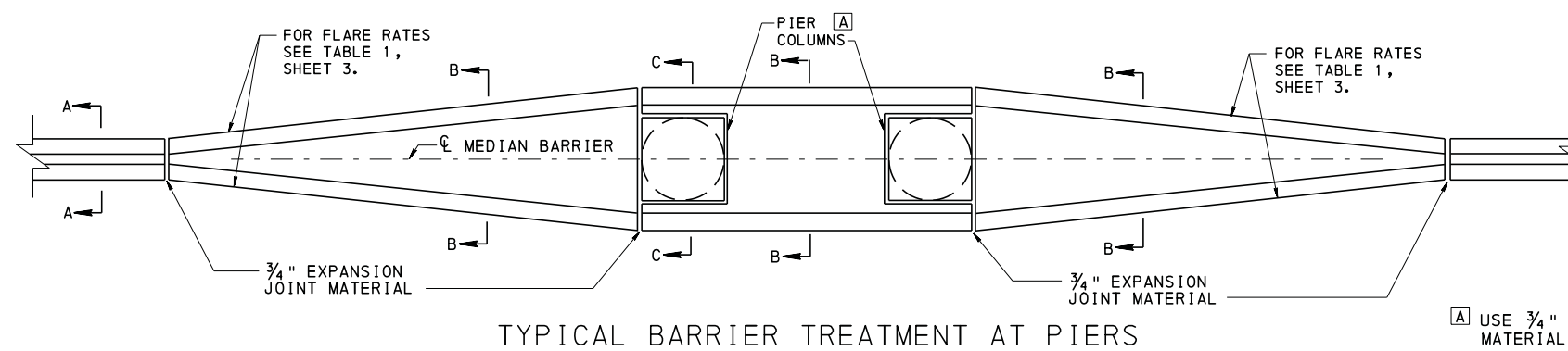


## TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



NOTES

1. REFER TO BRIDGE STANDARD DRAWINGS (BD-601M) FOR DETAILS OF CONCRETE MEDIAN BARRIER ACROSS STRUCTURES.
2. THE CONCRETE TRANSITIONS AND BARRIER TAPERS AT PIERS ARE INCIDENTAL TO THE MEDIAN BARRIER.
3. CAST ADDITIONAL VOIDS IN THE TAPERED END SECTIONS MEETING THE REQUIREMENTS PRESENTED IN SECTION D-D.
4. PROVIDE NO. 57 COARSE AGGREGATE THAT MEETS THE REQUIREMENTS OF PUBLICATION 408, SECTION 703.2. ALTERNATE SUITABLE GRANULAR MATERIAL MAY BE USED AS FILLER MATERIAL.
5. TO PREVENT INTRUSION OF COARSE AGGREGATE INTO WEEP HOLES, USE WIRE MESH SCREENING, GEOTEXTILES OR OTHER SUITABLE MATERIAL.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 1" EXCEPT AS SHOWN.



[A] USE 3/4" EXPANSION JOINT MATERIAL AROUND ALL PIERS.



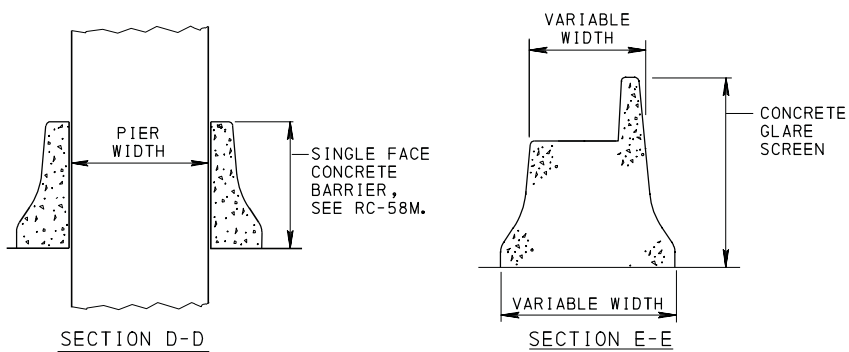
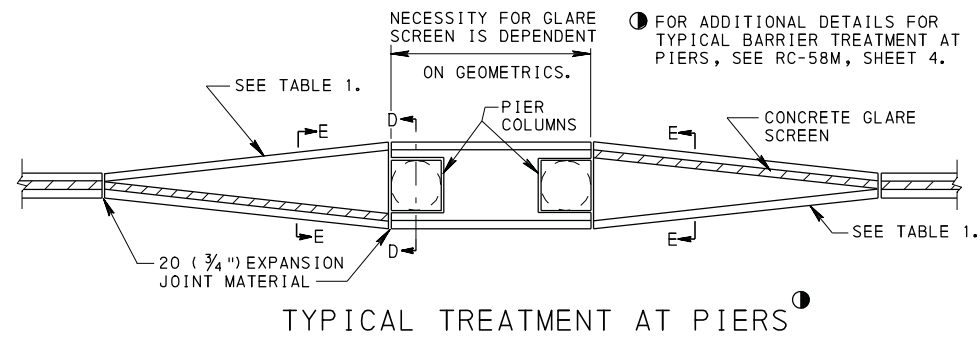


TABLE 1  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
Km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20: 1	15: 1
105	65	19: 1	15: 1
100	60	18: 1	14: 1
90	55	16: 1	12: 1
80	50	14: 1	11: 1
70	45	12: 1	10: 1
65	40	11: 1	9: 1
60	35	10: 1	8: 1
50	30	8: 1	7: 1

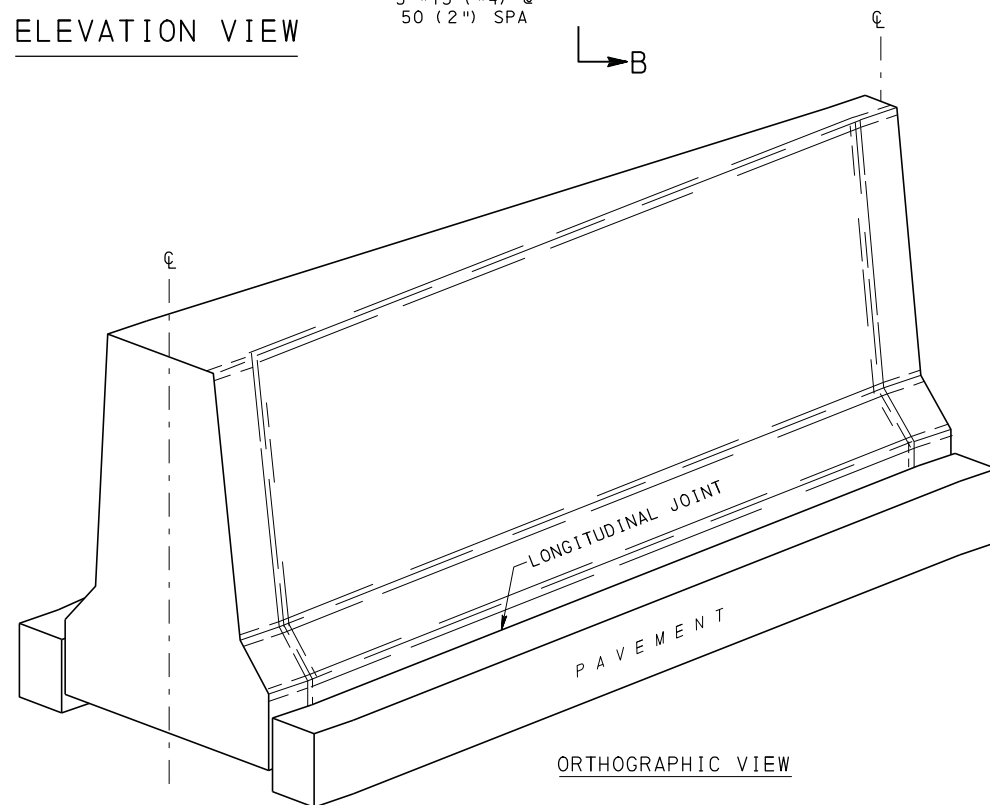
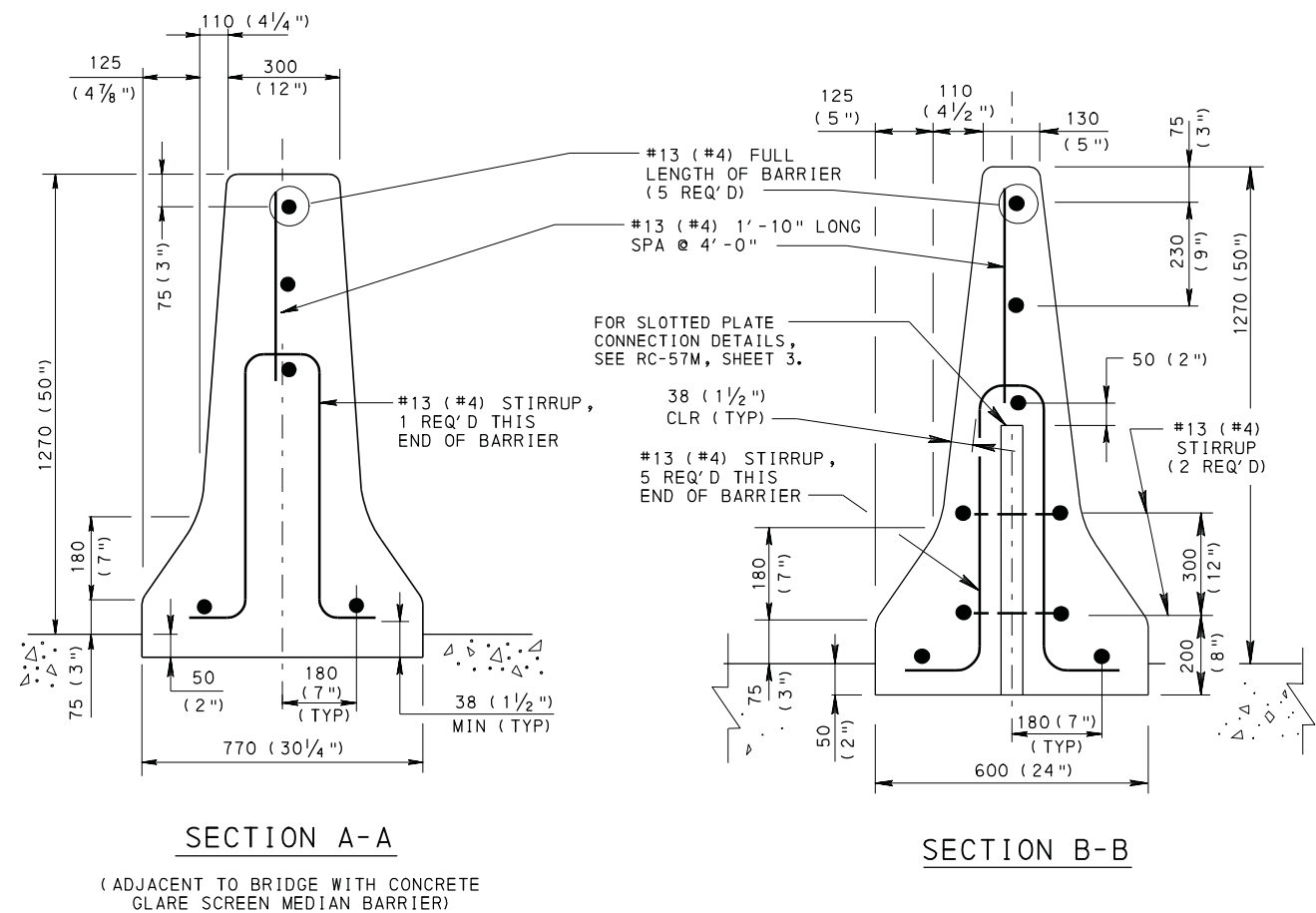
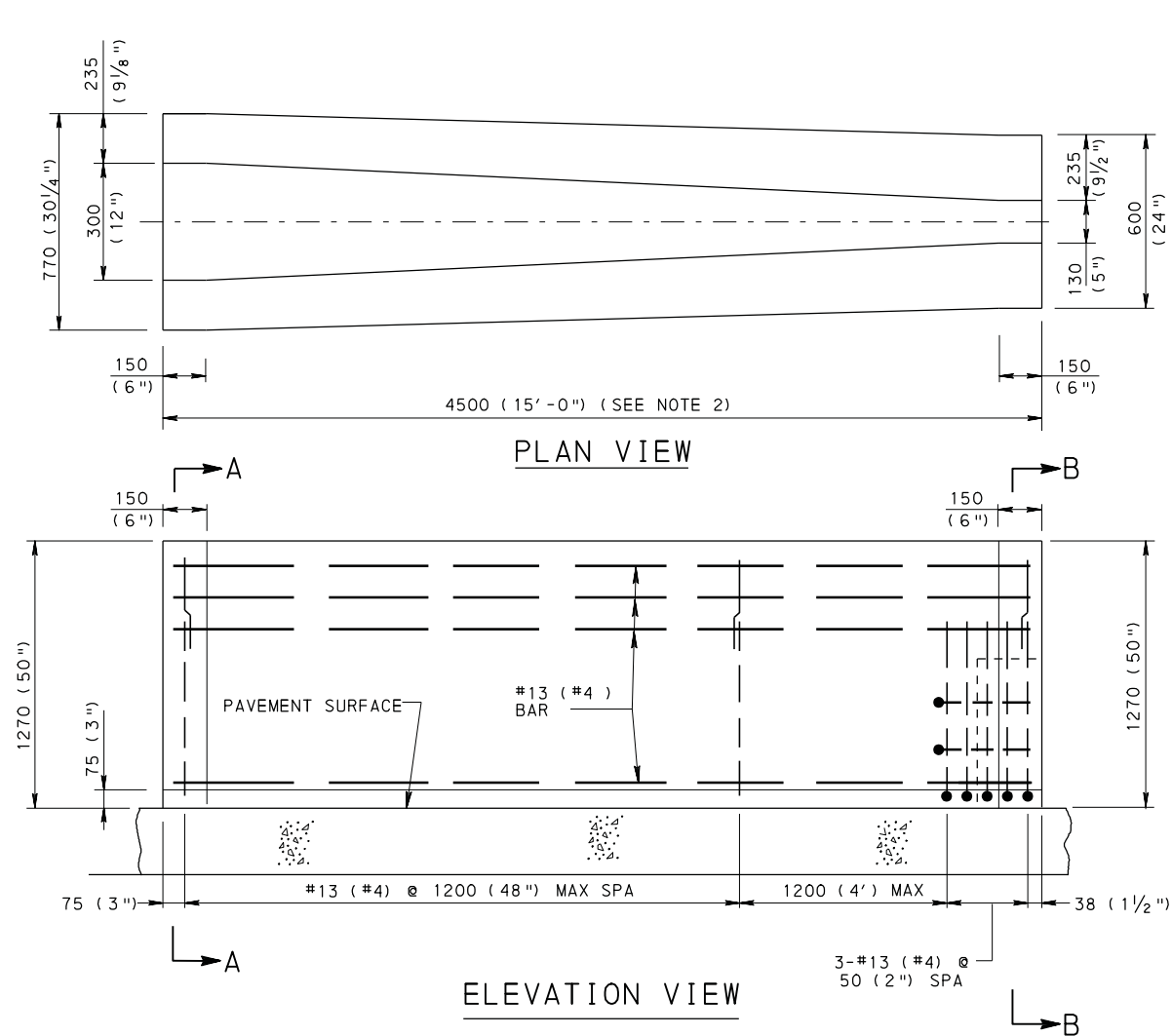
NOTE

1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57M, SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE GLARE SCREEN  
F-SHAPE



**TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION**  
**BRIDGE TO HIGHWAY TRANSITION**  
 (THE BRIDGE BARRIER IS A CONCRETE GLARE SCREEN MEDIAN BARRIER)

#### NOTES

1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 1.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

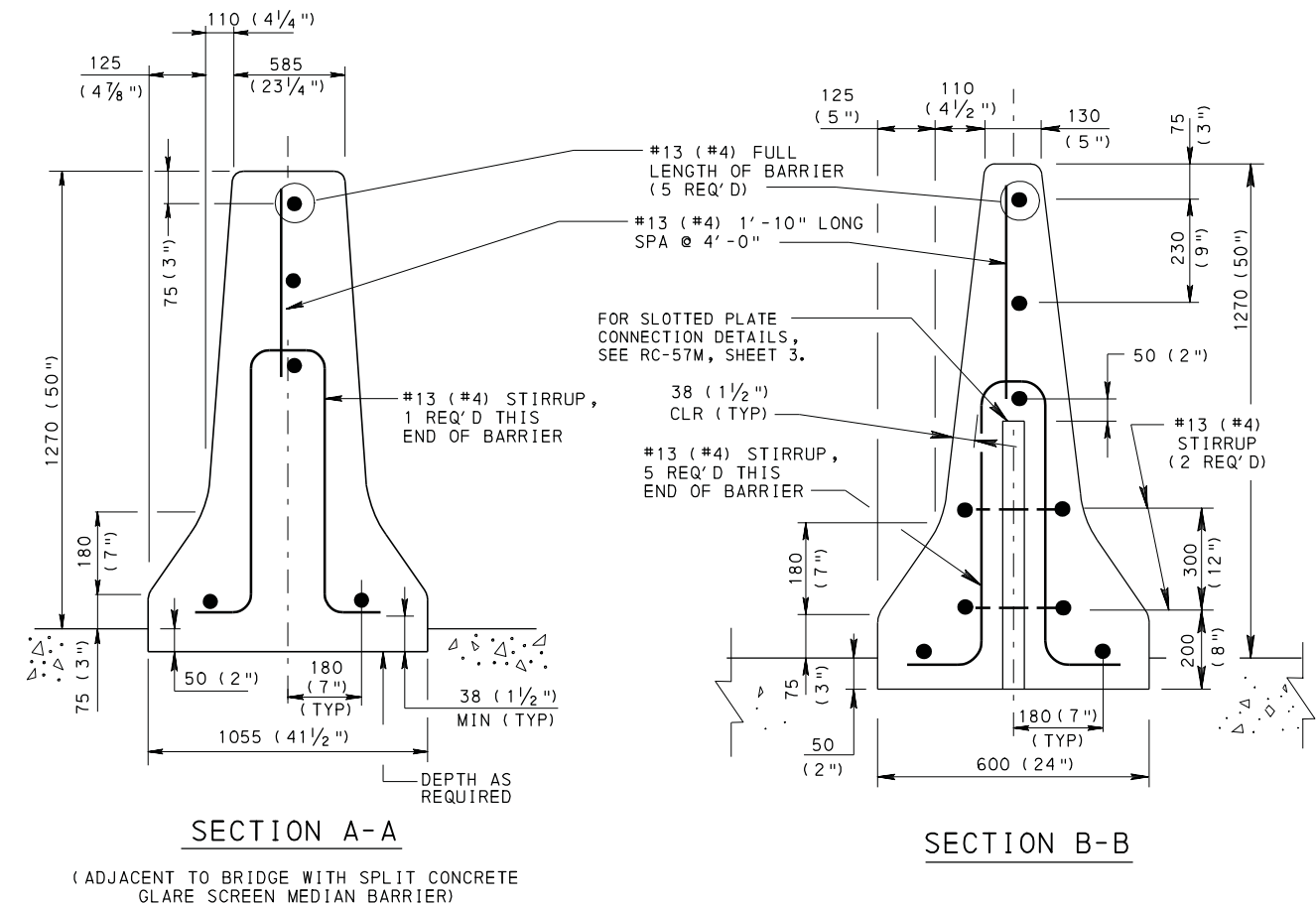
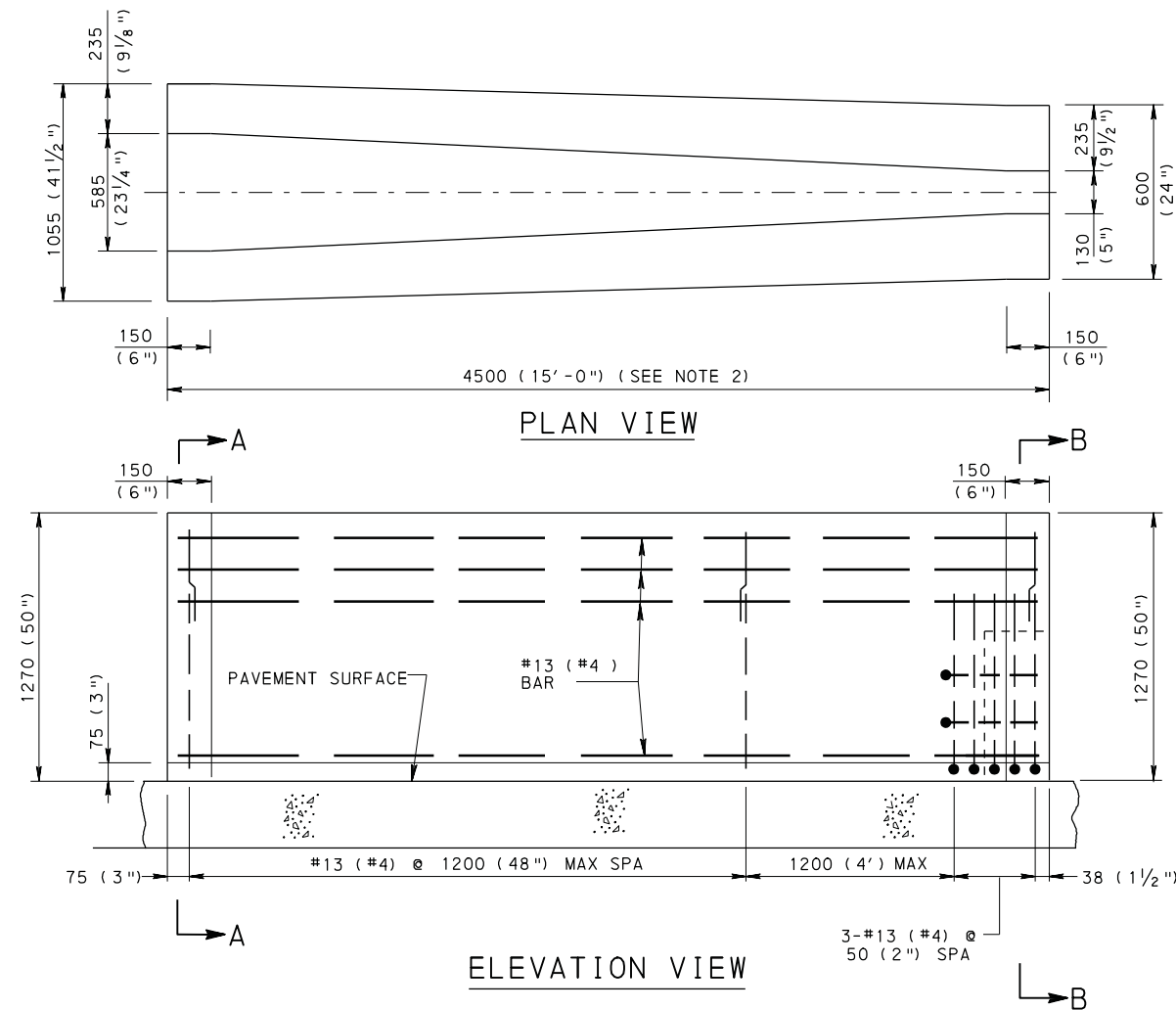
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

**CONCRETE GLARE SCREEN**  
**F-SHAPE**

RECOMMENDED JUN. 1, 2010  
*R. H. Wiley*  
 CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*B. B. Thompson*  
 DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 4  
**RC-59M**



**NOTES**

1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 1.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE GLARE SCREEN  
F-SHAPE

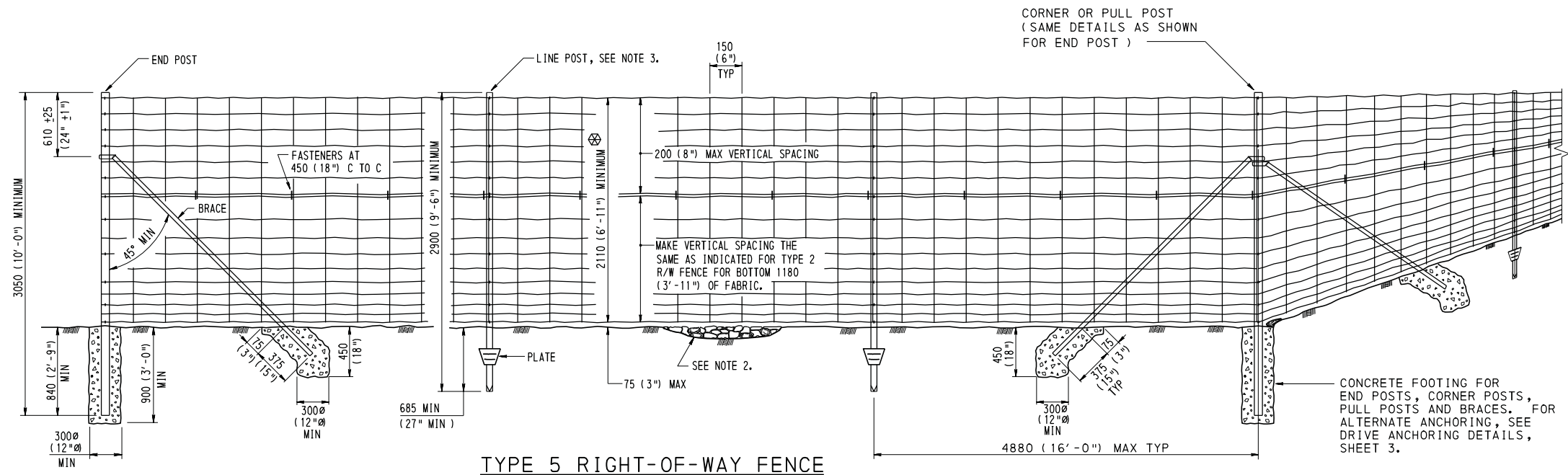
RECOMMENDED JUN. 1, 2010  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
DIRECTOR, BUREAU OF DESIGN

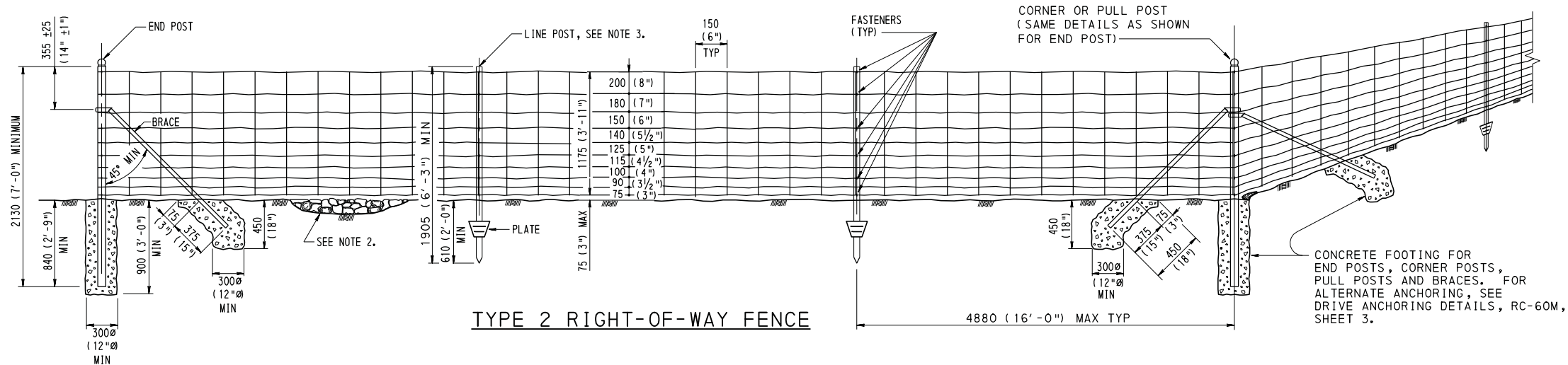
SHT 4 OF 4  
RC-59M

TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION  
BRIDGE TO HIGHWAY TRANSITION  
(THE BRIDGE BARRIER IS A SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)





TYPE 5 RIGHT-OF-WAY FENCE



TYPE 2 RIGHT-OF-WAY FENCE

#### GENERAL NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 624.
2. FILL ALL DEPRESSIONS GREATER THAN 75 (3") AND LESS THAN 300 (12") WITH ROCKS OR COMPACTED EARTH TO PREVENT ANIMALS FROM GOING UNDER THE RIGHT-OF-WAY FENCE.
3. INSTALL CONCRETE FOOTING OR DRIVE ANCHORS AT MAXIMUM INTERVALS OF 50 m (160') FOR ALL LINE POSTS.
4. PLACE PULL POSTS AT ANGLE POINTS IN VERTICAL ALIGNMENT AT MAXIMUM INTERVALS OF 150 m (500') BETWEEN END AND/OR CORNER POSTS IN LEVEL TERRAIN AND/OR WHERE DIRECTED.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

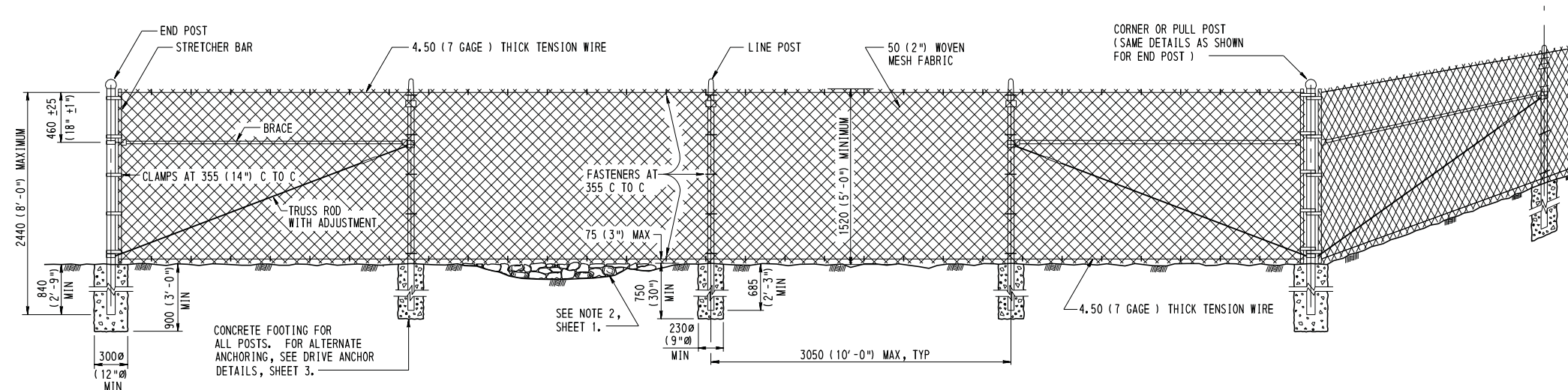
COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF DESIGN

RIGHT-OF-WAY FENCE

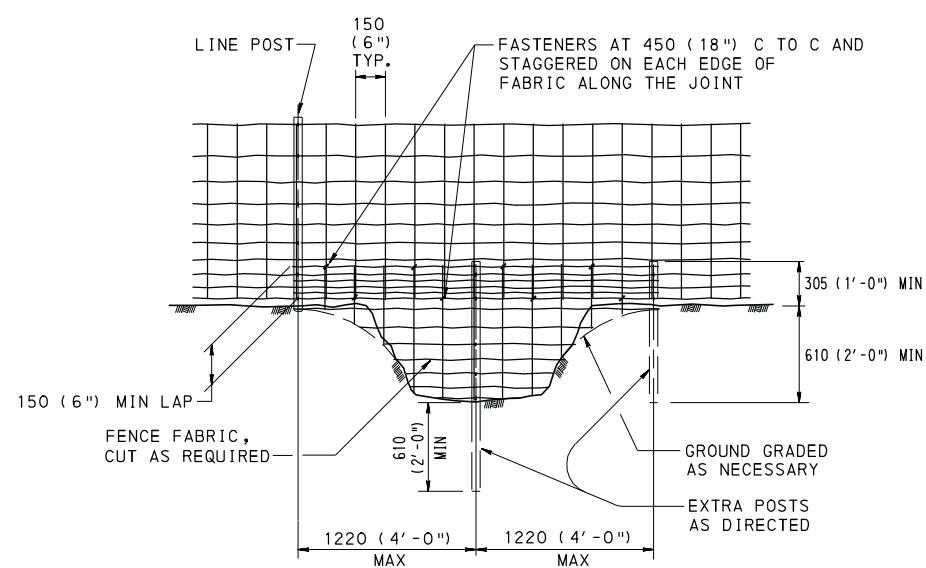
RECOMMENDED JUN. 1, 2010  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 3  
RC-60M



TYPE 1 RIGHT-OF-WAY FENCE



TREATMENT AT GROUND DEPRESSIONS  
GREATER THAN 300 (1'-0'')

FOR TYPES 2 AND 5 RIGHT-OF-WAY FENCE  
SEE SHEET 1

NOTE

1. FOR GENERAL NOTES SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

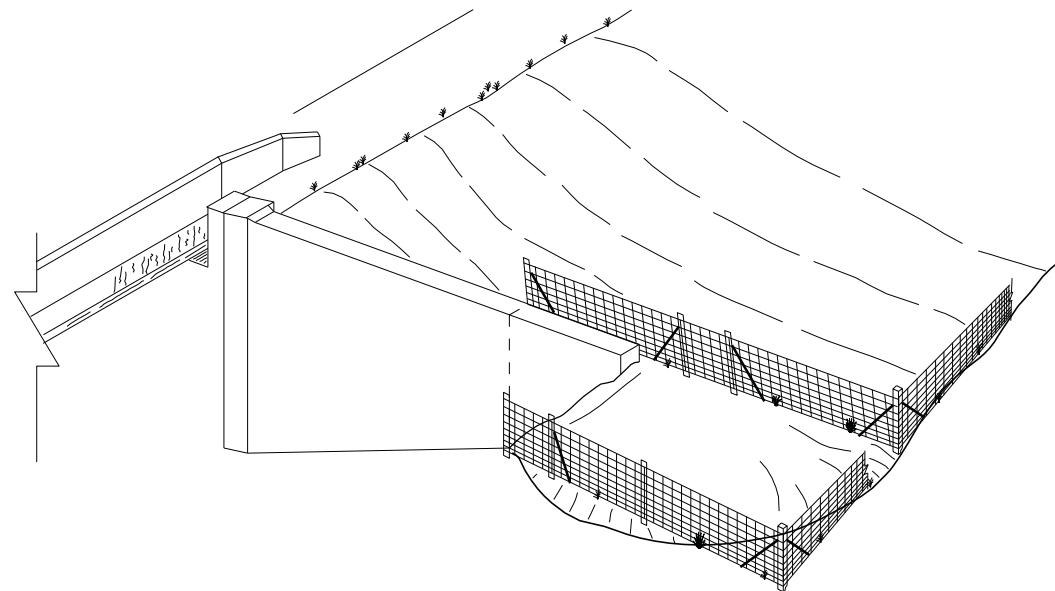
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE

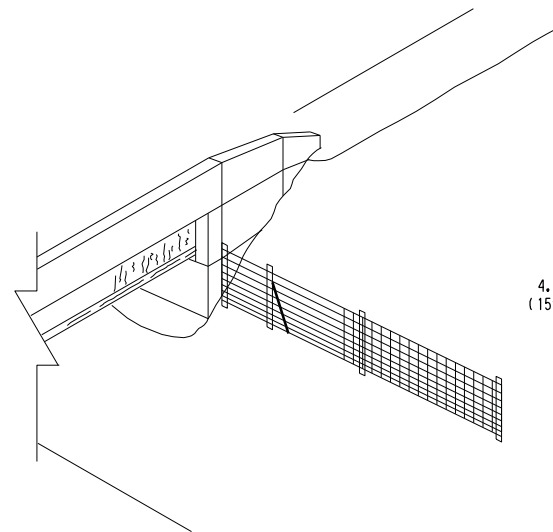
RECOMMENDED JUN. 1, 2010  
*R. W. Kelly*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*B. B. Thompson*  
DIRECTOR, BUREAU OF DESIGN

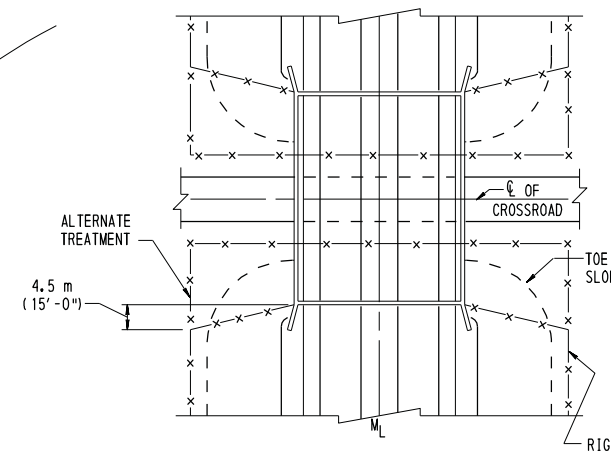
SHT 2 OF 3  
RC-60M



R/W FENCE TREATMENT AT  
HIGH WALLED ABUTMENT

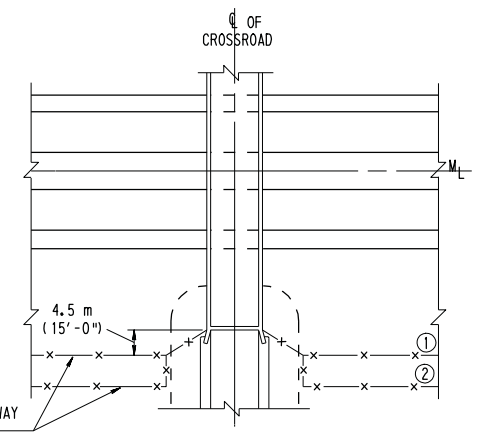


R/W FENCE TREATMENT  
AT STUB ABUTMENTS



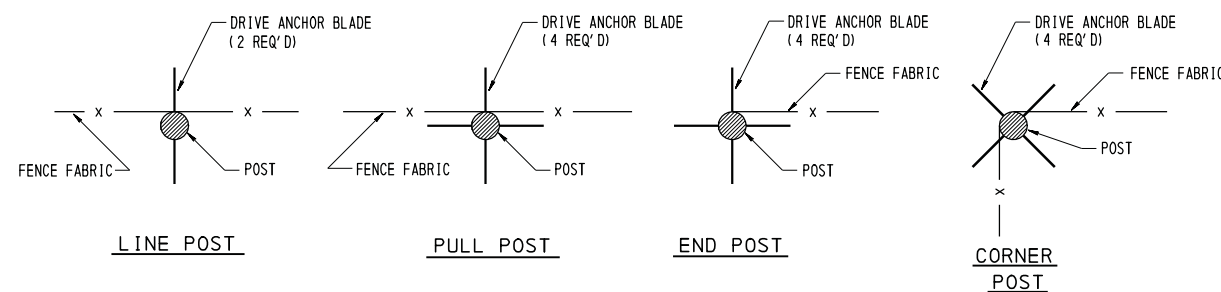
HIGHWAY OVER CROSSROAD

IF THE ROADWAY HAS DUAL STRUCTURES, ERECT THE RIGHT-OF-WAY FENCE TO CLOSE OFF THE MEDIAN AREA.

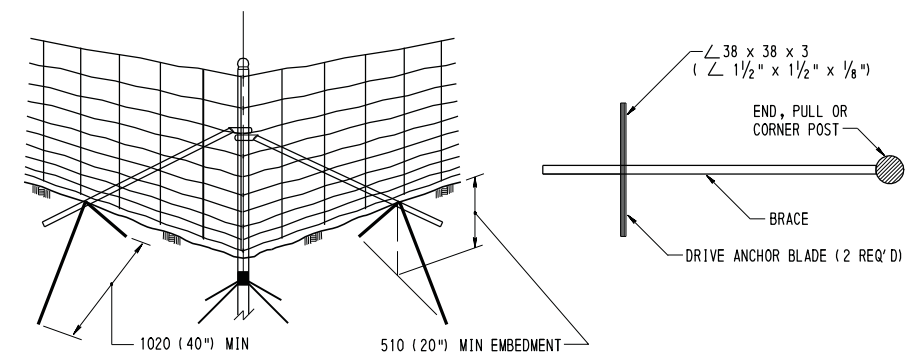


HIGHWAY UNDER CROSSROAD

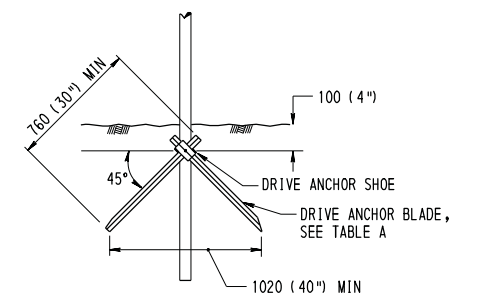
1. IF RIGHT-OF-WAY FENCE IS WITHIN 4.5 m (15'-0") OR LESS OF THE PROJECTED FACE OF THE BACKWALL, ANGLE THE FENCE INTO THE ABUTMENT AS SHOWN.
2. IF RIGHT-OF-WAY FENCE IS GREATER THAN 4.5 m (15'-0") FROM THE PROJECTED FACE OF THE BACKWALL, PLACE FENCE PARALLEL TO CROSSROAD AND ANGLE INTO ABUTMENT AS SHOWN.



DRIVE ANCHOR ORIENTATION

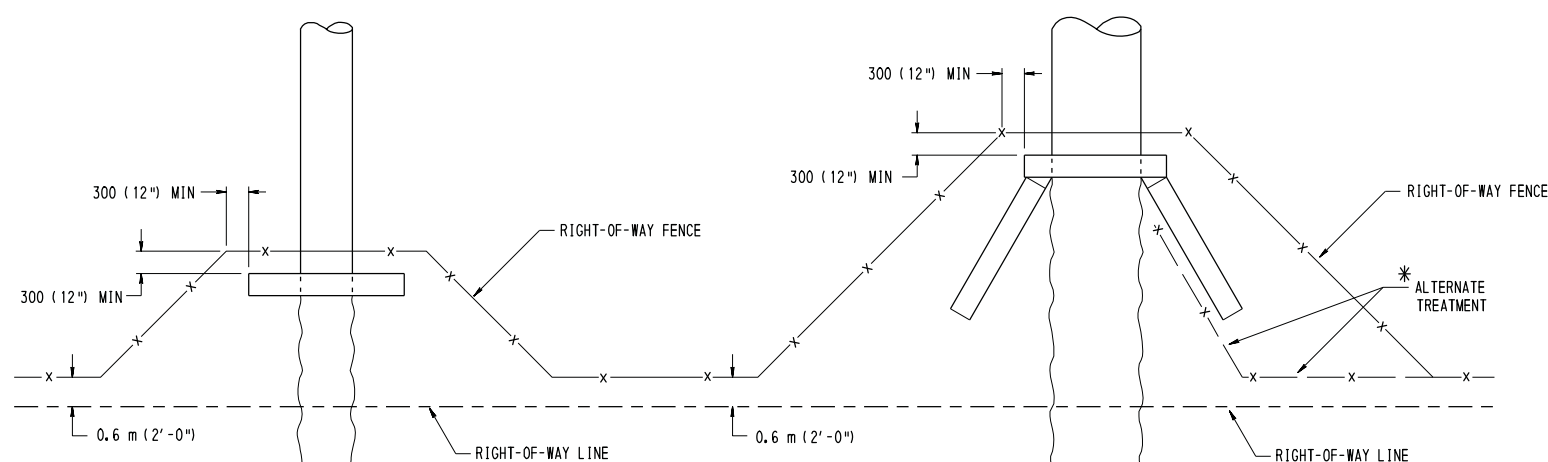


DRIVE ANCHOR DETAILS FOR POST BRACES  
ON TYPE 2 AND TYPE 5 R/W FENCE



DRIVE ANCHOR

(USE AS ALTERNATE TO CEMENT CONCRETE FOOTING FOR ALL TYPES OF RIGHT-OF-WAY FENCE.)



R/W FENCE TREATMENT AT CULVERTS

(EXERCISE CAUTION WHEN LOCATING POSTS NEAR THE CULVERT. ANY DAMAGE IS AT CONTRACTOR'S EXPENSE.)

\* PLACE THE LAST POST WITHIN 150 (6") OF THE WALL AND AT A POINT WHERE THE WALL HEIGHT IS NOT LESS THAN 3.0 m (10'-0").

FENCE HEIGHT	MINIMUM BLADE SIZE
1520 (5'-0") OR LESS	25 x 25 x 3 (1" x 1" x 1/8")
GREATER THAN 1520 (5'-0") BUT LESS THAN 2130 (7'-0")	32 x 32 x 3 (1 1/4" x 1 1/4" x 1/8")
2130 (7'-0") OR GREATER	38 x 38 x 3 (1 1/2" x 1 1/2" x 1/8")

TABLE A

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

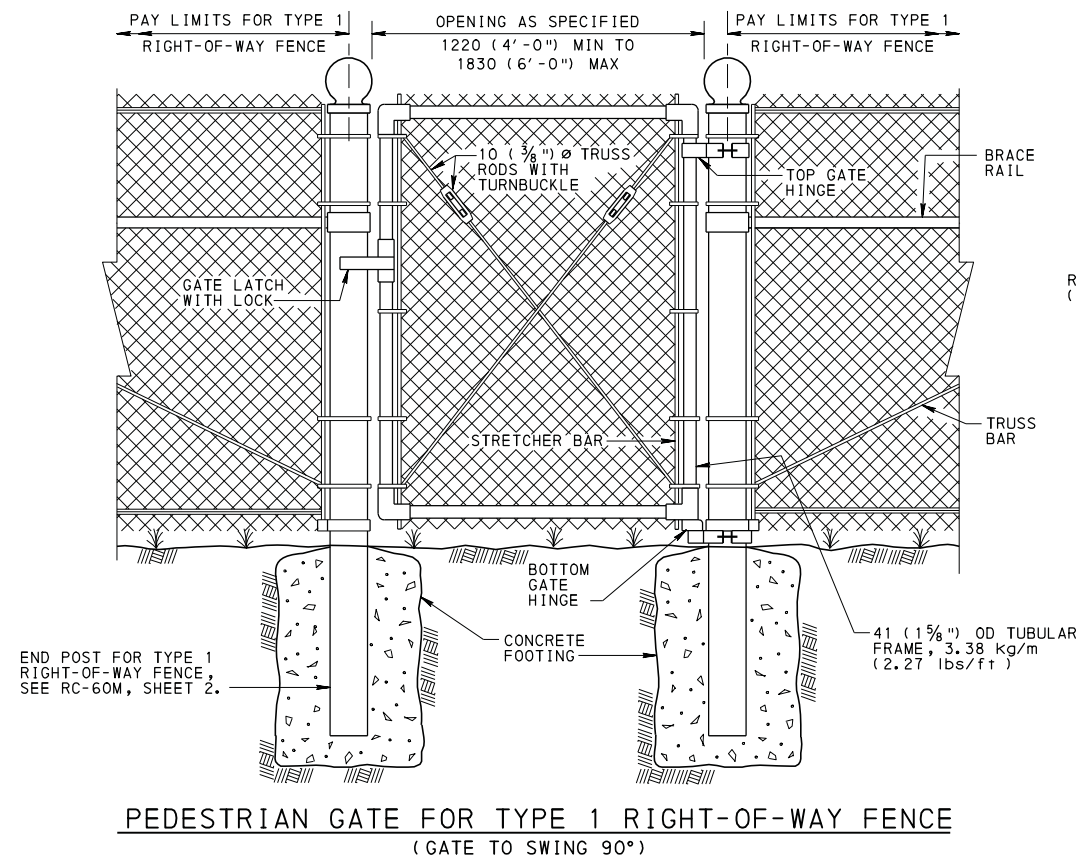
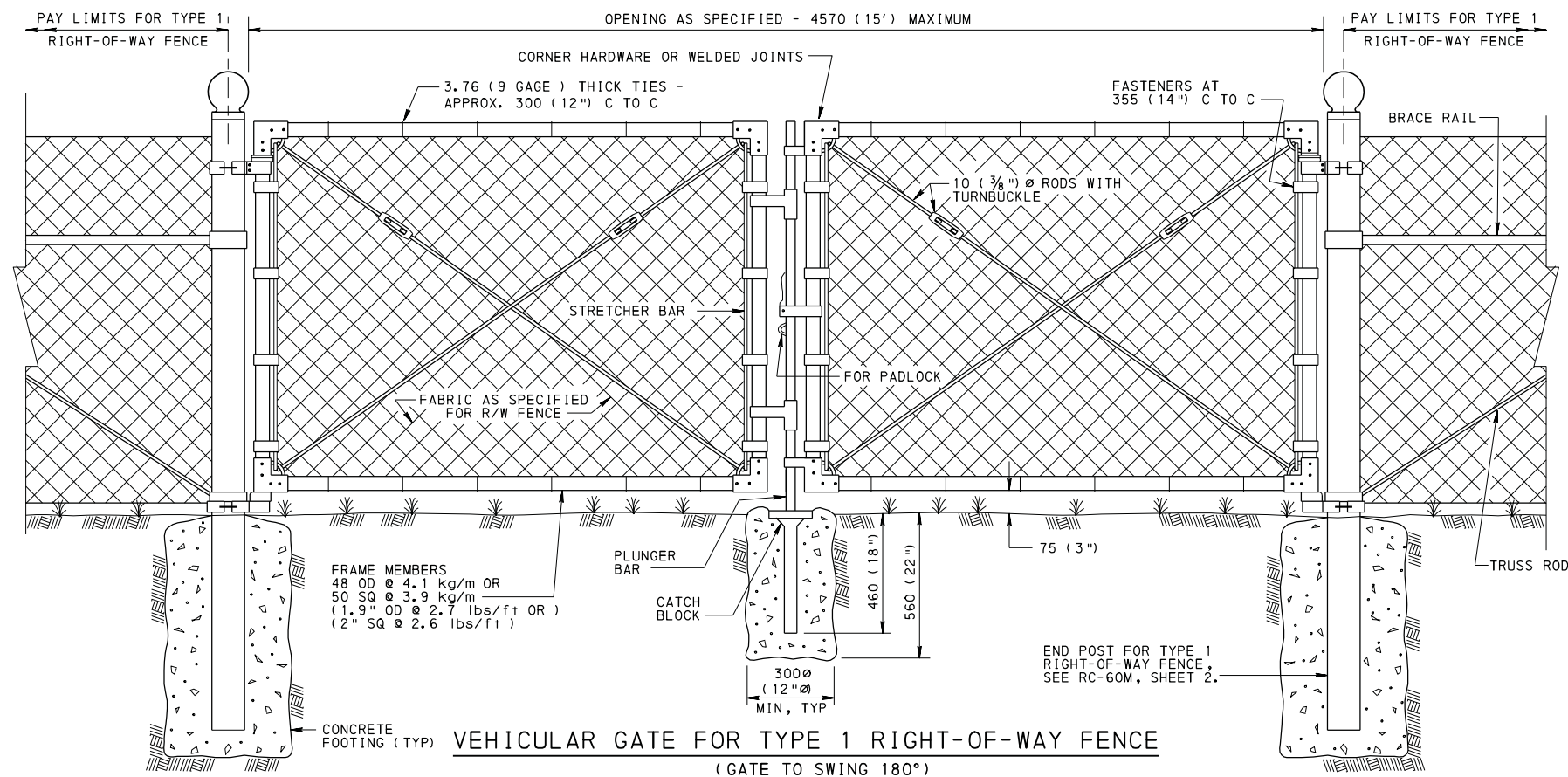
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF DESIGN**

**RIGHT-OF-WAY FENCE**

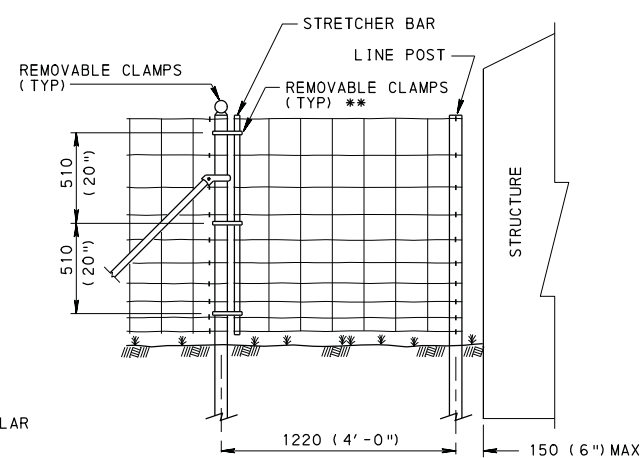
RECOMMENDED JUN. 1, 2010  
*W. H. Wiley*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*B. H. H. H.*  
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 3  
**RC-60M**



- \* INCLUDES STRETCHER BAR, BRACE AND REMOVABLE CLAMPS OR FASTENERS. SEE RC-60M, SHEET 2, FOR END POST DETAILS.
- \*\* FOR TYPE 2 R/W FENCE USE 3 CLAMPS AS SHOWN. FOR TYPE 1 R/W FENCE USE 4 CLAMPS EQUALLY SPACED. FOR TYPE 5 R/W FENCE USE 5 CLAMPS EQUALLY SPACED.
- \*\*\* CONSIDER THE PAYMENT FOR REMOVABLE FENCE SECTIONS INCIDENTAL TO THE R/W FENCE.

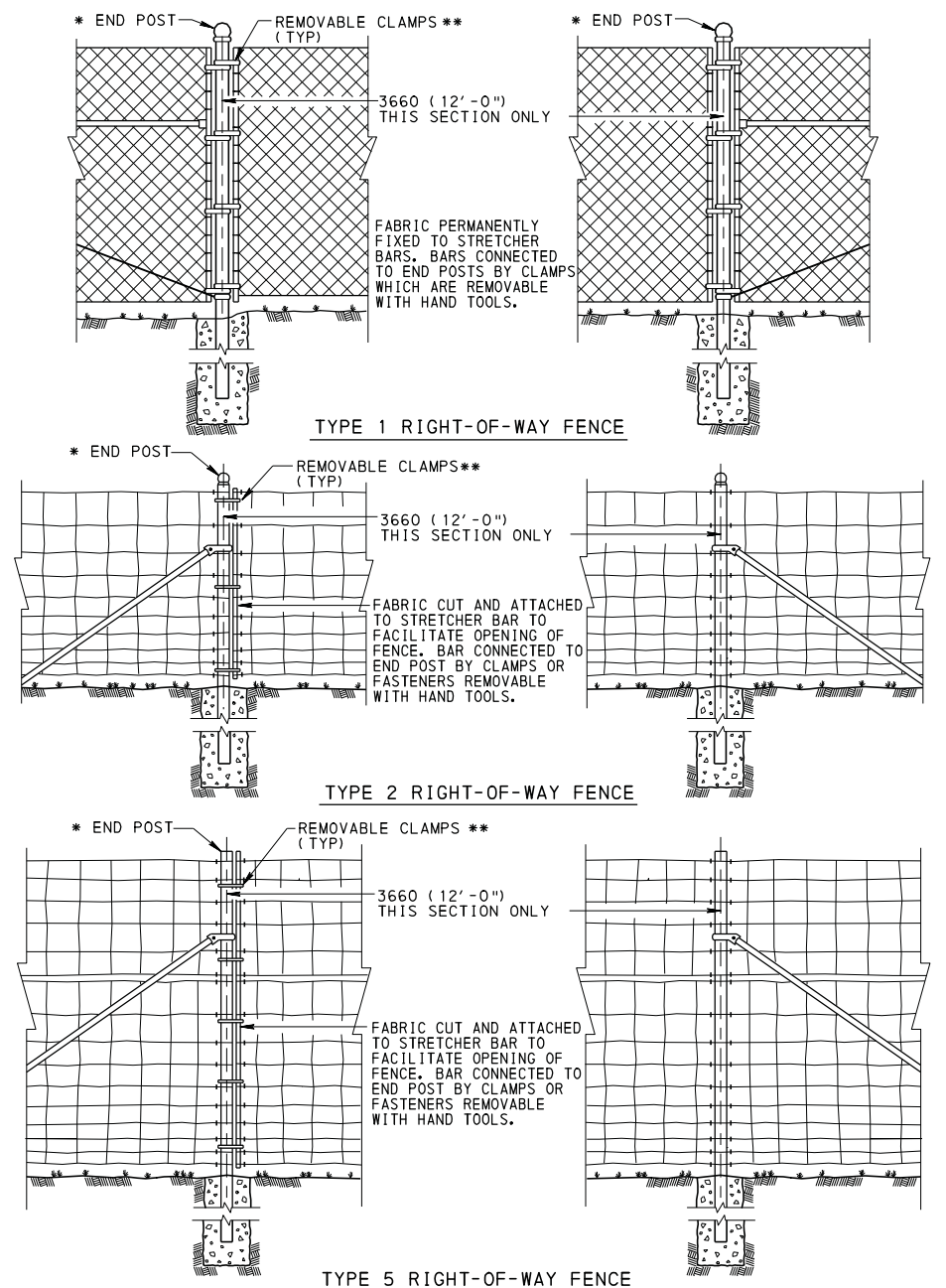


**NOTE:**  
TWO END POSTS ARE REQUIRED IF REMOVABLE FENCE SECTIONS AT STRUCTURES ARE PLACED ANYWHERE IN THE RUN OF FENCE OTHER THAN THE END.

### \*\*\*REMOVABLE FENCE SECTIONS AT STRUCTURES

#### NOTE

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



### REMOVABLE FENCE SECTIONS

**NOTE:** EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

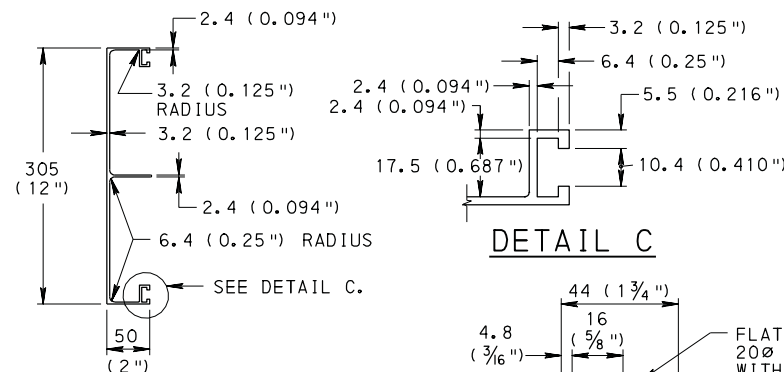
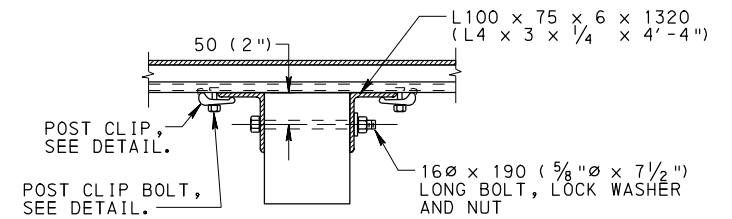
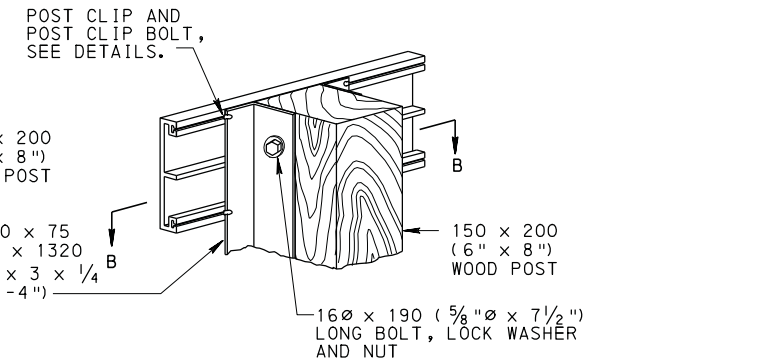
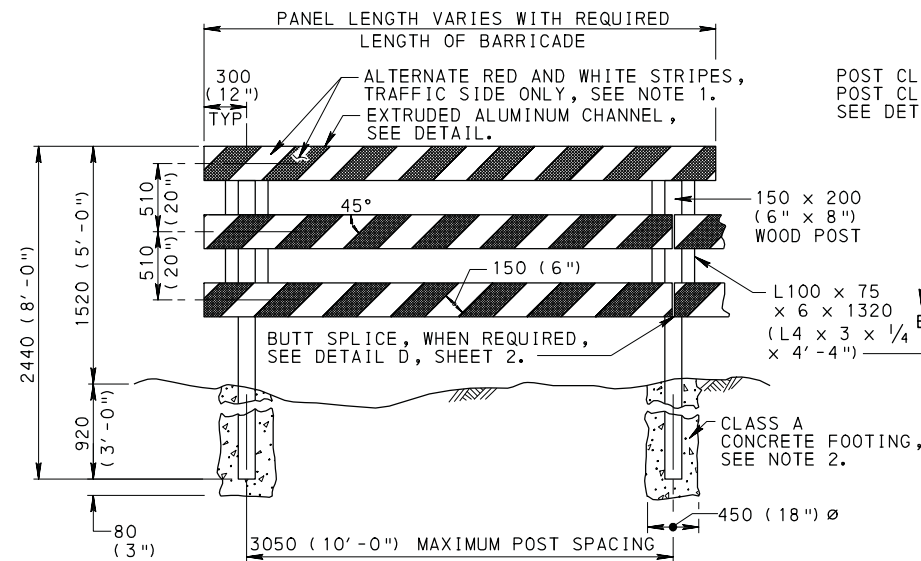
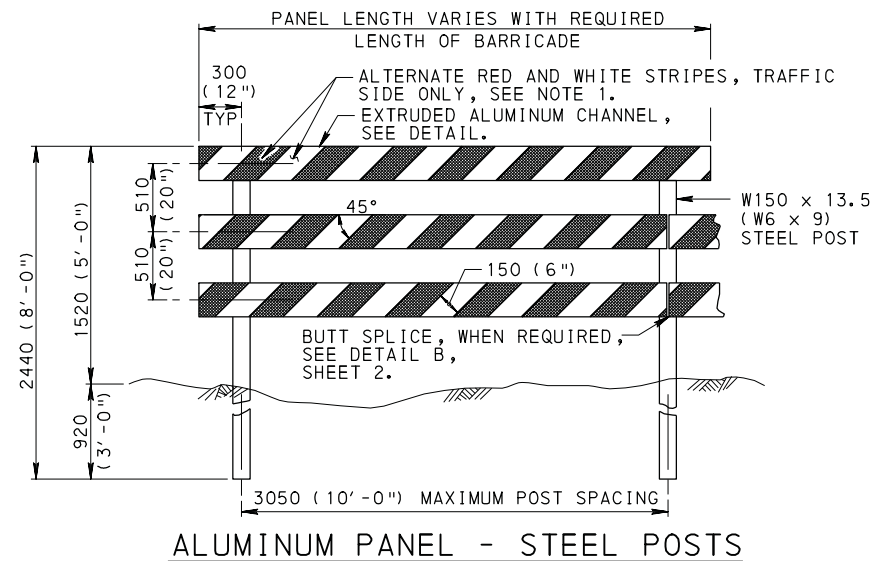
## RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS

RECOMMENDED JUN. 1, 2010  
*R. W. Hilly*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*David Thomas*  
DIRECTOR, BUREAU OF DESIGN

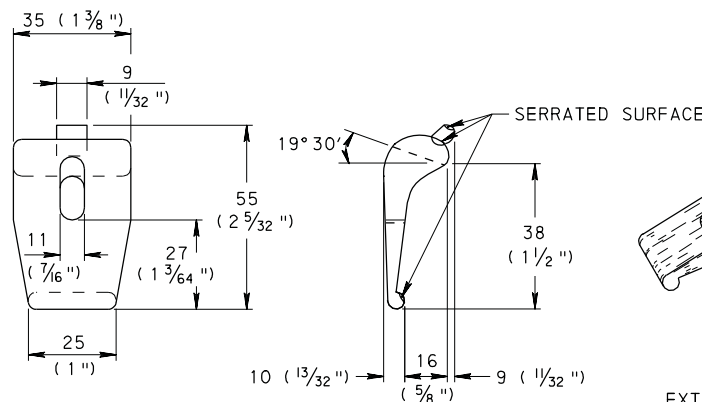
SHT 1 OF 1  
RC-61M





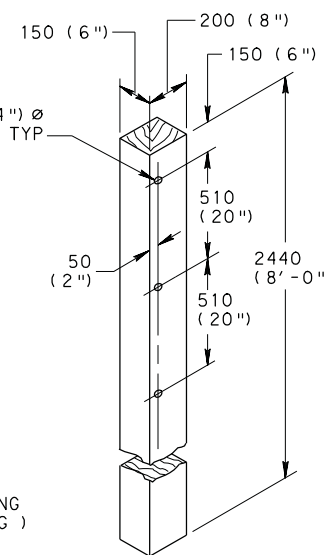
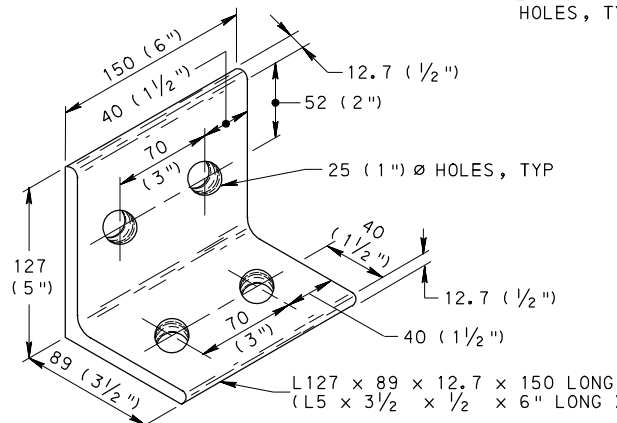
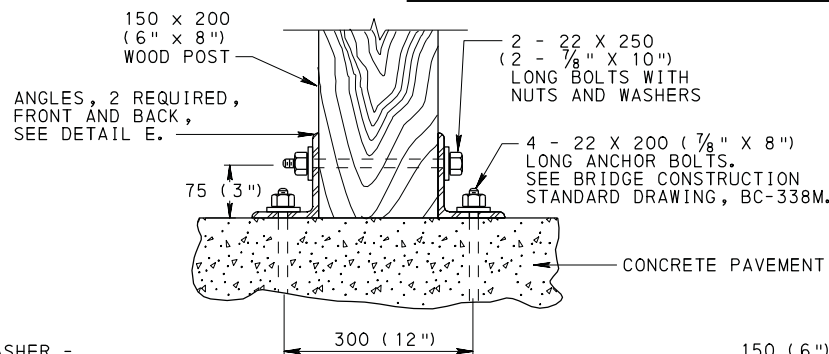
### EXTRUDED ALUMINUM CHANNEL

(DIMENSIONS FOR PANELS MAY VARY DEPENDING UPON MANUFACTURING COMPANY'S DESIGN.)



### POST CLIP BOLT

### POST CLIP



- ### NOTES
1. PERMIT ONLY RETROREFLECTIVE SHEETING MATERIAL SUPPLIED BY A MANUFACTURER, AS LISTED IN BULLETIN 15.
  2. DRIVE POSTS MECHANICALLY OR ERECT IN CONCRETE FOOTING.
  3. SEE RC-52M, SHEET 1, FOR MOUNTING OF STEEL POSTS ON CONCRETE PAVEMENT. SEE DETAIL D FOR MOUNTING OF WOOD POSTS ON CONCRETE PAVEMENT.
  4. USE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 678.
  5. ALL WOOD METRIC DIMENSIONS ARE NOMINAL.
  6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

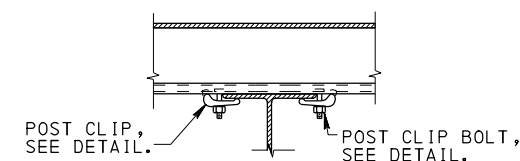
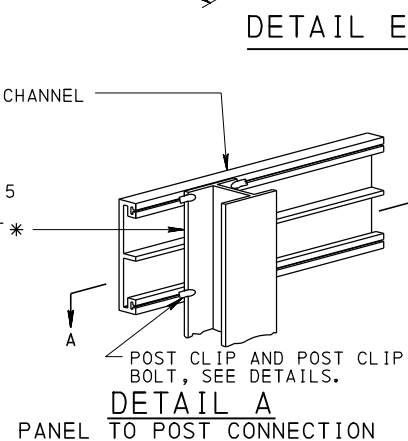
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

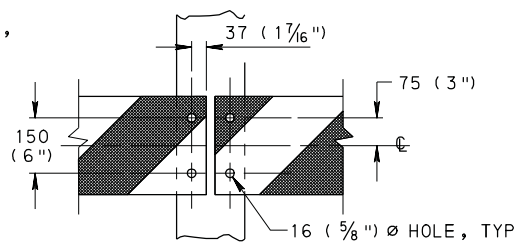
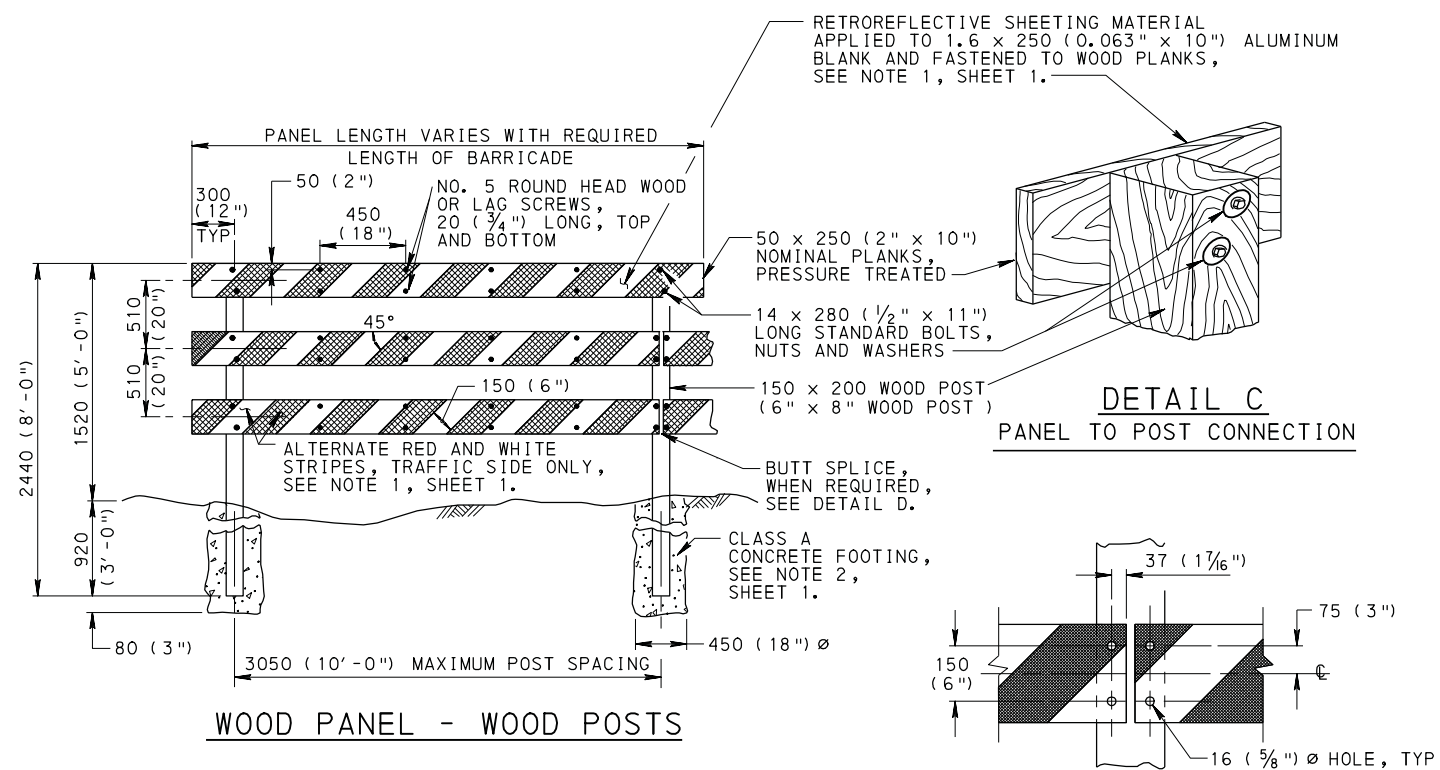
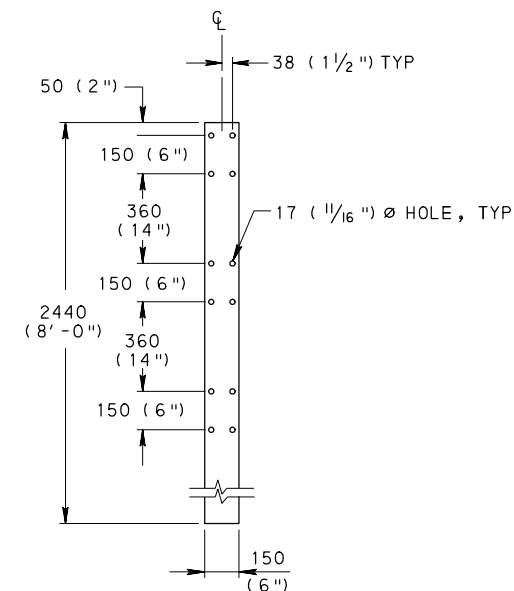
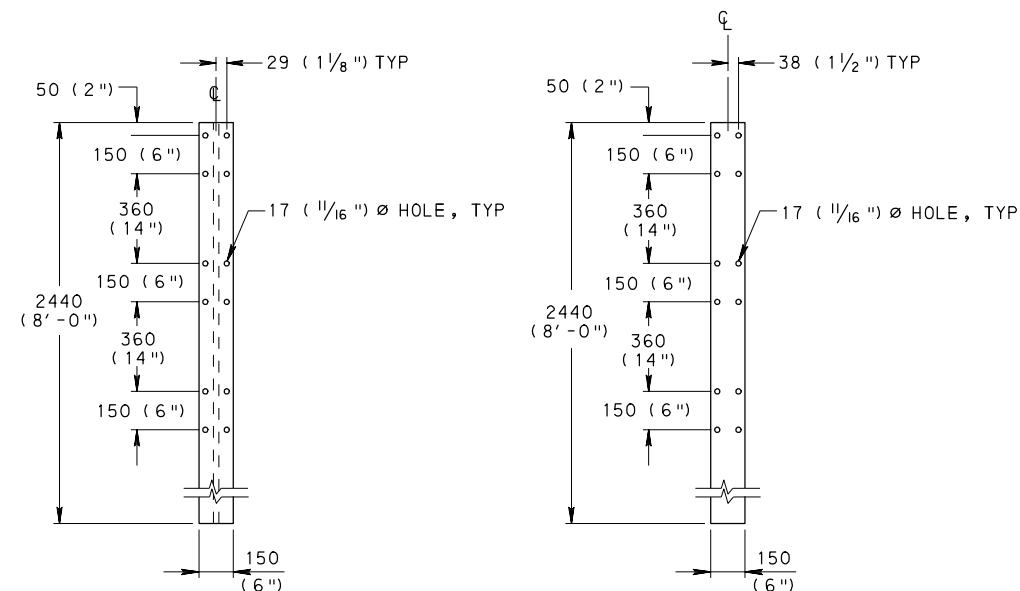
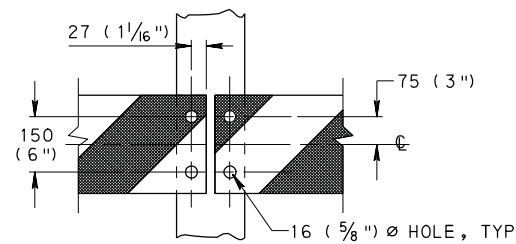
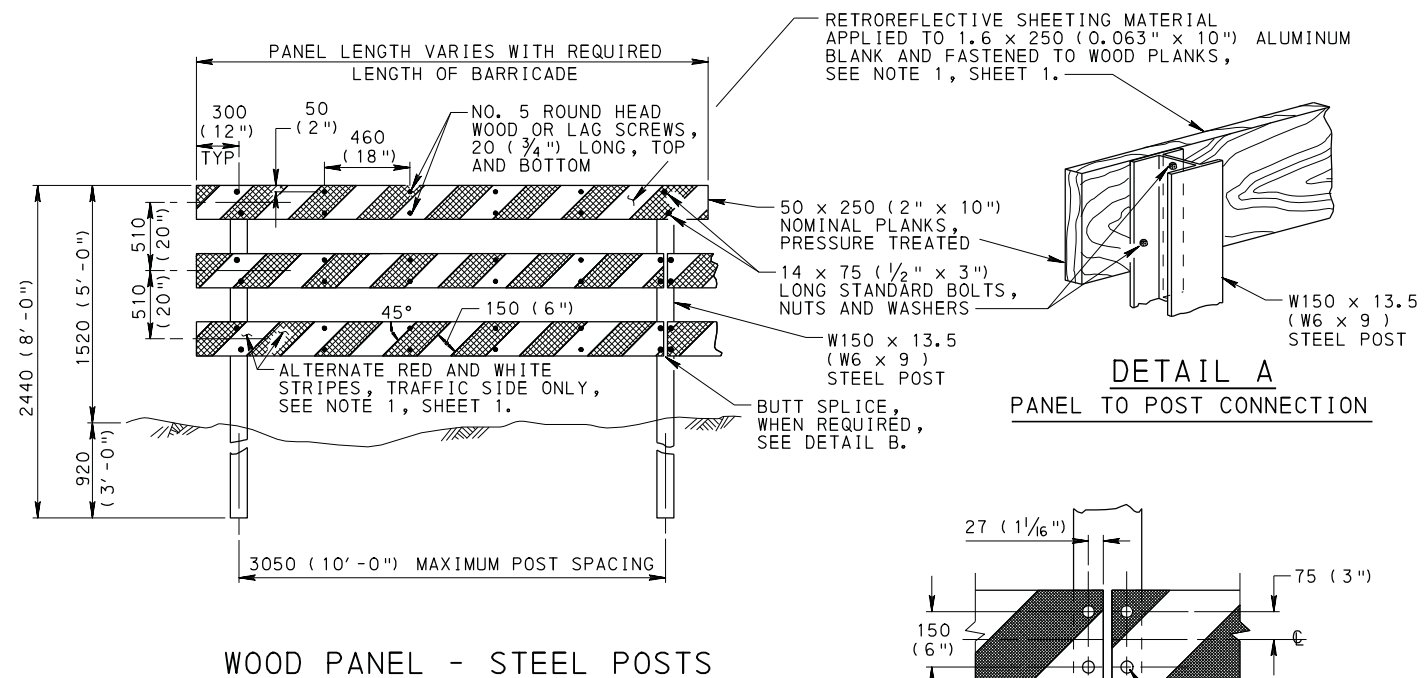
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ALUMINUM PANEL

RECOMMENDED JUN. 1, 2010  
R. H. Wiley  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
B. B. Thompson  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 2  
RC-63M





NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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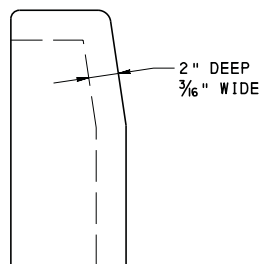
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WOOD PANEL

RECOMMENDED JUN. 1, 2010  
T. W. [Signature]  
CHIEF, HWY. QA DIVISION

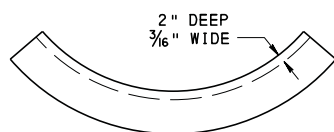
RECOMMENDED JUN. 1, 2010  
*Ben E. Thyson*  
 DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2  
RC-63M

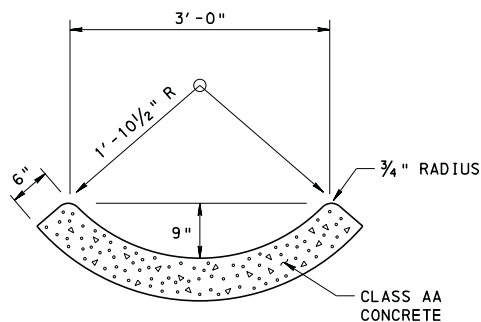




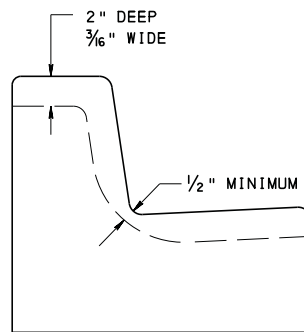
DETAIL A  
CONTRACTION JOINT



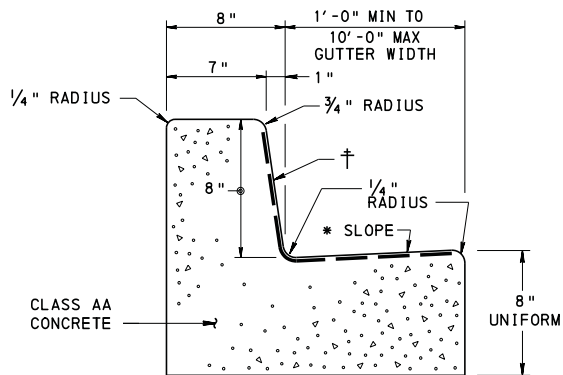
DETAIL B  
CONTRACTION JOINT



TYPICAL  
CROSS SECTION



DETAIL C  
CONTRACTION JOINT



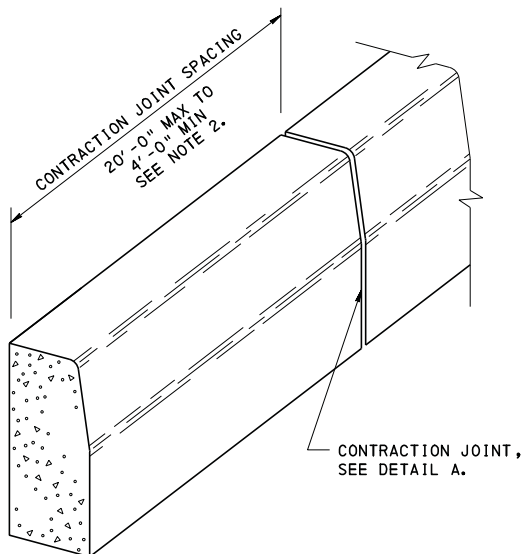
TYPICAL  
CROSS SECTION

\* UNDER 5'-0" GUTTER WIDTH  
= 8.0% MIN.

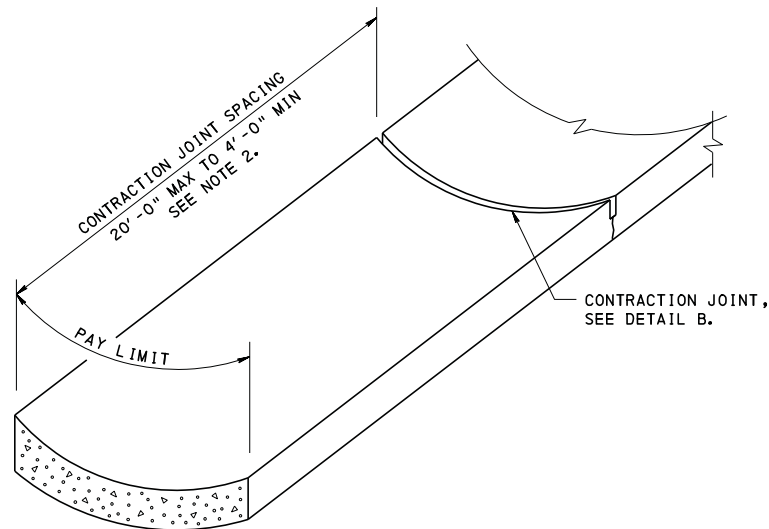
5'-0" AND GREATER GUTTER WIDTH  
= 4.0% MIN.

NOTE:  
REFER TO RC-67M FOR MAXIMUM SLOPE  
OF GUTTER WHEN PLACED AT A CURB RAMP

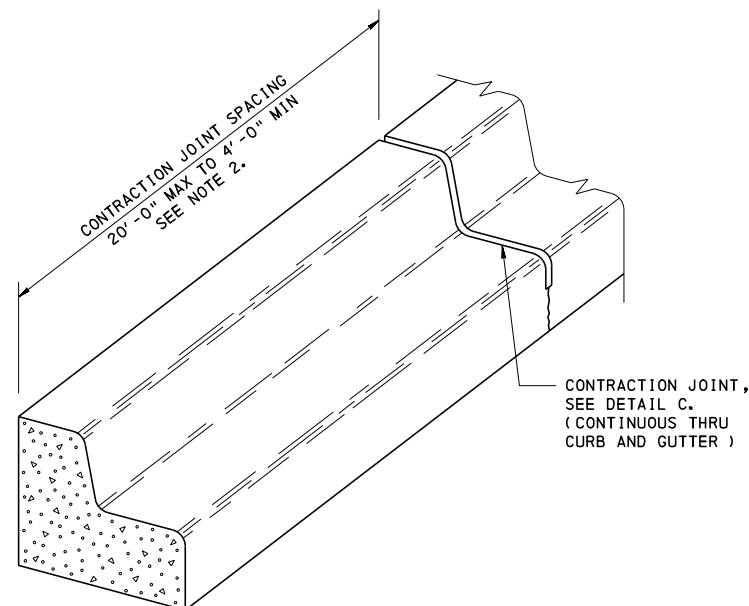
† --- REPRESENTS WIDTH OF GUTTER  
FOR COMPUTING PAY AREA.



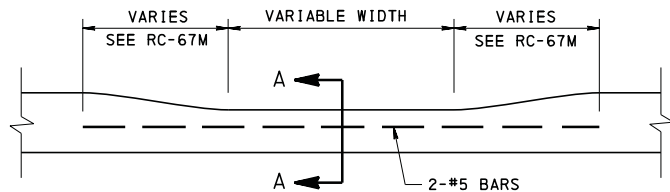
PLAIN CEMENT CONCRETE CURB  
(FOR TYPICAL CROSS SECTIONS SEE SHEET 2)



PLAIN CEMENT CONCRETE GUTTER



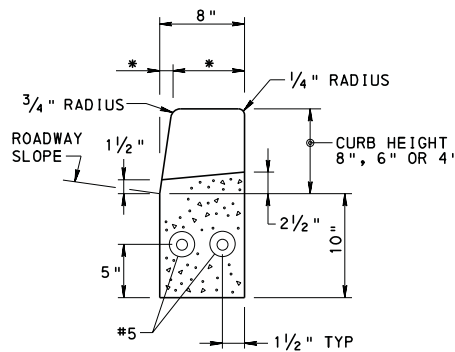
PLAIN CEMENT CONCRETE CURB GUTTER



ELEVATION VIEW

DEPRESSED CURB FOR DRIVEWAYS

\* VARIES BASED ON CURB HEIGHT



SECTION A-A

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 630 FOR PLAIN CEMENT CONCRETE CURB AND DEPRESSED CURB, SECTION 640 FOR PLAIN CEMENT CONCRETE GUTTER AND SECTION 641 FOR PLAIN CEMENT CONCRETE CURB GUTTER.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.
3. PLACE 3/4" THICK 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 CONFORM TO CROSS SECTIONAL AREA OF CURB.
4. SEE RC-50M FOR PLAIN CEMENT CONCRETE CURB, 4" HEIGHT SLOPED TOP TREATMENT ADJACENT TO STRUCTURES.

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CURBS AND GUTTERS

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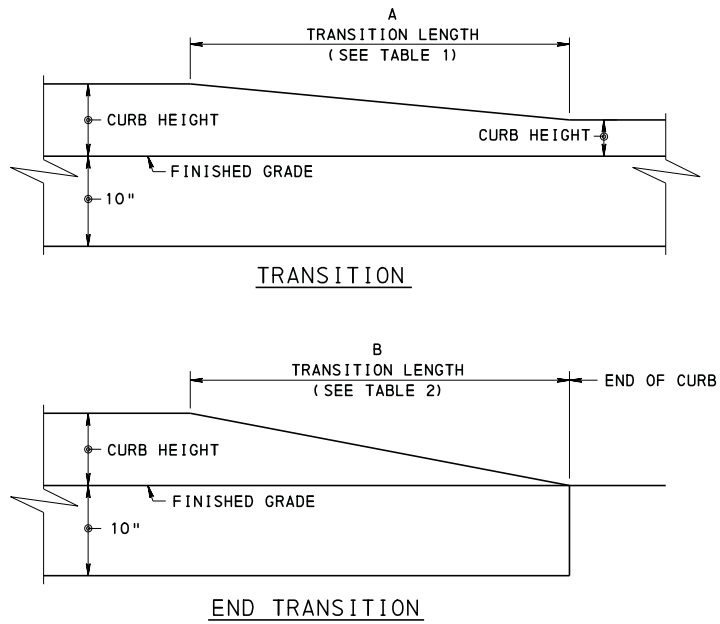
*Chris L. Sil*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

*Bruce Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 2

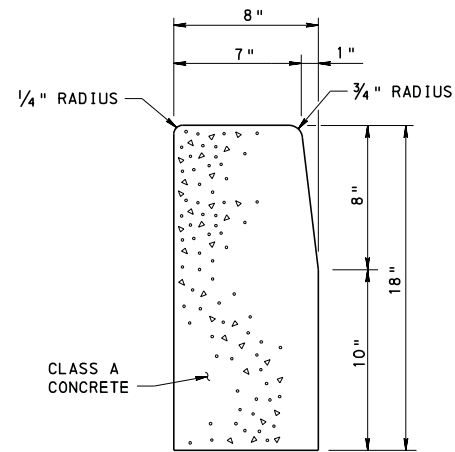
RC-64M



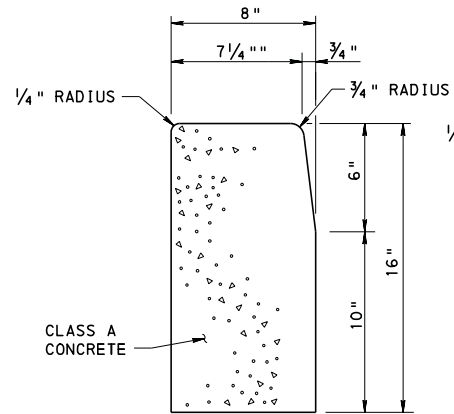
PLAIN CEMENT CONCRETE CURB - TRANSITIONS

TABLE 1	
CURB HEIGHT	A
8" CURB TO 6" CURB	2'-0"
8" CURB TO 4" CURB	3'-6"
6" CURB TO 4" CURB	2'-0"

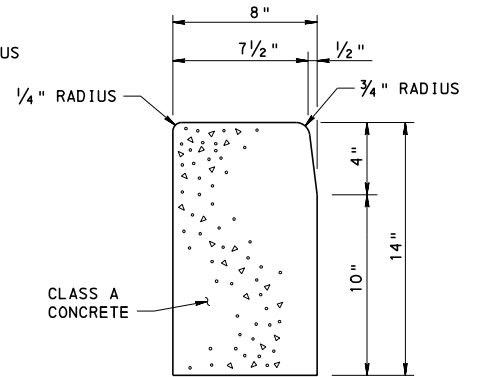
TABLE 2	
CURB HEIGHT	B
8" CURB TO 0" CURB	7'-0"
6" CURB TO 0" CURB	5'-0"
4" CURB TO 0" CURB	3'-6"



TYPICAL  
CROSS SECTION  
8" HEIGHT



TYPICAL  
CROSS SECTION  
6" HEIGHT



TYPICAL  
CROSS SECTION  
4" HEIGHT

PLAIN CEMENT CONCRETE CURB

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CURBS AND GUTTERS

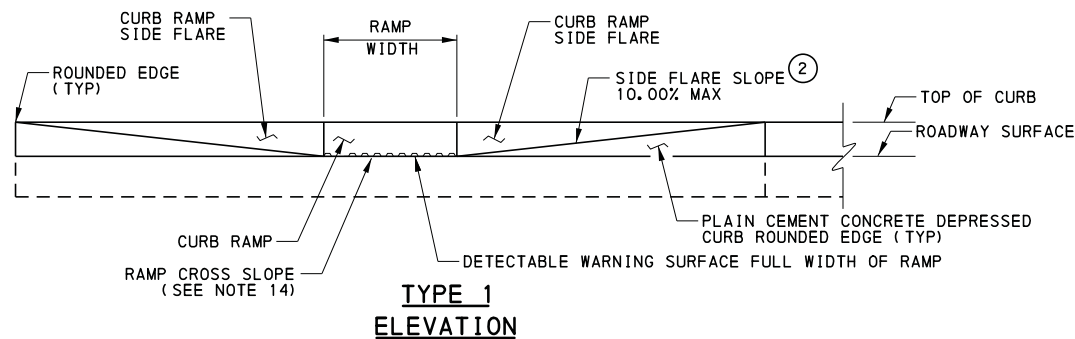
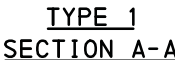
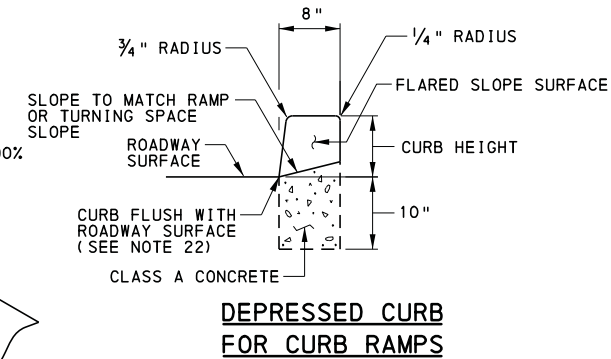
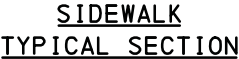
RECOMMENDED FEB. 19, 2021  
*Chris L. Sil*  
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*Brian Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 2  
RC-64M



RC-65M



PERCENT SLOPE	EQUIVALENT SLOPE
10.00%	10:1
8.33%	12:1
7.14%	14:1
5.00%	20:1
2.00%	50:1
1.00%	100:1

## EQUIVALENT SLOPES

## NOTES

1. PROVIDE MATERIALS AND FINISHES AS SPECIFIED IN PUBLICATION 608, SECTIONS 350, 413, 630, 676 AND 695.
2. PROVIDE EXPANSION JOINT MATERIAL 3/4" THICK WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.
3. CONSTRUCT CURB RAMPS WITH A MINIMUM 4'-0" X 4'-0" CLEAR SPACE BEYOND THE CURB FACE, WITHIN THE WIDTH OF THE CROSSWALK AND WHOLLY OUTSIDE THE PARALLEL VEHICLE TRAVEL LANE. SEE SHEET 7 FOR CROSSWALK DETAILS.
4. SEAL JOINTS WITH AN APPROVED SEALING MATERIAL.
5. PROVIDE SLIP RESISTANT TEXTURE ON CURB RAMP BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP. EXTEND TEXTURE THE FULL WIDTH AND LENGTH OF THE CURB RAMP INCLUDING SIDE FLARES.
6. MODIFY CONSTRUCTION DETAILS TO ADAPT DIMENSIONS TO NEW OR EXISTING CURB HEIGHTS WHERE THE CURB IS LESS THAN THE STANDARD 8" HEIGHT.
7. CURB RAMP AND SIDE FLARE LENGTHS ARE VARIABLE AND BASED ON CURB HEIGHT AND THE SIDEWALK SLOPE.
8. TO AVOID CHASING GRADE INDEFINITELY WHEN TRAVERSING THE HEIGHT OF CURB, RAMP LENGTH NOT TO EXCEED 15'-0". ADJUST RAMP SLOPE AS NEEDED TO PROVIDE ACCESS TO THE MAXIMUM EXTENT FEASIBLE.
9. NON-WALK AREA IS AN OBSTRUCTED OR GRASS/NON-PAVED AREA ADJACENT TO THE PEDESTRIAN ACCESS ROUTE THAT IS NOT USED BY THE PEDESTRIAN FOR ACCESS.
10. THE DETAILS DEPICT PEDESTRIAN PUSHBUTTON POLES TO ILLUSTRATE THE RECOMMENDED PLACEMENT OF PEDESTRIAN PUSHBUTTONS. FOR ALTERATION PROJECTS, PROVIDE ACCESS TO EXISTING PEDESTRIAN PUSHBUTTONS TO THE MAXIMUM EXTENT FEASIBLE. INSTALL PEDESTRIAN PUSHBUTTON STUB POLES, WHERE APPLICABLE, SO AS NOT TO CREATE PEDESTRIAN OBSTRUCTIONS.
11. SEE TC-8803 FOR ADDITIONAL PEDESTRIAN PUSHBUTTON DETAILS NOT SHOWN.
12. ALIGN DETECTABLE WARNING SURFACE TRUNCATED DOMES ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF THE RAMP AND PERPENDICULAR TO CURB. SEE SHEET 9 FOR INSTALLATIONS ALONG CURVED SURFACES.
13. PROVIDE DETECTABLE WARNING SURFACES (DWS) 24" MINIMUM (IN THE DIRECTION OF PEDESTRIAN TRAVEL) ACROSS FULL WIDTH OF RAMP AT THE GRADE BREAK NEAR STREET EDGE. PROVIDE DWS THAT CONTRAST VISUALLY WITH ADJACENT WALKWAY SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT FOR THE FULL WIDTH OF RAMP.
14. FOR NEW CONSTRUCTION, DO NOT EXCEED 2.00% CROSS SLOPE ON THE CURB RAMP OR PEDESTRIAN ACCESS ROUTE.
15. FOR NEW CONSTRUCTION AND ALTERATIONS, CONSTRUCT CURB RAMP AND FLARE SLOPES WITH THE FLATTEST SLOPE POSSIBLE. THE SLOPES INDICATED IN THE DETAILS SHOW THE MAX SLOPE ALLOWABLE. SLOPES THAT EXCEED THOSE INDICATED IN THE DETAILS, OR CONTRACT DOCUMENTS AS APPLICABLE, WILL NOT BE ACCEPTED AND WILL BE RECONSTRUCTED.
16. CONSTRUCT SIDEWALKS AT A LONGITUDINAL SLOPE NOT TO EXCEED 5.00%. FOR ROADWAY PROFILE SLOPES THAT EXCEED 5.00%, CONSTRUCT PARALLEL SIDEWALKS ADJACENT TO ROADWAY AT A LONGITUDINAL SLOPE NOT TO EXCEED ROADWAY PROFILE SLOPE.
17. THE CHANGE IN GRADE AT THE BOTTOM OF THE CURB RAMP AND ADJOINING ROAD SURFACE IS NOT TO EXCEED AN ALGEBRAIC DIFFERENCE OF 13.3%. THE COUNTER SLOPE OF THE GUTTER OR ROAD AT THE FOOT OF A CURB RAMP, TURNING SPACE OR BLENDED TRANSITION IS NOT TO EXCEED 5.00%. SEE SHEET 8 FOR DETAILS.
18. THE CONSTRUCTION STANDARDS DEPICTED ARE MOST APPROPRIATE FOR NEW CONSTRUCTION. ALL CONSTRUCTION MUST MEET THE STANDARDS CONTAINED HEREIN UNLESS OTHERWISE NOTED OR DIRECTED.
19. ALL SLOPES ARE MEASURED WITH RESPECT TO A LEVEL PLANE. THEREFORE, THE LENGTH OF RAMP IS NOT SOLELY DEPENDANT ON THE HEIGHT OF CURB. (FOR EXAMPLE, A 6" CURB DOES NOT NECESSARILY MEAN A RAMP LENGTH OF 6'-0" FOR A 12:1 SLOPE.)
20. SIDEWALK WIDTH MAY BE REDUCED TO 4'-0", WHEN PASSING AREAS 5'-0" X 5'-0" ARE PROVIDED EVERY 200'.
21. THE TRAVEL LANE IS DEFINED BY THE OUTSIDE EDGE OF THE WHITE PAVEMENT MARKING LINE. IF A WHITE PAVEMENT MARKING LINE DOES NOT EXIST, THE TRAVEL LANE IS DEFINED BY THE CONTRACT DOCUMENTS.
22. CONSTRUCT DEPRESSED CURB FOR CURB RAMPS FLUSH TO ADJACENT ROADWAY. GRADE EDGE OF ROAD ELEVATIONS AT THE FLOW LINE TO ENSURE POSITIVE DRAINAGE AND PREVENT PONDING. FOR LEVEL TURNING SPACES BEHIND DEPRESSED CURB, ADJUST SLOPES TO PROVIDE POSITIVE DRAINAGE. AT THE JOINT BETWEEN DEPRESSED CURB AND ROADWAYS, REMOVE EXCESS JOINT SEALER AND COVER THE SEALED AREA WITH A LIGHT APPLICATION OF DRY SAND.
23. CHEEK WALLS ARE PERMITTED WHEN ADJACENT TO NON-WALK AREAS OR ELEVATION DIFFERENCES CANNOT BE ACCOMMODATED BY FLARES OR GRADING. GRADE GRASS AREAS OR OTHER NON-WALK AREAS AT 3:1 OR FLATTER. DO NOT INSTALL CHEEK WALLS THAT INTERSECT THE PEDESTRIAN PATH.
24. CONSTRUCT TOP OF PLAIN CEMENT CONCRETE DEPRESSED CURB TO BE FLUSH WITH ADJACENT SURFACES (RAMPS, SIDEWALKS, FLARES).
25. FOR CURB RAMPS THAT LEAD TO A SINGLE CROSSWALK, THE RAMP (EXCLUDING FLARES) TO BE FULLY INSIDE OF MARKED CROSSWALK LINES. SEE SHEET 7 FOR DETAILS.
26. A 4'-0" MAXIMUM DIGITAL DISPLAY LEVEL WILL BE USED TO VERIFY THE SLOPES OF CURB RAMPS AND SIDEWALKS.
27. INSTALL DUMMY JOINTS WHERE RAMPS, TURNING SPACES, FLARES, AND SIDEWALKS ABUT.
28. CONSTRUCT DEPRESSED CURB SLOPE TO MATCH ROADWAY PROFILE AND HAVE A FLUSH CONNECTION. TRANSITION CURB RAMP CROSS SLOPE TO MATCH ROADWAY PROFILE AS GRADUALLY AS POSSIBLE. DO NOT EXCEED 3.00% PER 1'-0" CROSS SLOPE RATE OF CHANGE WHEN TRANSITIONING TO ROADWAY PROFILE.
29. DO NOT SCORE OR MAKE GROOVES ON SLOPED SURFACES. LINES SHOWN ON DETAILS ARE FOR ILLUSTRATION ONLY. SEE NOTE 5.
30. THE DEPRESSED CURB MAY BE PLACED MONOLITHICALLY WITH CURB RAMP, SIDE FLARES, OR BOTH. DO NOT PLACE DEPRESSED CURB MONOLITHICALLY WITH OTHER CEMENT CONCRETE SIDEWALK.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CURB RAMPS AND SIDEWALKS  
NEW CONSTRUCTION OR  
ALTERATION DETAILS  
TYPE 1 CURB RAMPS AND  
TYPICAL SECTIONS

RECOMMENDED FEB. 19, 2021

Chris L. Syl  
CHIEF, HWY. DELIVERY DIVISION

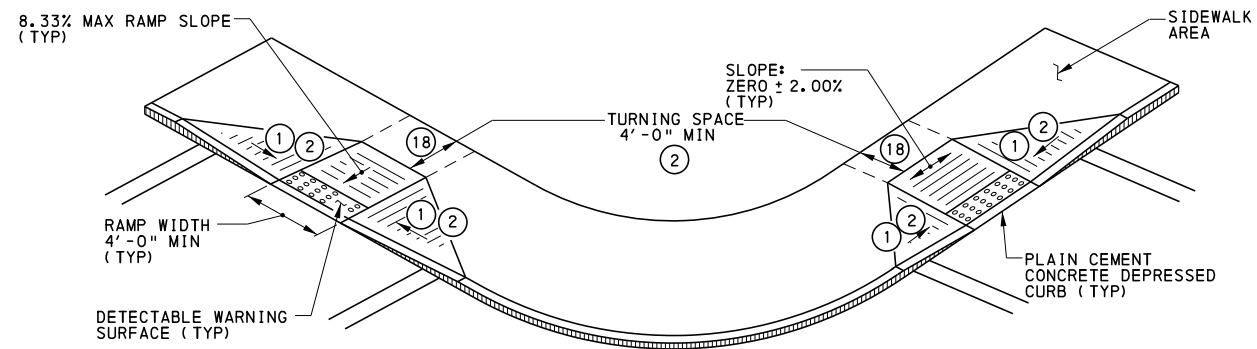
RECOMMENDED FEB. 19, 2021

*Brian B. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 14

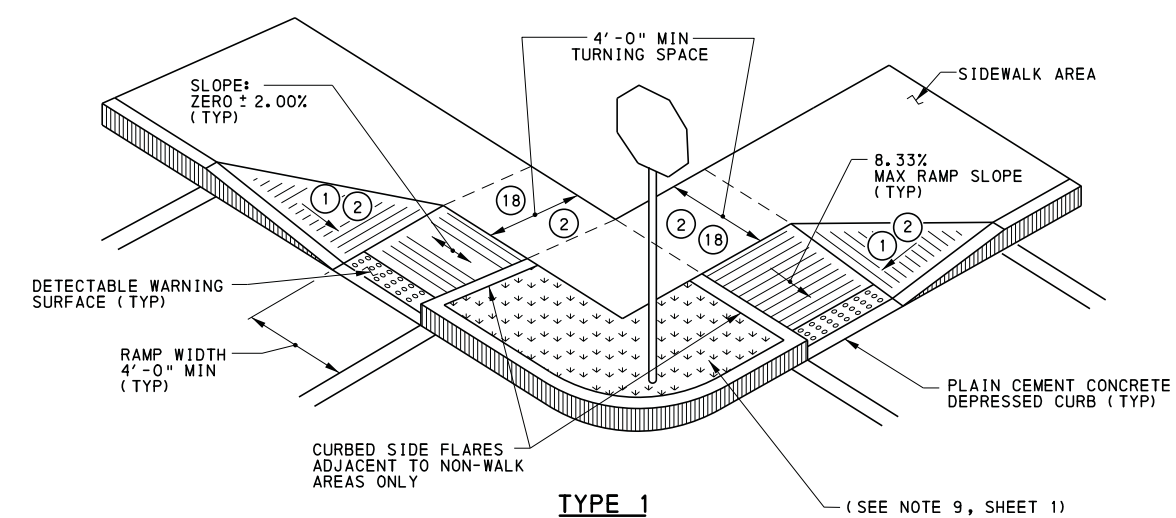
RC-67M



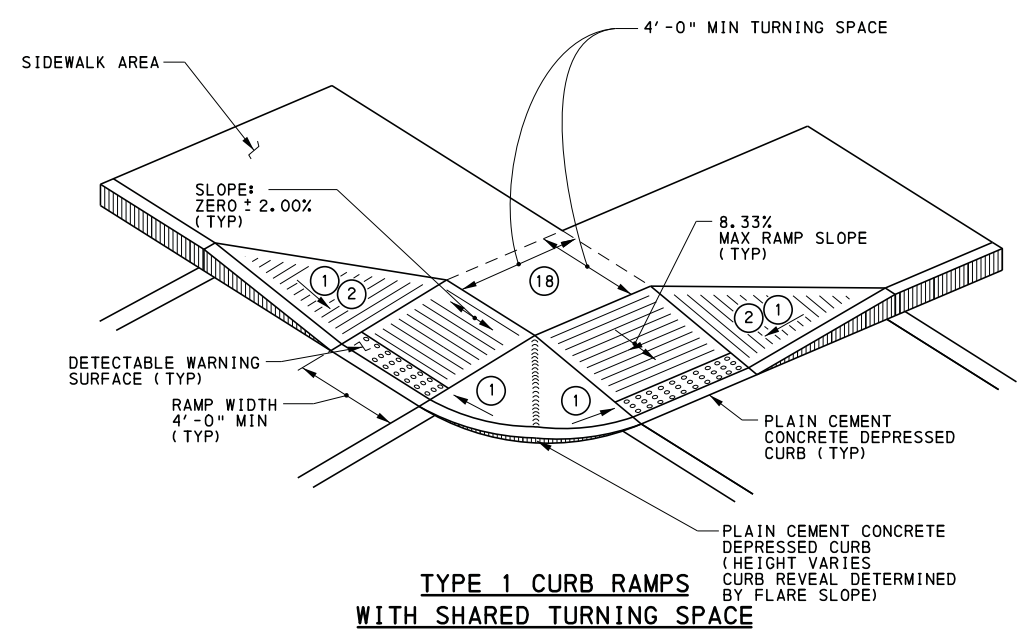


NOTE: IF SPACE IS LIMITED, IT MAY BE NECESSARY TO CURB THE SIDE FLARES OF THE TYPE 1 CURB RAMPS (SEE ALTERNATE INSTALLATION DETAIL BELOW). PEDESTRIAN TRAFFIC SHOULD NOT BE DIRECTED TO CROSS THE VERTICAL DROP.

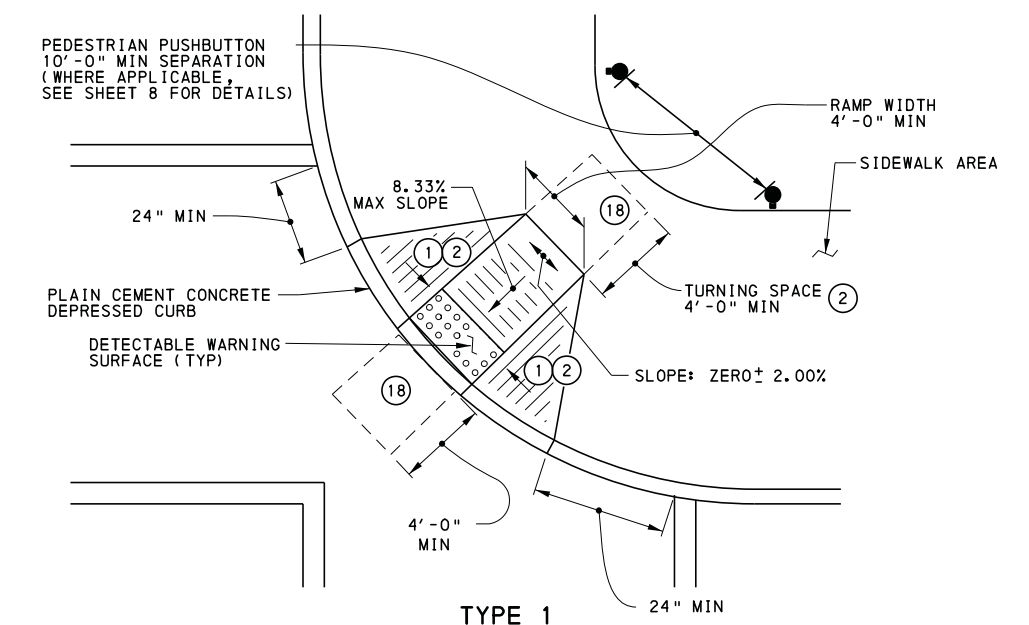
**TYPE 1  
DOUBLE CURB RAMPS  
(PREFERRED INSTALLATION)**



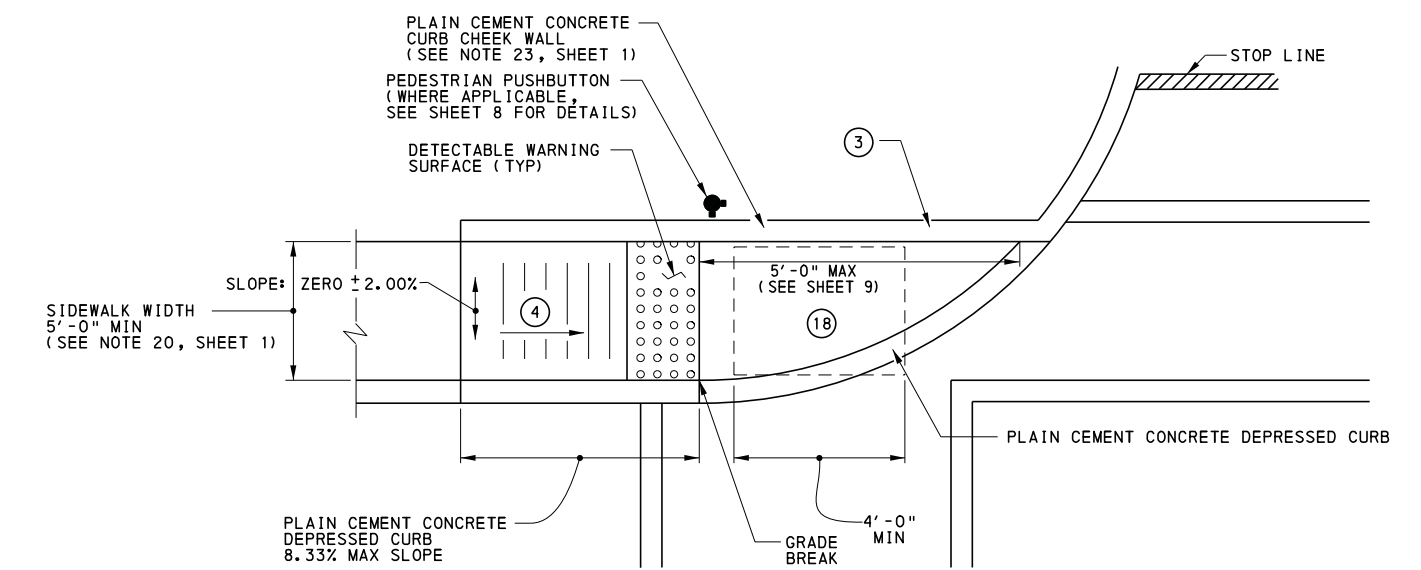
**TYPE 1  
DOUBLE CURB RAMPS  
(ALTERNATE INSTALLATION)**



**TYPE 1 CURB RAMPS  
WITH SHARED TURNING SPACE**



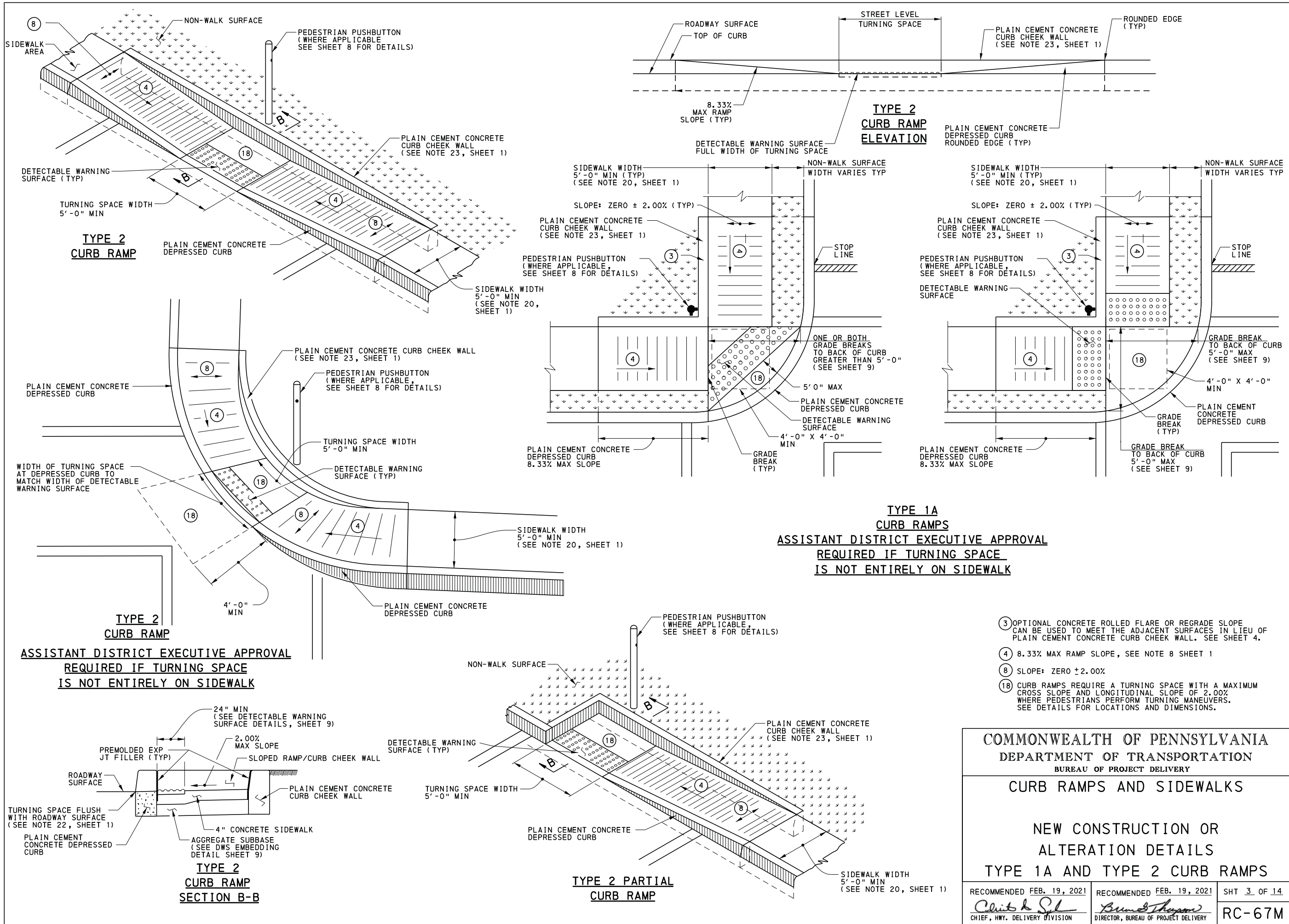
**TYPE 1  
CURB RAMP  
(DIAGONAL - REQUIRES ASSISTANT  
DISTRICT EXECUTIVE APPROVAL)**



**TYPE 1A  
CURB RAMP  
ASSISTANT DISTRICT EXECUTIVE APPROVAL  
REQUIRED IF TURNING SPACE  
IS NOT ENTIRELY ON SIDEWALK**

- ① SIDE FLARES 10.00% MAX SLOPE.
- ② IF THE TURNING SPACE IS INDICATED TO BE LESS THAN 4'-0", CONSTRUCT SIDE FLARES 8.33% MAX SLOPE.
- ③ OPTIONAL ROLLED CONCRETE SURFACE OR REGRADE SLOPE CAN BE USED TO MEET THE ADJACENT SURFACES IN LIEU OF A RETURN CURB CHEEK WALL.
- ④ 8.33% MAX RAMP SLOPE, SEE NOTE 8 SHEET 1.
- ⑧ CURB RAMPS REQUIRE A TURNING SPACE WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
CURB RAMPS AND SIDEWALKS		
NEW CONSTRUCTION OR ALTERATION DETAILS TYPE 1 AND TYPE 1A CURB RAMPS		
RECOMMENDED FEB. 19, 2021 <i>Chait &amp; Sp</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Burns &amp; Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 2 OF 14 RC-67M



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CURB RAMPS AND SIDEWALKS

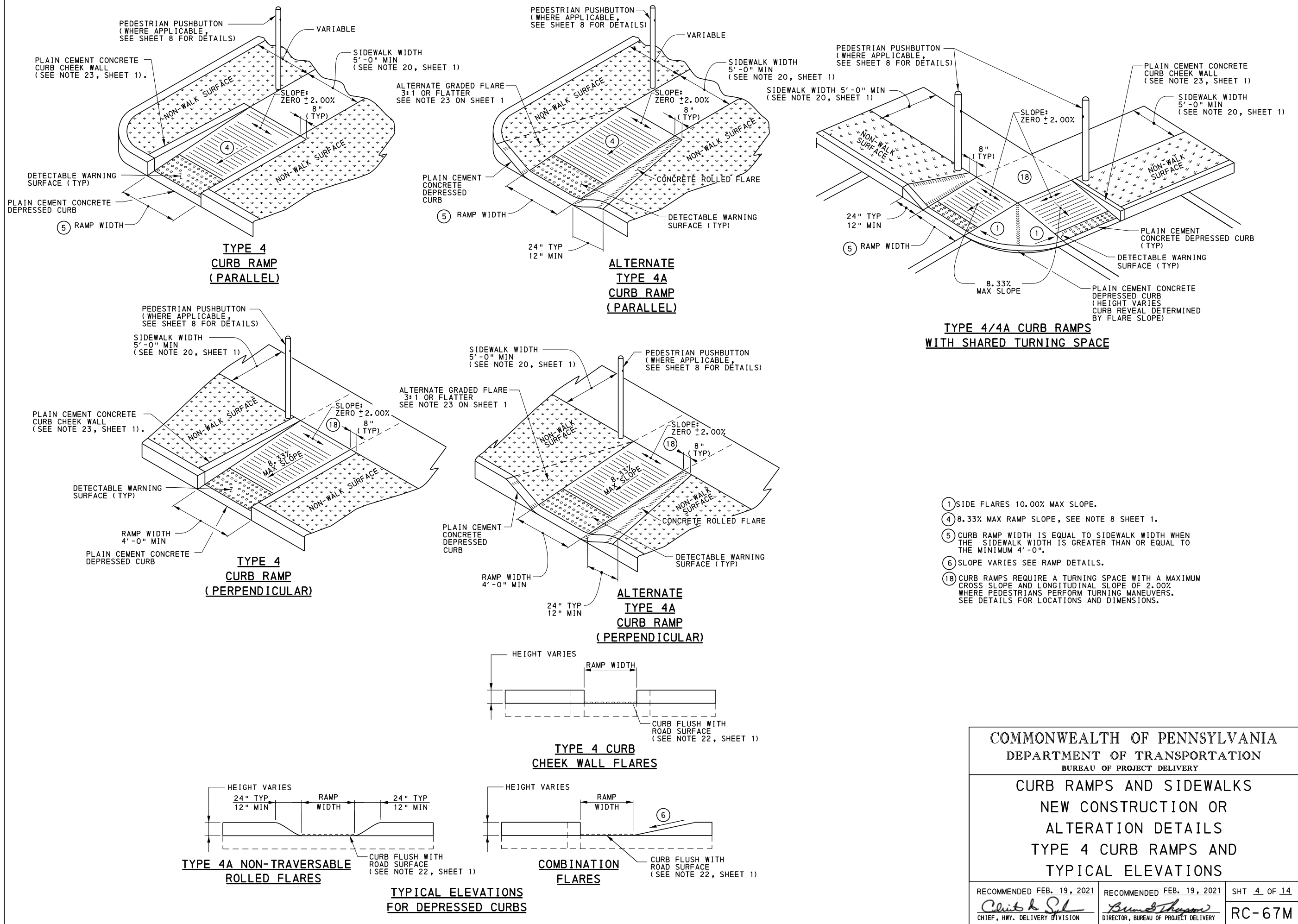
NEW CONSTRUCTION OR  
ALTERATION DETAILS  
TYPE 1A AND TYPE 2 CURB RAMPS

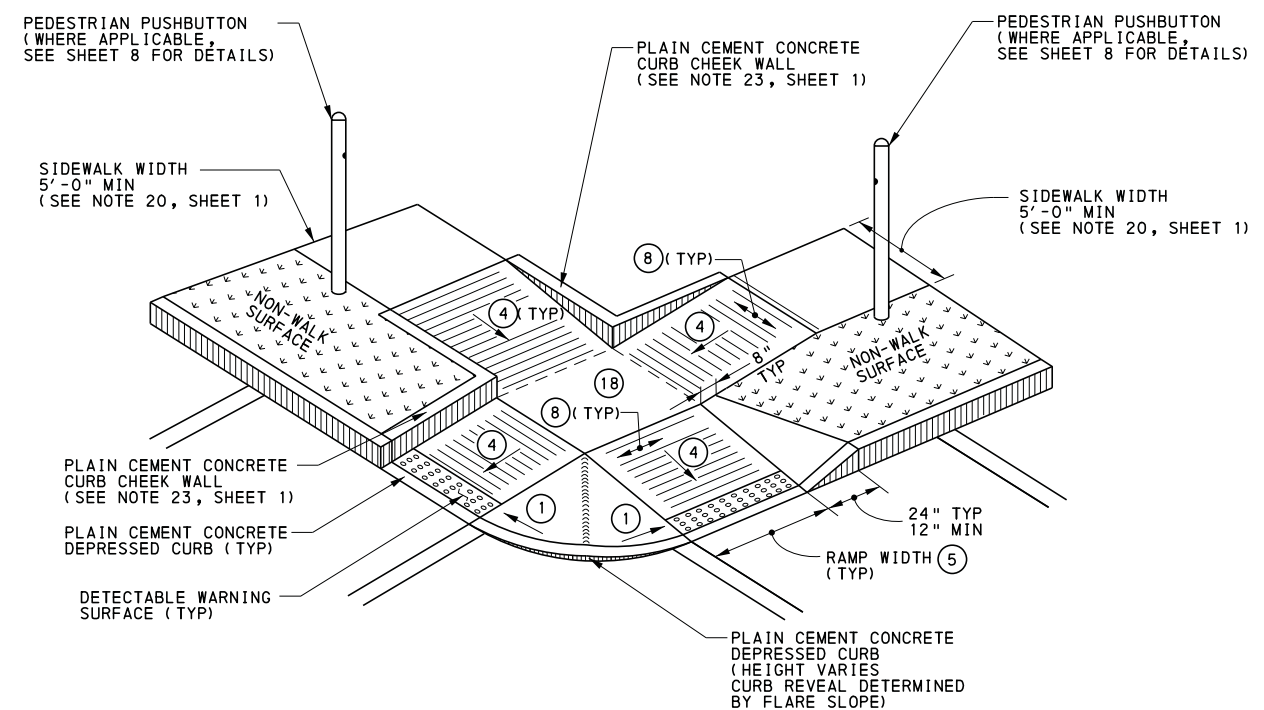
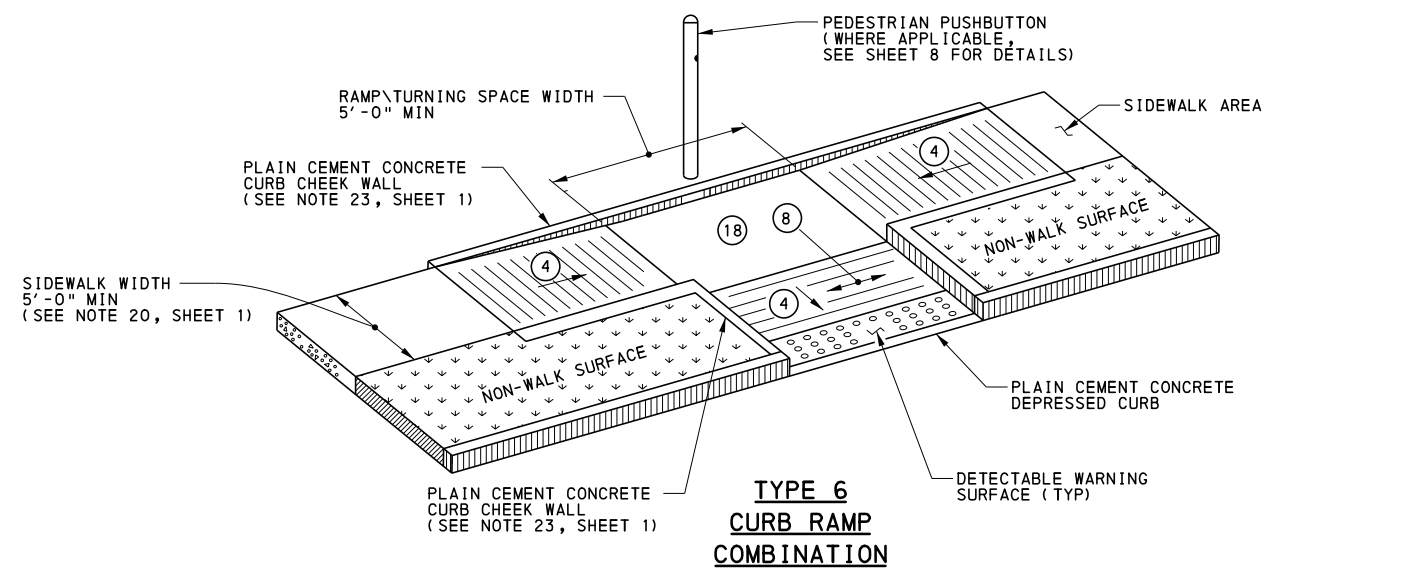
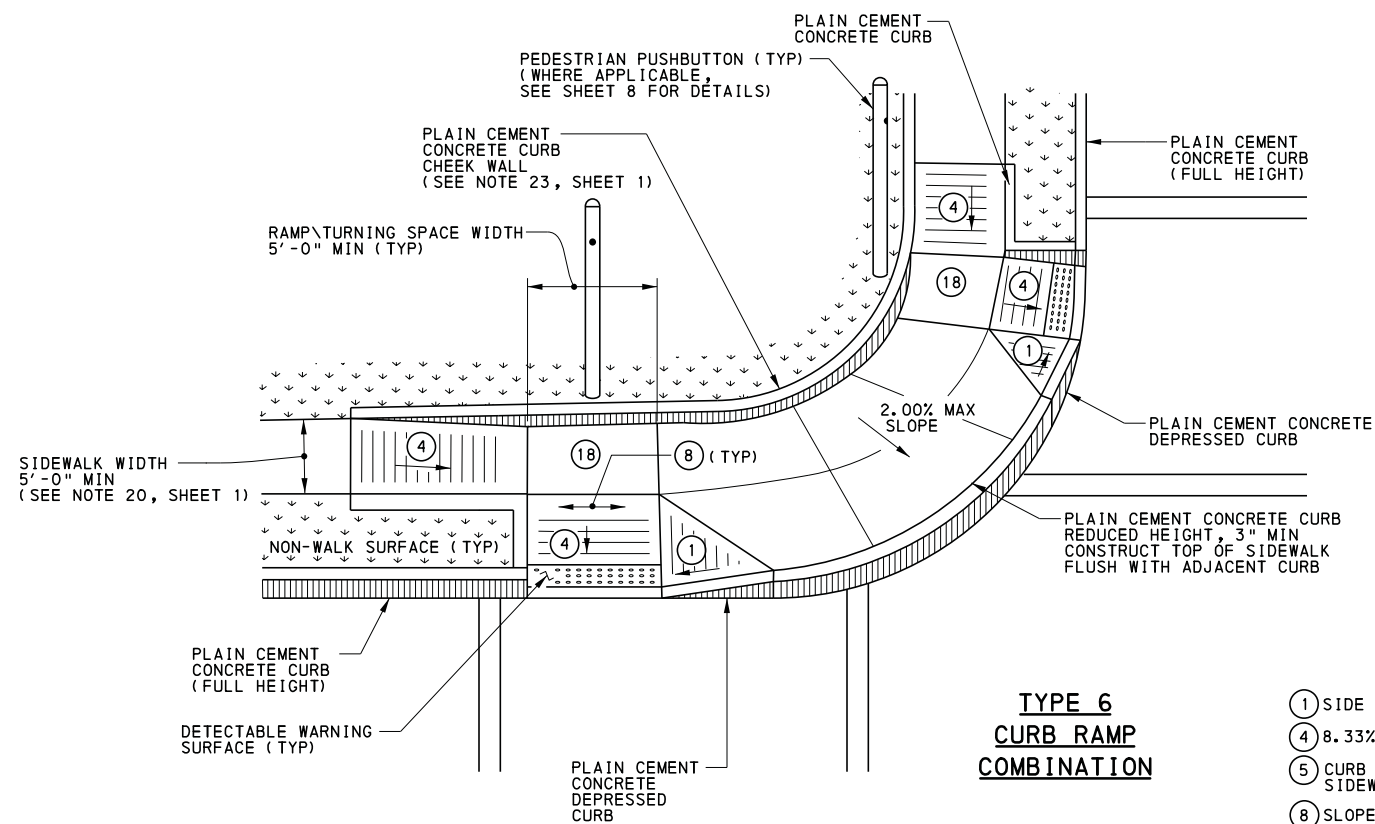
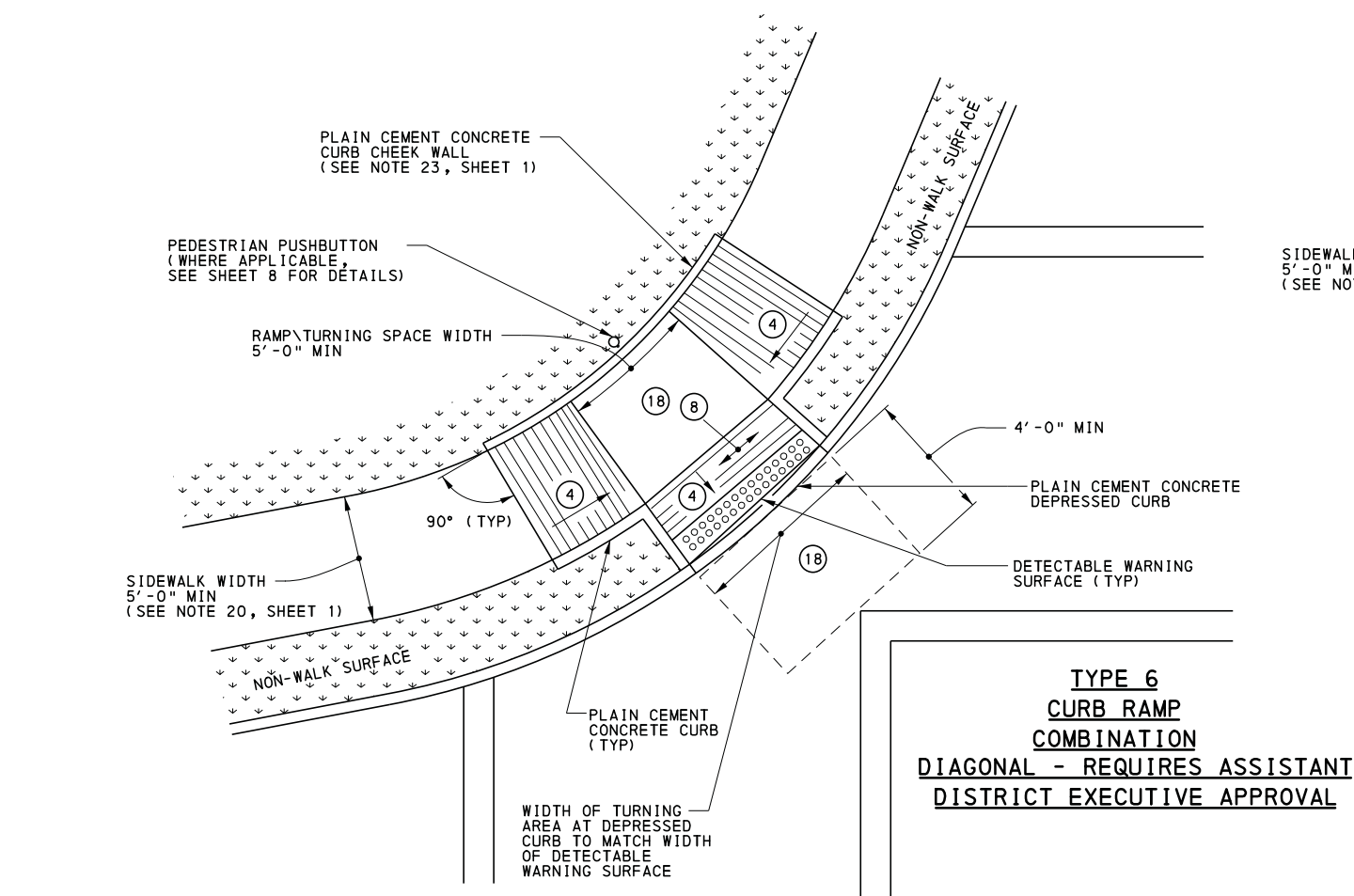
RECOMMENDED FEB. 19, 2021  
*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021  
*Burns & Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

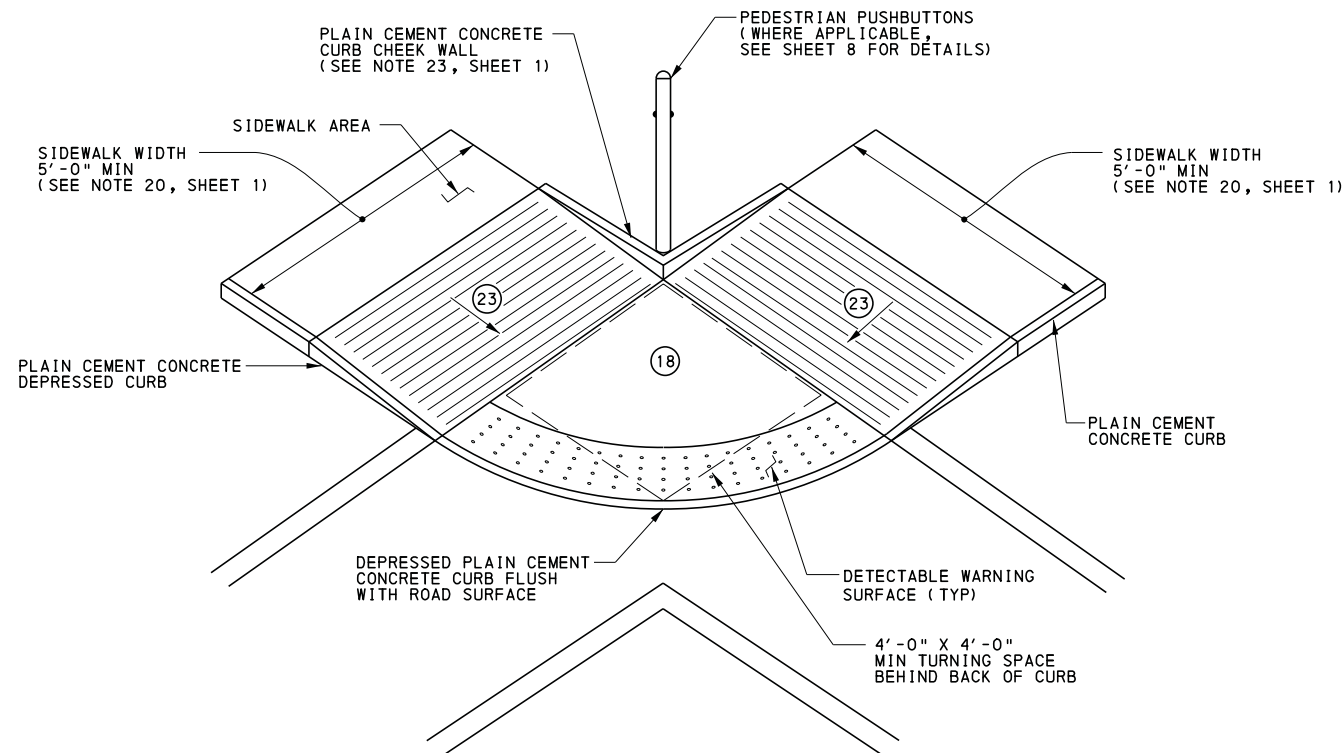
SHT 3 OF 14  
RC-67M





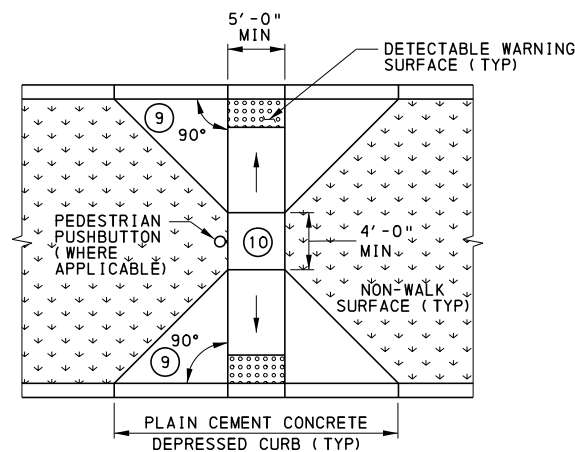


- ① SIDE FLARES 10.00% MAX SLOPE.
- ④ 8.33% MAX RAMP SLOPE, SEE NOTE 8 SHEET 1.
- ⑤ CURB RAMP WIDTH IS EQUAL TO SIDEWALK WIDTH WHEN THE SIDEWALK WIDTH IS GREATER THAN OR EQUAL TO 4'-0".
- ⑧ SLOPE: ZERO  $\pm$  2.00%.
- ⑱ CURB RAMPS REQUIRE A TURNING SPACE WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

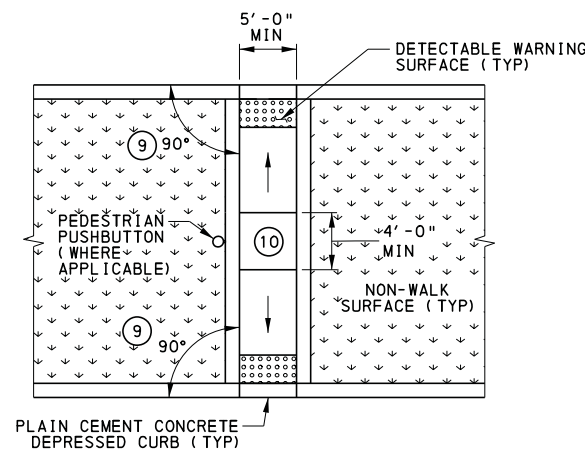


NOTE: DO NOT INSTALL GRATINGS, ACCESS COVERS AND OTHER APPURTENANCES ON THE BLENDED TRANSITION SURFACE WITHIN THE PEDESTRIAN ACCESS ROUTE. EXISTING UTILITY COVERS IN THE PATH OF TRAVEL ARE ACCEPTABLE IF THE TOP SURFACE IS FLUSH (LESS THAN 1/4" IN ELEVATION DIFFERENCE), FIRM, STABLE AND SLIP RESISTANT. INLET GRATES MUST HAVE OPENINGS NO GREATER THAN 1/2" IN DIRECTION OF TRAVEL.

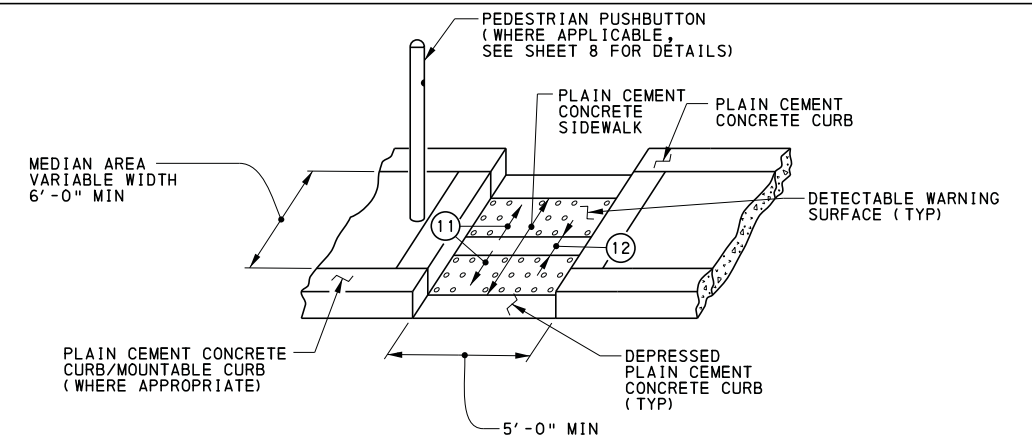
### BLENDING TRANSITION



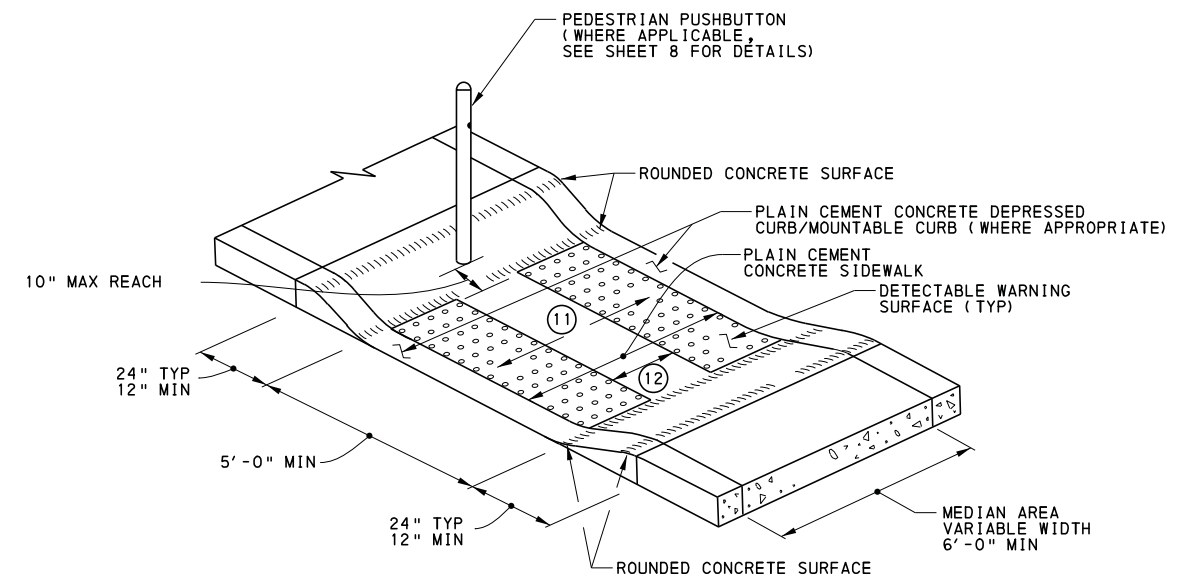
**RAMPED MEDIAN OR ISLAND  
ACCESS OPENING  
(TYPE 1 DOUBLE CURB RAMPS)**



**RAMPED MEDIAN OR ISLAND  
ACCESS OPENING  
(TYPE A DOUBLE CURB RAMPS)**



**TYPE A  
TYPICAL MEDIAN OR ISLAND  
ACCESS OPENING  
WITH CURB SIDES  
(NARROW MEDIANS)**



**TYPE B  
TYPICAL MEDIAN OR ISLAND  
ACCESS OPENING  
WITH FLARED SIDES  
(NARROW MEDIANS)**

- ⑨ 90° DESIRABLE.
- ⑩ TURNING SPACES ARE NOT REQUIRED FOR LONGITUDINAL SLOPES 5.00% OR LESS.
- ⑪ PROVIDE ADEQUATE SLOPE FOR DRAINAGE (5.00% MAX).
- ⑫ 2'-0" MIN SEPARATION. DO NOT INSTALL DETECTABLE WARNING SURFACES IF SEPARATION IS LESS THAN 2'-0". REFER TO DM-2 CHAPTER 6 FOR ADDITIONAL DETAILS.
- ⑬ CURB RAMPS REQUIRE A TURNING SPACE WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.
- ⑭ 5.00% MAX RUNNING SLOPE FOR BLENDED TRANSITION. FOR SLOPES GREATER THAN 5.00% SEE TYPE 2 CURB RAMPS ON SHEET 3 FOR ADDITIONAL DETAILS.

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### CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR  
ALTERATION DETAILS  
BLENDING TRANSITION / MEDIANS

RECOMMENDED FEB. 19, 2021

*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

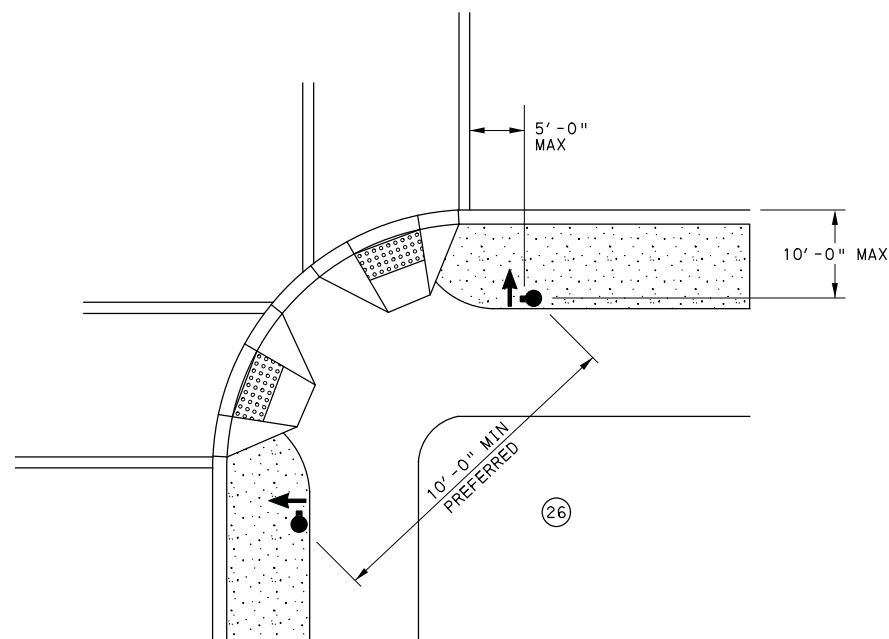
*Burns & Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 6 OF 14

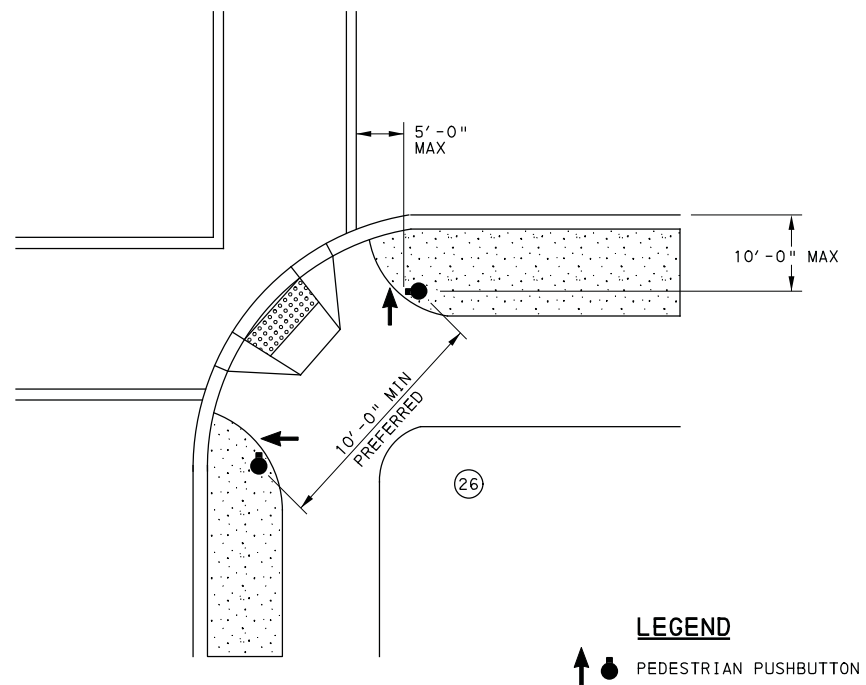
RC-67M



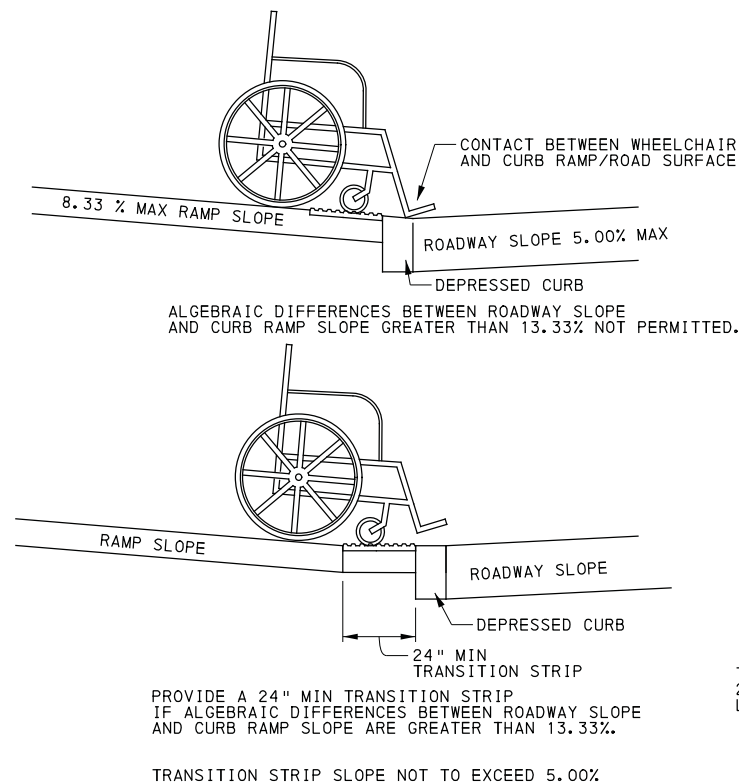




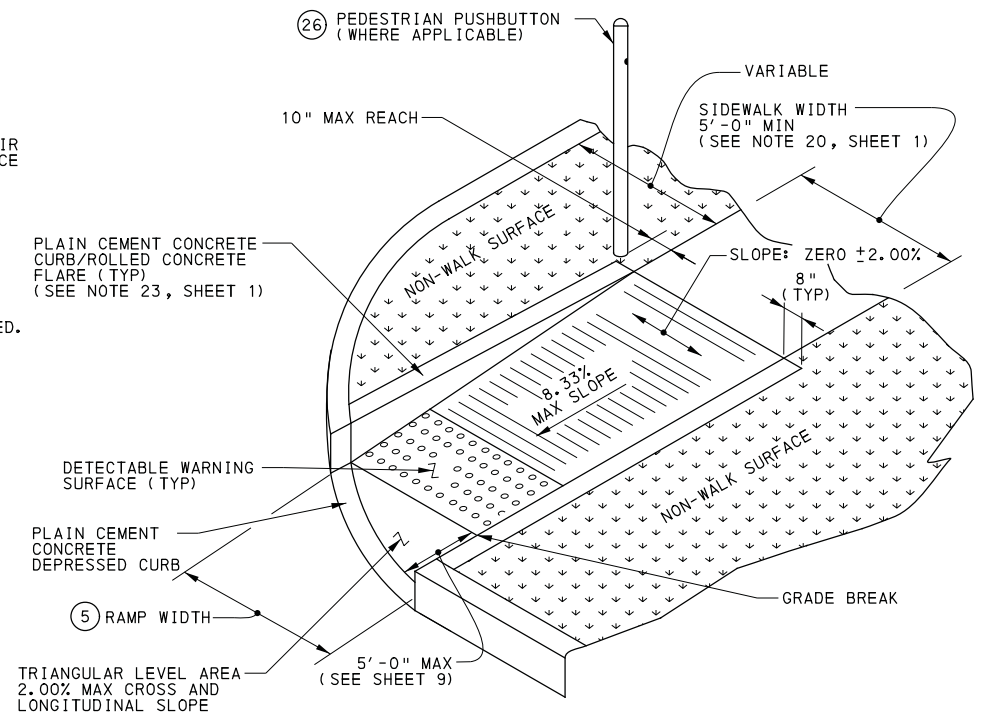
RECOMMENDED PUSHBUTTON LOCATIONS



RECOMMENDED PUSHBUTTON LOCATIONS



CHANGE OF GRADE LIMITATIONS



TRIANGULAR LEVEL AREA FOR DIRECTIONAL RAMPS ON CURB RETURNS

PROVIDE A LEVEL TRIANGULAR AREA WHEN DIRECTIONAL RAMPS ARE INSTALLED ON A CURB RETURN TO TRANSITION THE GRADE BREAK.



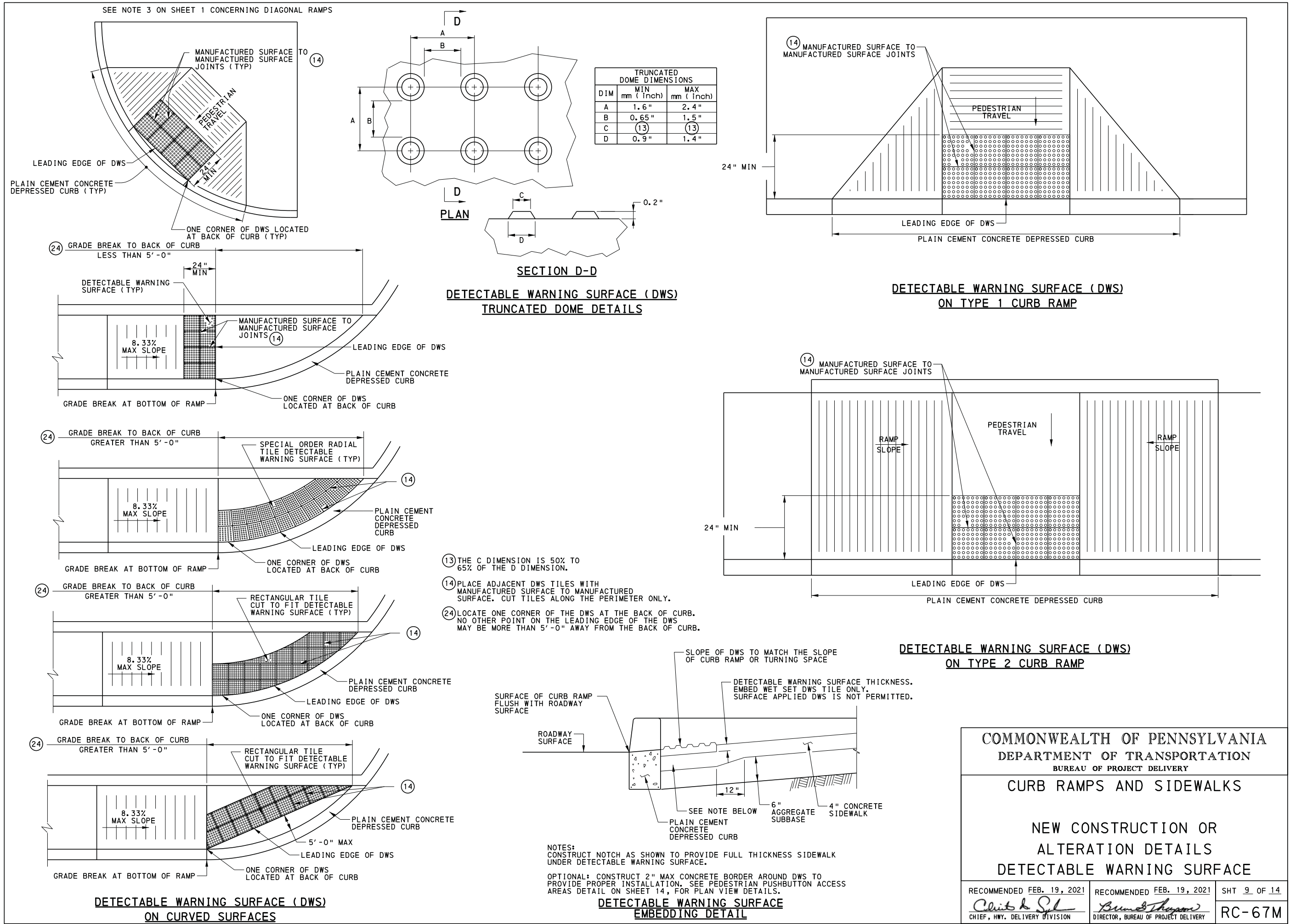
RAMP CROSS SLOPE TRANSITION TO MATCH ROADWAY PROFILE SLOPE

TRANSITION CURB RAMP CROSS SLOPE TO MATCH ROADWAY PROFILE AS GRADUALLY AS POSSIBLE. DO NOT EXCEED 3.00% PER 1'-0" CROSS SLOPE RATE OF CHANGE WHEN TRANSITIONING TO ROADWAY PROFILE.

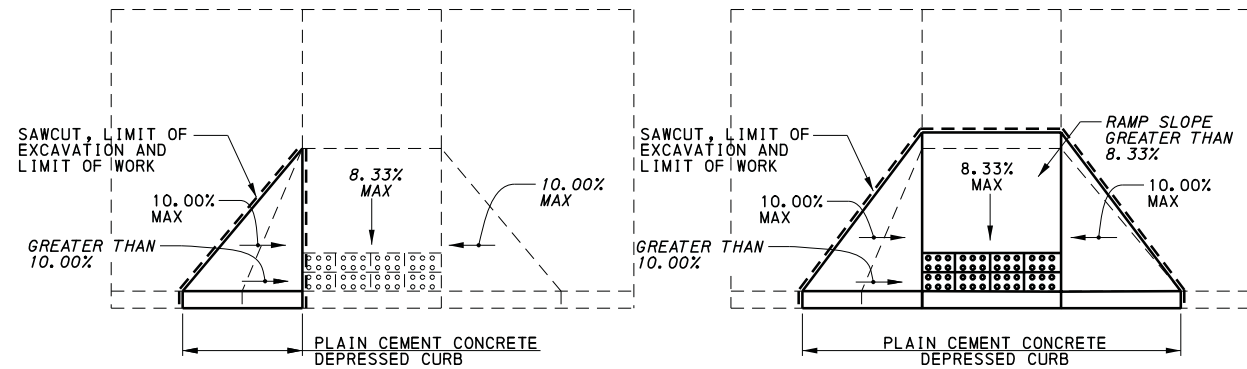
COMPLETE TRANSITION TO ROADWAY PROFILE BEHIND DETECTABLE WARNING SURFACE OR USE 1'-0" DETECTABLE WARNING SURFACE TILES.

CONSTRUCT DEPRESSED CURB SLOPE TO MATCH ROADWAY PROFILE.

- 5 CURB RAMP WIDTH IS EQUAL TO SIDEWALK WIDTH WHEN THE SIDEWALK WIDTH IS GREATER THAN OR EQUAL TO 4'-0".
- 26 NEW CONSTRUCTION MUST COMPLY WITH RECOMMENDED LOCATIONS. FOR ALTERATION PROJECTS LOCATE PEDESTRIAN PUSHBUTTONS, TO THE MAXIMUM EXTENT FEASIBLE, AS FOLLOWS:
  - ADJACENT TO A LEVEL NON-SLIP SURFACE TO PROVIDE ACCESS FROM A WHEELCHAIR, AND WHERE THERE IS A NON-SLIP WHEELCHAIR ACCESSIBLE ROUTE TO THE RAMP.
  - WITHIN 5'-0" OF THE CROSSWALK EXTENDED.
  - BETWEEN 1'-6" AND 10'-0" OF THE EDGE OF CURB, SHOULDER OR PAVEMENT.
  - PARALLEL TO THE CROSSWALK TO BE USED.



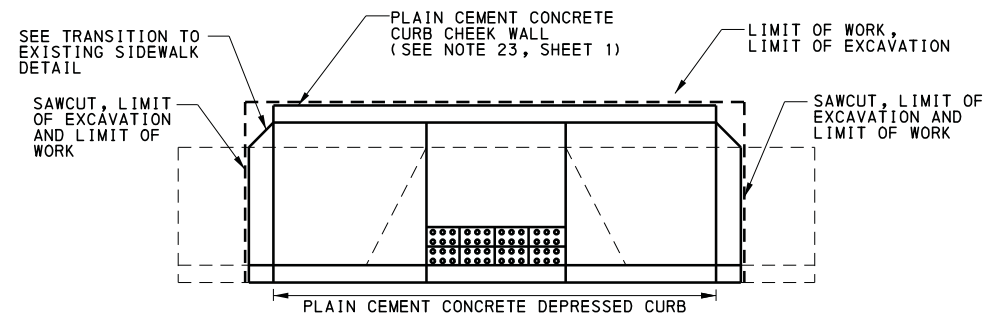




DETAIL ILLUSTRATES FLARE REMOVAL AND REPLACEMENT.      DETAIL ILLUSTRATES CURB RAMP (INCLUDING FLARES) REPLACEMENT.

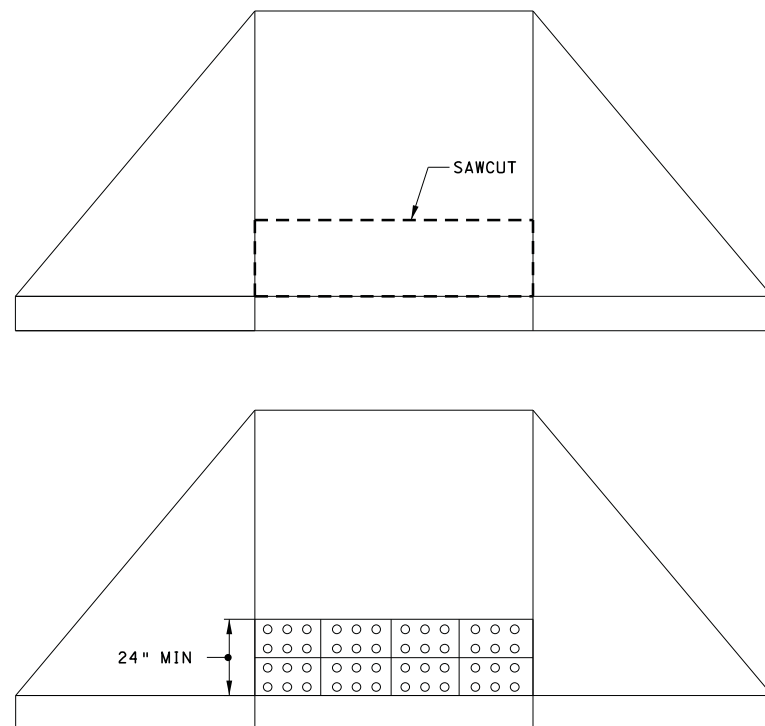
**SIDE FLARE  
RECONSTRUCTION**

**TOTAL RAMP  
RECONSTRUCTION**

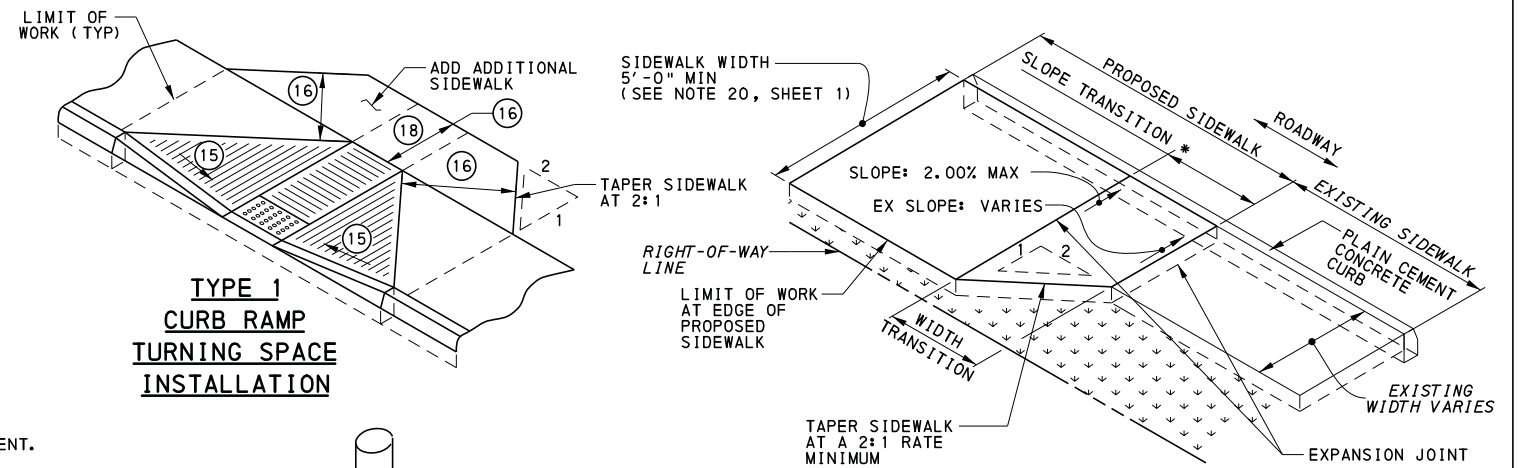


DETAIL ILLUSTRATES A TYPE 1 EXISTING RAMP REPLACED WITH A TYPE 2 RAMP. USE THIS DETAIL AS AN EXAMPLE TO REPLACE ANY RAMP WITH A DIFFERENT CURB RAMP TYPE.

**TOTAL RAMP  
RECONSTRUCTION  
(RAMP TYPE CHANGE)**



**DETECTABLE WARNING SURFACE (DWS)  
INSTALLATION DETAIL**



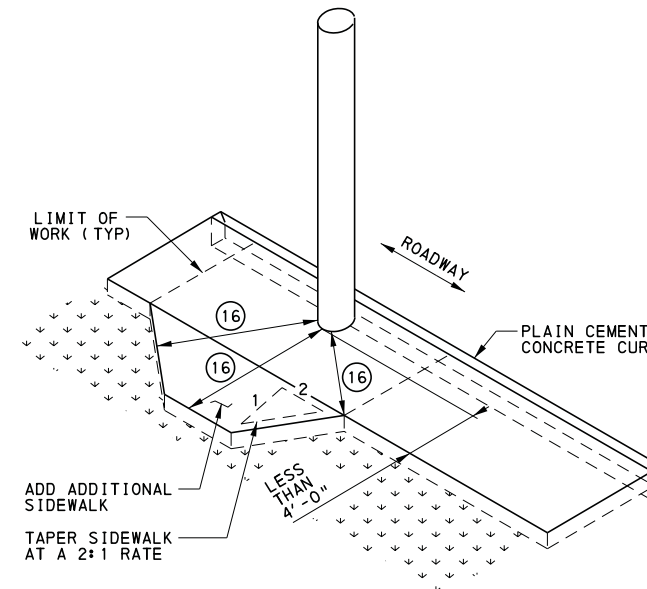
**TRANSITION TO EXISTING  
SIDEWALK DETAIL**

\* MINIMUM SLOPE TRANSITION LENGTH BASED ON THE DIFFERENCE OF PROPOSED SIDEWALK CROSS SLOPE AND EXISTING SIDEWALK CROSS SLOPE AT THE LOCATION OF TIE IN. THIS MINIMUM LENGTH TO BE DETERMINED BY THE FOLLOWING FORMULA:  
 $\Delta\% \text{ SLOPE} \times 0.5'$

THE MINIMUM WIDTH TRANSITION SHALL BE CALCULATED USING THE FOLLOWING FORMULA:  
 $\text{CHANGE IN WIDTH} \times 2$

DEPENDING ON WHICH IS LONGEST, EITHER THE SLOPE TRANSITION OR WIDTH TRANSITION WILL CONTROL THE LENGTH OF SIDEWALK TRANSITION.

TRANSITION AREAS SERVE AS TEMPORARY CONNECTIONS OF THE PEDESTRIAN ACCESS ROUTE. FUTURE IMPROVEMENTS TO THE REMAINING PORTION OF EXISTING SIDEWALK SHALL INCLUDE REMOVING THE TRANSITION AREA AND CONSTRUCTING A FULLY COMPLIANT SIDEWALK.



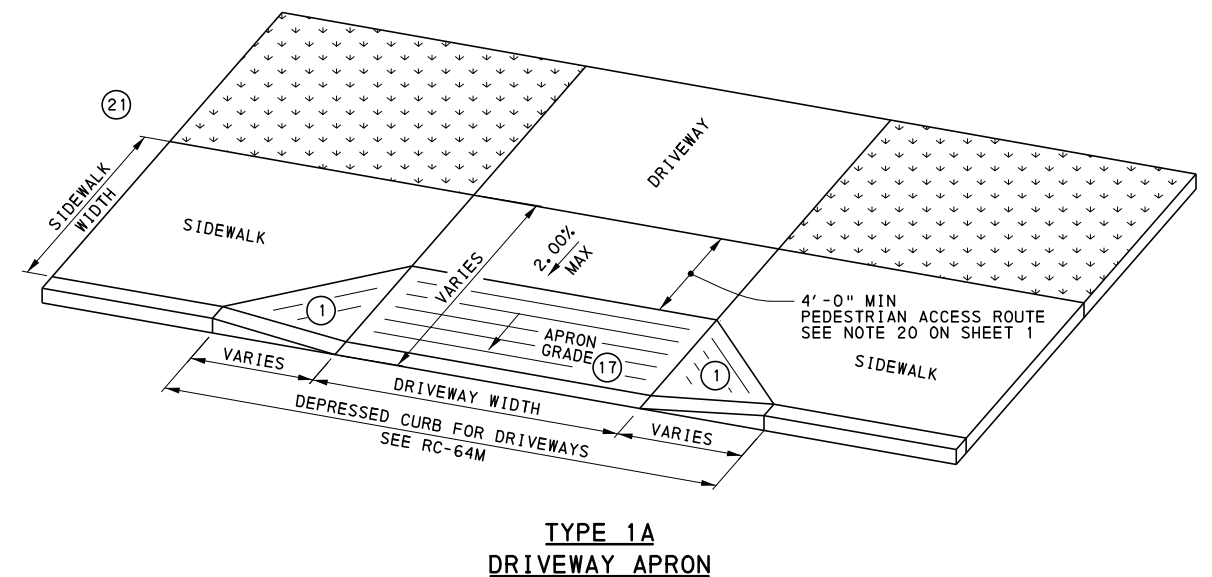
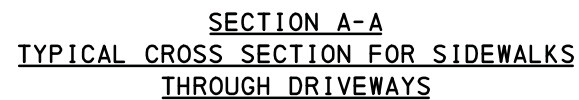
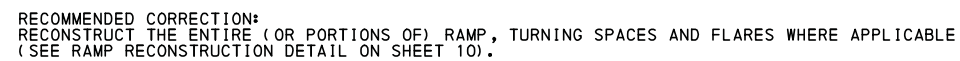
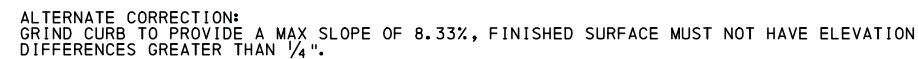
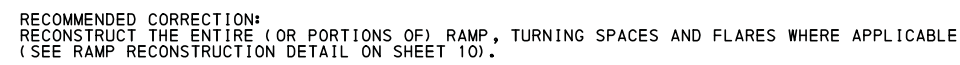
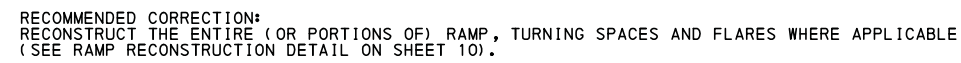
**SIDEWALK ADDITION DUE TO  
OBSTRUCTIONS**

**DETECTABLE WARNING SURFACE (DWS)  
INSTALLATION INSTRUCTIONS**

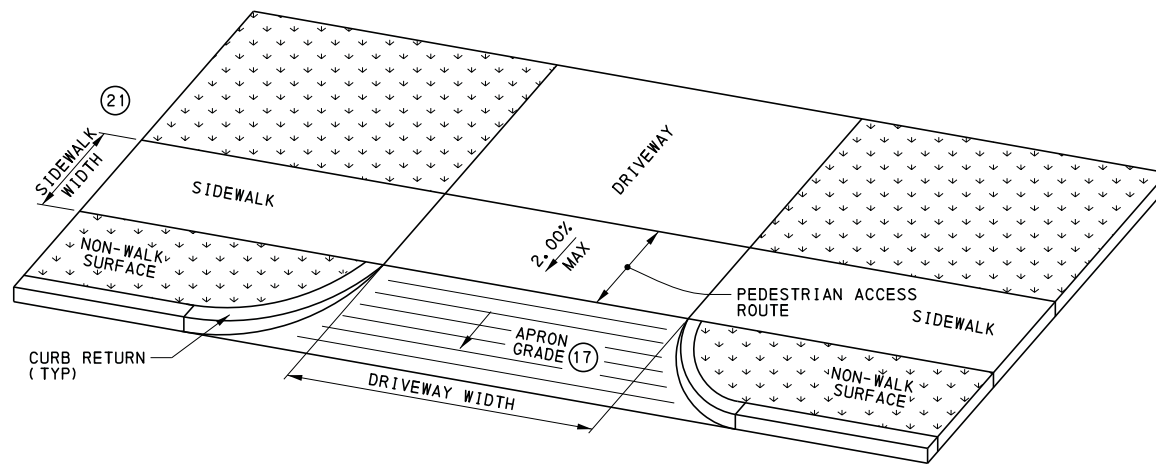
1. SAW CUT EXISTING CURB RAMP SURFACE WHERE THE DWS WILL BE PLACED.
2. REMOVE EXISTING CONCRETE FROM THIS AREA.
3. REPLACE AND COMPACT ANY DISTURBED AGGREGATE SUBBASE.
4. PLACE NEW CEMENT CONCRETE AND LEVEL TO A 4 INCH DEPTH SO THAT THE TOP OF THE CONCRETE IS LOWER THAN THE ADJOINING SIDEWALK, EQUIVALENT TO THE EMBEDDING DEPTH OF THE DWS MATERIAL.
5. LAY OUT AND PROPERLY FIT EACH UNIT PRIOR TO SETTING IN WET CONCRETE.
6. CUT UNITS AS NECESSARY ALONG PERIMETER OF DETECTABLE WARNING SURFACE.
7. PLACE UNITS ACROSS THE ENTIRE WIDTH OF THE CURB RAMP SURFACE AND/OR WHERE THE CURB IS FLUSH.
8. PRESS UNITS INTO FULL CONTACT WITH THE FRESH CONCRETE.
9. ADJUST HEIGHT OF EACH UNIT EDGE TO BE LEVEL WITH ADJACENT RAMP SURFACES.
10. ONLY TRUNCATED DOMES SHOULD BE ABOVE THE ADJACENT FINISHED CONCRETE.
11. FILL ANY SAW CUT GAPS WITH APPROVED JOINT SEALANT MATERIAL.

- (15) SIDE FLARES 10.00% MAX FOR RAMPS WITH TURNING SPACES 4'-0" OR GREATER.  
SIDE FLARES 8.33% MAX FOR RAMPS WITH TURNING SPACES LESS THAN 4'-0".
- (16) 4'-0" MIN PEDESTRIAN ACCESS ROUTE.
- (18) CURB RAMPS REQUIRE A TURNING SPACE WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

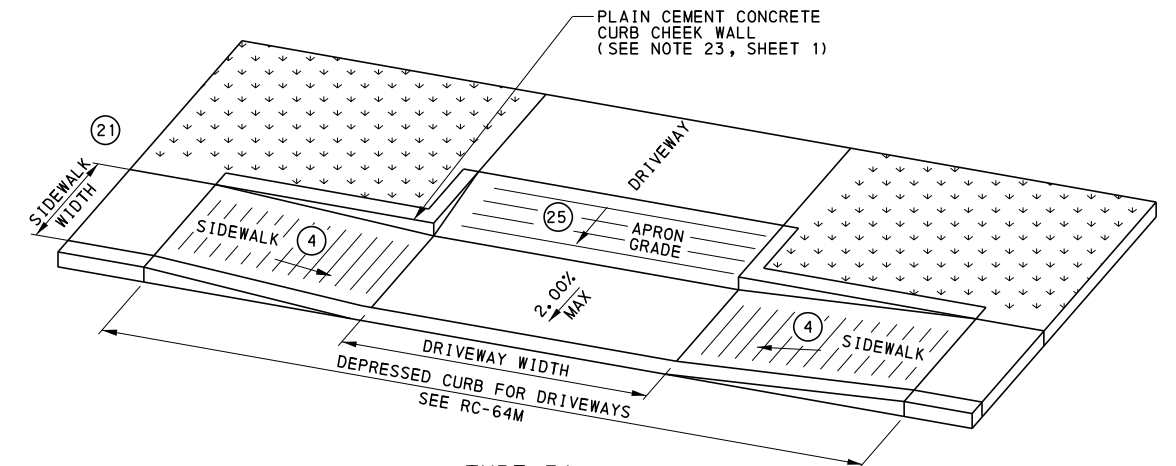
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
CURB RAMPS AND SIDEWALKS		
ALTERATION DETAILS		
RECOMMENDED FEB. 19, 2021 <i>Chait &amp; Sp</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 19, 2021 <i>Burns &amp; Thompson</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 10 OF 14 RC-67M



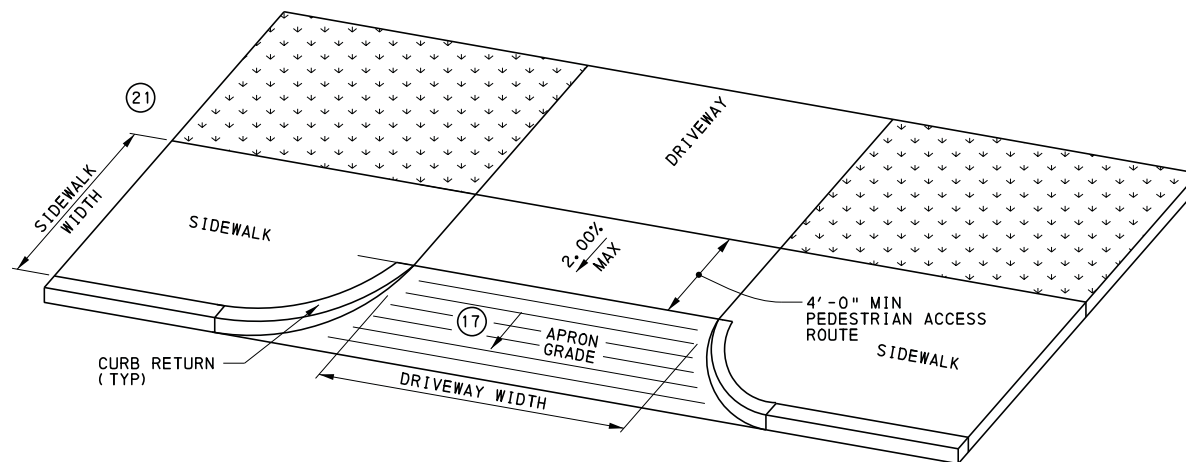
- ① SIDE FLARES 10.00% MAX SLOPE.
- ①7 8.00% MAX CHANGE IN GRADE BETWEEN ROAD SURFACE AND DRIVEWAY.
- ②1 MINIMUM SIDEWALK WIDTH 5' - 0" (SEE NOTE 20, SHEET 1).



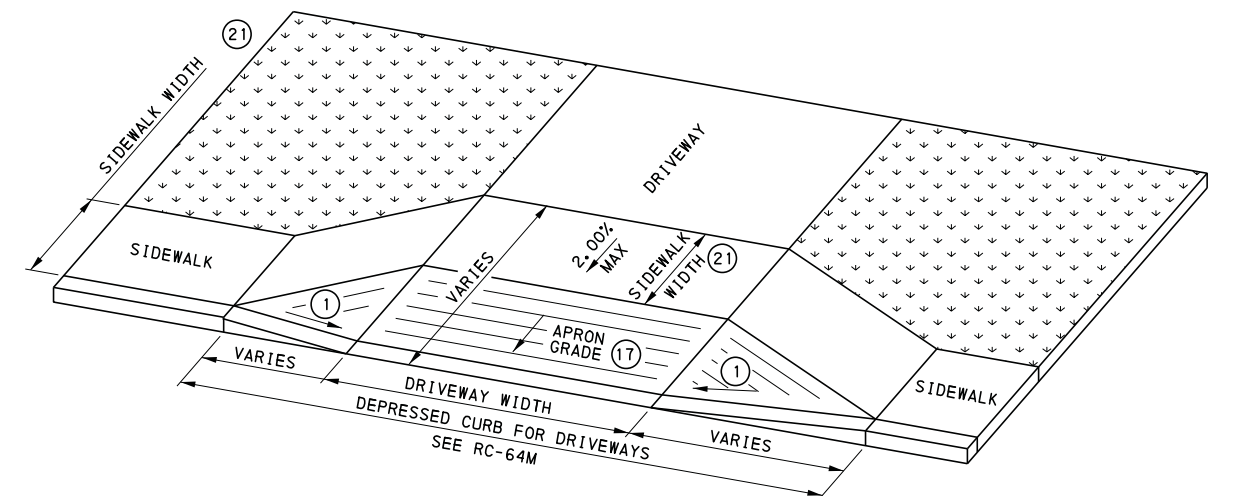
**TYPE 2  
DRIVEWAY APRON**



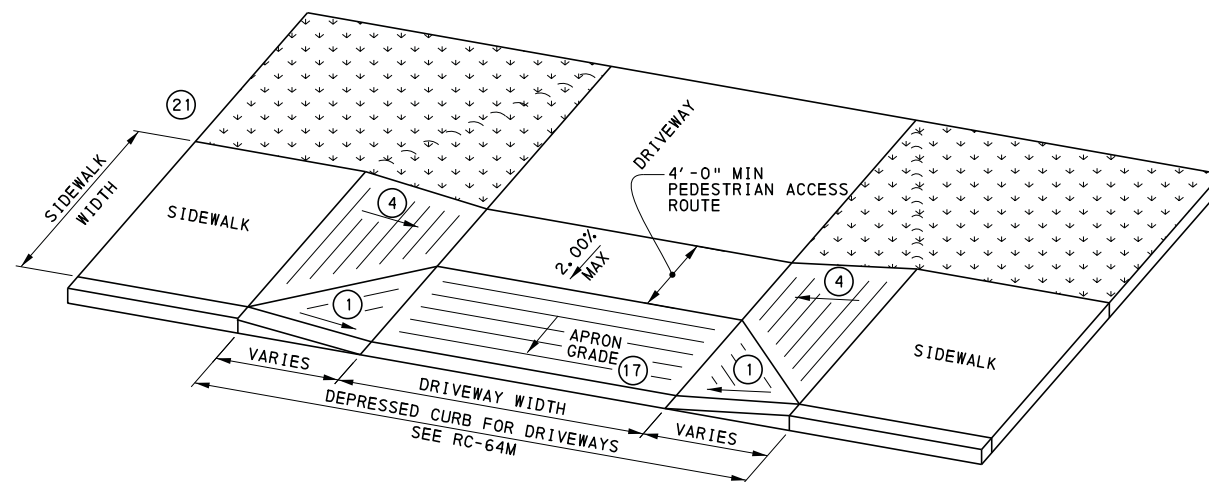
**TYPE 3A  
DRIVEWAY APRON**



**TYPE 2A  
DRIVEWAY APRON**



**TYPE 4  
DRIVEWAY APRON**



**TYPE 3  
DRIVEWAY APRON**

- (1) SIDE FLARES 10.00% MAX SLOPE.
- (4) 8.33% MAX RAMP SLOPE, SEE NOTE 8 SHEET 1.
- (17) 8.00% MAX CHANGE IN GRADE BETWEEN ROAD SURFACE AND DRIVEWAY.
- (21) MINIMUM SIDEWALK WIDTH 5'-0" (SEE NOTE 20, SHEET 1)
- (25) 8.00% MAX CHANGE IN GRADE BETWEEN DRIVEWAY SURFACE AND SIDEWALK.

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CURB RAMPS AND SIDEWALKS

DRIVEWAY APRONS

RECOMMENDED FEB. 19, 2021

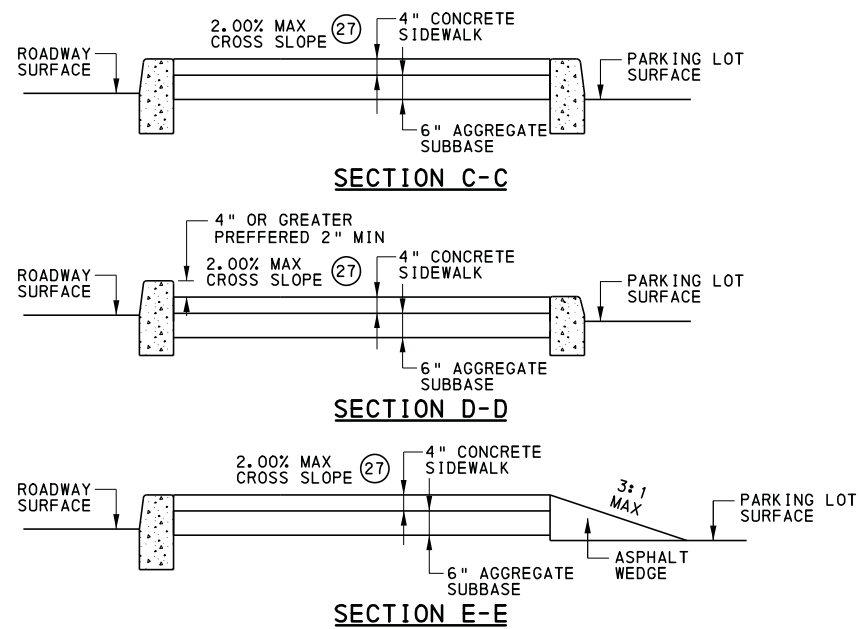
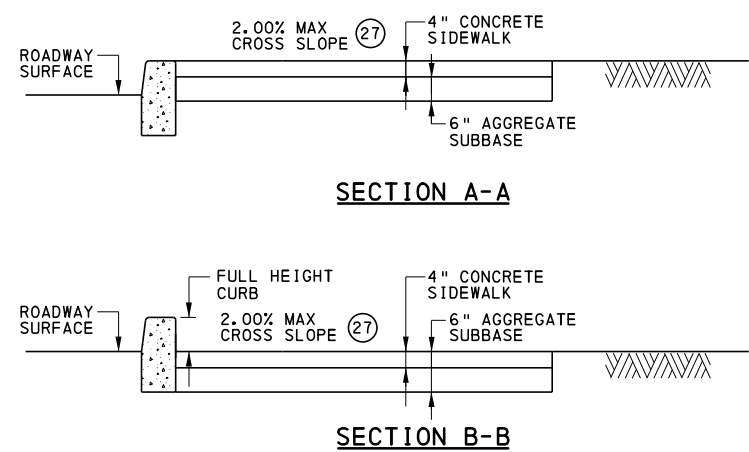
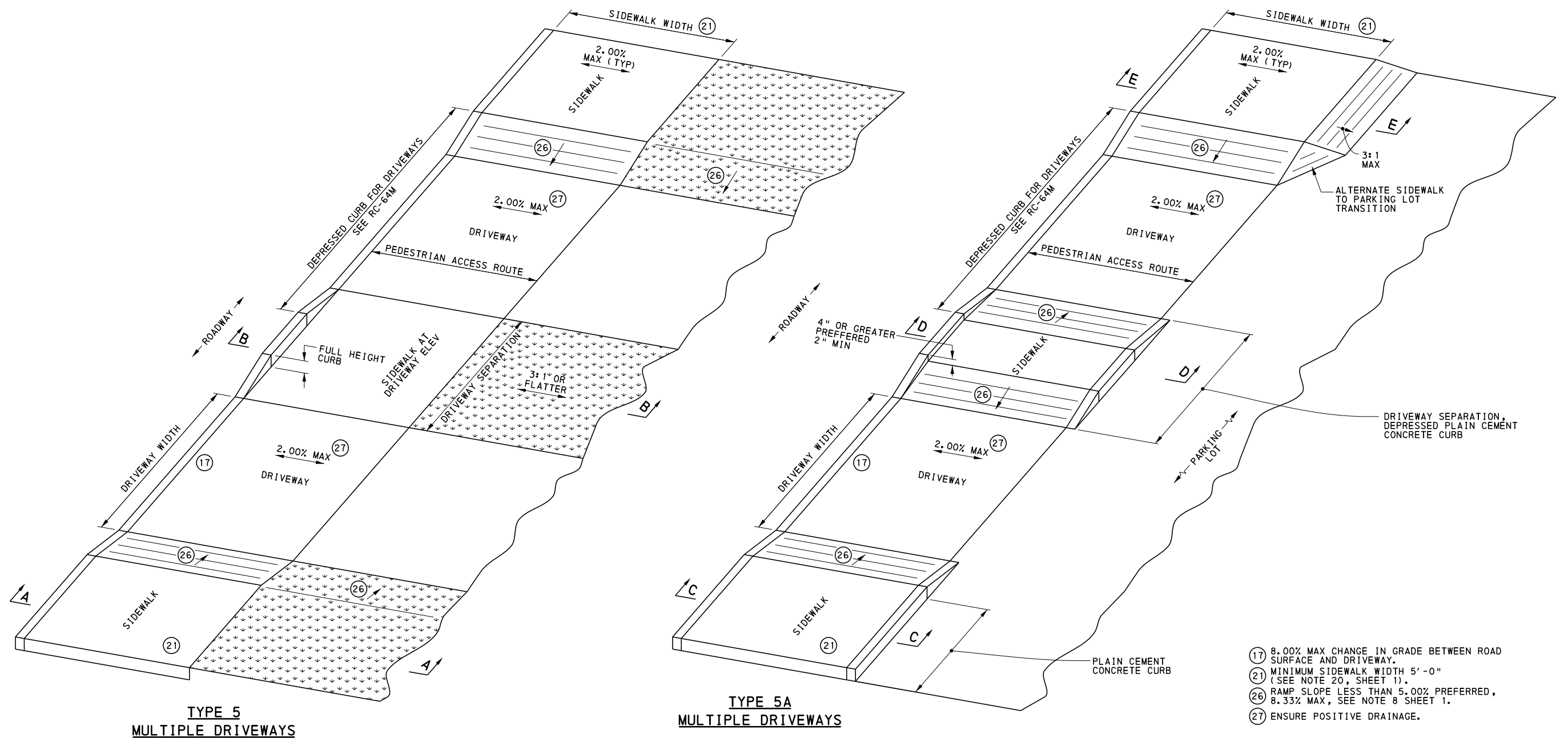
*Chait & Sp*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 19, 2021

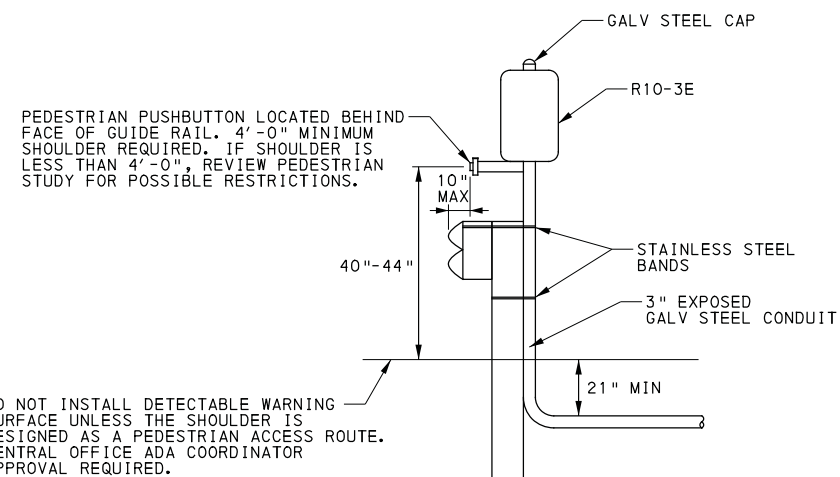
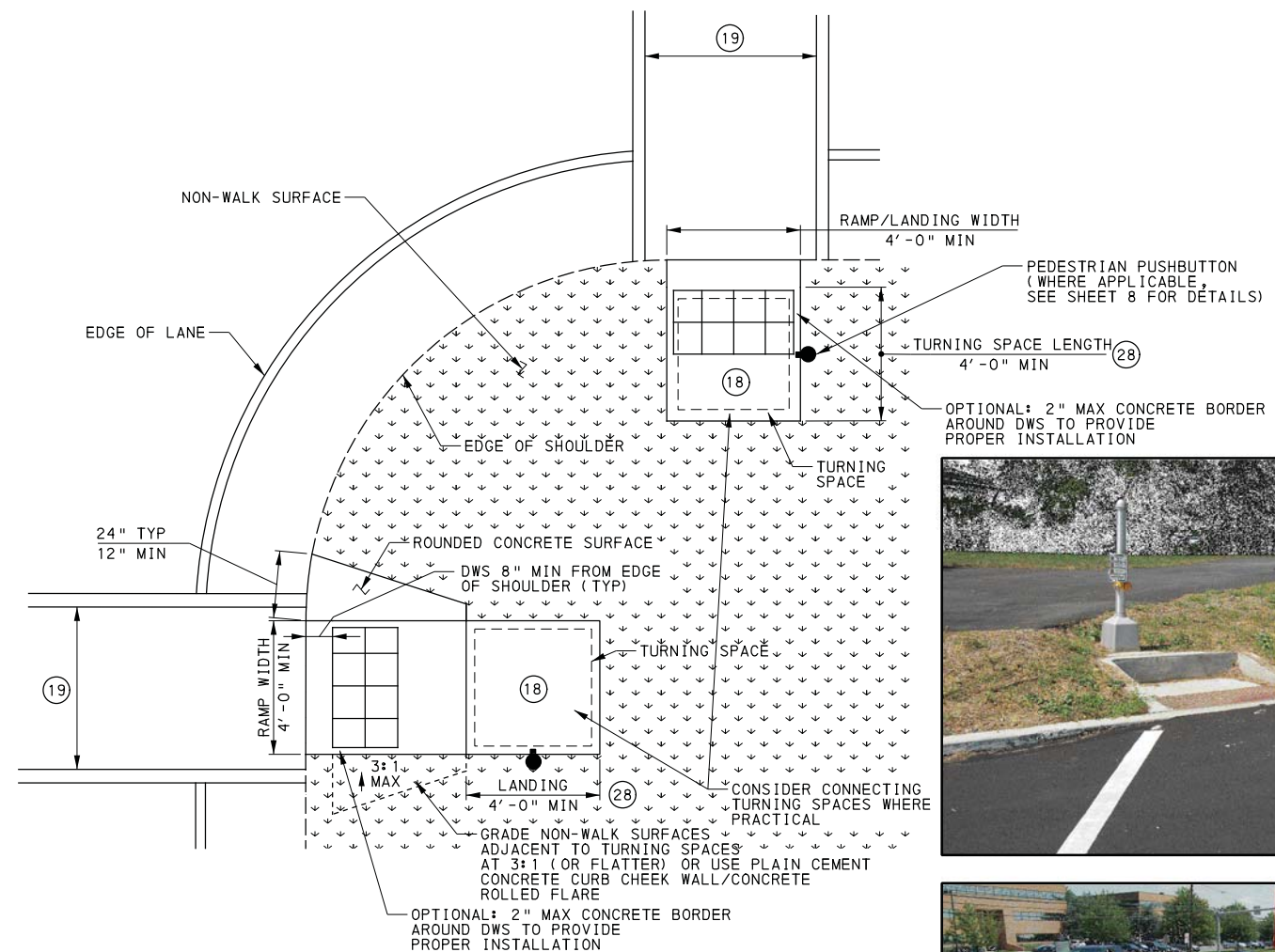
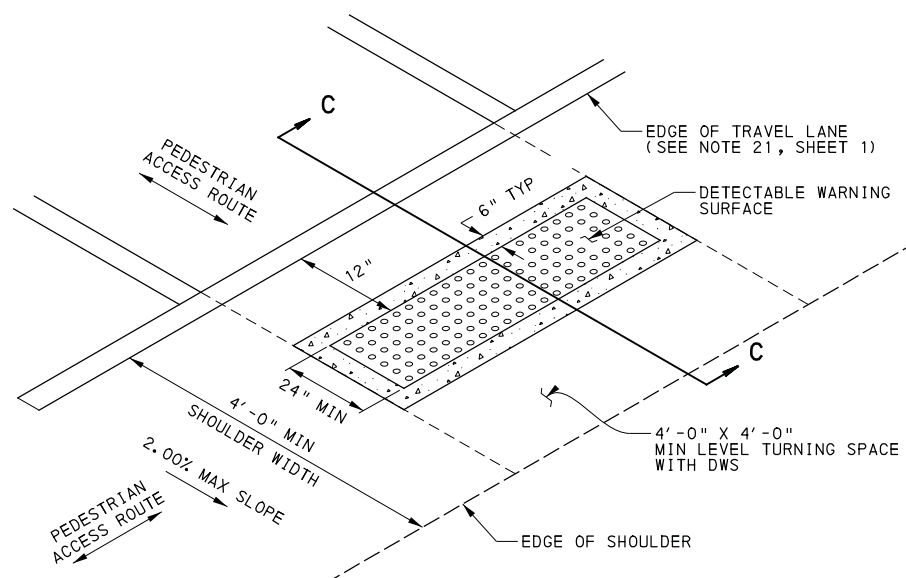
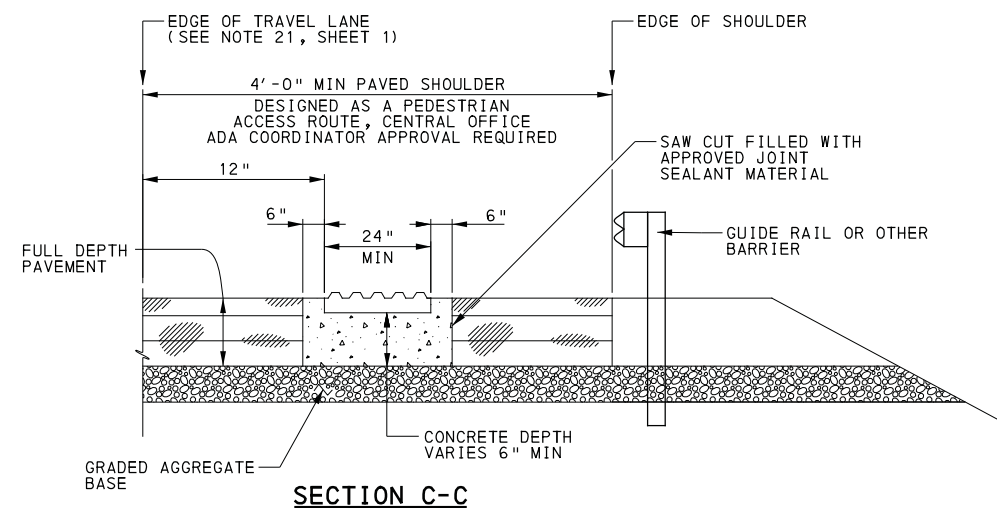
*Burns & Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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CURB RAMPS AND SIDEWALKS  
DWS PLACEMENT ON  
PAVED SHOULDERS AND AT  
PEDESTRIAN PUSHBUTTONS

RECOMMENDED FEB. 19, 2021  
*Christ L. Spil*  
 CHIEF, HWY. DELIVERY DIVISION

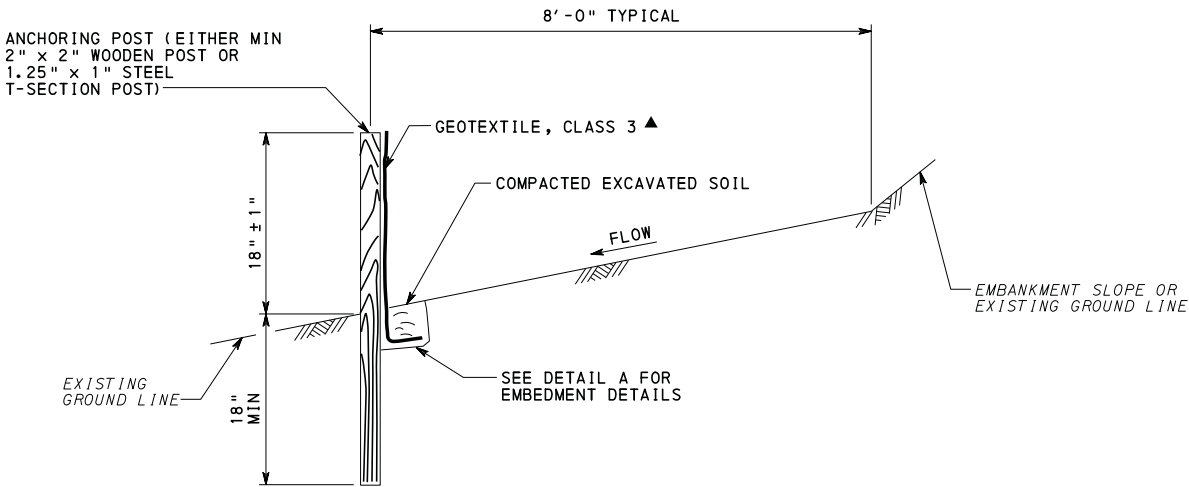
RECOMMENDED FEB. 19, 2021  
*Brian B. Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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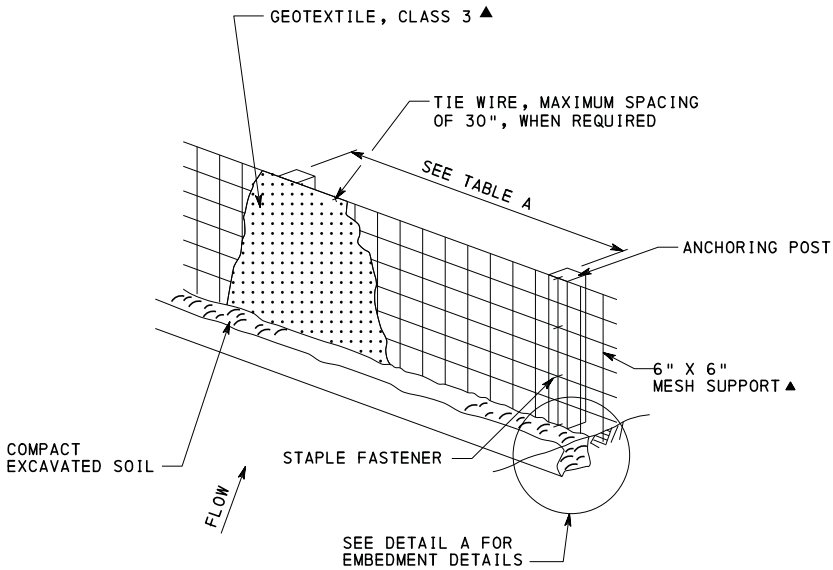
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NOTES

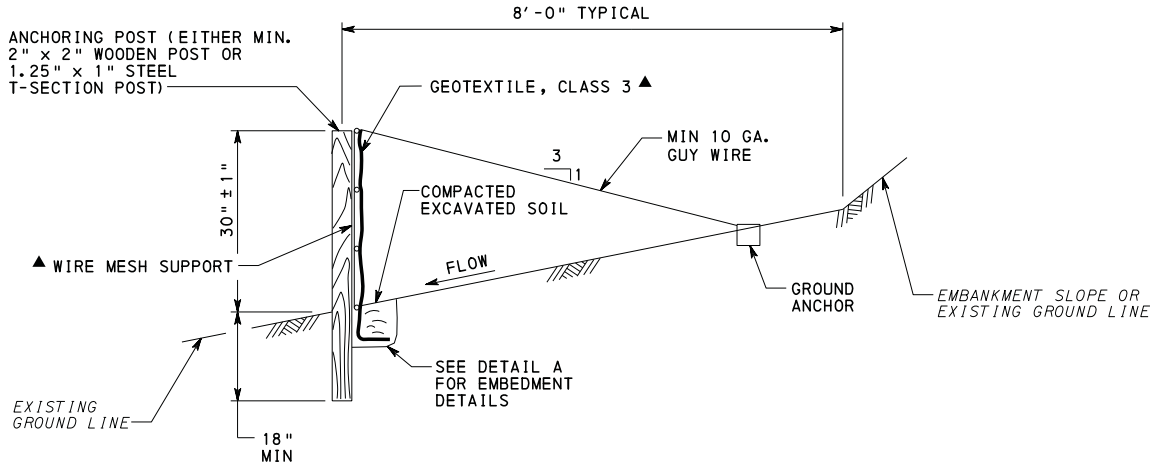
1. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT FENCE.
2. ADHERE TO THE MANUFACTURER'S RECOMMENDATIONS RELATIVE TO REQUIRED GEOTEXTILE REPLACEMENT DUE TO WEATHERING.
3. PLACE SILT FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 8'-0" UPSLOPE 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).



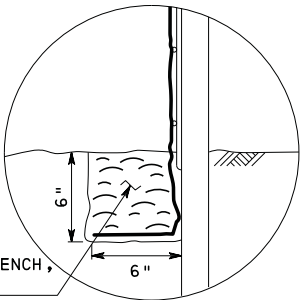
**SILT BARRIER FENCE, 18" HEIGHT**  
▲ SEE TABLE A



**SILT BARRIER FENCE**  
▲ SEE TABLE A

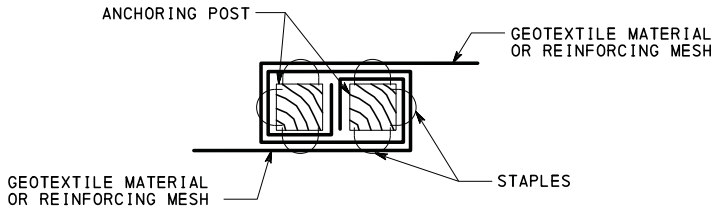


**SILT BARRIER FENCE, 30" HEIGHT**  
▲ SEE TABLE A



**DETAIL A**

EXTEND GEOTEXTILE A MINIMUM OF 6" INTO EXCAVATED TRENCH AND A MINIMUM OF 6" ALONG THE BOTTOM OF THE EXCAVATED TRENCH, BACKFILL THE TRENCH WITH THE EXCAVATED SOIL, AND COMPACT



**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	MAX 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 "	NA	4' - 0 "
30 "	3B	42 "	NA	4' - 0 "

NA = NOT APPLICABLE

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BUREAU OF PROJECT DELIVERY

PERIMETER CONTROL DEVICES

RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

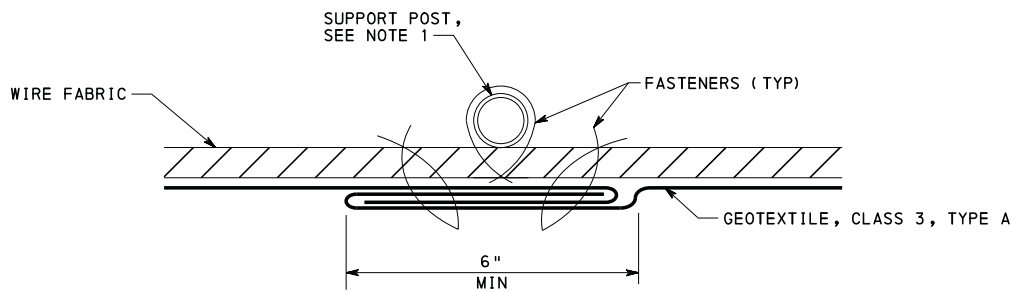
RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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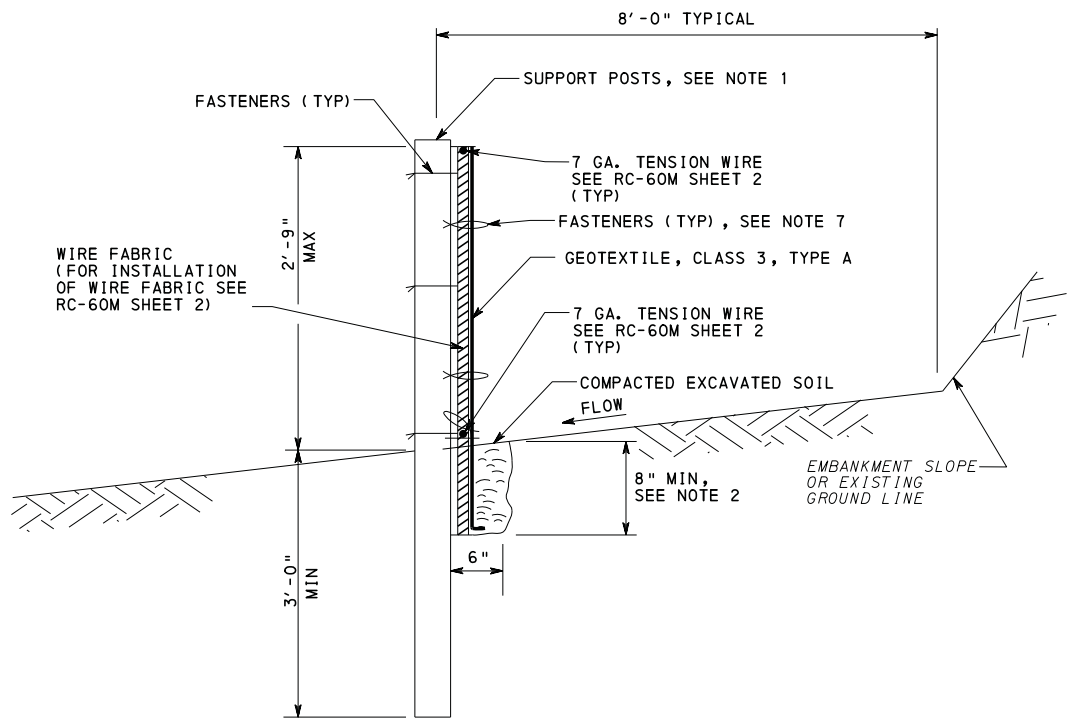


NOTES

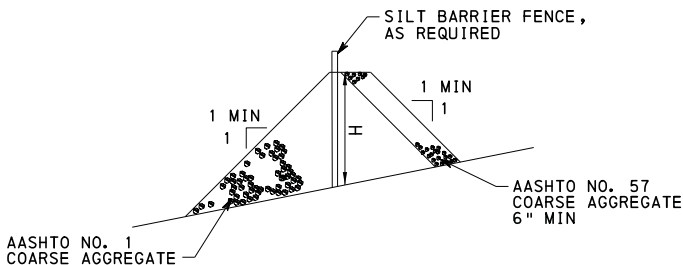
1. SPACE POSTS AT 10'-0" MAXIMUM. USE 2.5" DIAMETER GALVANIZED STEEL OR ALUMINUM POSTS.
2. EXTEND GEOTEXTILE AND WIRE FABRIC 8" MIN INTO EXCAVATED TRENCH.
3. PLACE HEAVY DUTY SILT BARRIER FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 8'-0" UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
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.



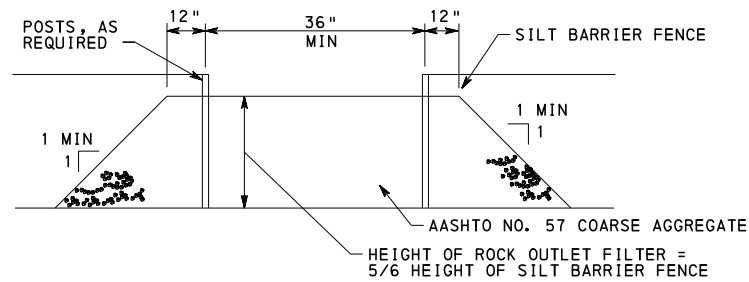
GEOTEXTILE OVERLAP DETAIL



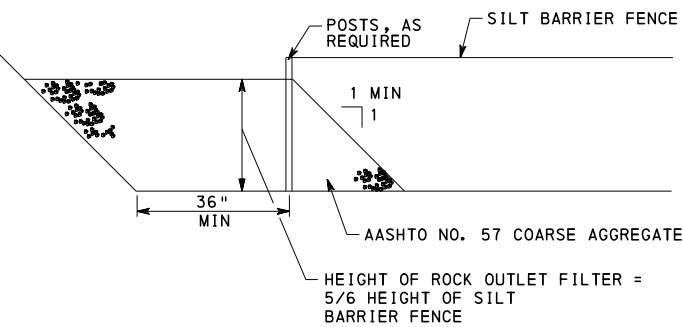
HEAVY DUTY SILT BARRIER FENCE



CROSS SECTION



FILTER AT INTERSECTION  
OF SILT BARRIER FENCE  
UPSLOPE FACE



FILTER AT TOE OF SLOPE

ROCK FILTER OUTLET

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PERIMETER CONTROL DEVICES

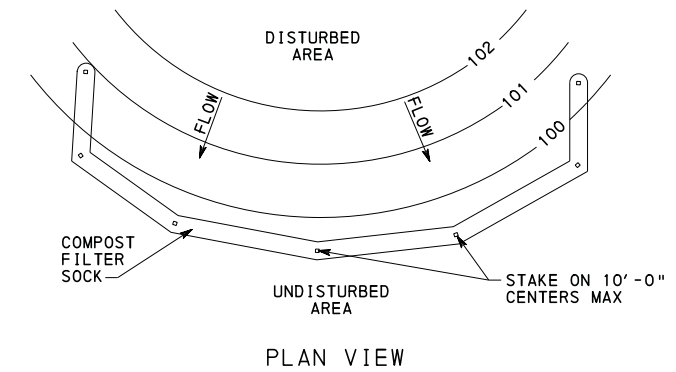
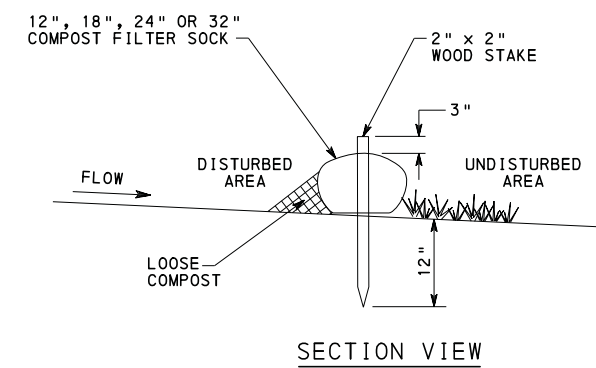
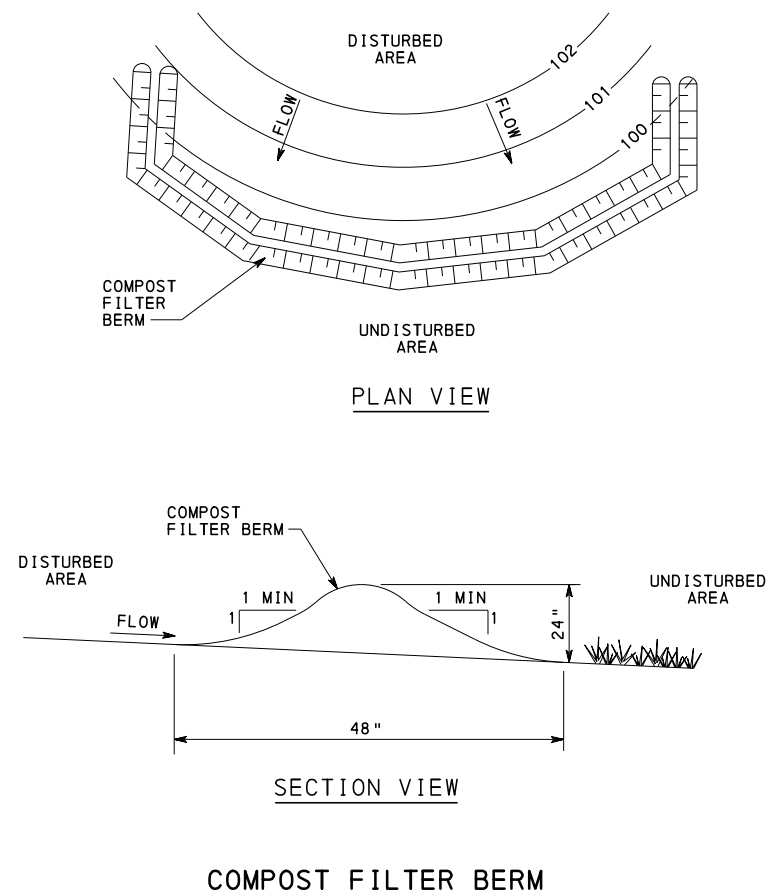
RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Betsch*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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## 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

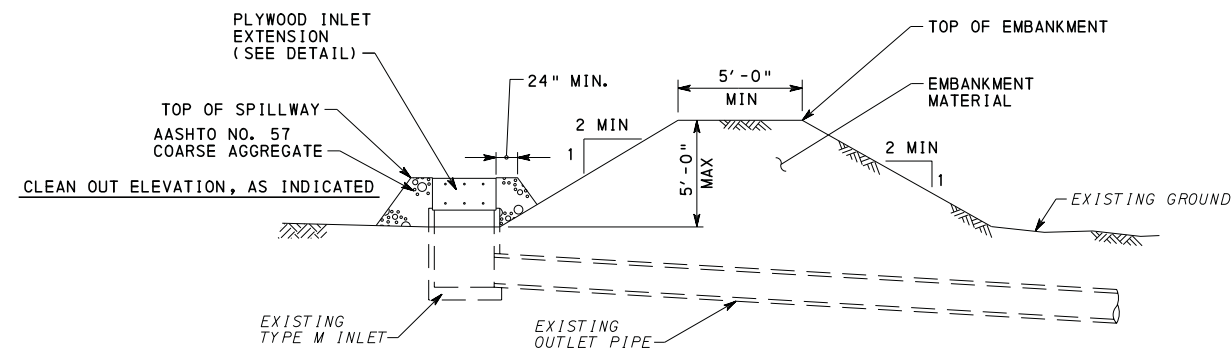
RECOMMENDED FEB. 8, 2019  
*Mark J. Chynell*  
 CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa Betak*  
 DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 3  
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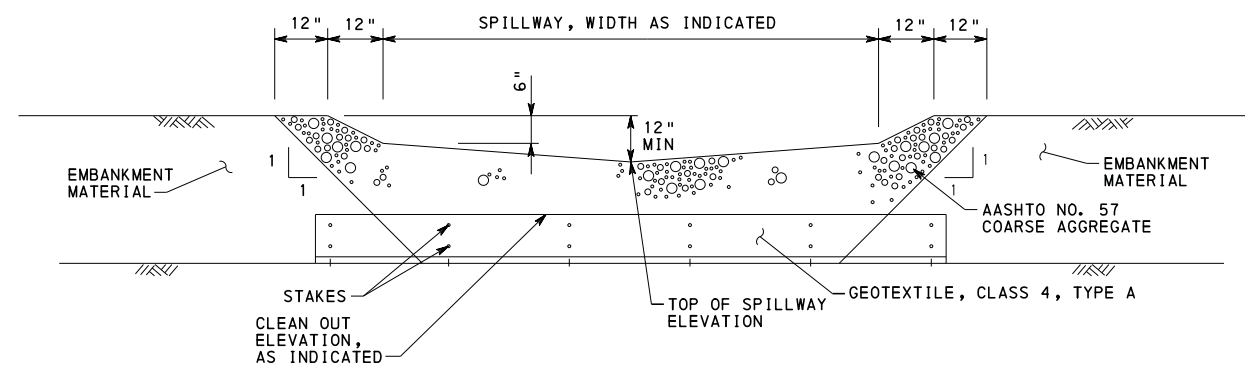
## NOTES

1. PLACE CLEAN OUT STAKES NEAR THE CENTER OF SEDIMENT TRAP. REMOVE SEDIMENT WHEN THE CLEAN OUT ELEVATIONS ON THE STAKES HAVE BEEN REACHED. DURING REMOVAL, IF REQUIRED, REMARK CLEAN OUT ELEVATIONS ON THE STAKES. SATISFACTORILY DISPOSE OF SEDIMENT.
2. STABILIZE INTERIOR AND EXTERIOR SLOPES WITH SEEDING AND SOIL SUPPLEMENTS AND MULCH AS INDICATED.
3. INSPECT SEDIMENT TRAP ONCE A WEEK AND AFTER EACH STORM EVENT THAT PRODUCES RUNOFF.
4. REPAIR DAMAGED OR CLOGGED SPILLWAYS IMMEDIATELY.
5. REMOVE ALL TRASH AND OTHER DEBRIS FROM SEDIMENT TRAP AND SPILLWAY WHEN DIRECTED.
6. WHEN DIRECTED, REMOVE TEMPORARY SEDIMENT TRAP.

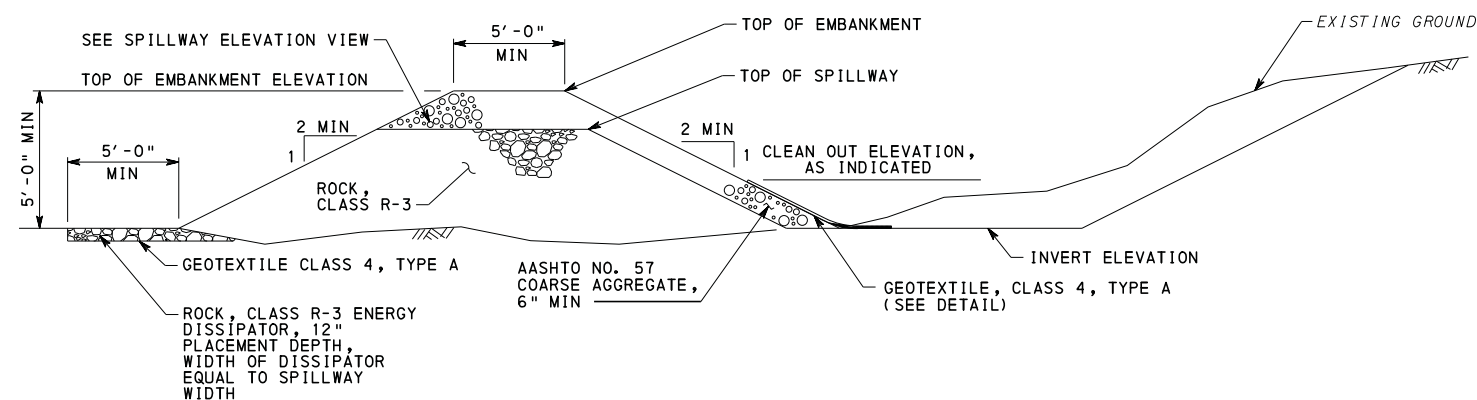


SECTION VIEW THROUGH SPILLWAY

EMBANKMENT SEDIMENT TRAP ( TYPE M INLET)

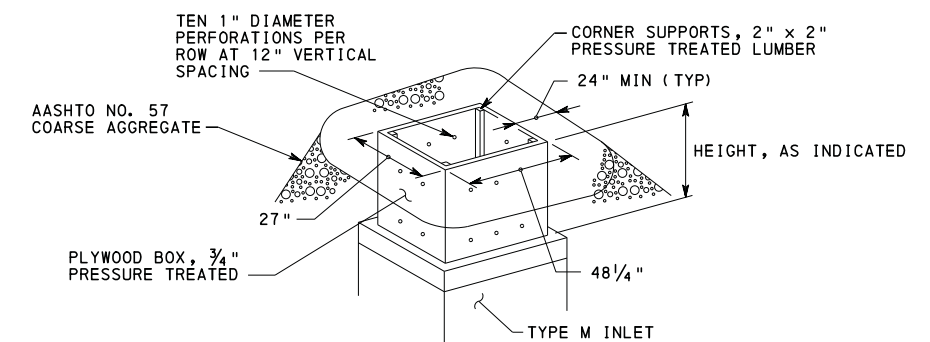


ELEVATION VIEW ( INTERIOR OF SPILLWAY)

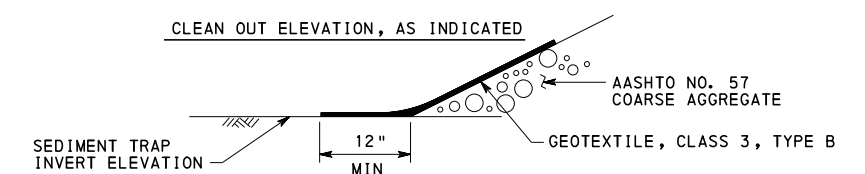


SECTION VIEW THROUGH SPILLWAY

SEDIMENT TRAP ( EMBANKMENT )



PLYWOOD INLET EXTENSION DETAIL



### GEOTEXTILE PLACEMENT DETAIL

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BUREAU OF PROJECT DELIVERY

## SEDIMENT BASIN AND SEDIMENT TRAP

RECOMMENDED AUG. 4, 2017  
*Melissa J. Betuk*  
 CHIEF, HWY. DELIVERY DIVISION

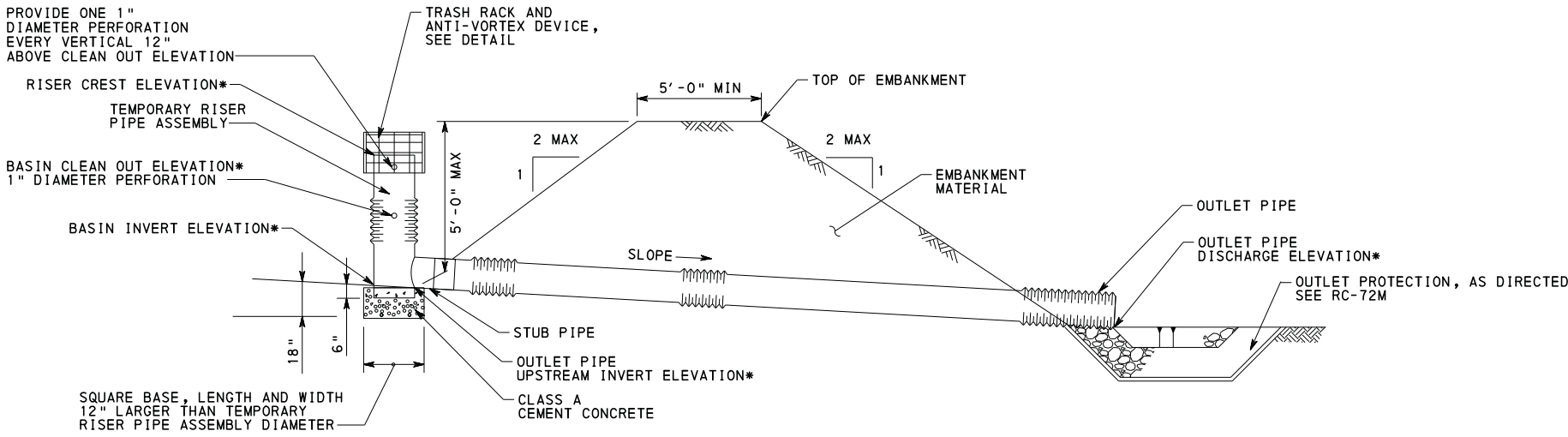
RECOMMENDED AUG. 4, 2017  
*Burke Thompson*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 4  
RC-71M

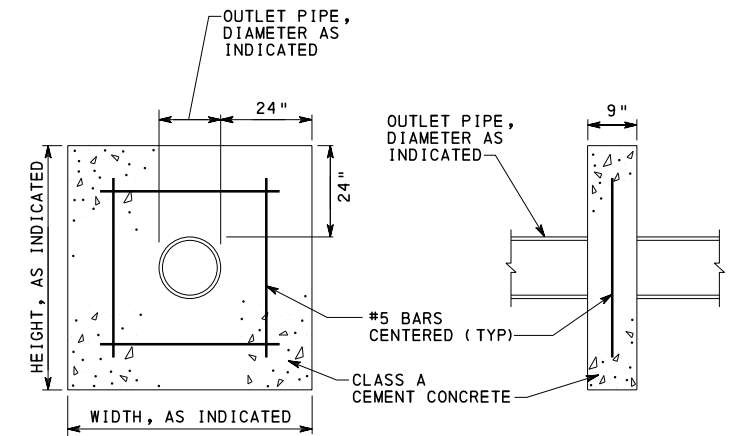
NOTES

1. PROVIDE SUITABLE MATERIAL TO ENSURE THAT EMBANKMENTS, RISERS, PIPES AND CONNECTIONS DO NOT LEAK.
2. PLACE CLEAN OUT STAKES NEAR THE CENTER OF SEDIMENT TRAP. REMOVE SEDIMENT WHEN THE CLEAN OUT ELEVATIONS ON THE STAKES HAVE BEEN MET. DURING REMOVAL, IF REQUIRED, REMARK CLEAN OUT ELEVATIONS ON THE STAKES. SATISFACTORILY DISPOSE OF SEDIMENT.
3. STABILIZE INTERIOR AND EXTERIOR SLOPES WITH SEEDING AND SOIL SUPPLEMENTS AND MULCH AS INDICATED.
4. INSPECT SEDIMENT TRAP/BASIN ONCE A WEEK, AFTER EACH RUNOFF STORM EVENT, OR AS DIRECTED.
5. REPAIR DAMAGED OR CLOGGED SPILLWAYS IMMEDIATELY.
6. REMOVE ALL TRASH AND OTHER DEBRIS FROM SEDIMENT TRAP/BASIN AND SPILLWAY AS DIRECTED.
7. WHEN DIRECTED REMOVE TEMPORARY SEDIMENT TRAP/BASIN OR CONVERT TEMPORARY SEDIMENT TRAP/BASIN TO PERMANENT STORMWATER MANAGEMENT FACILITY AS INDICATED.

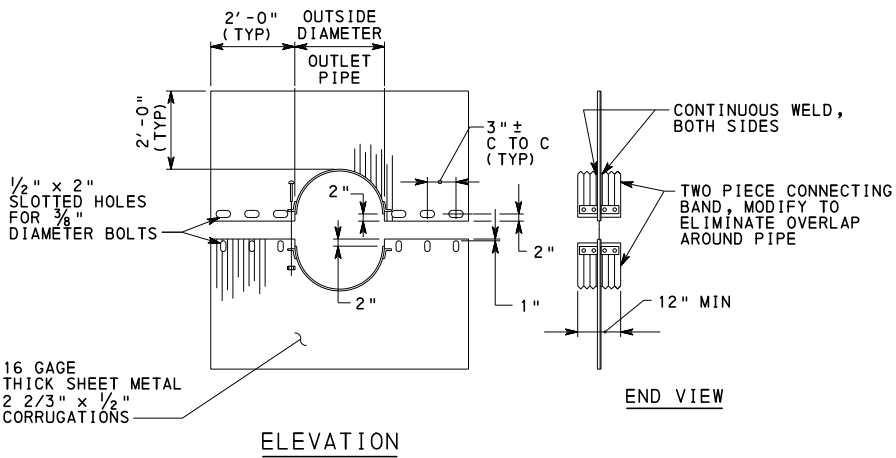
\* ELEVATION AS INDICATED



SEDIMENT TRAP (RISER)

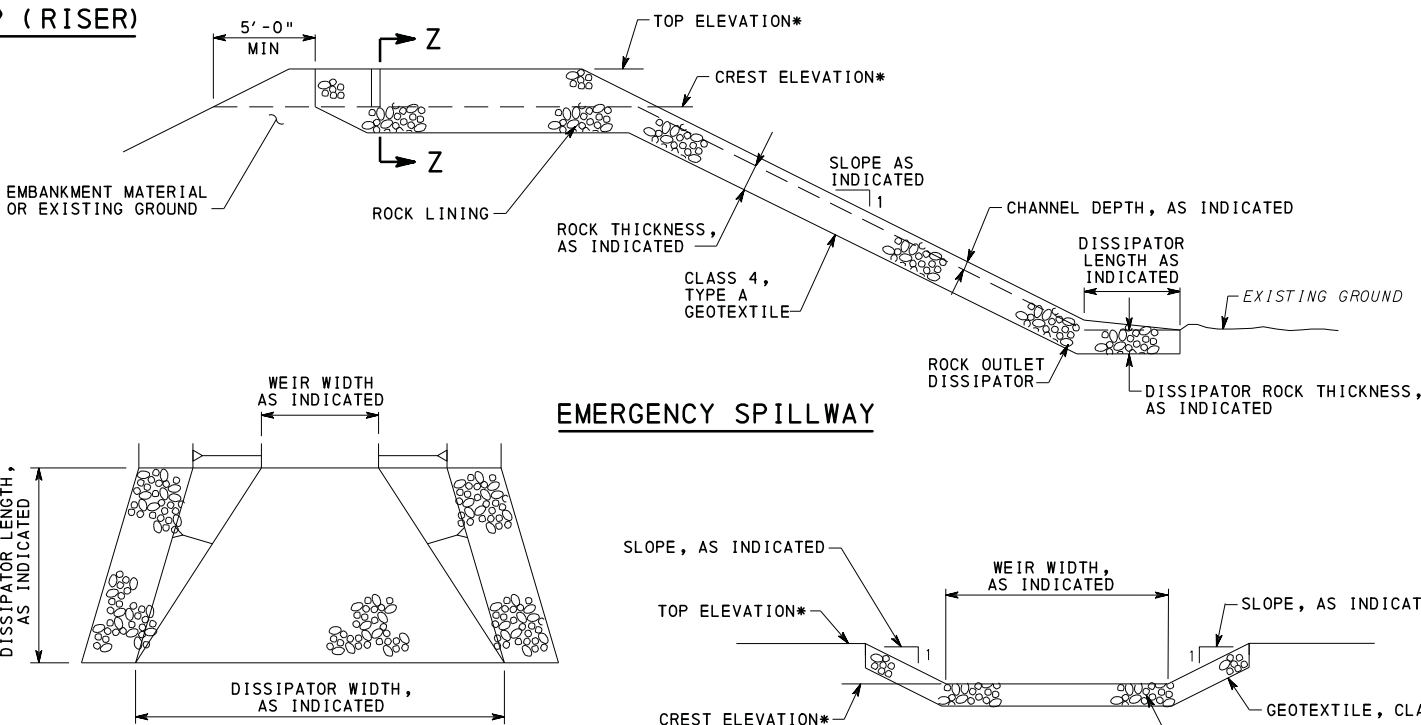


CONCRETE ANTI-SEEP COLLAR



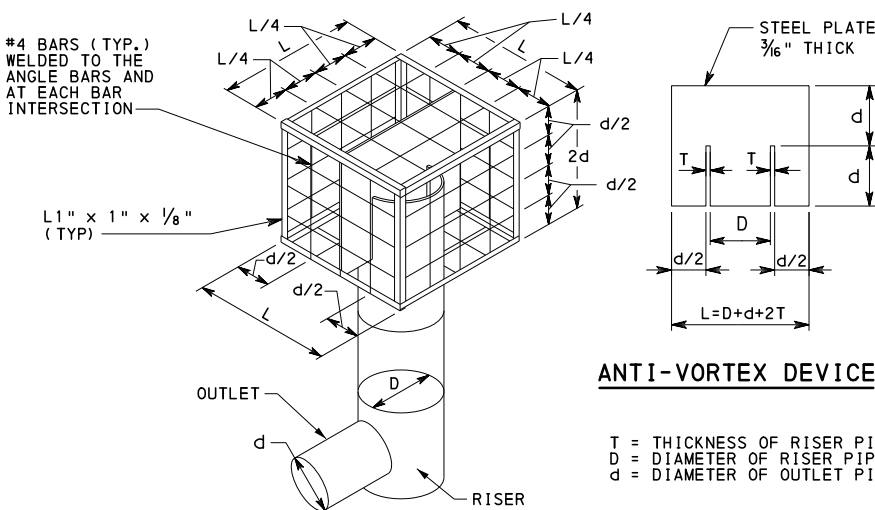
CMP ANTI-SEEP COLLAR

CAULK THE LAP BETWEEN THE TWO HALF-SECTIONS WITH BITUMINOUS MASTIC AT THE TIME OF INSTALLATION. MARK UNASSEMBLED COLLARS BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.



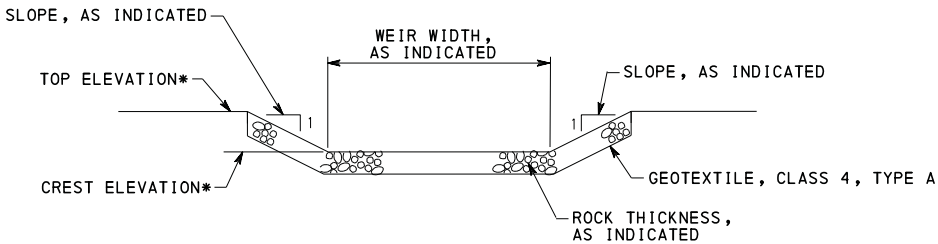
EMERGENCY SPILLWAY

PLAN VIEW: ROCK OUTLET DISSIPATOR



TRASH RACK AND ANTI-VORTEX DEVICE

WEIR SECTION Z-Z



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SEDIMENT BASIN  
AND SEDIMENT TRAP

RECOMMENDED AUG. 4, 2017  
*Melissa J. Betak*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED AUG. 4, 2017  
*Brian J. Dwyer*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

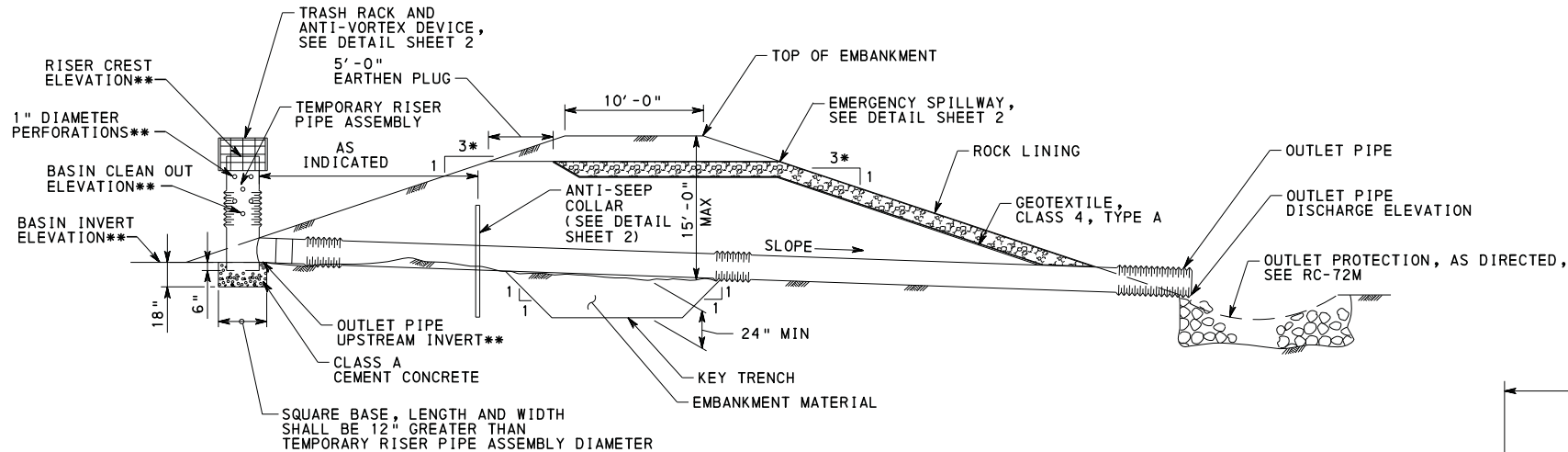
SHT 2 OF 4  
RC-71M

NOTE

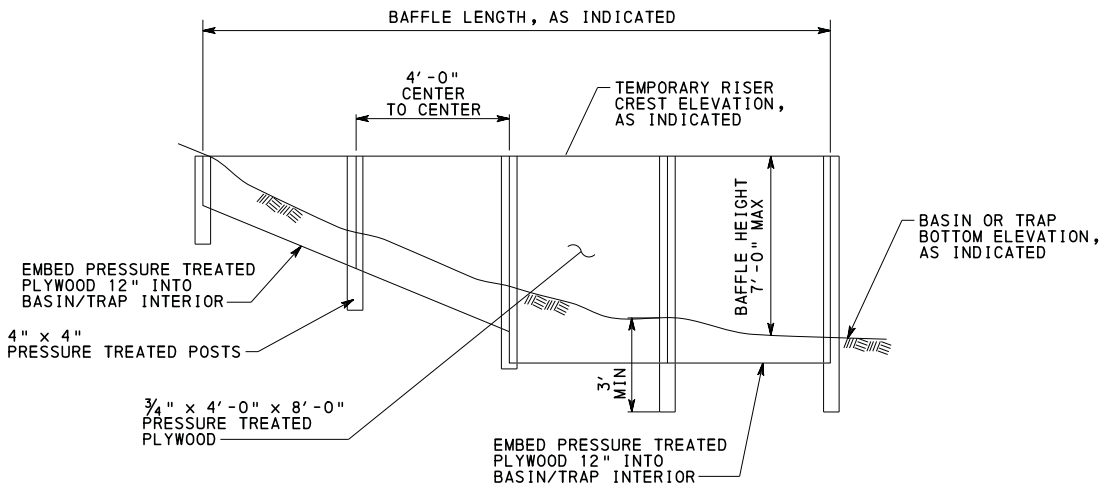
1. REFER TO SHEET 2 FOR SEDIMENT BASIN CONSTRUCTION NOTES.

\* HORIZONTAL COMPONENT OF SIDE SLOPES SHALL NOT EXCEED 3:1 IN AREAS ADJACENT TO TRAFFIC WHERE SLOPES NEED TO BE TRAVERSABLE.

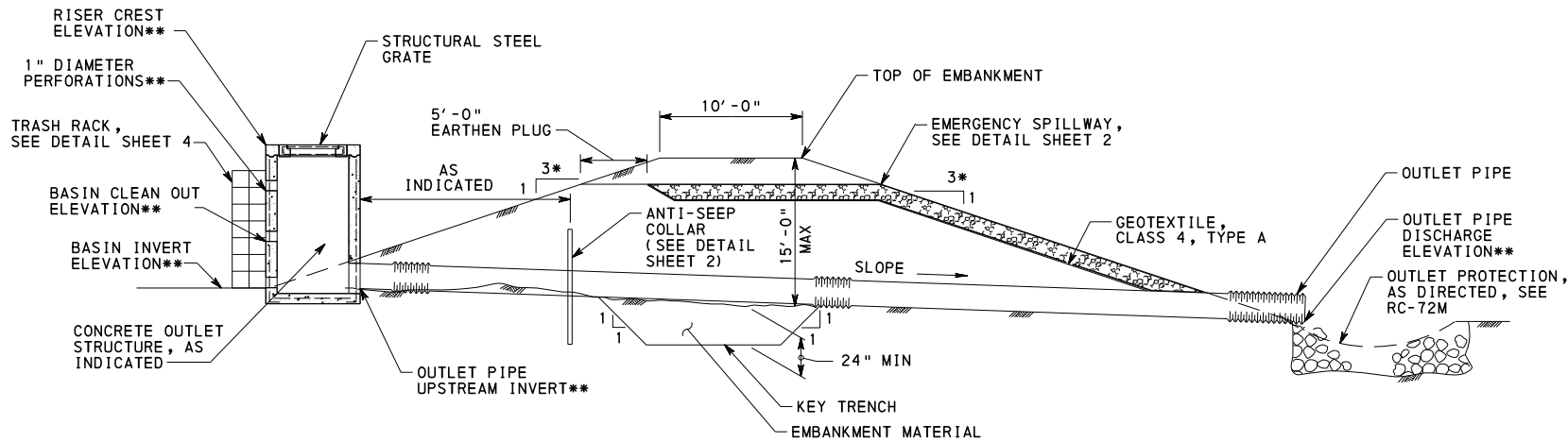
\*\* ELEVATION AS INDICATED



SEDIMENT BASIN - TEMPORARY CONFIGURATION



TEMPORARY BAFFLE WALL



SEDIMENT BASIN - PERMANENT CONFIGURATION

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SEDIMENT BASIN  
AND SEDIMENT TRAP

RECOMMENDED AUG. 4, 2017  
*Melissa J. Betuk*  
CHIEF, HWY. DELIVERY DIVISION

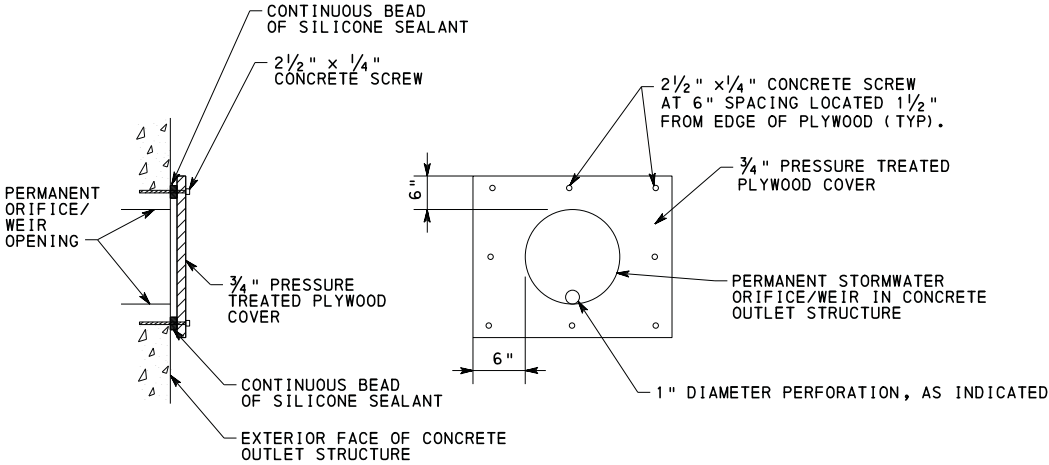
RECOMMENDED AUG. 4, 2017  
*Brian J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 4  
RC-71M

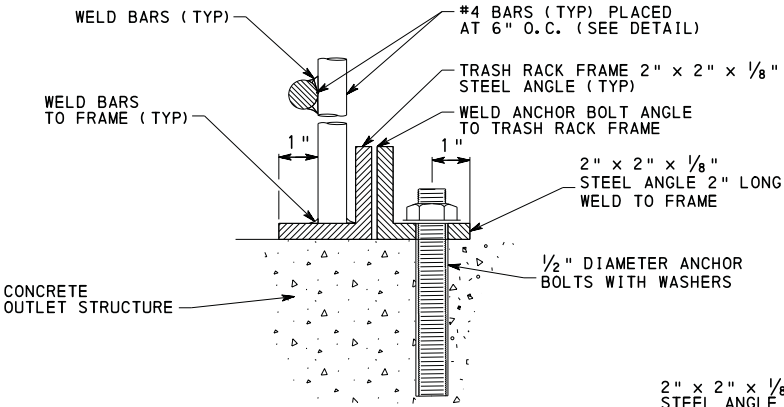


NOTE

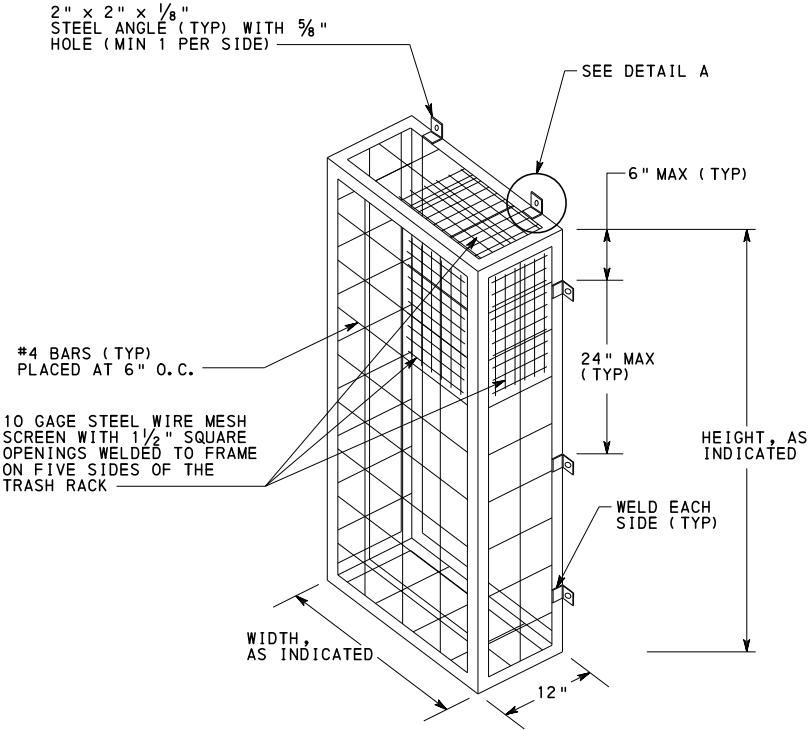
1. FORM BOTTOM OF OUTLET STRUCTURE TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE.



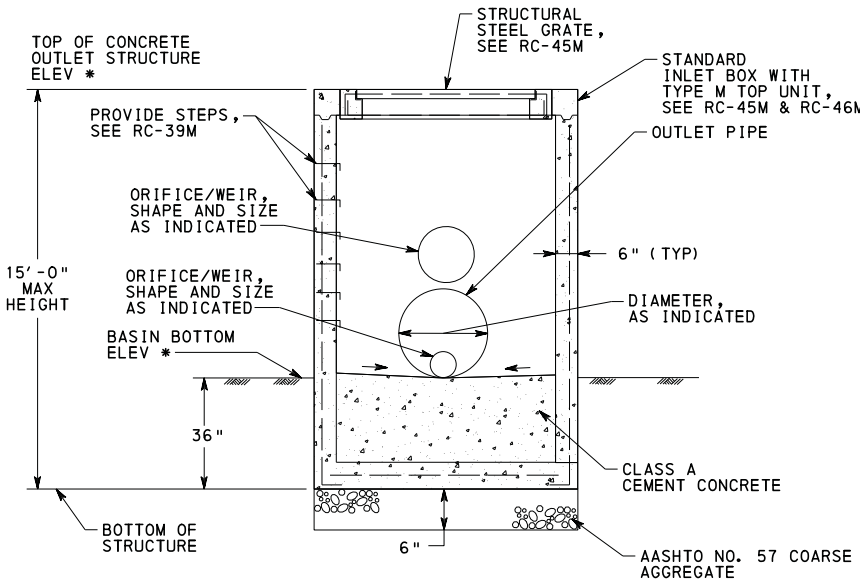
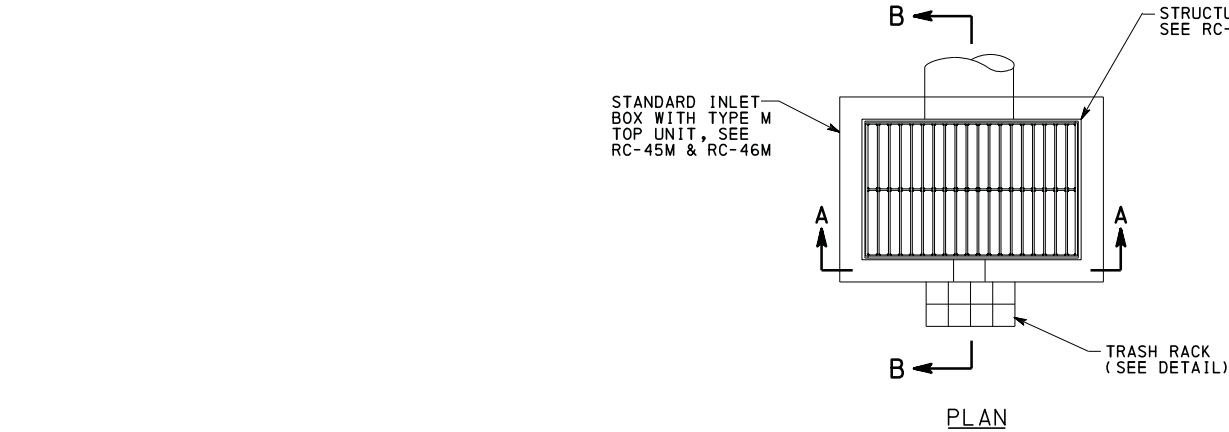
TEMPORARY ORIFICE COVER PLATE



DETAIL A

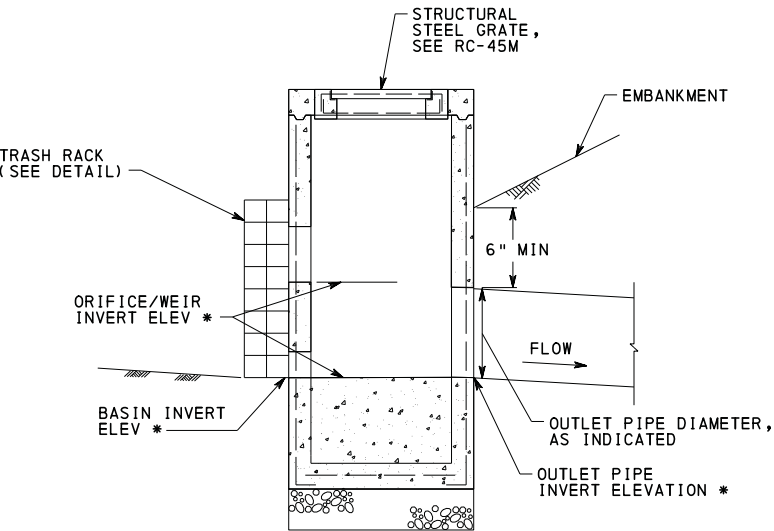


TRASH RACK



SECTION A-A

CONCRETE OUTLET STRUCTURE



SECTION B-B

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SEDIMENT BASIN  
AND SEDIMENT TRAP

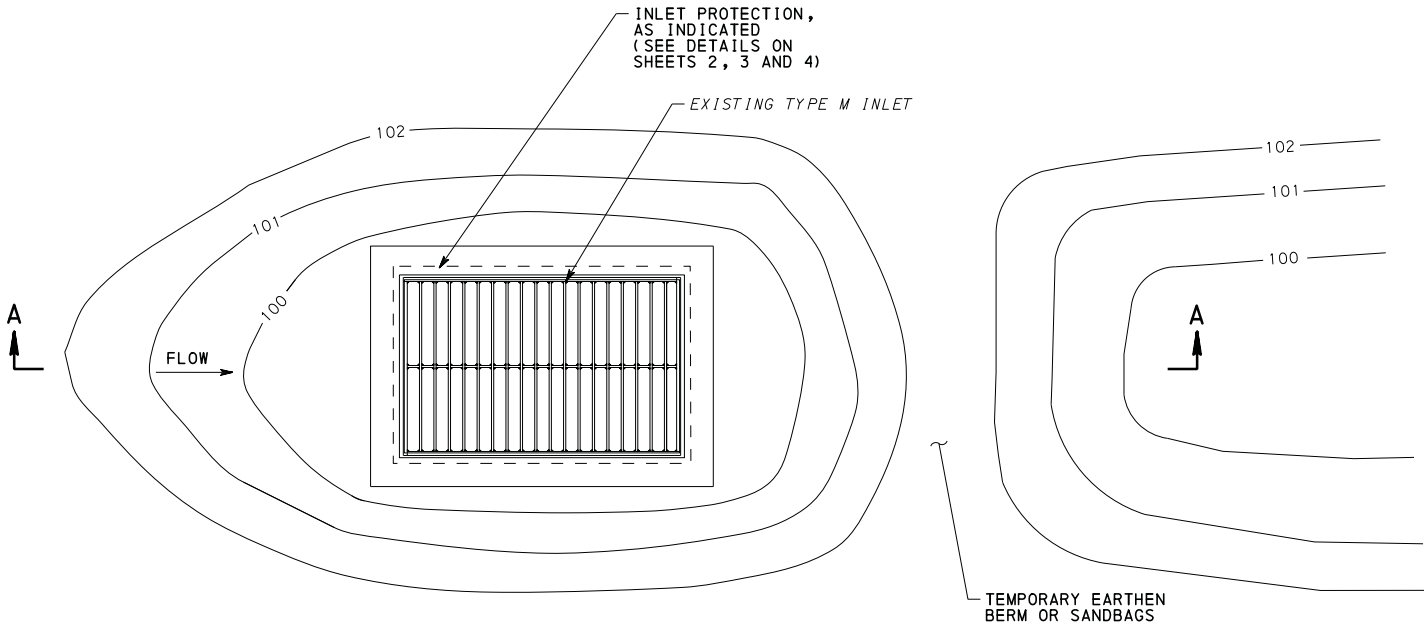
RECOMMENDED AUG. 4, 2017  
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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED AUG. 4, 2017  
*Brian J. Tolan*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

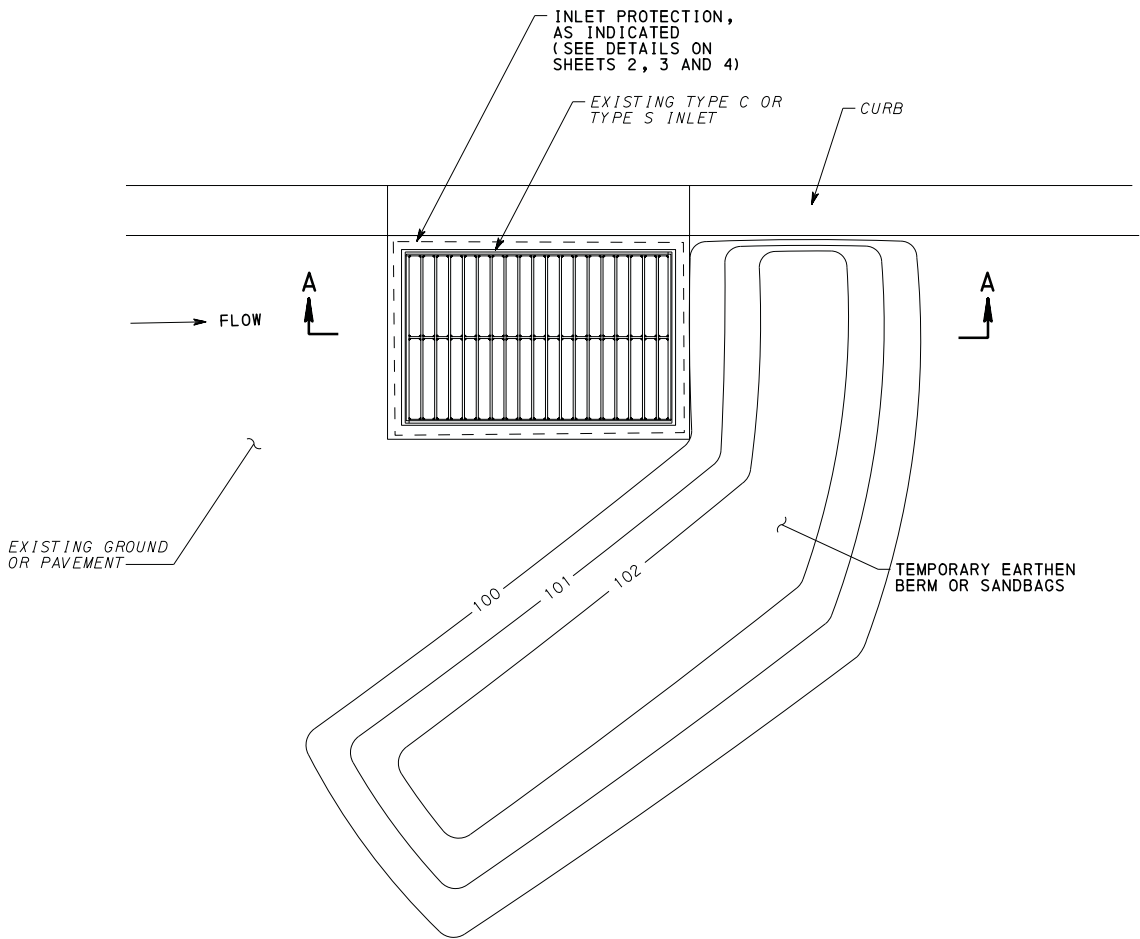
SHT 4 OF 4  
RC-71M

NOTES

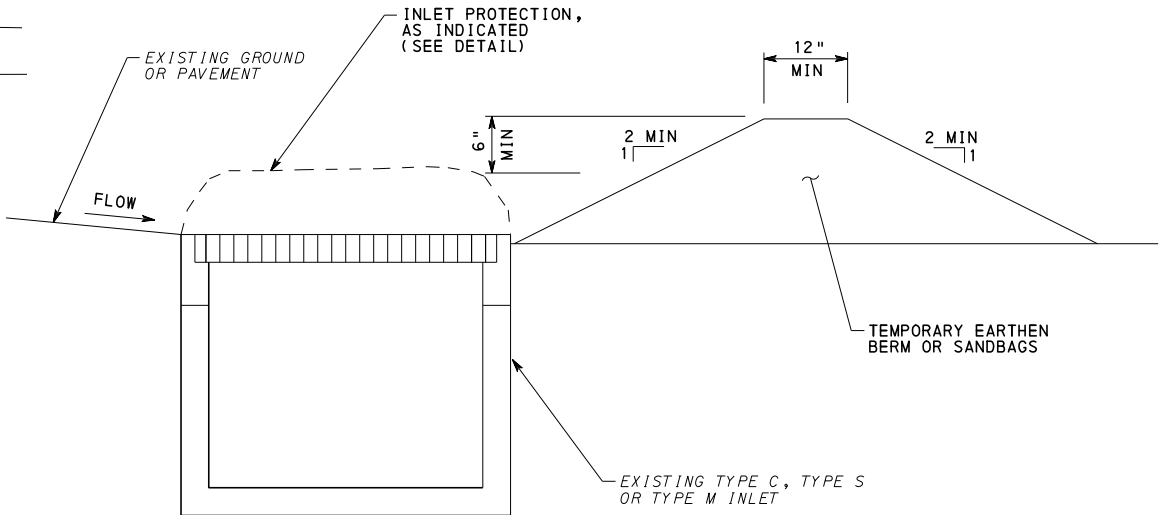
1. TEMPORARY EARTHEN BERMS OR SANDBAGS CAN BE USED FOR ALL INLET PROTECTION.
2. USE BERMS AS REQUIRED.
3. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.



TYPE M INLET PROTECTION



TYPE C OR TYPE S INLET PROTECTION



SECTION A-A

TYPE C, TYPE S OR TYPE M INLET PROTECTION SIDE VIEW

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET AND OUTLET  
PROTECTION

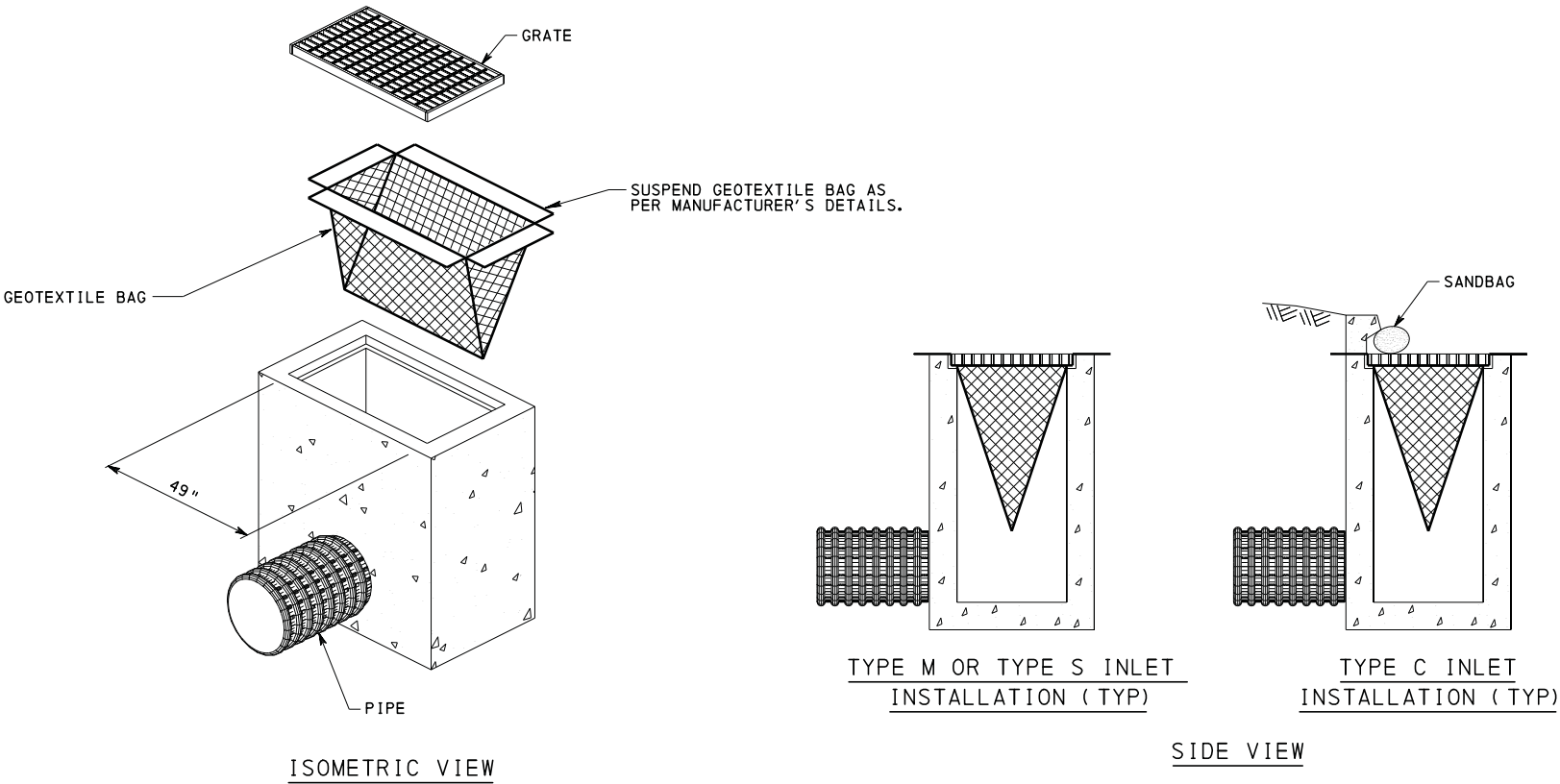
RECOMMENDED FEB. 8, 2019  
*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 7  
RC-72M

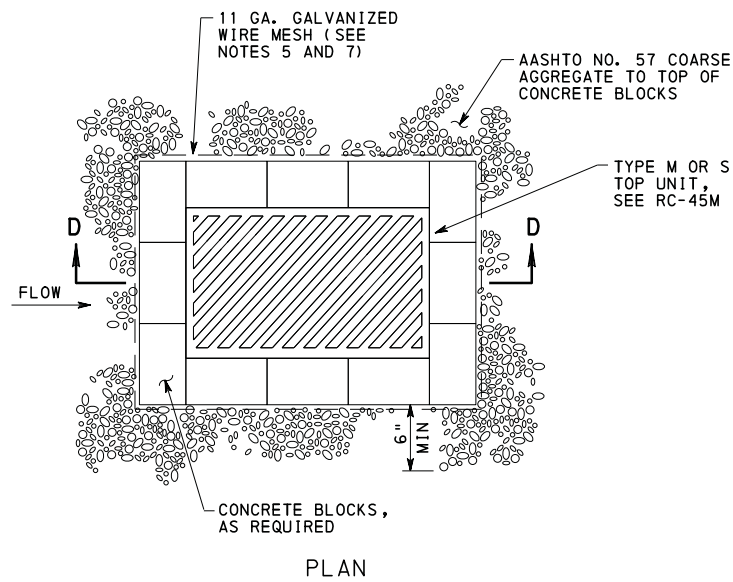
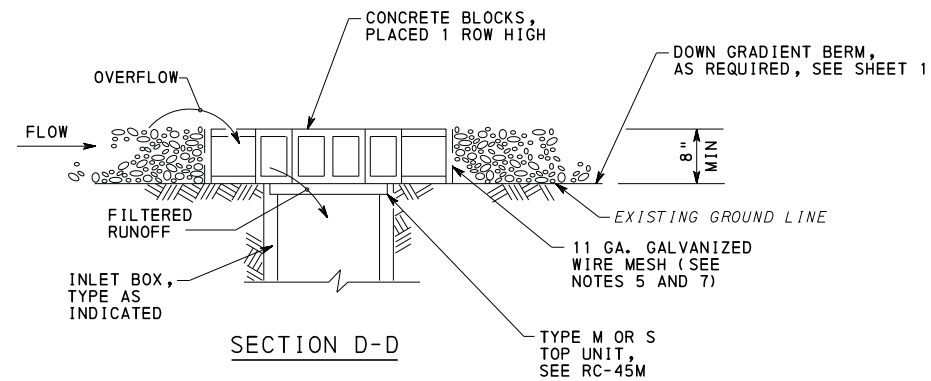
NOTES

1. INSPECT INLET FILTER BAG AFTER EACH RUNOFF EVENT. MAINTAIN AS REQUIRED TO ENSURE PROPER FUNCTIONING OF THE BAG.
2. REMOVE ACCUMULATED SEDIMENT/DEBRIS WHEN THE INLET FILTER REACHES ONE-HALF MAXIMUM CAPACITY.
3. REPLACE FILTER BAG IF RIPPED OR TORN.
4. PROVIDE DOWN GRADIENT BERM AS INDICATED ON SHEET 1. DO NOT USE IN SAG/SUMP CONDITIONS.
5. USE SANDBAGS AT TYPE C INLET CURB OPENINGS TO PREVENT BYPASS FLOW.
6. REMOVE AND PROPERLY DISPOSE OF INLET FILTER BAG WHEN NO LONGER NEEDED.

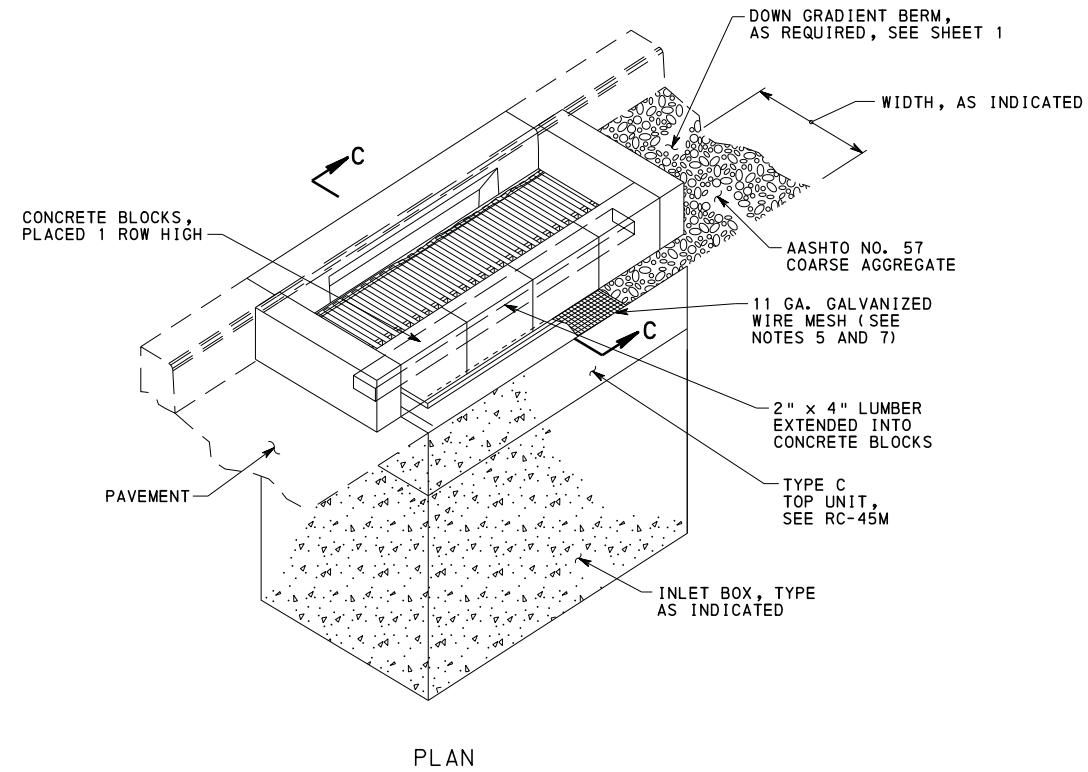
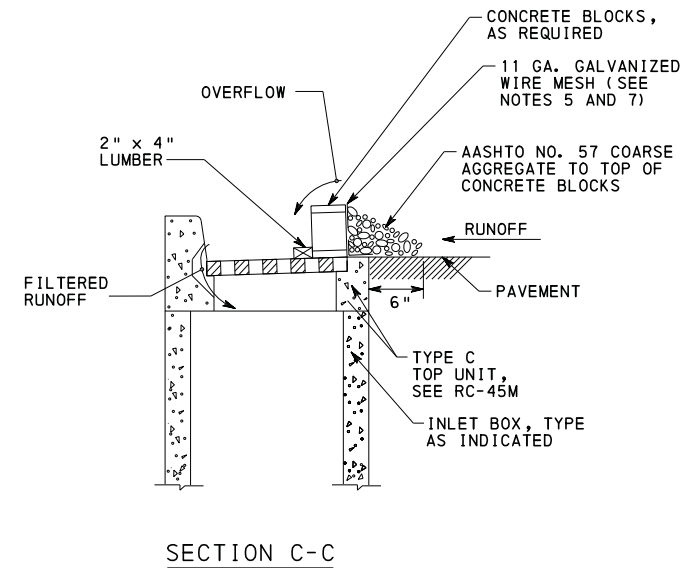


INLET FILTER BAG

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
INLET AND OUTLET PROTECTION		
RECOMMENDED FEB. 8, 2019 <i>Mark J. Chynoweth</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 2 OF 7 RC-72M



**CONCRETE BLOCK/GRAVEL INLET PROTECTION  
(TYPE M OR TYPE S INLETS)**



**CONCRETE BLOCK/GRAVEL INLET PROTECTION  
(TYPE C INLET)**

# NOTES

1. INSPECT AND REPAIR CONCRETE BLOCK/GRAVEL INLET FILTER AFTER EACH RUNOFF EVENT. REMOVE ACCUMULATED SEDIMENT AS NECESSARY. REMOVE AND DISPOSE OF SEDIMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
2. REMOVE SEDIMENT AS REQUIRED OR WHEN DIRECTED FROM TRAVELED ROADWAYS.
3. REPLACE AND SATISFACTORILY DISPOSE OF CLOGGED FILTER STONE (AASHTO NO. 57 COARSE AGGREGATE). RAKE PERIODICALLY TO INCREASE INFILTRATION.
4. PLACE 11 GA. GALVANIZED WIRE MESH AROUND PERIMETER OF CONCRETE BLOCKS TO PREVENT MOVEMENT OF GRAVEL.
5. UPON APPROVAL, 1/4" MAX PLASTIC MESH MAY BE SUBSTITUTED FOR GALVANIZED WIRE MESH.
6. PLACE CONCRETE BLOCKS MEETING THE REQUIREMENTS OF PUBLICATION 408 AROUND INLET PERIMETER.
7. PLACE 11 GA. GALVANIZED WIRE MESH OVER EXPOSED GRATE AREA OF TYPE C INLETS ONLY. PLACE WIRE MESH ALONG PERIMETER OF CONCRETE BLOCKS PRIOR TO PLACING AASHTO NO. 57 COARSE AGGREGATE, ALL INLET TYPES.
8. PROVIDE DOWN GRADIENT BERM AS INDICATED ON SHEET 1. DO NOT USE IN SAG/SUMP CONDITIONS.
9. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.

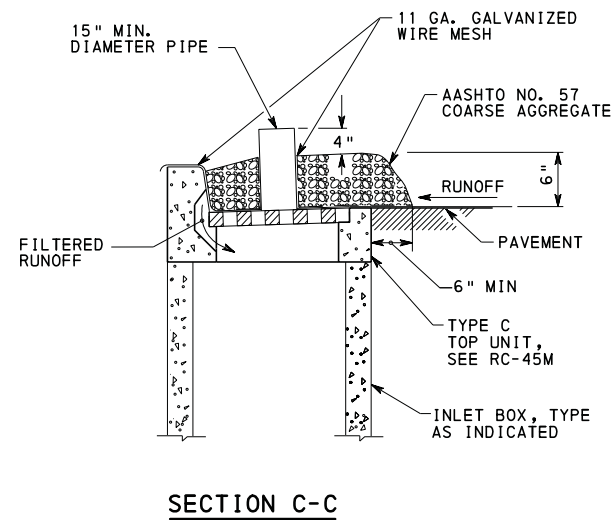
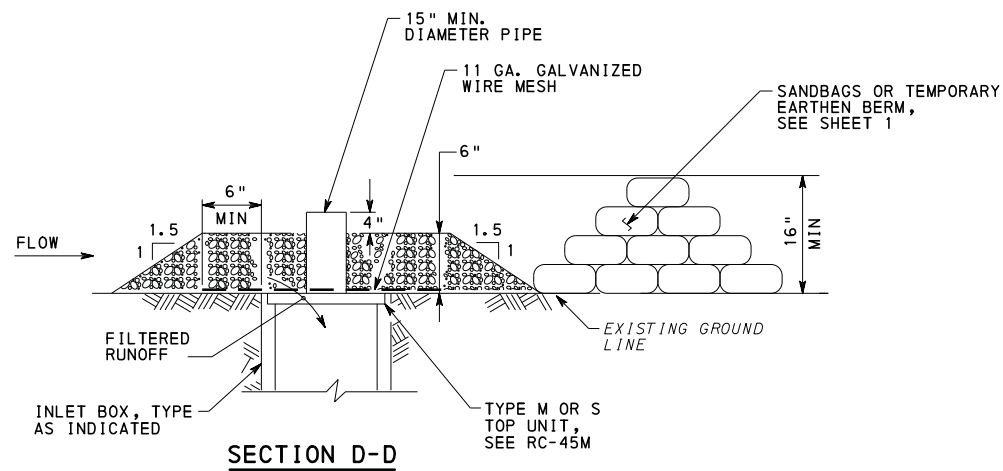
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## INLET AND OUTLET PROTECTION

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CHIEF, HWY. DELIVERY DIVISION

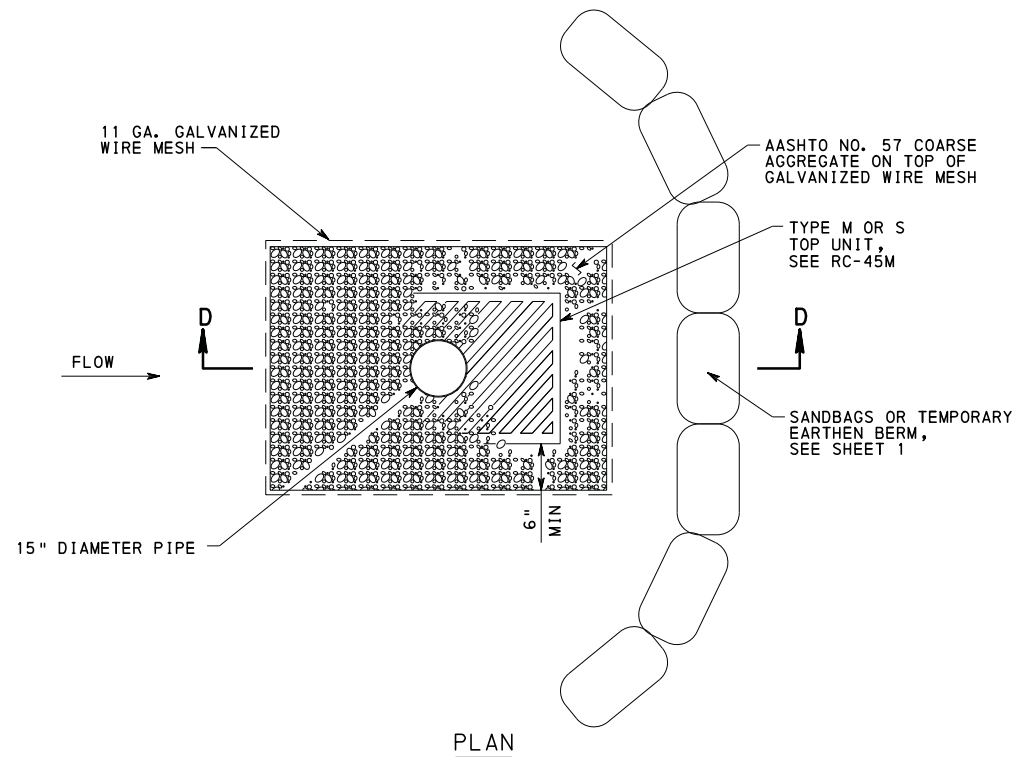
RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 7  
RC-72M

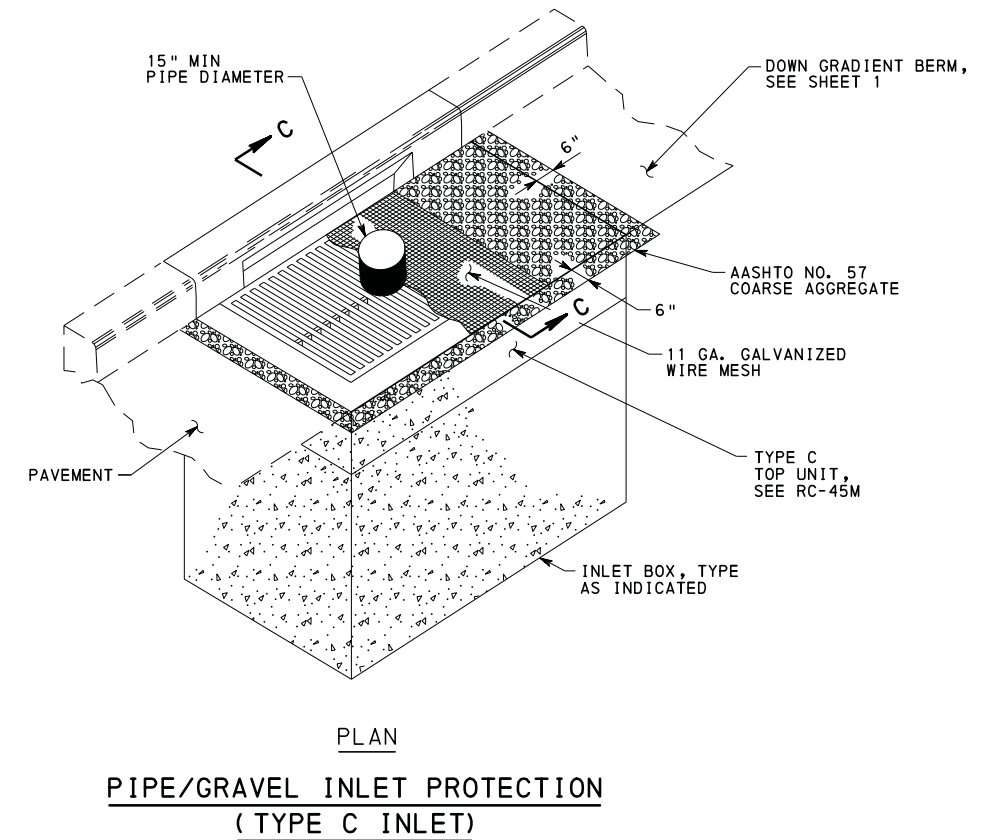


#### NOTES

1. INSPECT AND REPAIR PIPE/GRAVEL INLET FILTER AFTER EACH RUNOFF EVENT. REMOVE ACCUMULATED SEDIMENT AS NECESSARY. REMOVE AND DISPOSE OF SEDIMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
2. REMOVE SEDIMENT AS REQUIRED OR WHEN DIRECTED FROM TRAVELED ROADWAYS.
3. REPLACE AND SATISFACTORILY DISPOSE OF CLOGGED FILTER STONE (AASHTO NO. 57 COARSE AGGREGATE). RAKE PERIODICALLY TO INCREASE INFILTRATION.
4. PLACE 11 GA. GALVANIZED WIRE MESH ON TOP OF INLET.
5. PLACE 15" DIAMETER PIPE ON WIRE MESH AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
6. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.



PIPE/GRAVEL INLET PROTECTION  
(TYPE M OR TYPE S INLET)



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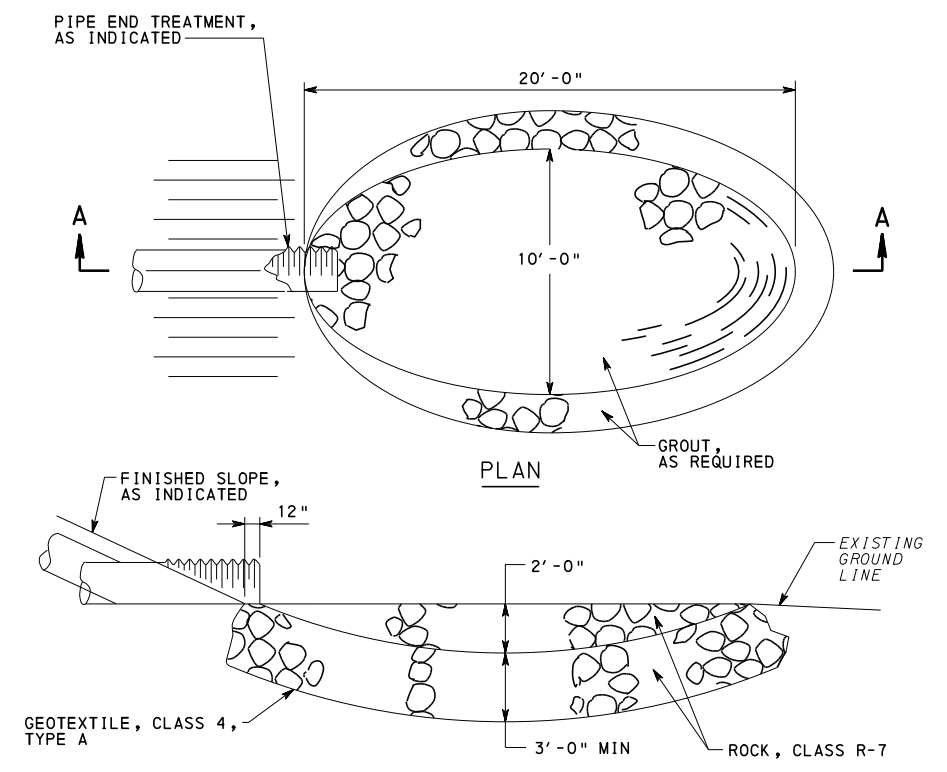
#### INLET AND OUTLET PROTECTION

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CHIEF, HWY. DELIVERY DIVISION

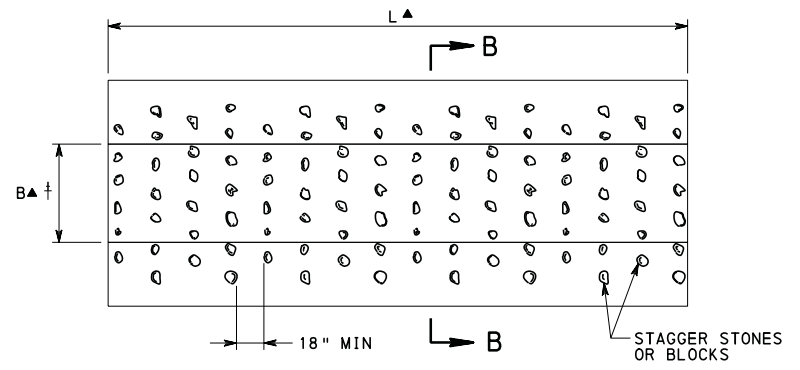
RECOMMENDED FEB. 8, 2019  
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DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 4 OF 7  
RC-72M

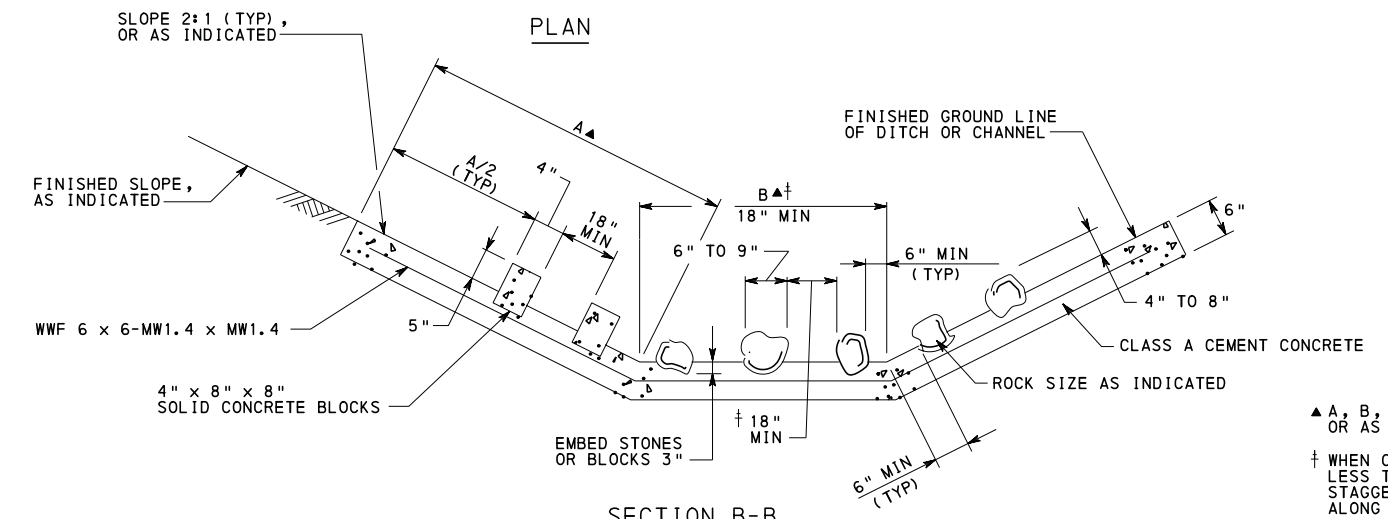




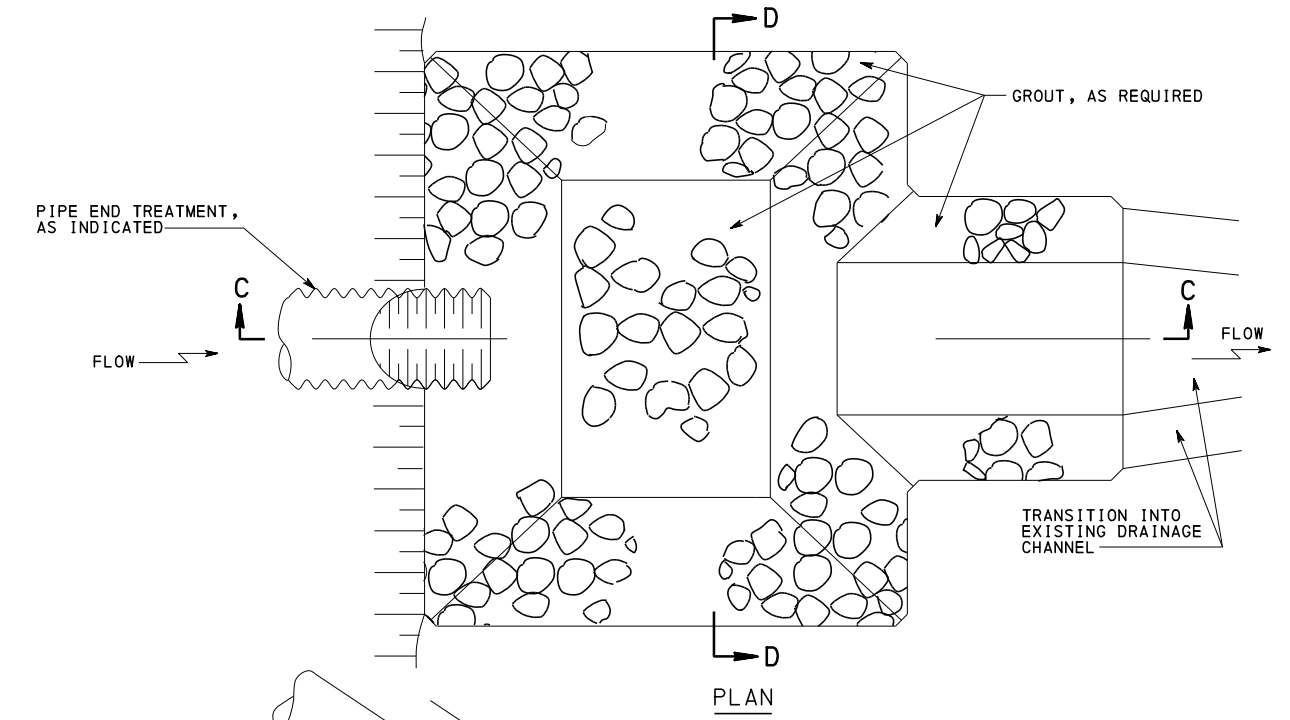
SECTION A-A  
ROCK BASIN



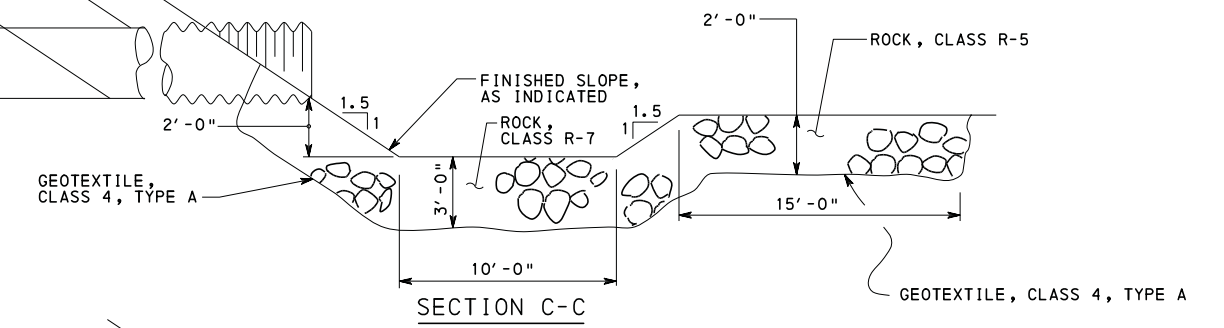
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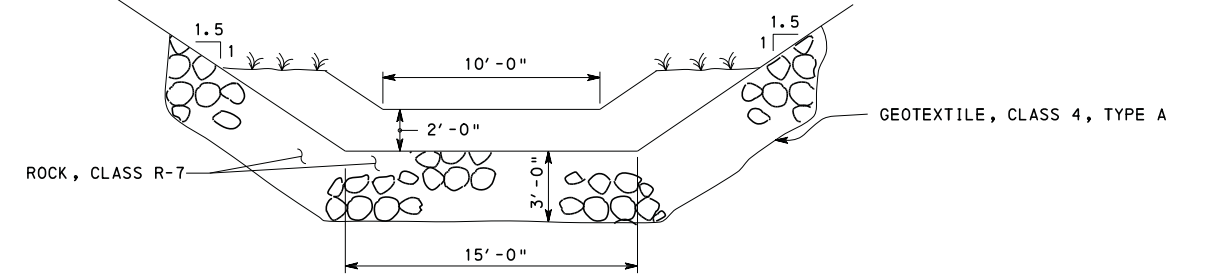
SECTION B-B  
PAVED ENERGY DISSIPATOR



PLAN



SECTION C-C



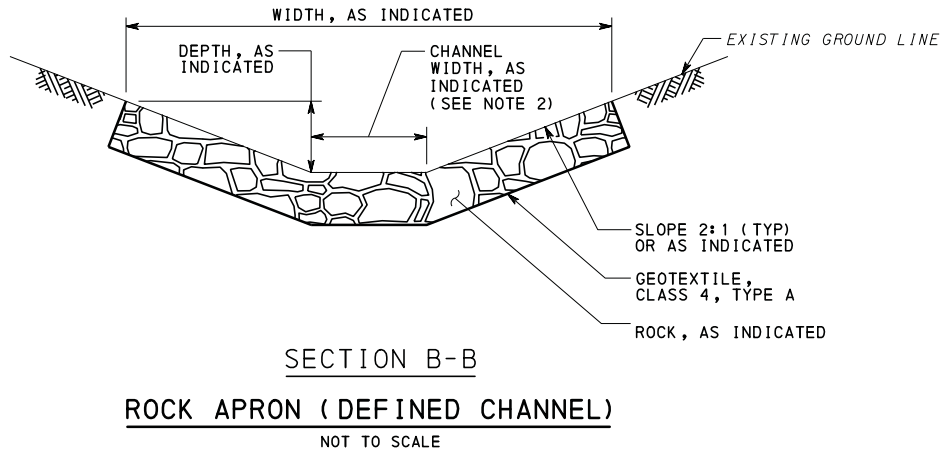
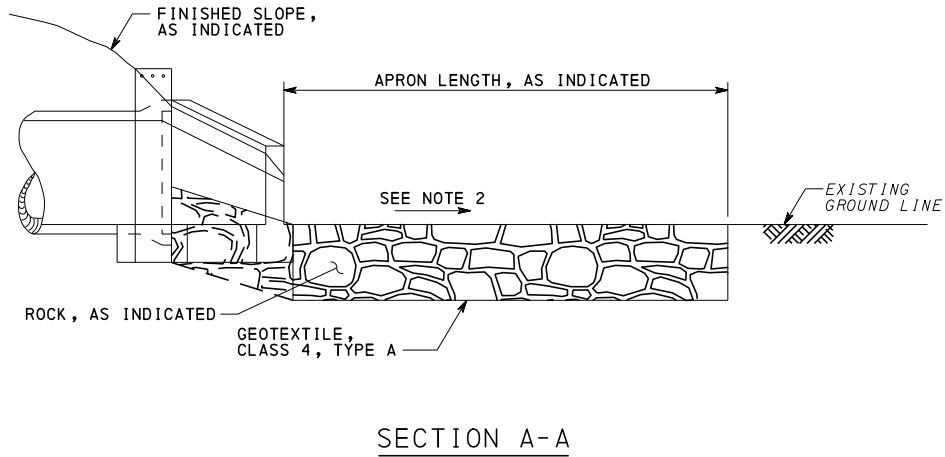
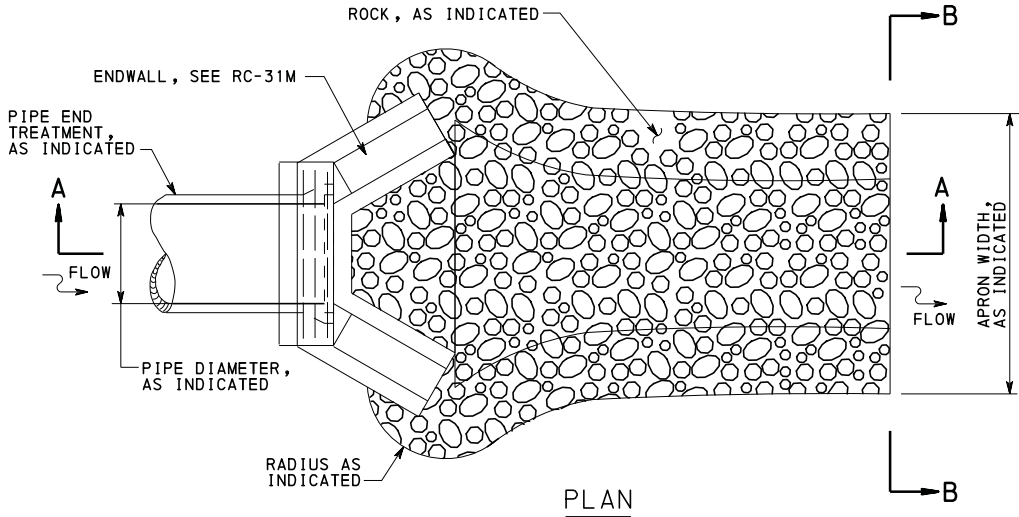
SECTION D-D  
ROCK ENERGY DISSIPATOR

▲ A, B, AND L AS INDICATED  
OR AS DIRECTED  
† WHEN CHANNEL BOTTOM WIDTH IS  
LESS THAN 3'-0", USE A SINGLE,  
STAGGERED ROW OF STONES OR BLOCKS  
ALONG CHANNEL BOTTOM

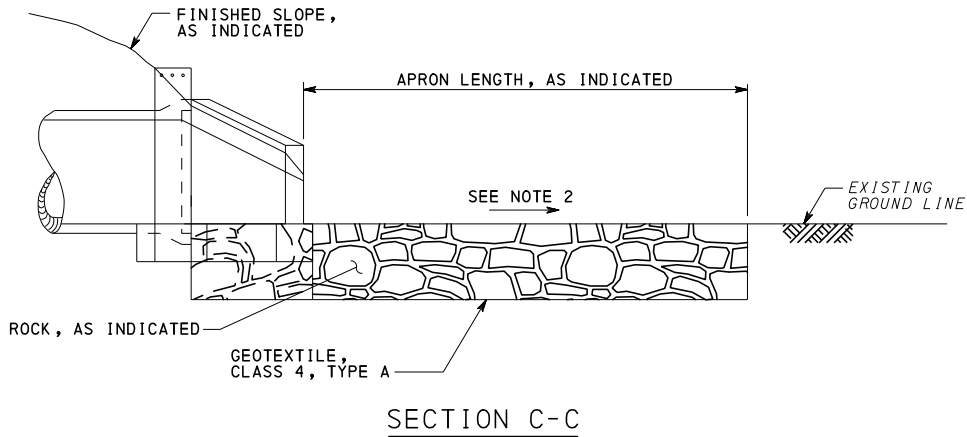
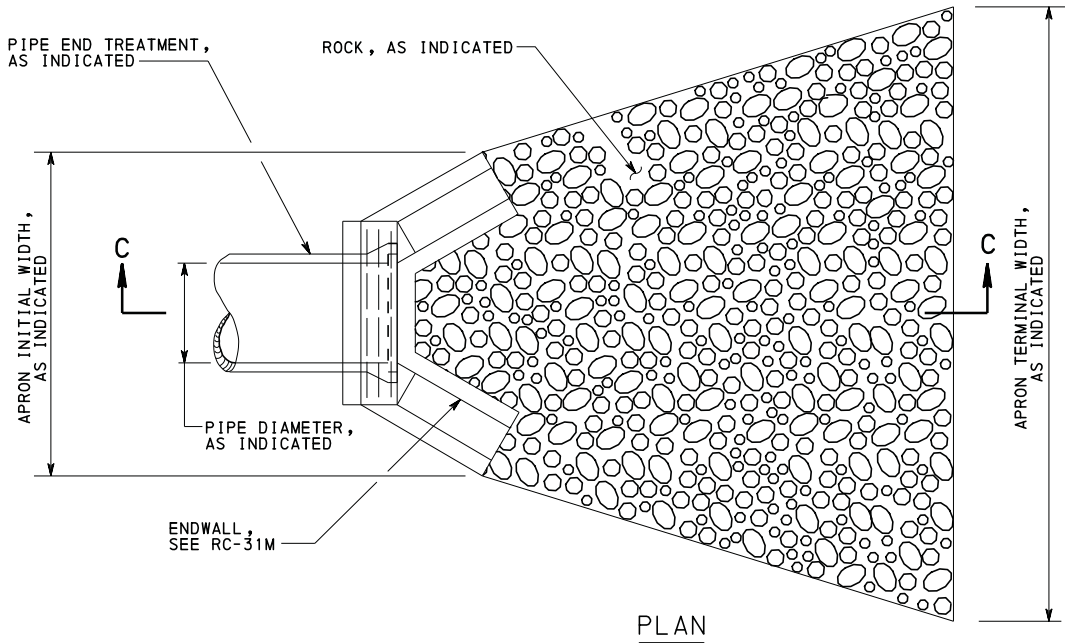
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INLET AND OUTLET PROTECTION		
RECOMMENDED FEB. 8, 2019 <i>Mark J. Chynoweth</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 5 OF 7 RC-72M

NOTES

1. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
2. SLOPE SHOULD BE LEVEL OR AS CLOSE TO LEVEL AS REASONABLY POSSIBLE BASED ON SITE CONDITIONS.



SECTION B-B  
ROCK APRON (DEFINED CHANNEL)  
NOT TO SCALE



SECTION C-C  
ROCK APRON (FLAT AREA)

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

INLET AND OUTLET  
PROTECTION

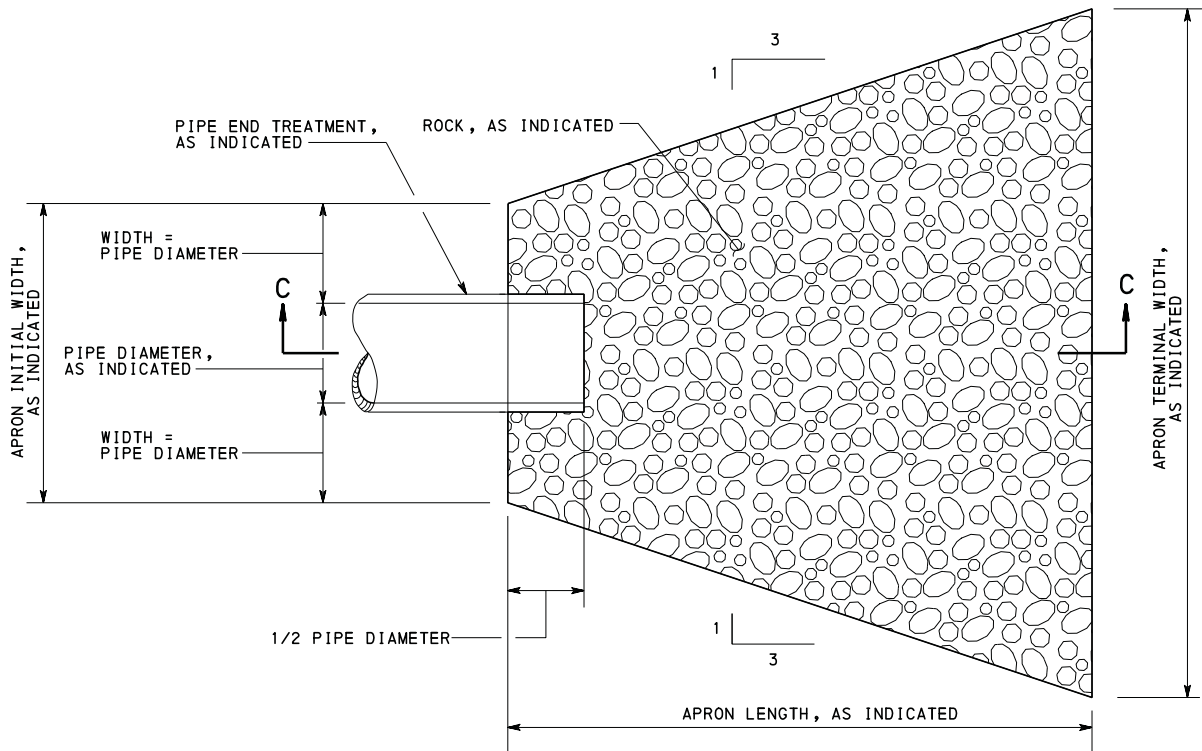
RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

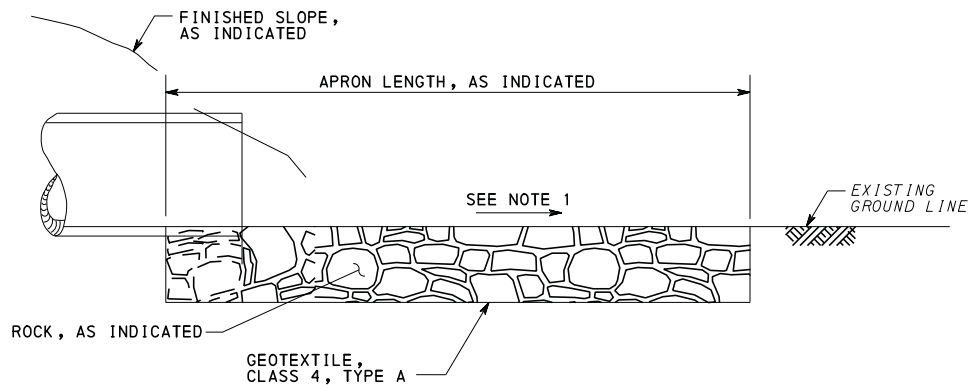
SHT 6 OF 7  
RC-72M

NOTE

1. SLOPE SHOULD BE LEVEL OR AS CLOSE TO LEVEL AS REASONABLY POSSIBLE BASED ON SITE CONDITIONS.



PLAN



SECTION C-C

ROCK APRON (FLAT AREA)

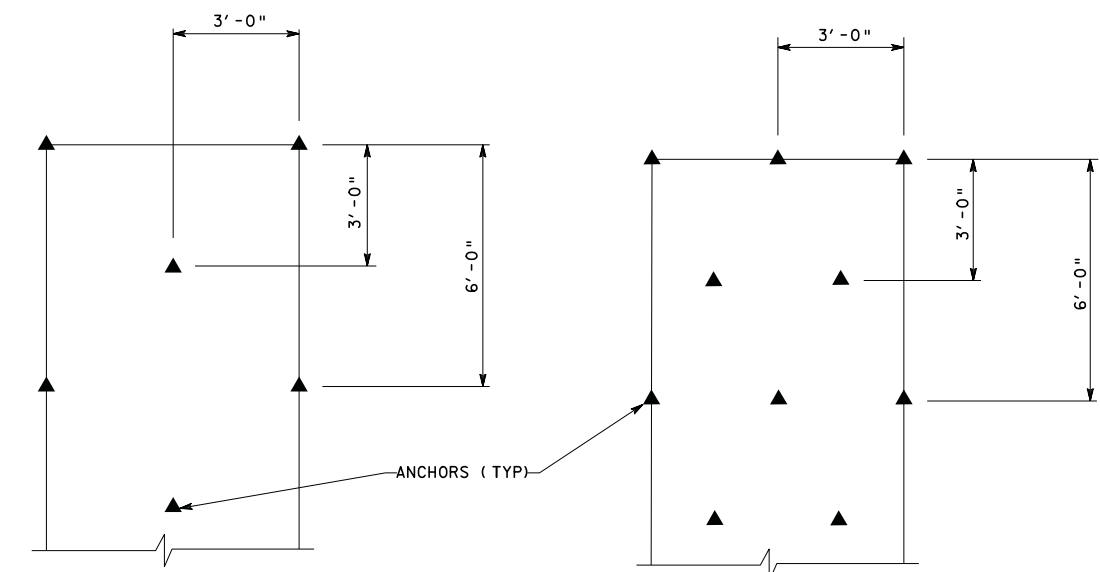
COMMONWEALTH OF PENNSYLVANIA  
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BUREAU OF PROJECT DELIVERY

INLET AND OUTLET  
PROTECTION

RECOMMENDED FEB. 8, 2019  
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CHIEF, HWY. DELIVERY DIVISION

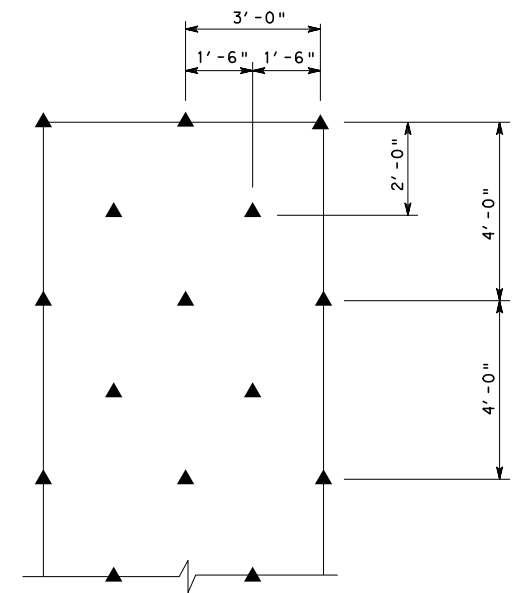
RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 7 OF 7  
RC-72M

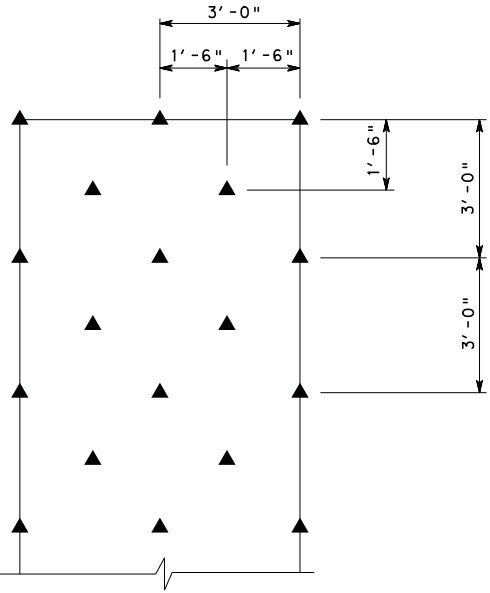


ANCHOR PATTERN FOR  
SLOPES FLATTER THAN 3:1  
1 ANCHOR/SY

ANCHOR PATTERN FOR SLOPES  
BETWEEN 3:1 AND 2:1  
(INCLUDING 3:1)  
1½ ANCHORS/SY



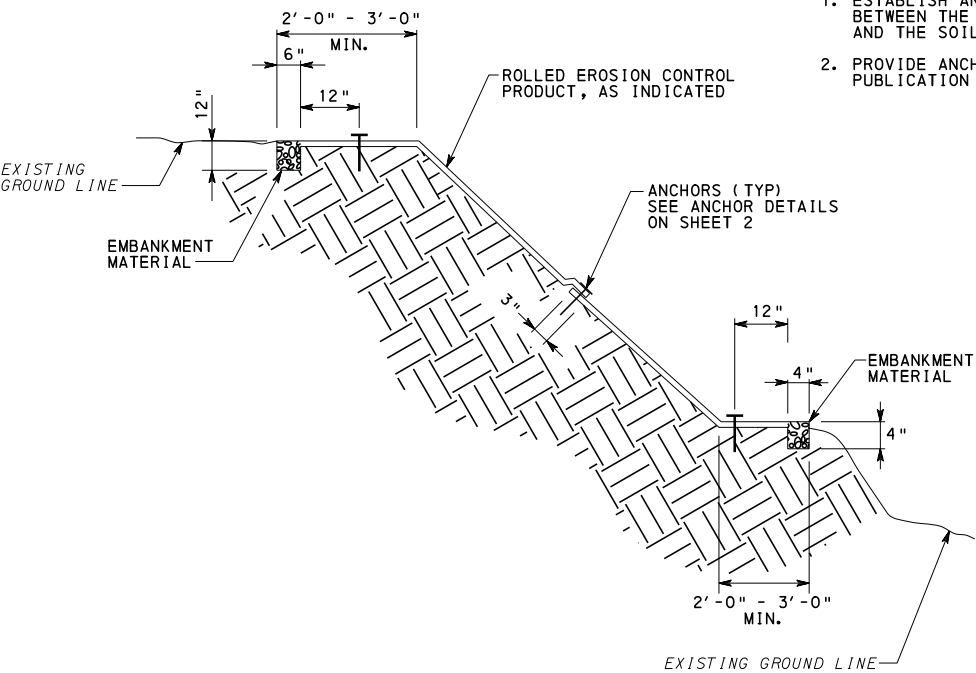
ANCHOR PATTERN FOR SLOPES  
BETWEEN 2:1 AND 1:1  
(INCLUDING 2:1)  
2 ANCHORS/SY



ANCHOR PATTERN FOR  
1:1 OR STEEPER  
2½ ANCHORS/SY

ANCHOR PATTERNS FOR SLOPES

ROLLED EROSION CONTROL PRODUCTS (RECP)



TYPICAL SLOPE CROSS-SECTION

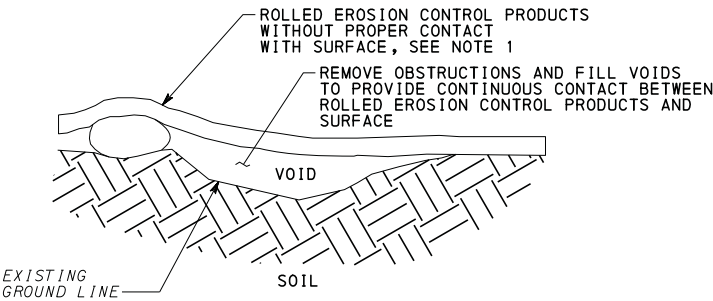


FIGURE 1  
LACK OF CONTINUOUS CONTACT

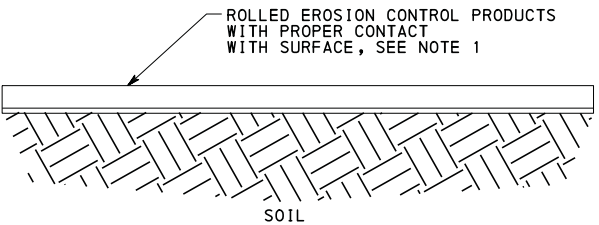


FIGURE 2  
CONTINUOUS CONTACT

NOTES

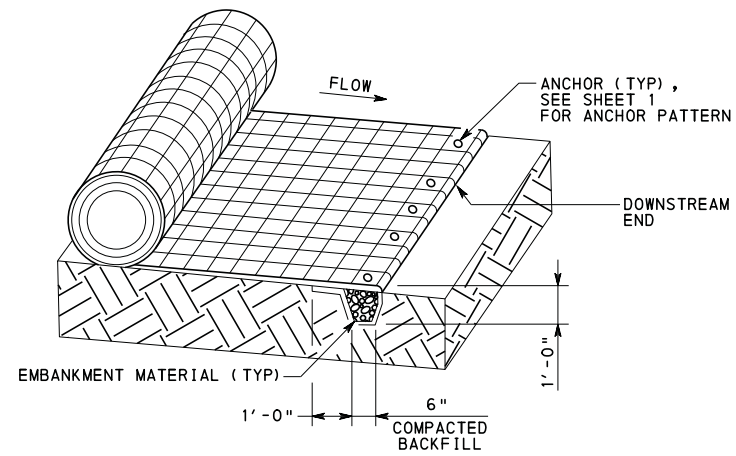
1. ESTABLISH AND MAINTAIN CONTINUOUS CONTACT BETWEEN THE ROLLED EROSION CONTROL PRODUCTS AND THE SOIL.
2. PROVIDE ANCHORING DEVICES IN ACCORDANCE WITH PUBLICATION 408, SECTION 806.2(d).

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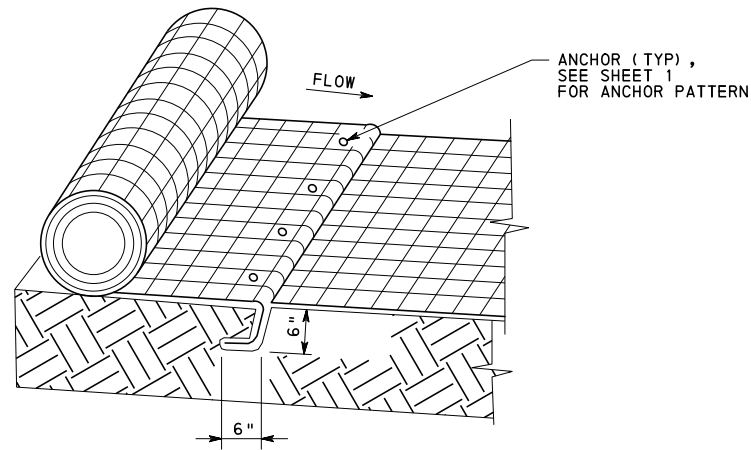
CHANNEL AND SLOPE  
PROTECTION

RECOMMENDED FEB. 8, 2019  
CHIEF, HWY. DELIVERY DIVISION  
RECOMMENDED FEB. 8, 2019  
DIRECTOR, BUREAU OF PROJECT DELIVERY

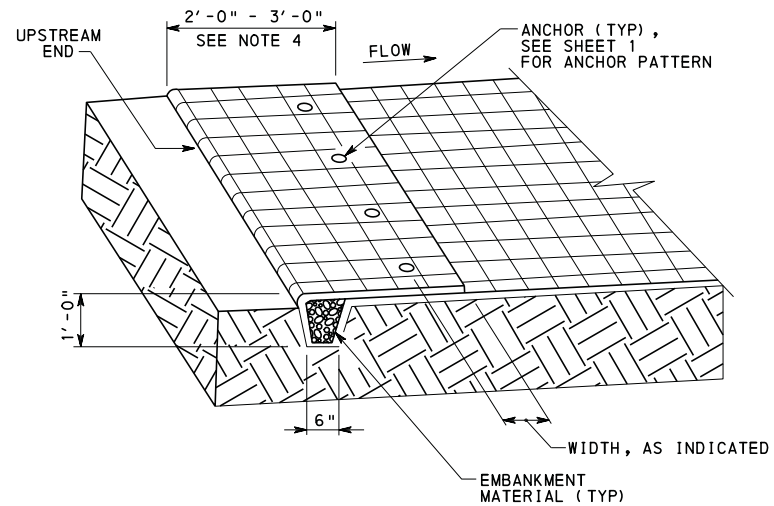
SHT 1 OF 4  
RC-73M



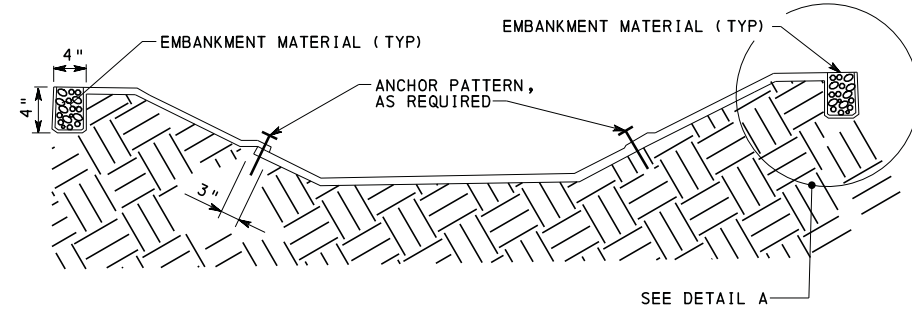
INITIAL ANCHOR TRENCH  
SEE NOTE 1



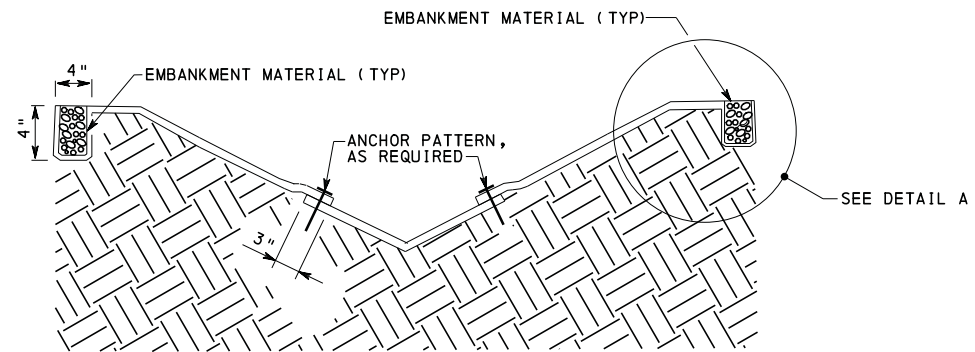
INTERMITTENT CHECK SLOT  
SEE NOTE 2



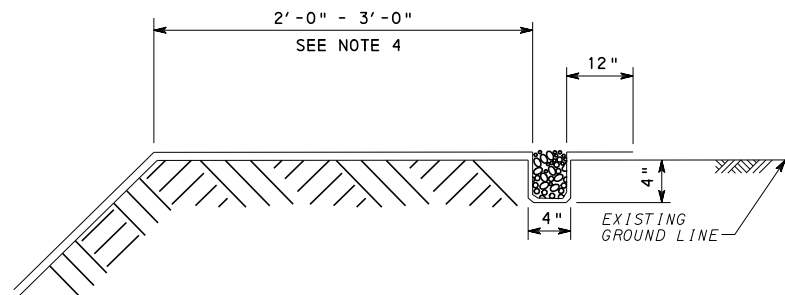
TERMINAL ANCHOR TRENCH  
SEE NOTE 3



TYPICAL TRAPEZOIDAL  
CHANNEL CROSS-SECTION



TYPICAL V-DITCH  
CROSS-SECTION



DETAIL A

## NOTES

1. EXCAVATE INITIAL ANCHOR TRENCH 1'-0" DEEP AND 6" WIDE ACROSS THE WIDTH OF THE CHANNEL TO PREVENT UNDERMINING OF THE ROLLED EROSION CONTROL PRODUCTS.
2. EXCAVATE INTERMITTENT CHECK SLOT 6" DEEP AND 6" WIDE ACROSS THE WIDTH OF THE CHANNEL AT 25'-0" TO 30'-0" ALONG THE LENGTH OF THE ROLLED EROSION CONTROL PRODUCTS TO PREVENT LOOSE SOIL FROM BEING TRANSPORTED DOWNSTREAM BENEATH THE ROLLED EROSION CONTROL PRODUCTS.
3. EXCAVATE TERMINAL ANCHOR TRENCH 1'-0" DEEP AND 6" WIDE ACROSS THE WIDTH OF THE CHANNEL TO ENSURE WATER FLOW TRANSITIONS SMOOTHLY ONTO THE ROLLED EROSION CONTROL PRODUCTS WITHOUT SEPARATION FROM THE SOIL.
4. EXTEND ROLLED EROSION CONTROL PRODUCTS 2'-0" - 3'-0" ABOVE THE CREST OF CHANNEL SIDE WHENEVER POSSIBLE.
5. PLACE 2½ ANCHORS/SY.
6. PROVIDE ANCHORING DEVICES IN ACCORDANCE WITH SECTION 806.2(d) OF PUBLICATION 408.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## CHANNEL AND SLOPE PROTECTION

RECOMMENDED FEB. 8, 2019  
*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

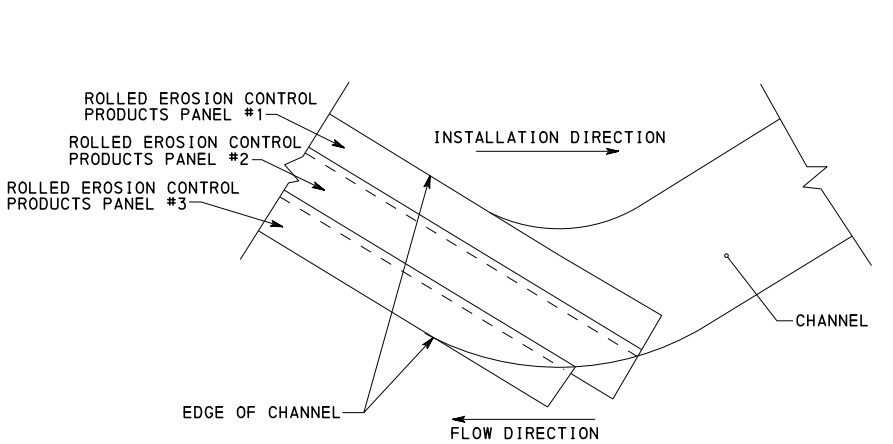
SHT 2 OF 4  
RC-73M

ROLLED EROSION CONTROL PRODUCTS (RECP)

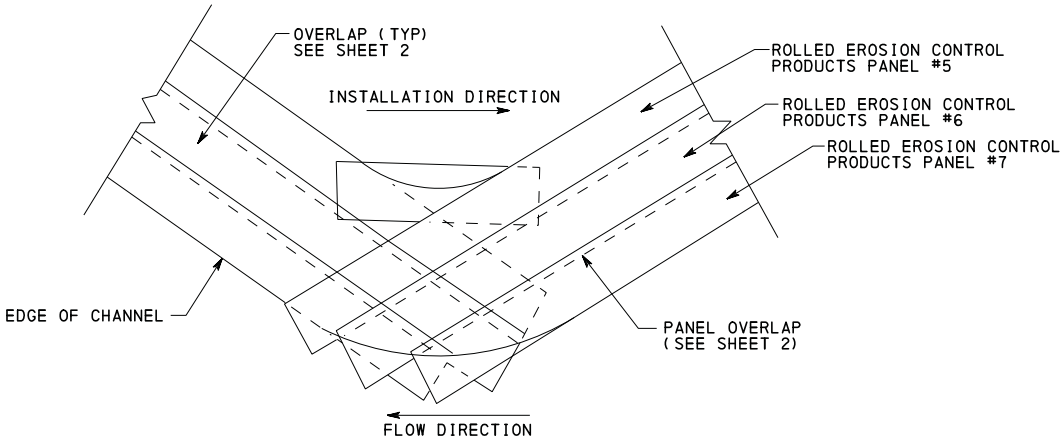


NOTES

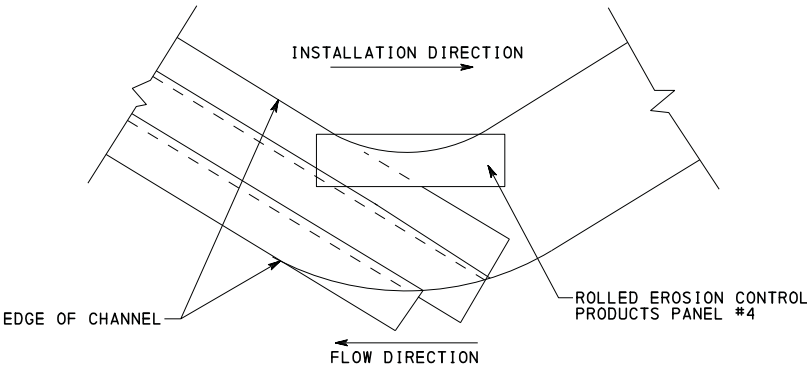
1. INSTALL ROLLED EROSION CONTROL PRODUCTS IN STRAIGHT SECTIONS AROUND CHANNEL BEND TO AVOID CURLING OF MAT EDGES. INSTALL ROLLED EROSION CONTROL PRODUCTS STARTING WITH PANEL #1.
2. ESTABLISH AND MAINTAIN CONTINUOUS CONTACT BETWEEN THE ROLLED EROSION CONTROL PRODUCTS AND SOIL SURFACE.
3. INSTALL ROLLED EROSION CONTROL PRODUCTS AS INDICATED AND AS SHOWN ON SHEET 2.
4. TERMINATE PANELS AT CHANNEL EDGE OR AS DIRECTED BY THE REPRESENTATIVE.



ROLLED EROSION CONTROL PRODUCTS PANELS 1, 2 & 3



ROLLED EROSION CONTROL PRODUCTS PANELS 5, 6 & 7



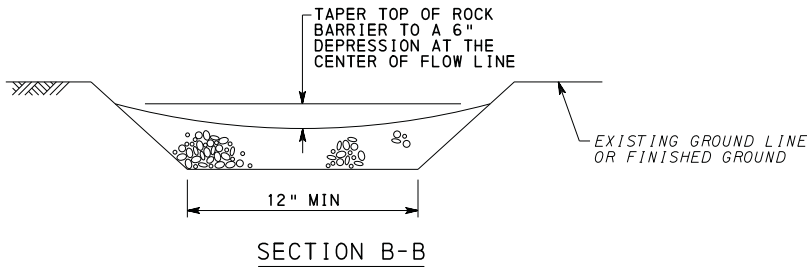
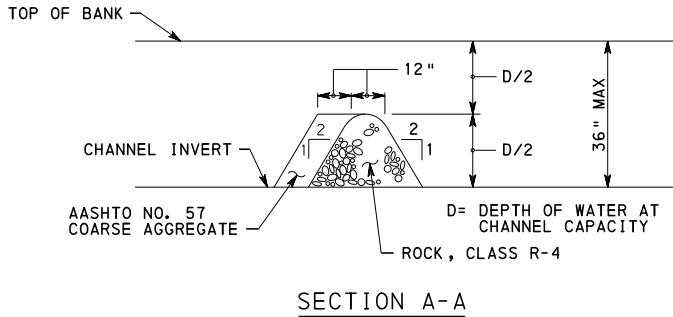
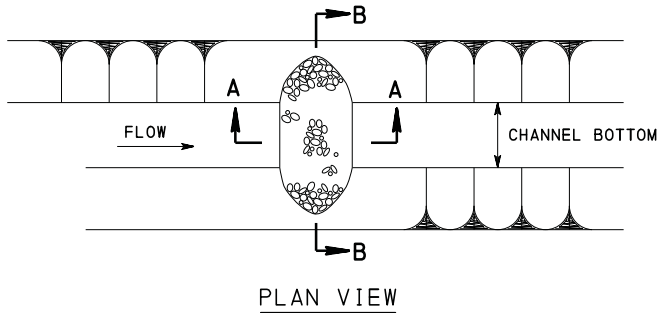
ROLLED EROSION CONTROL PRODUCTS PANEL 4

INSTALLATION FOR CHANNEL BENDS  
ROLLED EROSION CONTROL PRODUCTS (RECP)

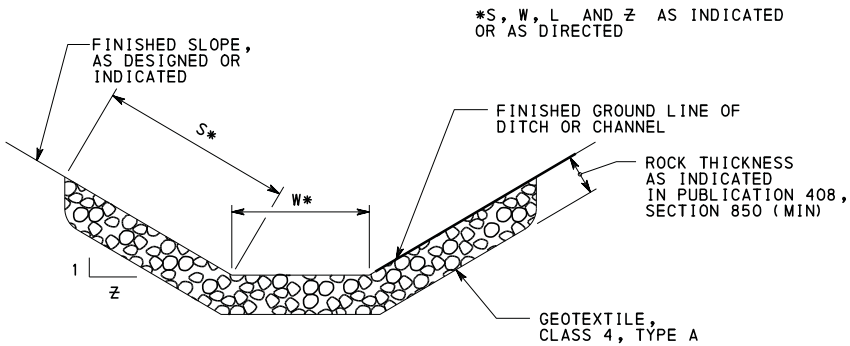
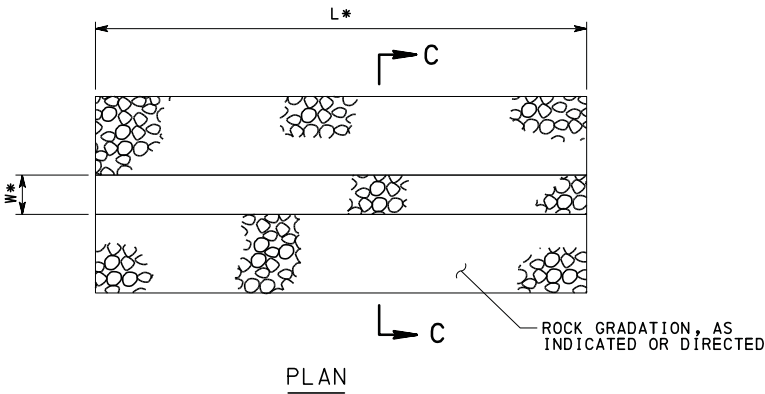
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY		
CHANNEL AND SLOPE PROTECTION		
RECOMMENDED FEB. 8, 2019 <i>Mark J. Chynoweth</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 <i>Melissa J. Batek</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 3 OF 4 RC-73M

NOTES

1. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-HALF THE HEIGHT OF THE ROCK BARRIER. REPLACE CLOGGED FILTER STONE. REMOVE AND DISPOSE OF SEDIMENT IN AN APPROVED MANNER.
2. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.



ROCK BARRIER



ROCK LINING FOR CHANNELS

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

CHANNEL AND SLOPE  
PROTECTION

RECOMMENDED FEB. 8, 2019  
*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

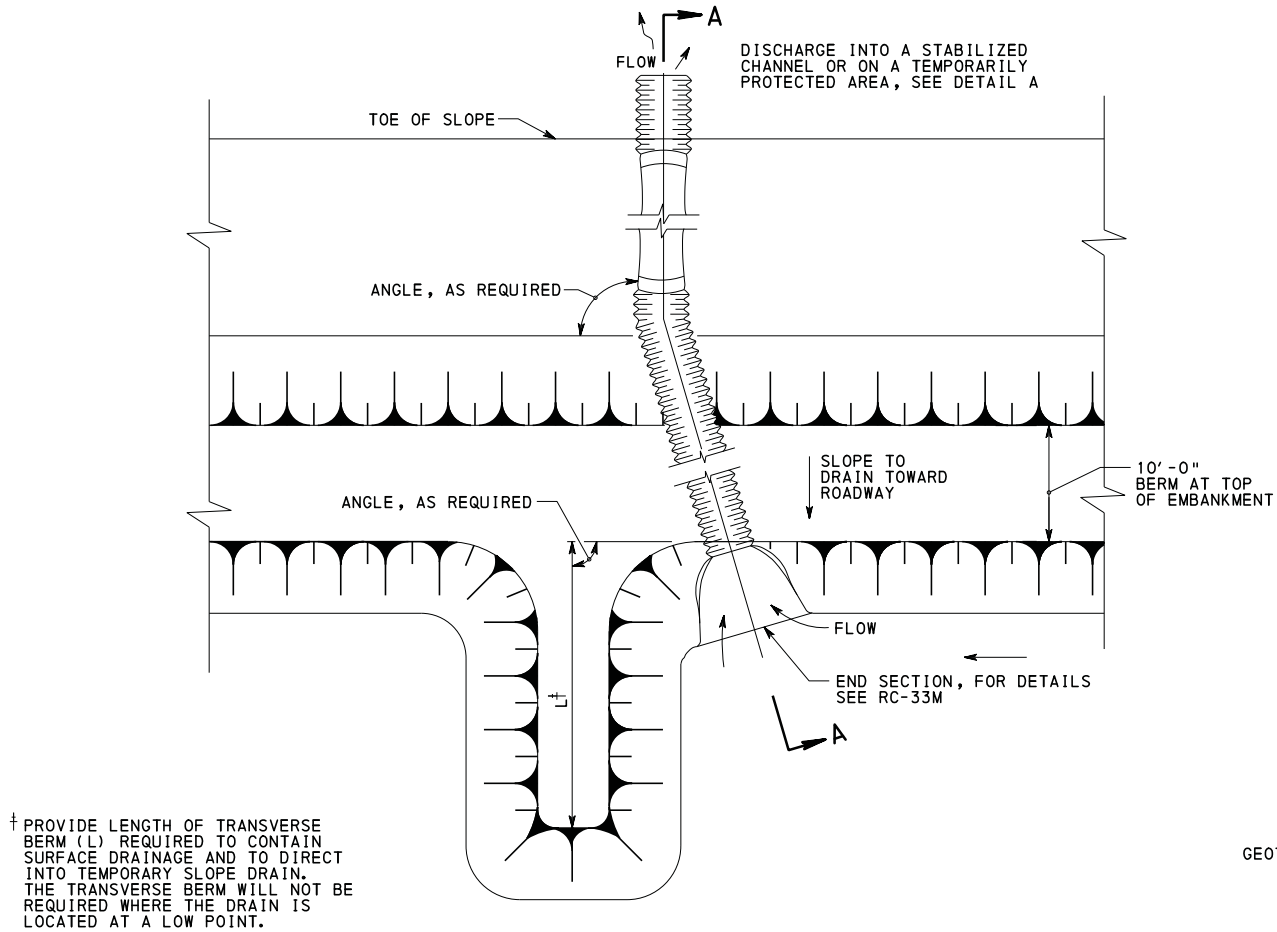
SHT 4 OF 4  
RC-73M

NOTES

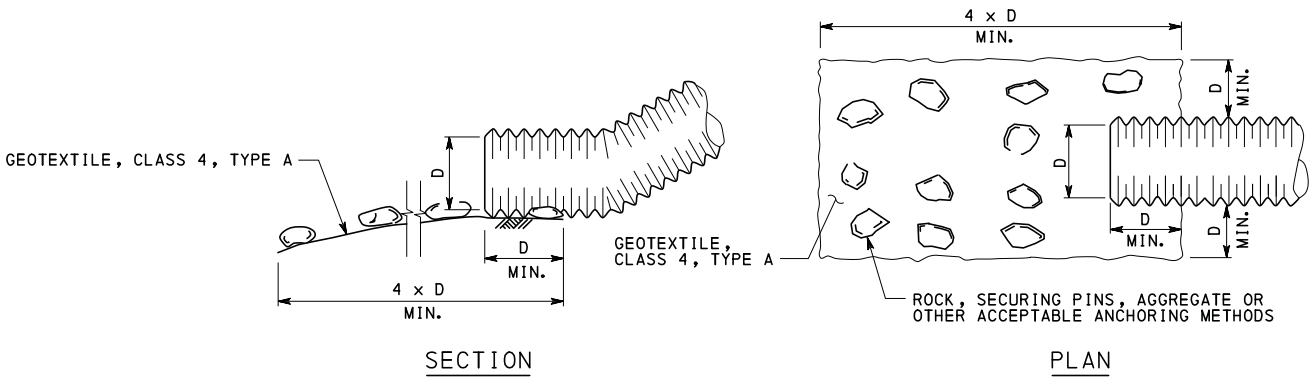
1. MAINTAIN SLOPE PIPES AT ALL TIMES AS INDICATED IN PUBLICATION 408, SECTION 854. CLEAN OR REPAIR ALL CLOGGED OR LEAKING PIPES AS NECESSARY. REPLACE ALL INLETS AND OUTLETS AS NECESSARY. REMOVE ACCUMULATED SEDIMENT FROM THE ENTRANCE OR EXIT OF EACH SLOPE PIPE AND DISPOSE OF IN AN APPROVED MANNER.
2. INSPECT TEMPORARY SLOPE PIPES ONCE A WEEK AND AFTER EACH STORM EVENT THAT PRODUCES RUNOFF.

TABLE A  
SUGGESTED MINIMUM SIZES

DRAINAGE AREA ACRES	CORRUGATED PIPE SIZE DIAMETER INCHES	MINIMUM BERM HEIGHT INCHES
0 TO 2	12	24
2 TO 4	15	27
4 TO 5	18	30



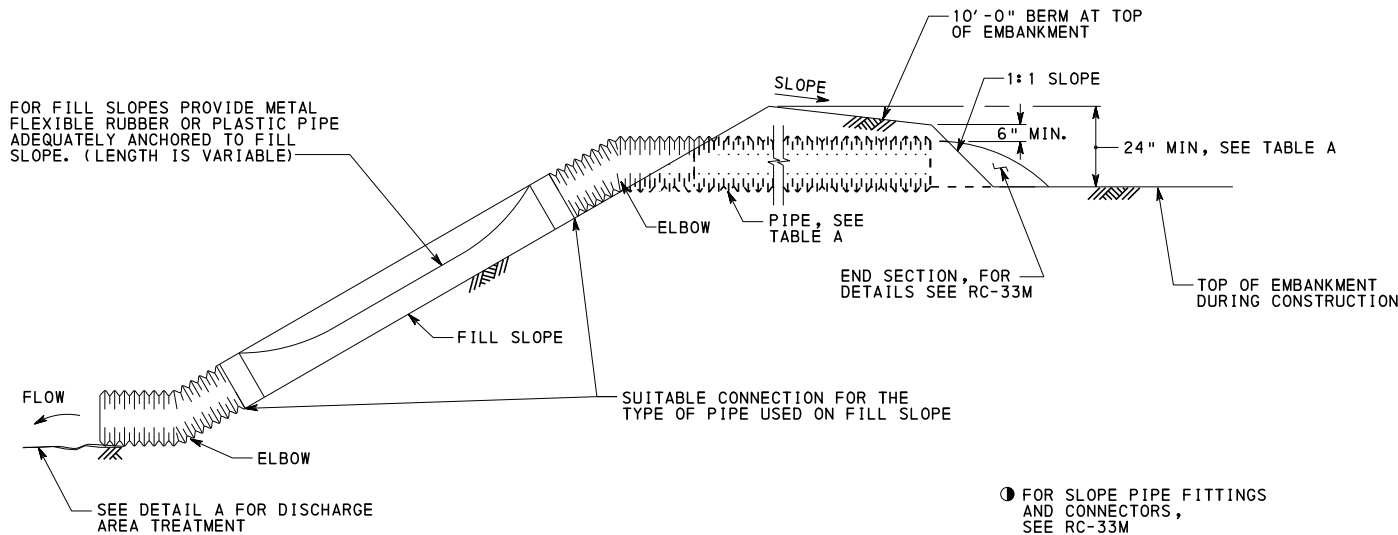
PLAN



SECTION

PLAN

DETAIL A



SECTION A-A  
TEMPORARY SLOPE PIPE ●

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

TEMPORARY DIVERSIONS

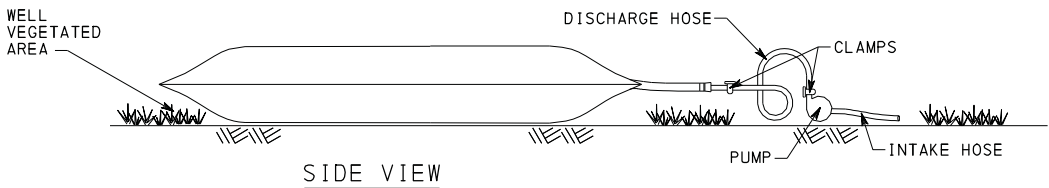
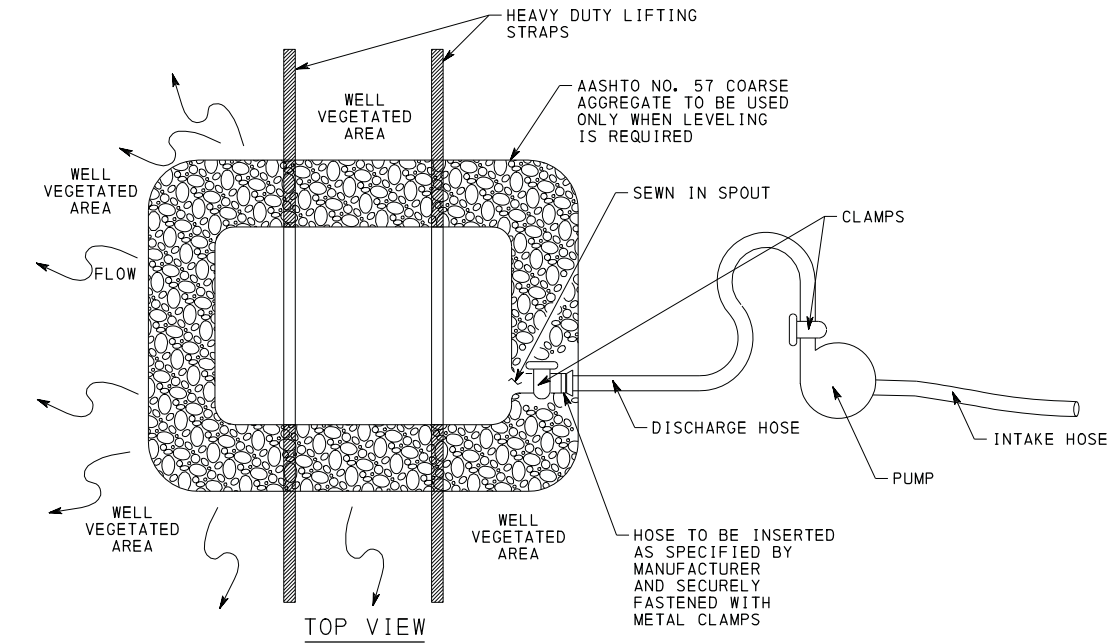
RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 1  
RC-74M

NOTES

1. LOCATE BAG IN LEVEL AREAS (LESS THAN 5% GRADE). WHEN LEVEL AREAS ARE NOT AVAILABLE, PLACE AASHTO NO. 57 COARSE AGGREGATE TO LEVEL THE BAG.
2. LOCATE BAG IN A WELL VEGETATED AREA. DISCHARGE ONTO A STABLE, EROSION RESISTANT AREA. WHEN VEGETATED AREA IS NOT AVAILABLE, PROVIDE A GEOTEXTILE (CLASS 4, TYPE A) LINED FLOW PATH TO A STABLE EROSION RESISTANT RECEIVING WATER COURSE OR A WELL VEGETATED AREA.
3. LOCATE BAG IN AN AREA ACCESSIBLE BY EQUIPMENT FOR MAINTENANCE AND REMOVAL PURPOSES.
4. DO NOT INSERT MORE THAN ONE HOSE INTO A BAG.
5. REPLACE THE BAG WHEN 50% OF THE SEDIMENT CAPACITY HAS BEEN FILLED AND/OR WHEN THERE IS A FAILURE. THE ADDITIONAL BAGS WILL BE PAID AS EACH.
6. REMOVE AND PROPERLY DISPOSE OF THE PUMPED WATER FILTER BAGS. RESTORE THE AREA IN ACCORDANCE WITH THE SPECIFICATIONS IN PUBLICATION 408. DO NOT CUT FILTER BAG OR DISTRIBUTE AND SEED SEDIMENT.
7. DO NOT PERMIT DISCHARGE FROM THE BAG TO DRAIN BACK INTO WORK OR ACCESS AREAS OF THE PROJECT.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



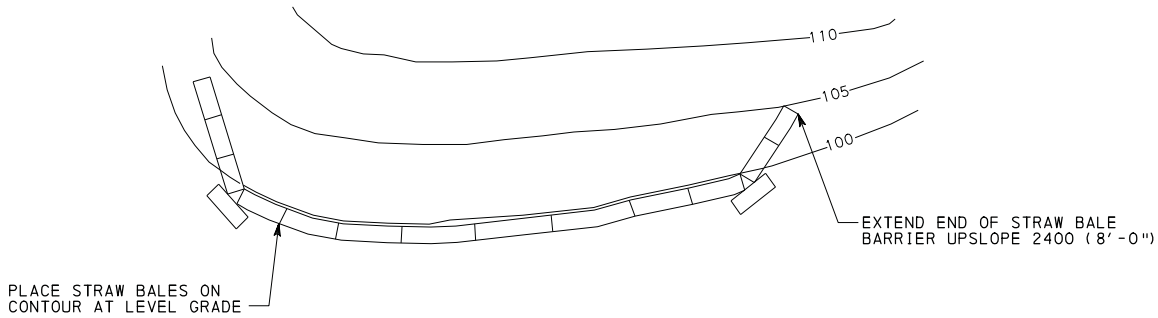
PUMPED WATER FILTER BAG

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

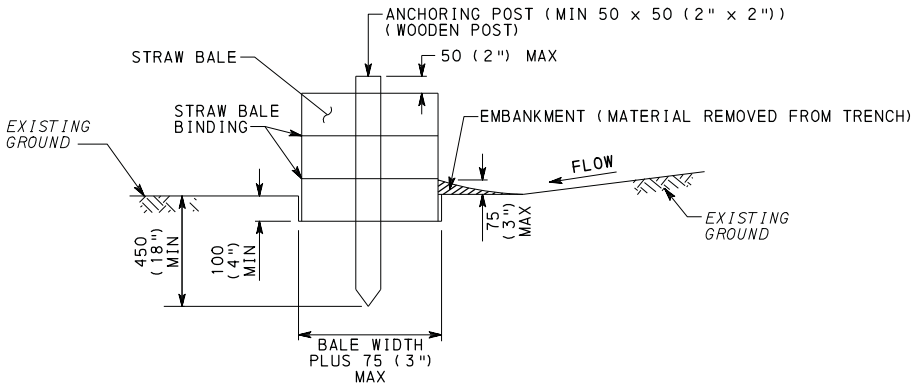
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
DEWATERING DEVICES		
RECOMMENDED JUN. 1, 2010 <i>R. H. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>David D. Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 1 RC-75M

NOTES

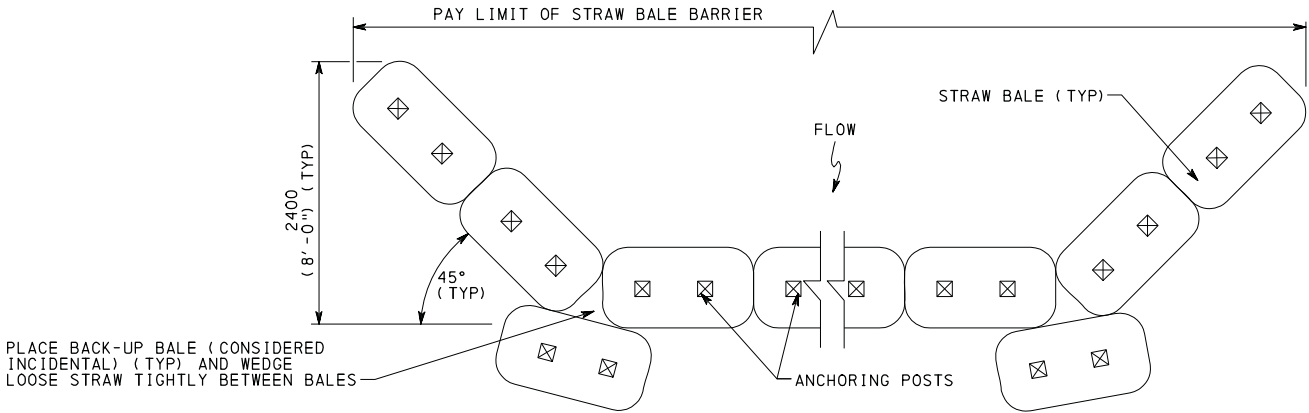
1. PLACE AND COMPACT EMBANKMENT MATERIAL FROM THE TRENCH EXCAVATION ON THE UPSLOPE SIDE OF THE STRAW BALE BARRIER.
2. PLACE STRAW BALE BARRIER ON UNIFORM GRADE. EXTEND BOTH ENDS UPSLOPE 2400 (8'-0") MIN AT 45 DEGREES FROM MAIN STRAW BALE BARRIER ALIGNMENT.
3. REMOVE SEDIMENT ACCUMULATION WHEN DEPTH OF SEDIMENT EQUALS 75 (3") ABOVE THE COMPACTED EMBANKMENT MATERIAL.
4. PLACE BALES SO BINDINGS ARE IN THE HORIZONTAL POSITION.
5. ANCHOR EACH BALE WITH TWO WOOD STAKES MINIMUM. DRIVE FIRST STAKE AT AN ANGLE AND INTO THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
6. REMOVE/REPLACE STRAW BALE BARRIER EVERY THREE MONTHS WHEN DIRECTED OR WHEN NO LONGER NEEDED. PROPERLY DISPOSE OF STRAW, POSTS AND SEDIMENT.
7. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE BARRIER WITH A ROCK FILTER OUTLET.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



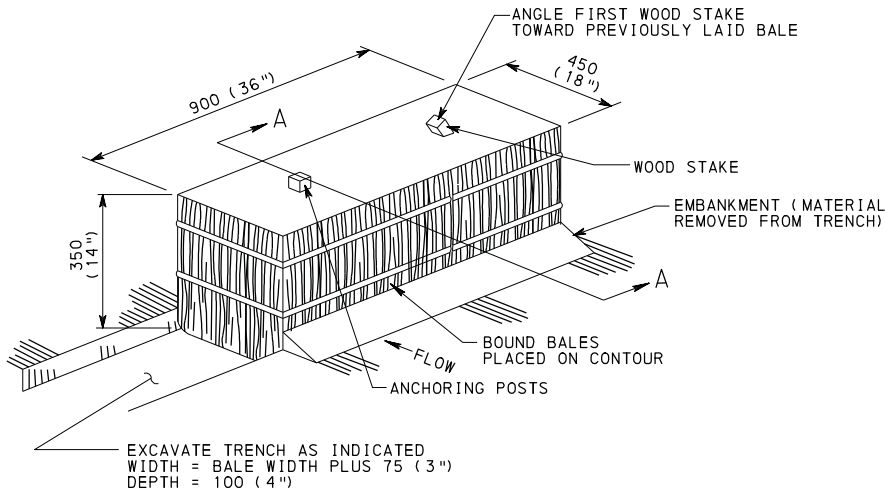
CONTOUR PLAN



SECTION A-A



PLAN  
STRAW BALE BARRIER

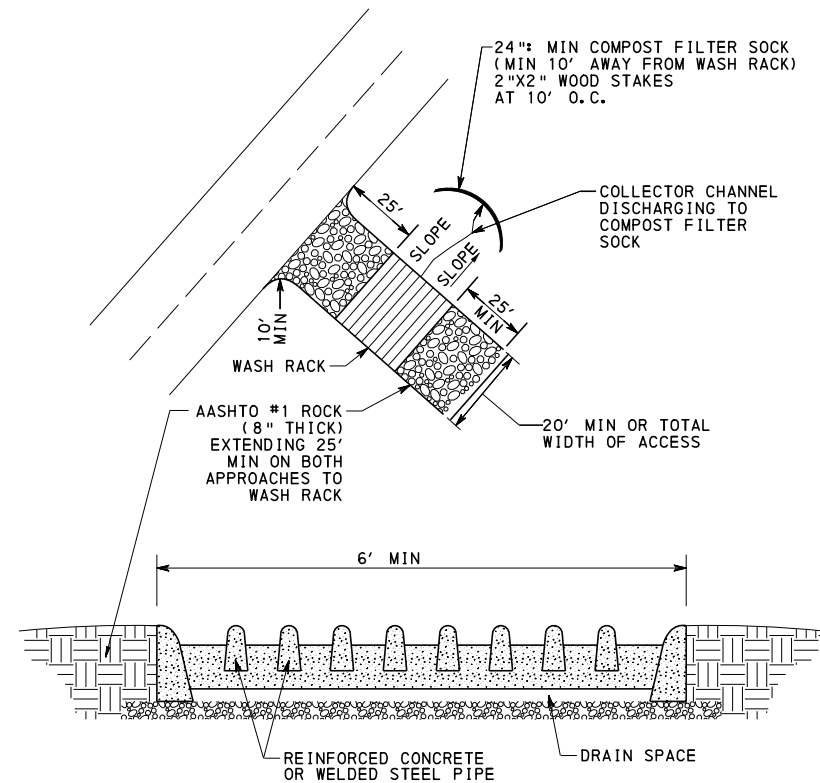


STRAW BALE BARRIER DETAIL

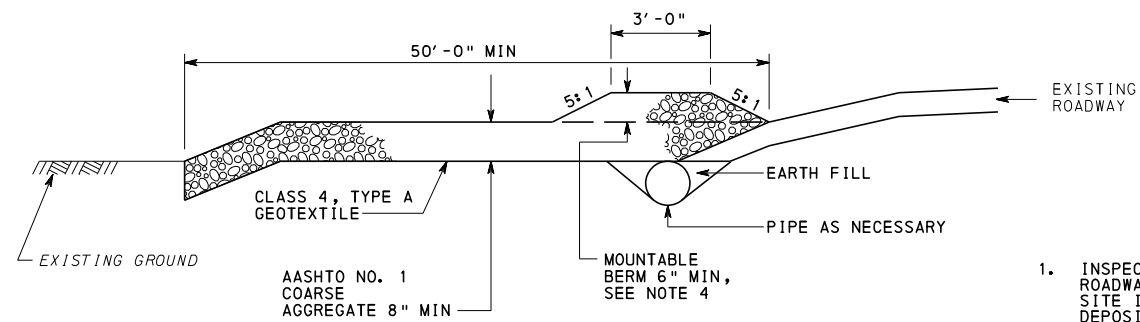
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
STRAW BALE BARRIER		
RECOMMENDED JUN. 1, 2010 <i>R. H. Wiley</i> CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 <i>David Thompson</i> DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 1 RC-76M

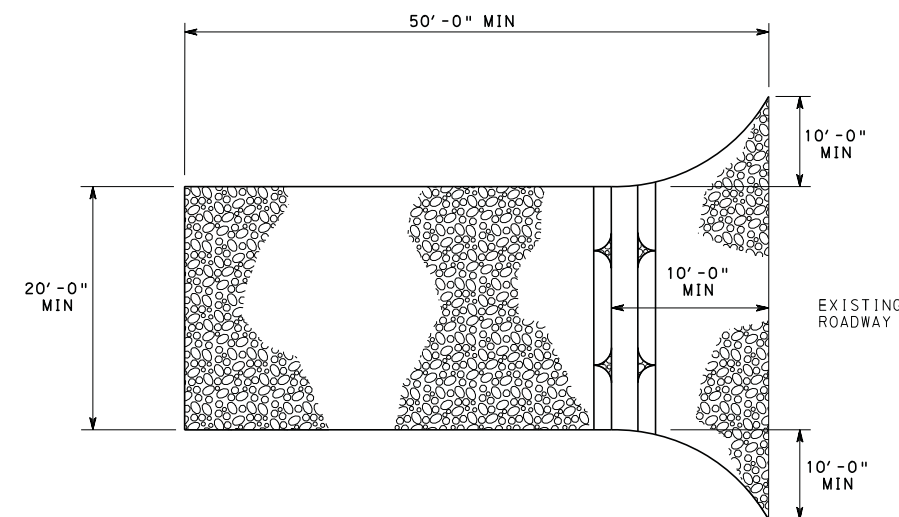




**ROCK CONSTRUCTION ENTRANCE  
WITH WASH RACK**



**PROFILE**



**PLAN**

**ROCK CONSTRUCTION ENTRANCE**

**NOTES**

1. INSPECT THE ENTRANCE DAILY. ALL SEDIMENT DEPOSITED ON THE ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.
2. MAINTAIN THE SPECIFIED ROCK CONSTRUCTION ENTRANCE THICKNESS. PLACE ADDITIONAL ROCK WHENEVER ROCK BECOMES CLOGGED WITH SEDIMENT.
3. MAINTAIN STOCKPILE OF AASHTO NO.1 COARSE AGGREGATE.
4. CONSTRUCT A MOUNTABLE BERM ONLY WHEN 6" MIN COVER CANNOT BE PROVIDED OVER THE PIPE.
5. SATISFACTORILY REMOVE MATERIALS AS SPECIFIED IN PUBLICATION 408, SECTION 849 WHEN ROCK CONSTRUCTION ENTRANCE IS NO LONGER NEEDED.
6. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 735. FURNISH AND INSTALL AS SPECIFIED IN PUBLICATION 408, SECTION 212. PROVIDE GEOTEXTILE ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
7. CONSTRUCT ROCK CONSTRUCTION ENTRANCE WITHIN THE RIGHT-OF-WAY OR EASEMENT AREAS. ENTRANCE MAY BE CONSTRUCTED ON A SKEW IF ADEQUATE PULL OUT SIGHT DISTANCE IS AVAILABLE.
8. DESIGN AND CONSTRUCT WASH RACK TO ACCOMMODATE CONSTRUCTION VEHICLE TRAFFIC.
9. PROVIDE WATER SUPPLY TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.
10. KEEP DRAIN SPACE UNDER WASH RACK OPEN AT ALL TIMES.
11. REPAIR DAMAGE TO THE WASH RACK PRIOR TO FURTHER USE OF THE RACK.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

**ROCK CONSTRUCTION ENTRANCE**

RECOMMENDED DEC. 17, 2019

*9219 Chapel*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

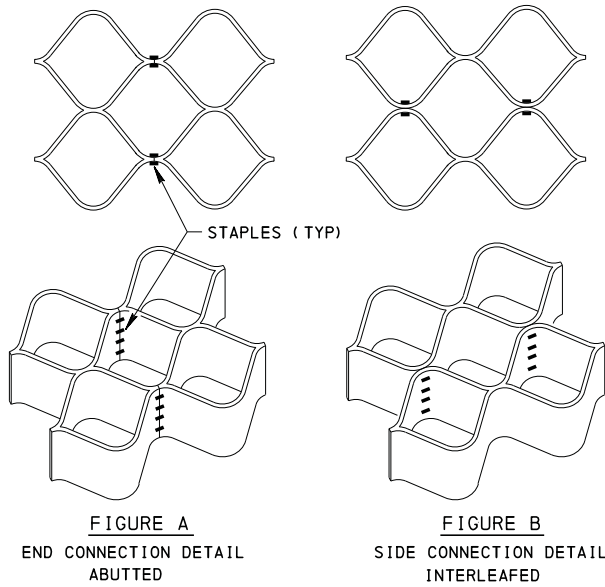
*Melvin J. Bostak*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 1

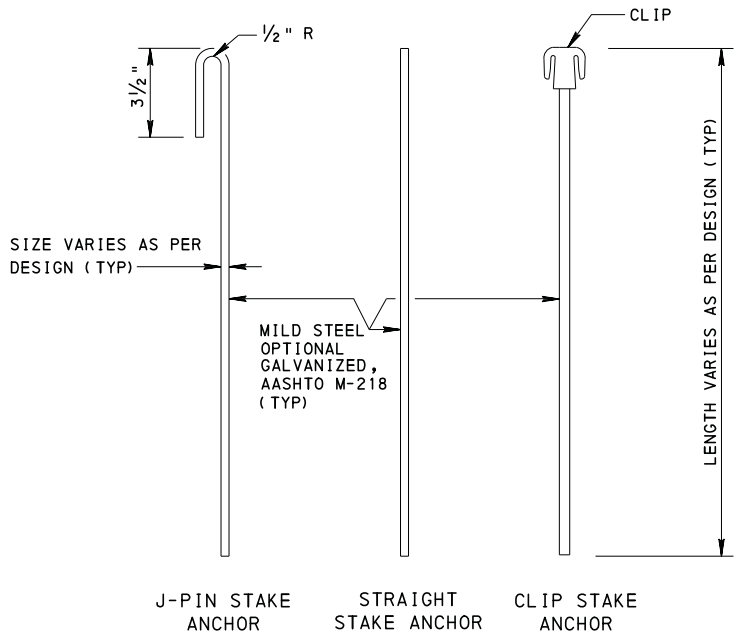
RC-77M

**NOTES FOR STANDARD CONNECTIONS  
BETWEEN GEOCELL SECTIONS:**

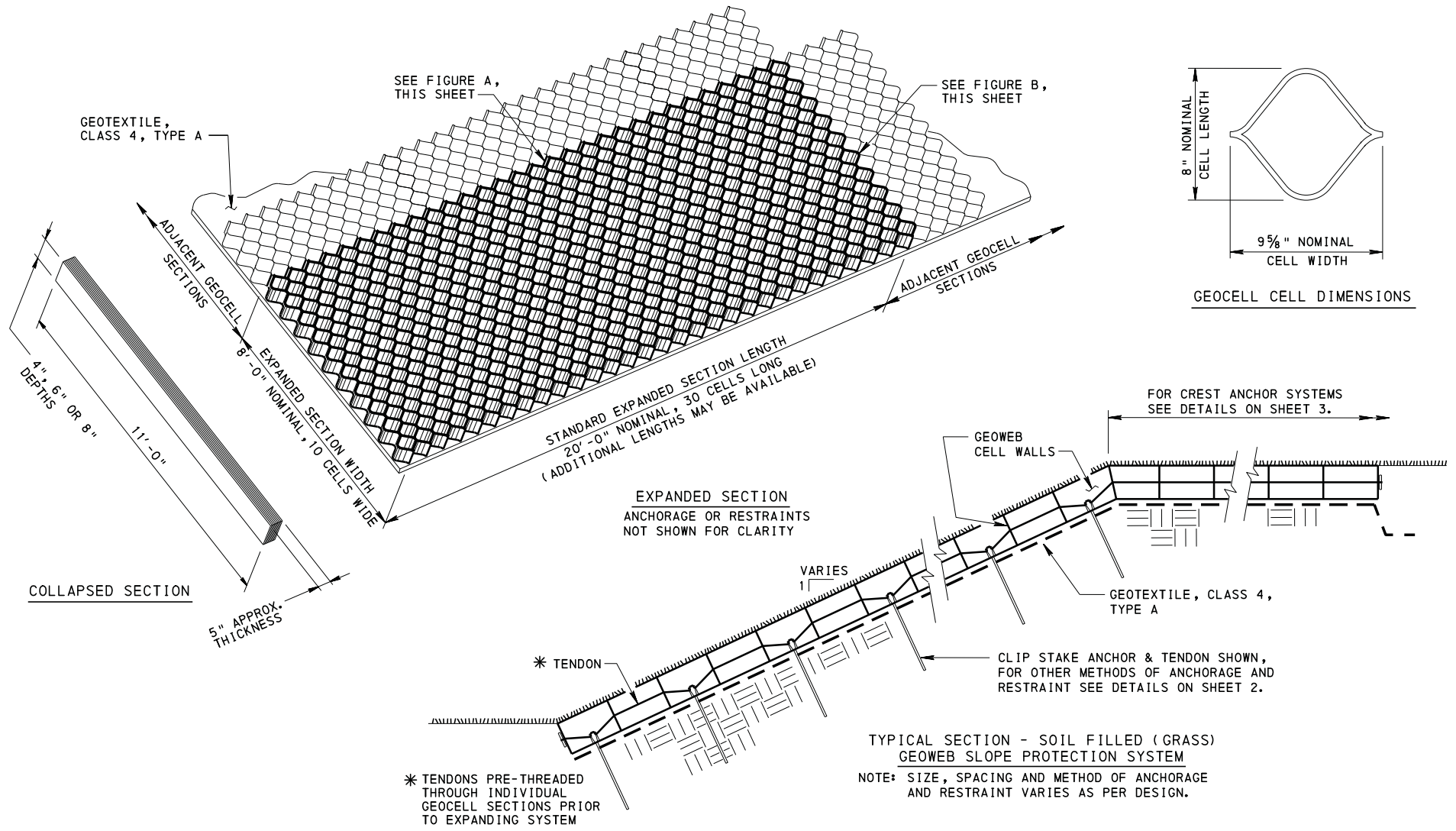
1. STAPLE ADJACENT GEOCELL SECTIONS TOGETHER USING MANUFACTURER APPROVED STAPLERS AND STAPLES.
2. HOLD THE TOP EDGES OF ADJACENT CELL WALLS FLUSH WHEN STAPLING.
3. INTERLEAF SIDE CONNECTIONS BETWEEN EXPANDED GEOCELL SECTIONS AS SHOWN IN FIGURE B. ALIGN WELDED EDGE SEAMS WHEN STAPLING.
4. BUTT END CONNECTIONS BETWEEN GEOCELL SECTIONS AS SHOWN IN FIGURE A. ALIGN AND STAPLE THE LONGITUDINAL CENTER-LINES OF ABUTTING EXTERNAL CELLS AT THE CELL WALL CONTACT POINT.



**STAPLED END CONNECTION DETAILS**



**STAKE ANCHOR DETAILS**



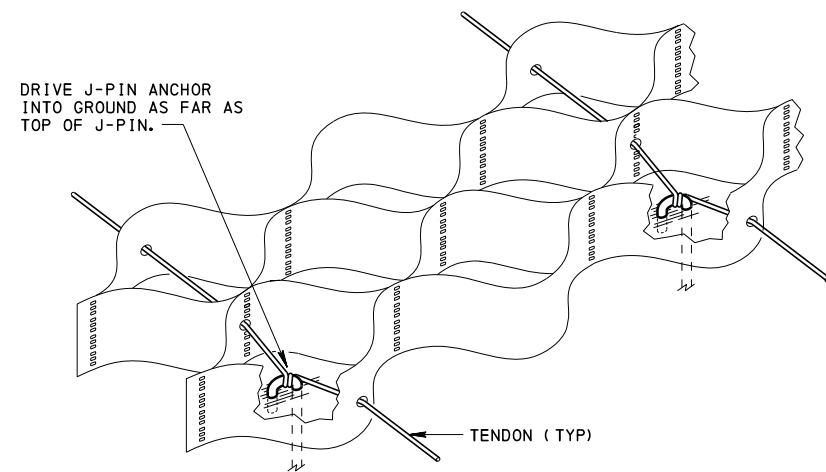
**TYPICAL GEOCELL SECTION DETAILS, STANDARD SIZE CELLS NON-PERFORATED**

**GENERAL INSTALLATION NOTES:**

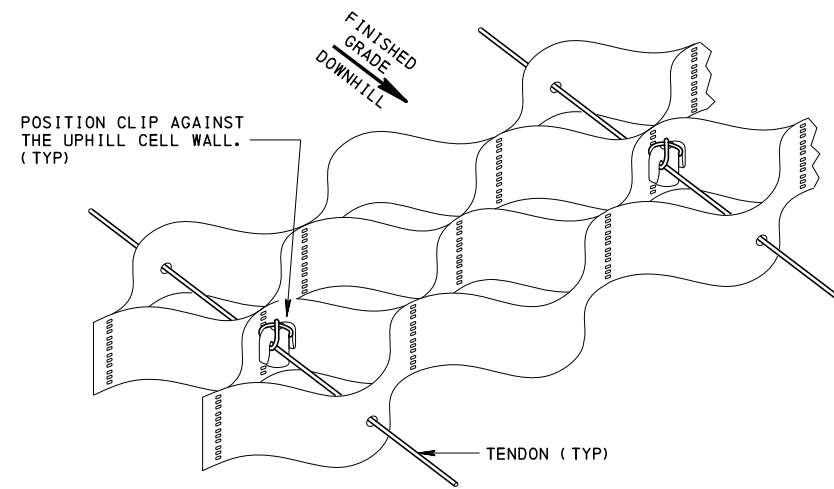
1. PROVIDE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408, SECTION 858.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH FULL GROUND CONTACT.
3. EXCAVATE AND SHAPE AN EVEN SLOPE/CHANNEL SUBGRADE TO ACCEPT GEOCELL SECTIONS WHICH ARE EXPANDED DOWN THE SLOPE (NOT ACROSS THE SLOPE).
4. PLACE TOP OF GEOCELL FLUSH WITH OR SLIGHTLY LOWER THAN SUBGRADE OR FINAL GRADE, AND PROPERLY COMPACT SUBGRADE.
5. OVERLAP ADJACENT GEOTEXTILE PIECES. PROVIDE ADEQUATE PINNING AND PLACEMENT OF FABRIC IN PERIMETER TOE IN TRENCHES.
6. ANCHOR UPPER AND LOWER EDGE OF PROPOSED PROTECTION AREA PER DESIGN.
7. EXPAND DOWN SLOPE.
8. PROPERLY ALIGN SECTIONS TO INTERLEAVE AND MECHANICALLY CONNECT ADJOINING SECTIONS OR BUTT AND MECHANICALLY CONNECT END SECTIONS, FLUSH BETWEEN UPPER SURFACES OF SECTIONS.
9. BEGIN INFILLING ONLY AFTER ANCHORING IS IN PLACE.
10. LIMIT DROP HEIGHT OF INFILL MATERIAL TO 3'.
11. INFILL FROM CREST OF SLOPE TO THE TOE.
12. CONTROL CELL OVERFILL TO ALLOW FOR COMPACTION.
13. ENSURE FILL IS FLUSH TO CELL TOP SURFACE AT COMPLETION OF WORK.
14. AVOID EXCESSIVE OVERFILLING AND PLACEMENT OF LARGE CLUMPS OF SOIL INFILL IN CELLS.
15. TAMP SOIL INFILL TO REMOVE EXCESSIVE AIR VOIDS FROM THE TOPSOIL.
16. ENSURE THAT SOIL INFILL CELLS ARE COMPLETELY FILLED AFTER LIGHTLY TAMPING THE INFILL.
17. AVOID OVERTAMPING (COMPACTING) OF SOIL INFILL THAT MAY RETARD ESTABLISHMENT OF VEGETATION.
18. COMMENCE SEEDING AND INSTALLATION OF EROSION BLANKETS IMMEDIATELY FOLLOWING PLACEMENT OF SOIL INFILL.
19. ON SLOPES, AVOID END DUMPING OR DROPPING SMALL INFILL AGGREGATE FROM HEIGHTS GREATER THAN 3' AND LARGE INFILL AGGREGATE FROM HEIGHTS GREATER THAN 1'-6". ENSURE THAT AGGREGATE INFILL CELLS ARE FULL BUT NOT EXCESSIVELY OVER-FILLED.
20. COMPACT AGGREGATE INFILL INTO THE GEOCELL CELLS WITH A PLATE TAMPER OR USING THE BACK OF A SMOOTH BUCKET ON THE PLACEMENT EQUIPMENT.

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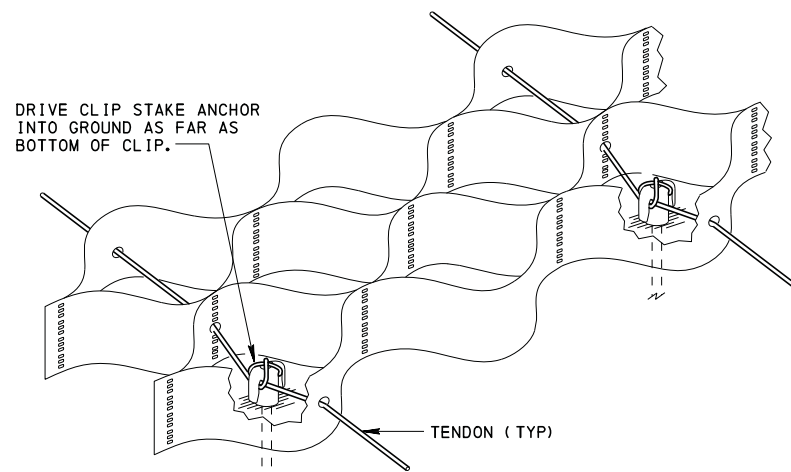
**SLOPE PROTECTION  
GEOCELL CELL AND GEOCELL  
SECTION DETAILS**



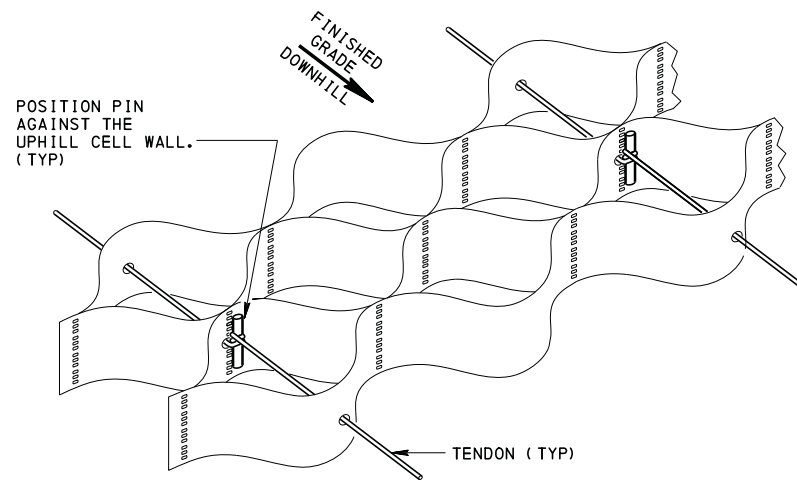
J-PIN STAKE ANCHOR & TENDON DETAIL



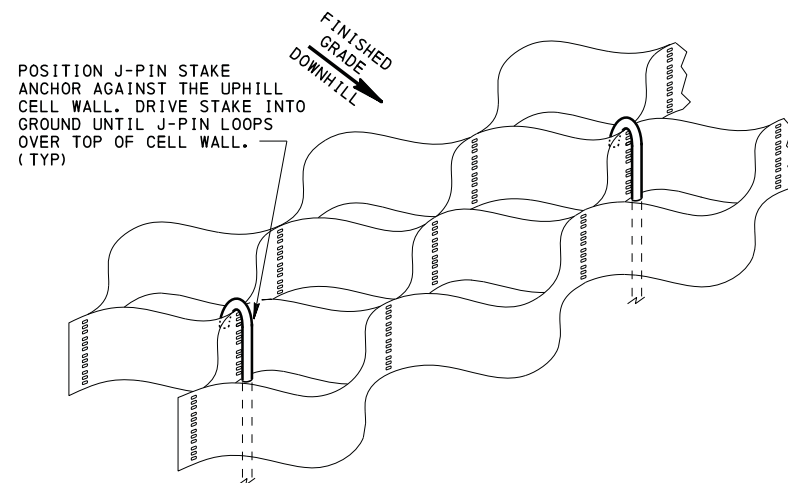
RESTRAINT CLIP & TENDON DETAIL



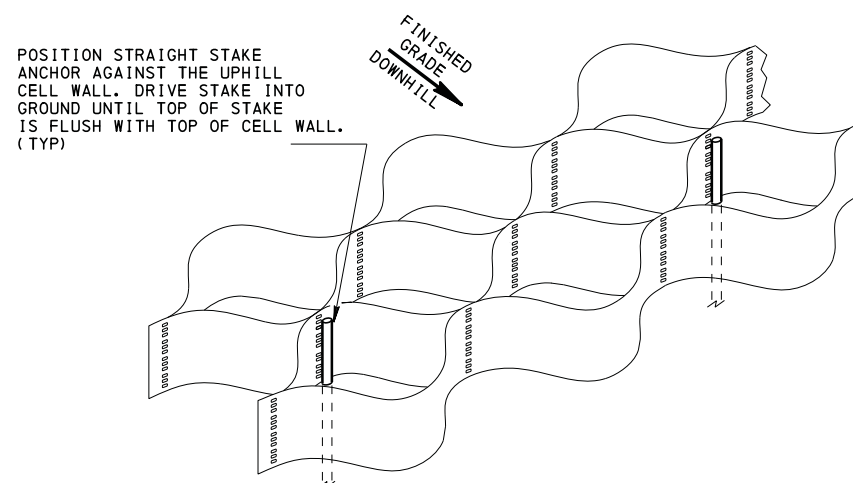
CLIP STAKE ANCHOR & TENDON DETAIL



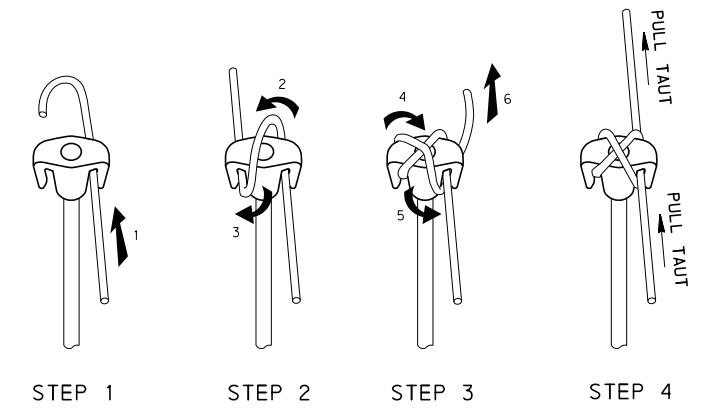
RESTRAINT CLIP & TENDON DETAIL



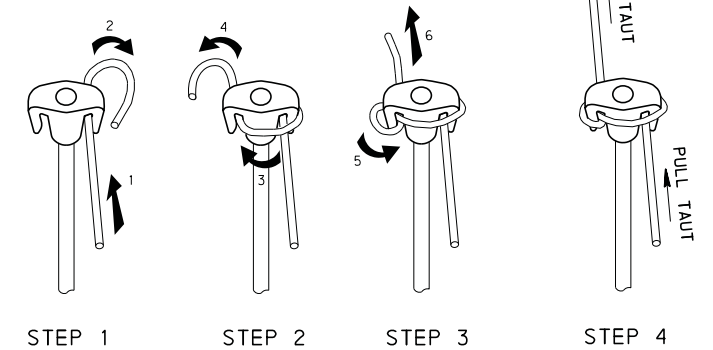
J-PIN STAKE ANCHOR DETAIL



STRAIGHT STAKE ANCHOR DETAIL

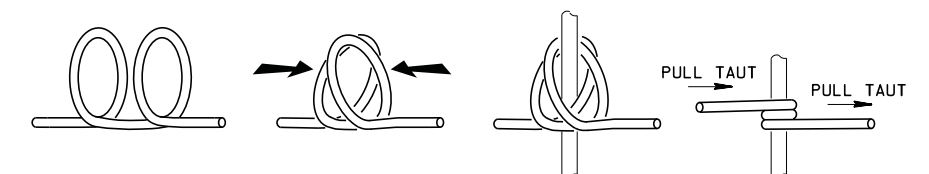


MOORE HITCH KNOT



CLOVE HITCH KNOT

KNOTS FOR RESTRAINT CLIP & TENDON SYSTEM AND CLIP STAKE ANCHOR & TENDON SYSTEM



KNOT FOR RESTRAINT PIN & TENDON SYSTEM AND CLIP STAKE ANCHOR & TENDON SYSTEM

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SLOPE PROTECTION  
GEOCELL CELL AND GEOCELL  
SECTION DETAILS

RECOMMENDED FEB. 8, 2019

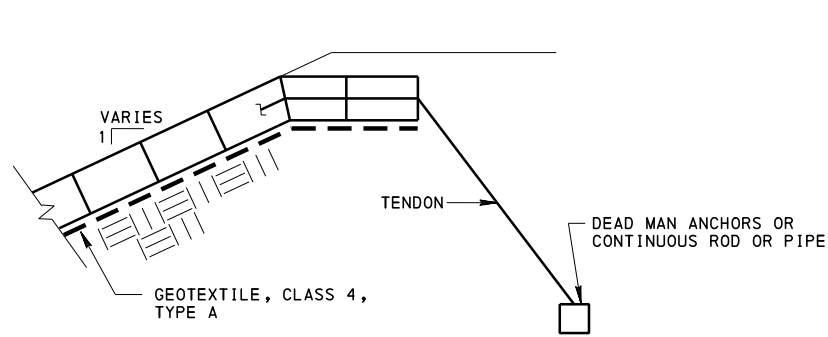
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019

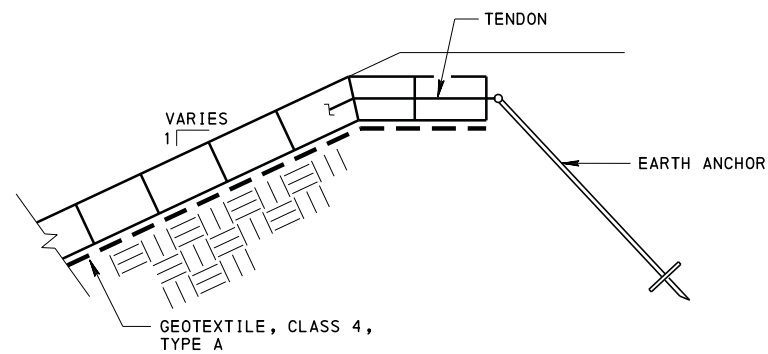
*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 4

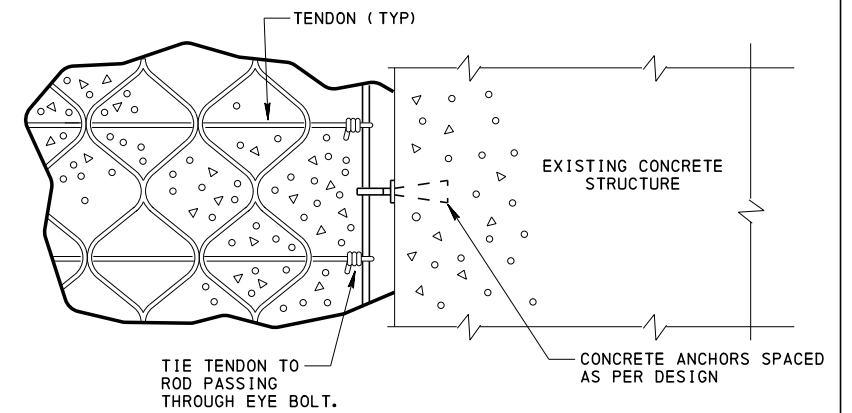
RC-78M



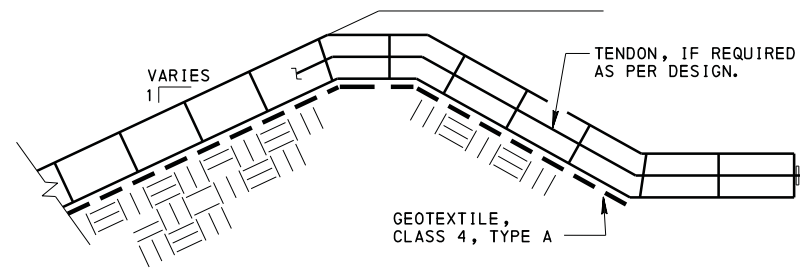
**DEADMAN ANCHOR**



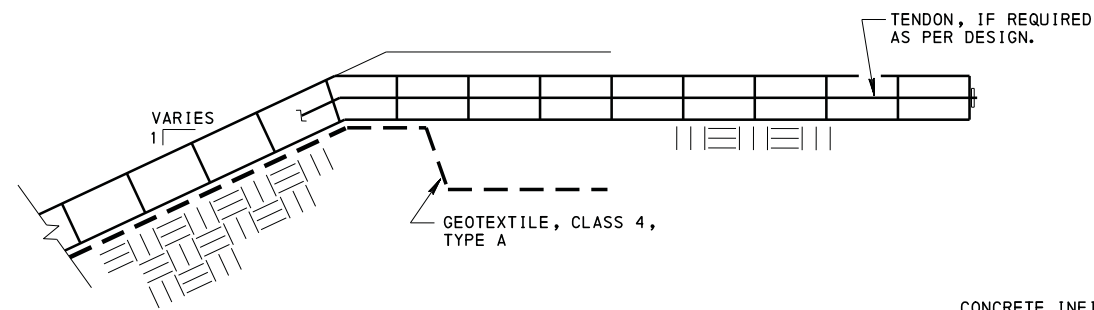
**EARTH ANCHOR**



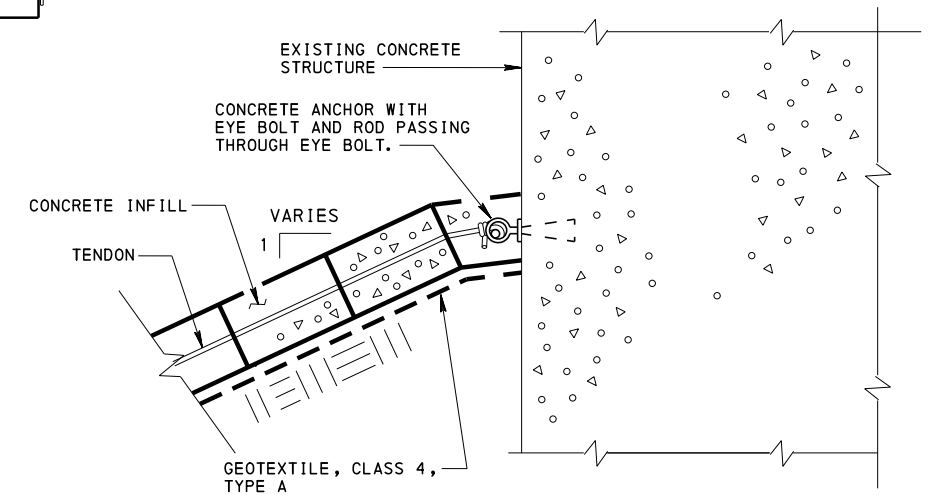
**PLAN**



**ANCHOR TRENCH**

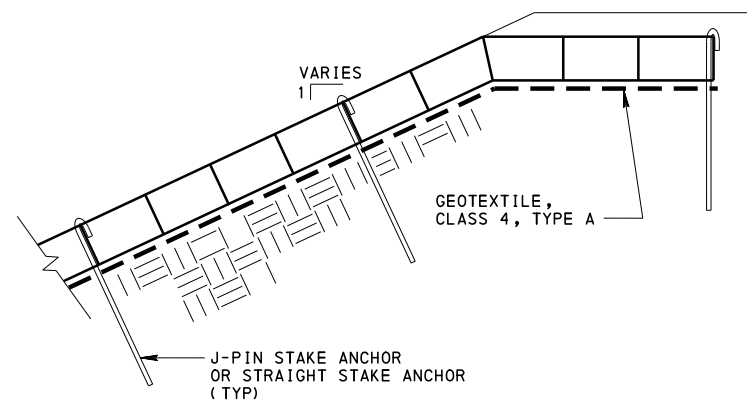


**SOIL COVER EMBEDMENT**

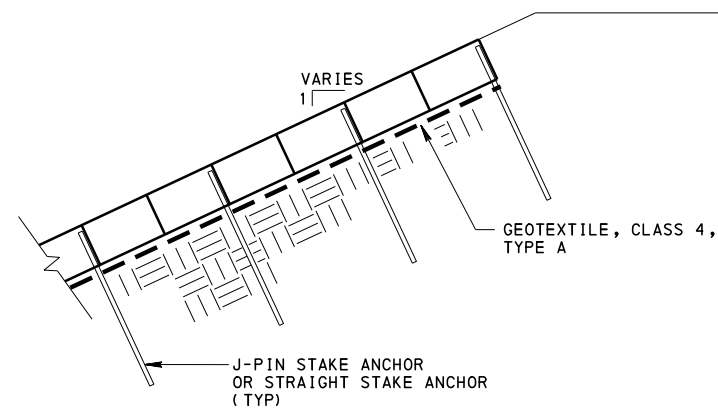


**SECTION**

**CONCRETE ANCHOR CONNECTION TO EXISTING STRUCTURE**



**STAKE AND CREST ANCHORAGE**



**STAKE ONLY ANCHORAGE**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

SLOPE PROTECTION  
GEOCELL CELL AND GEOCELL  
SECTION DETAILS

RECOMMENDED FEB. 8, 2019

*Mark J. Chynoweth*  
CHIEF, HWY. DELIVERY DIVISION

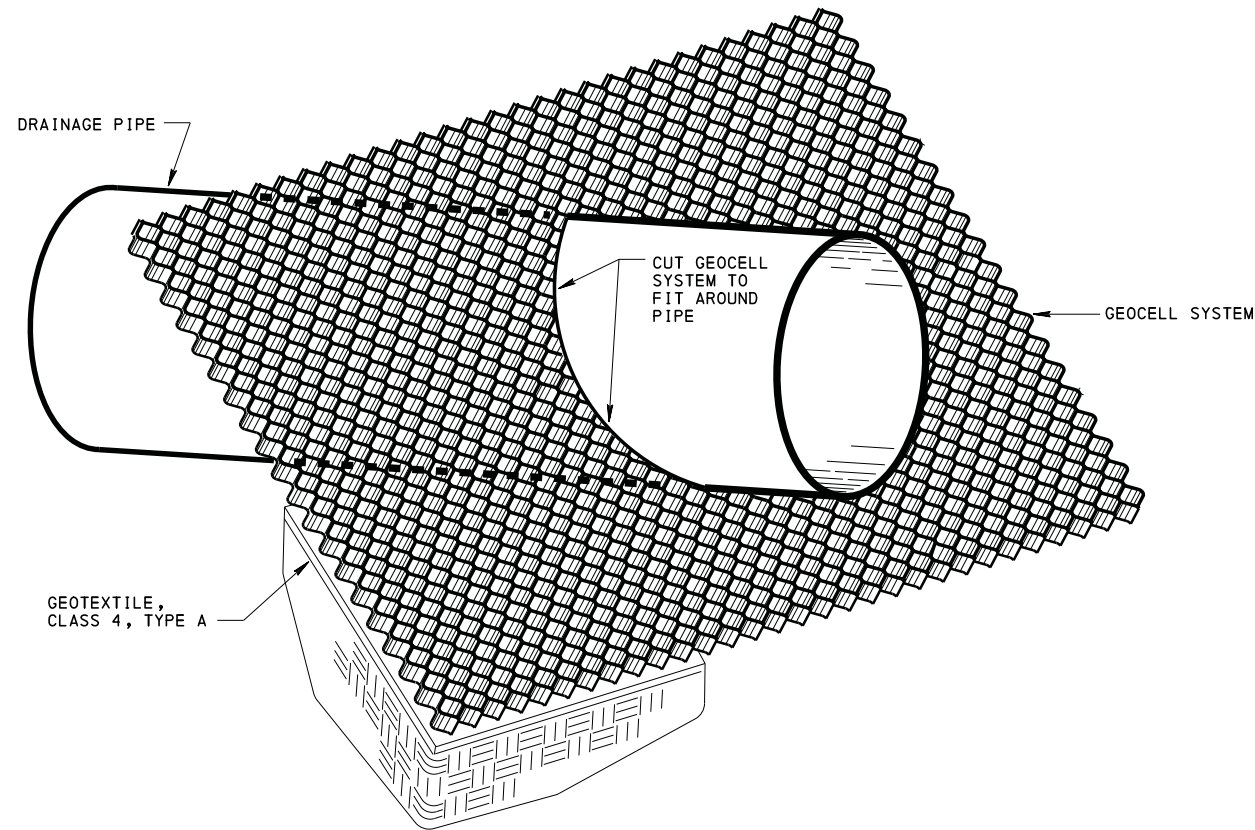
RECOMMENDED FEB. 8, 2019

*Melissa J. Batek*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

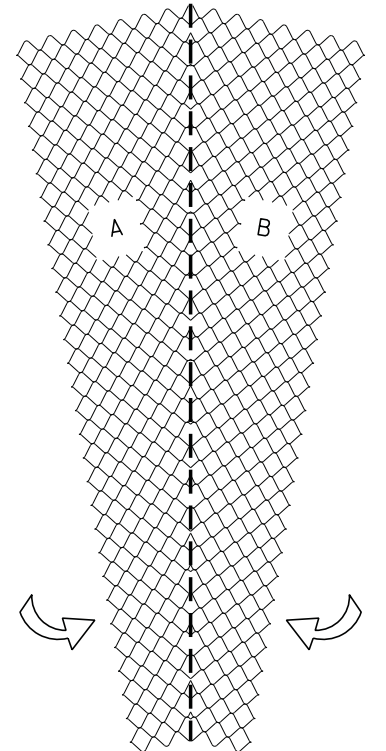
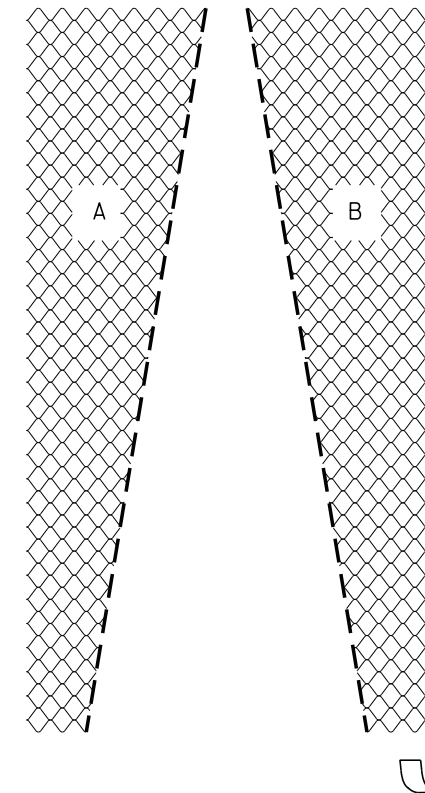
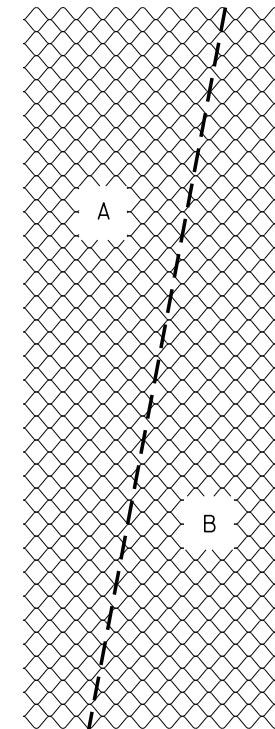
SHT 3 OF 4

RC-78M

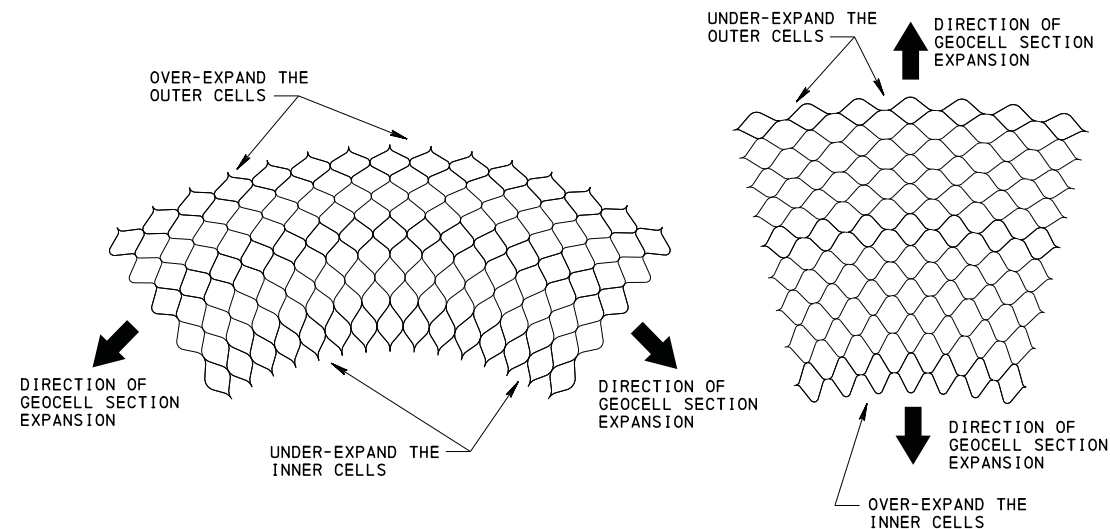




GEOCELL SECTION AROUND PIPE ON SLOPE



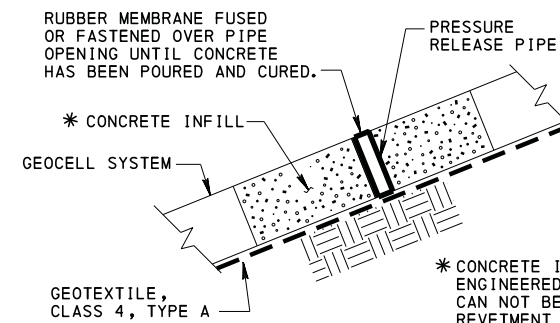
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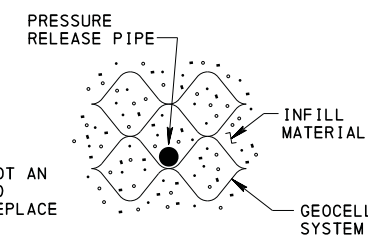
CURVED EXPANSION - PLAN

TAPERED EXPANSION - PLAN

CURVED AND TAPERED EXPANSION OF GEOCELL SECTION



SECTION



PLAN

PRESSURE RELIEF HOLES  
DRAINAGE THROUGH GEOCELL SYSTEM

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BUREAU OF PROJECT DELIVERY

SLOPE PROTECTION  
GEOCELL CELL AND GEOCELL  
SECTION DETAILS

RECOMMENDED FEB. 8, 2019  
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RECOMMENDED FEB. 8, 2019  
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DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 4 OF 4  
RC-78M



NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. LEVEL TOP OF FORMS IN BOTH DIRECTIONS.
3. GALVANIZE ALL ANCHORAGE HARDWARE, STEEL FLAT OR SPRING LOCK WASHERS AND TOP 300 (12") OF ANCHOR BOLTS.
4. GROUND ROD 13 (1/2") Ø x 2.4 m (8'-0") MINIMUM, COPPER CLAD STEEL WITH 25 Ω MAXIMUM RESISTANCE TO EARTH GROUND.
5. SEE RC-83M FOR POLE DETAILS.
6. FOR LIGHTING POLE ANCHORAGES ON BRIDGES, SEE BRIDGE CONSTRUCTION STANDARD DRAWINGS, BC-722M.
7. PROVIDE 750 (30") OF 21.15 mm<sup>2</sup> (#4) GROUND WIRE COILED ABOVE FOUNDATION, WIRE EXTENDS THROUGH CENTER OF FOUNDATION.
8. MINIMUM BEND RADIUS TO BE TWELVE TIMES CONDUIT DIAMETER, UNLESS OTHERWISE SPECIFIED.
9. TOP OF CONDUIT BUSHING NOT TO BE HIGHER THAN 25 (1") FROM THE TOP OF THE FOUNDATION.
10. THE LIGHTING POLE MANUFACTURER PROVIDES TEMPLATE FOR SETTING ANCHOR BOLTS FOR TYPE "A" OR TYPE "S" LIGHTING POLES, AND ALL HARDWARE.
11. USE 3-CONDUIT ACCESS WHERE PLAN CIRCUITS INDICATE BRANCH TAP INSIDE POLE BASE. POSITION CONDUITS IN FOUNDATION TO AVOID UNNECESSARY BENDS. PROVIDE ONE, TWO OR THREE CONDUITS AS REQUIRED.
12. FOR TYPE S POLES - PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE FOUNDATION, ANCHOR BOLT, OR STUB OF BREAK-AWAY DEVICE, WHICHEVER IS HIGHER, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") LONG CHORD, ALIGNED RADIALLY PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE SUPPORT. PROVIDE A MAXIMUM TAPER OF 45° TO THE EDGE OF THE FOUNDATION AS REQUIRED TO SATISFY THE ABOVE REQUIREMENT. BEGIN THE TAPER NOT LESS THAN 25 (1") FROM THE OUTSIDE OF THE BREAKAWAY BASE DIMENSION. MOUNTING SURFACE OF FOUNDATION IS TO EXTEND ABOVE THE GROUND LINE.
13. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

TABLE A  
FOUNDATION DIMENSIONS

MOUNTING HEIGHT	D x D	E x E	AUGER DIAMETER	L
UP TO 9.1 m (UP TO 30')	610 x 610 (2'-0" x 2'-0")	510 x 510 (1'-8" x 1'-8")	710 (2'-4")	1800 (6'-0")
10.7 m (35')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	1800 (6'-0")
12.2 m (40')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2000 (6'-6")
13.7 m (45')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2100 (7'-0")
15.2 m (50')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2300 (7'-6")

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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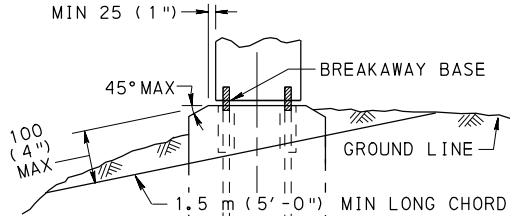
HIGHWAY LIGHTING  
FOUNDATIONS  
CONVENTIONAL LIGHTING POLE

RECOMMENDED JUN. 1, 2010  
R. W. [Signature]  
CHIEF, HWY. QA DIVISION

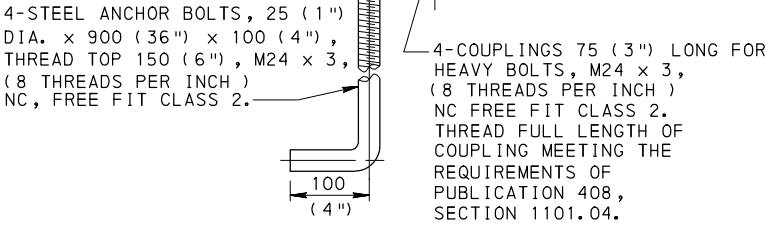
RECOMMENDED JUN. 1, 2010  
[Signature]  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 2  
RC-80M

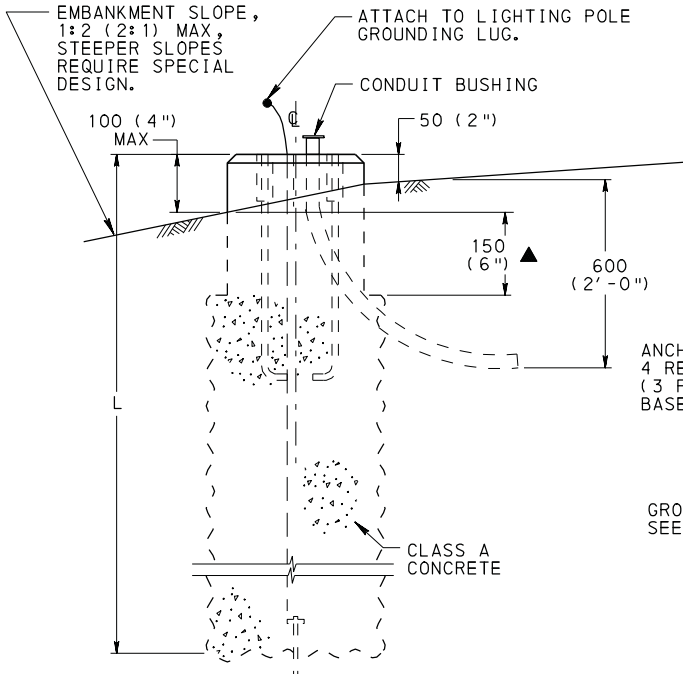
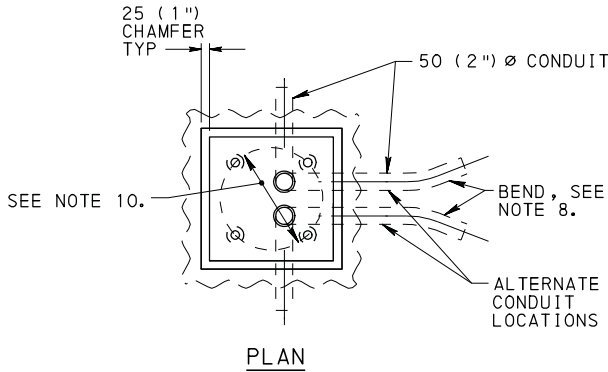
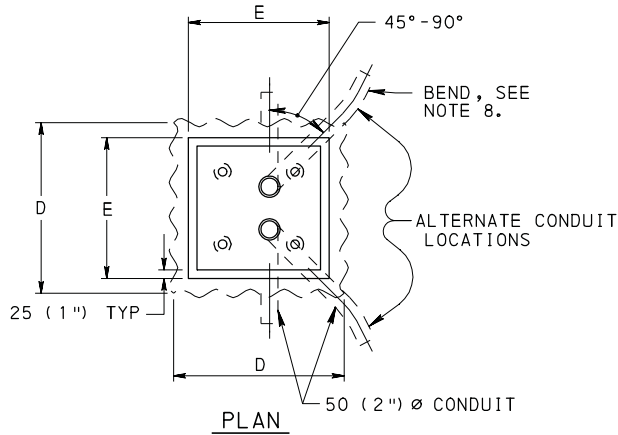
▲ FORM 150 (6") BELOW GROUND LEVEL. BELOW THIS POINT, PLACE CONCRETE AGAINST NATURAL GROUND.  
† DESIGNED FOR 9.1 m (30'-0") MAXIMUM ARM LENGTH. SEE TABLE A FOR FOUNDATION DIMENSIONS.  
SEE TYPE A POLE BASE FOUNDATION DETAILS FOR ADDITIONAL TYPE S POLE BASE FOUNDATION REQUIREMENTS.



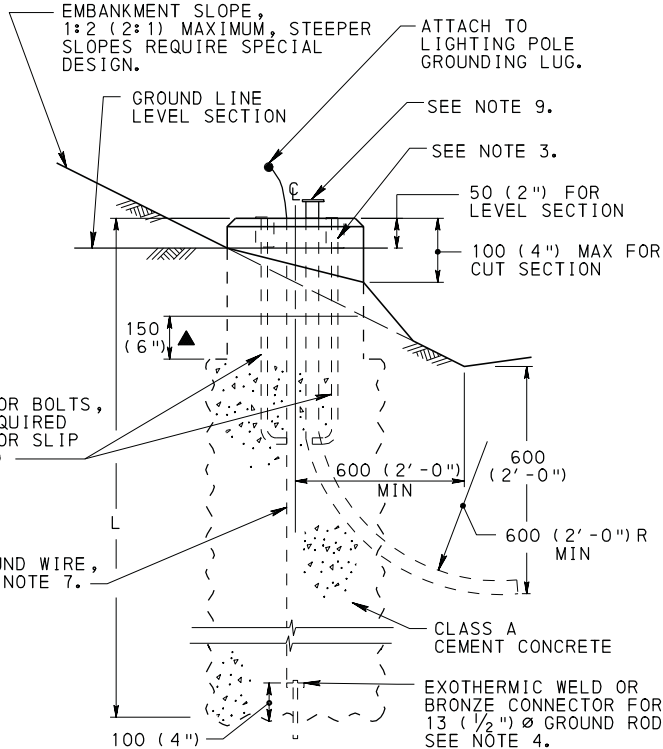
DETAIL FOR TYPE S POLE BASE FOUNDATION  
(SEE NOTE 12.)  
THE MAXIMUM NEGATIVE SLOPE FOR TYPE S POLE BASE FOUNDATION LOCATION IS 1:6 (6:1).



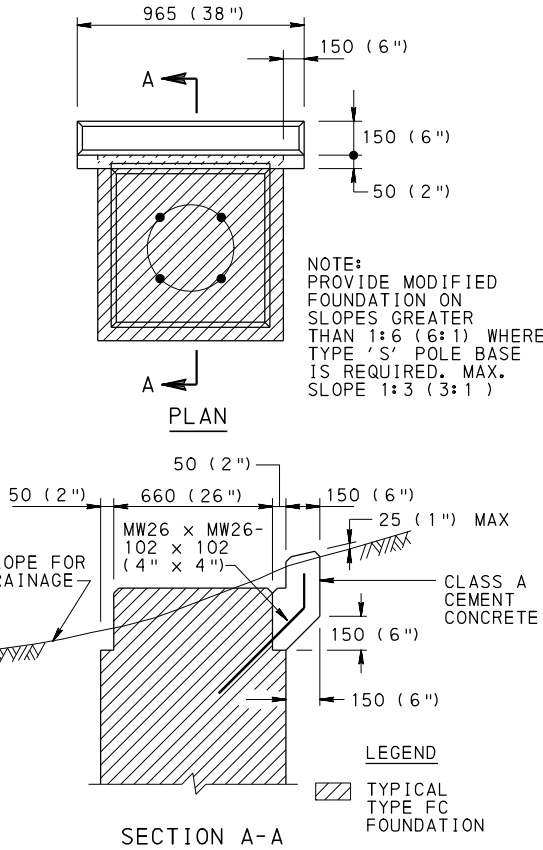
DETAIL OF ANCHOR BOLT



DETAIL FOR TYPE A POLE BASE  
FOR FILL SECTION



DETAIL FOR TYPE A POLE BASE  
FOR CUT OR LEVEL SECTION



TYPE FC MODIFIED FOUNDATION

TYPE FC FOUNDATION<sup>†</sup>  
SEE NOTE 12.

14-JUNE-2010

POLE HEIGHTS	BASE PLATE THICKNESS	# OF ANCHOR BOLTS	MINIMUM ANCHOR BOLT DIAMETER
18.3 m (60' - 0")	50 (2")	6	38 (1½")
21.3 m (70' - 0")	50 (2")	8	38 (1½")
24.4 m (80' - 0")	63 (2½")	8	38 (1½")
27.4 m (90' - 0")	63 (2½")	8	38 (1½")
30.5 m (100' - 0")	76 (3")	10	38 (1½")
33.5 m (110' - 0")	76 (3")	10	38 (1½")
36.6 m (120' - 0")	76 (3")	12	44 (1¾")



## NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE A 750 (30") LENGTH OF 21.15 mm<sup>2</sup> (#4) GROUND WIRE COILED ABOVE FOUNDATION. EXTEND WIRE THROUGH THE 25 (1") Ø CONDUIT IN THE CENTER OF THE FOUNDATION.
3. THE SIZE OF PEDESTAL OR DRILLED CAISSON SHOWN ACCOMMODATES THE PREASSEMBLED ANCHOR BOLT ASSEMBLY SUPPLIED BY THE MANUFACTURER FOR BOLT CIRCLE DIAMETERS 865 (34") OR LESS. FOR BOLT CIRCLE DIAMETERS GREATER THAN 865 (34") , MODIFY PEDESTAL OR DRILLED CAISSONS ACCORDINGLY.
4. FOR REINFORCEMENT BAR FABRICATION DETAILS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING, BC-736M. DEVELOPMENT AND LAP SPLICE LENGTHS ARE AS PER AASHTO ONLY.
5. SEAL WITH STAINLESS STEEL SCREEN, 6 TO 10 (¼" TO ¾") OPENING, TO PREVENT ENTRY OF RODENTS. SCREEN IS TO BE REMOVABLE AND ATTACHED TO BASE PLATE WITH STAINLESS STEEL HARDWARE. SCREEN IS TO BE OF SUFFICIENT STIFFNESS TO PREVENT ENTRY BETWEEN SCREEN AND FOUNDATION WHILE PERMITTING DRAINAGE.
6. VERIFY THE GROUND ELEVATION AT THE FOUNDATION LOCATION FOR ALL HIGH MAST POLE FOUNDATIONS. NOTIFY THE DEPARTMENT OF ANY DISCREPANCY OF MORE THAN 1.0 m (3' -0") BEFORE PROCEEDING WITH CONSTRUCTION. THE POLE LENGTH MAY BE AFFECTED.

POLE HEIGHTS	VERTICAL STEEL
18.3 m ( 60' - 0 ")	16-#29 ( #9)
21.3 m ( 70' - 0 ")	16-#29 ( #9)
24.4 m ( 80' - 0 ")	16-#29 ( #9)
27.4 m ( 90' - 0 ")	16-#29 ( #9)
30.5 m ( 100' - 0 ")	16-#29 ( #9)
33.5 m ( 110' - 0 ")	16-#29 ( #9)
36.6 m ( 120' - 0 ")	16-#36 ( #11)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
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COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
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HIGHWAY LIGHTING  
FOUNDATIONS  
HIGH MAST LIGHTING POLE

RECOMMENDED JUN. 1, 2010

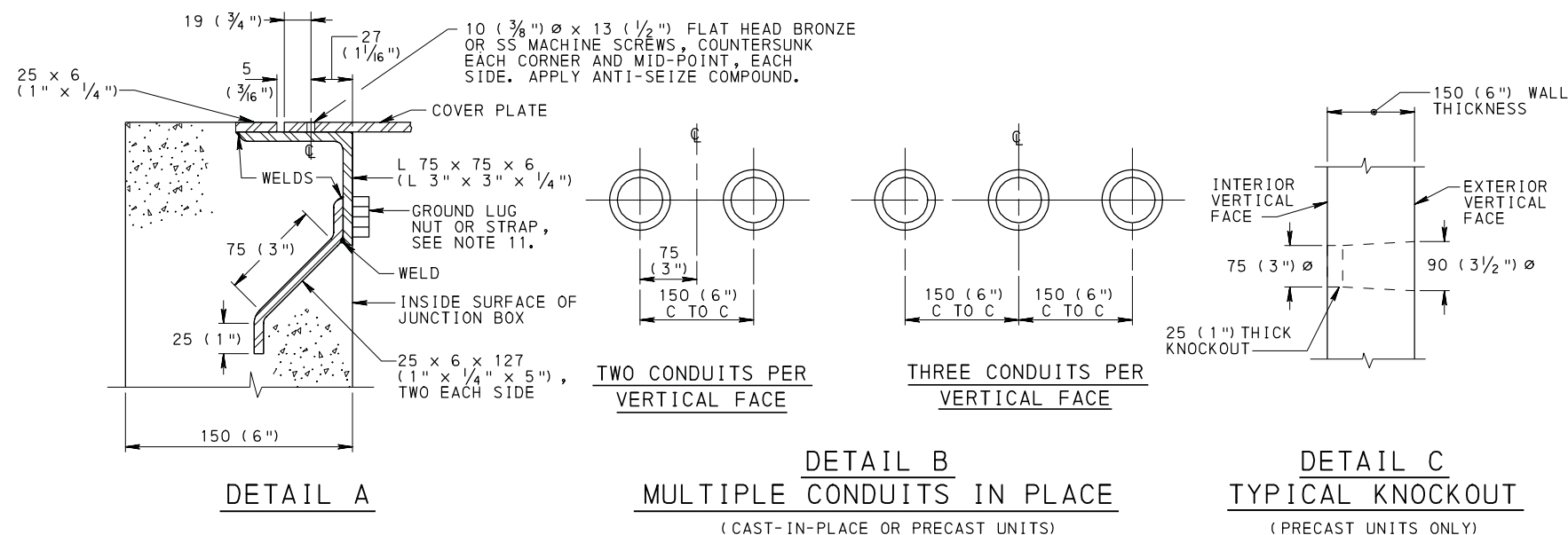
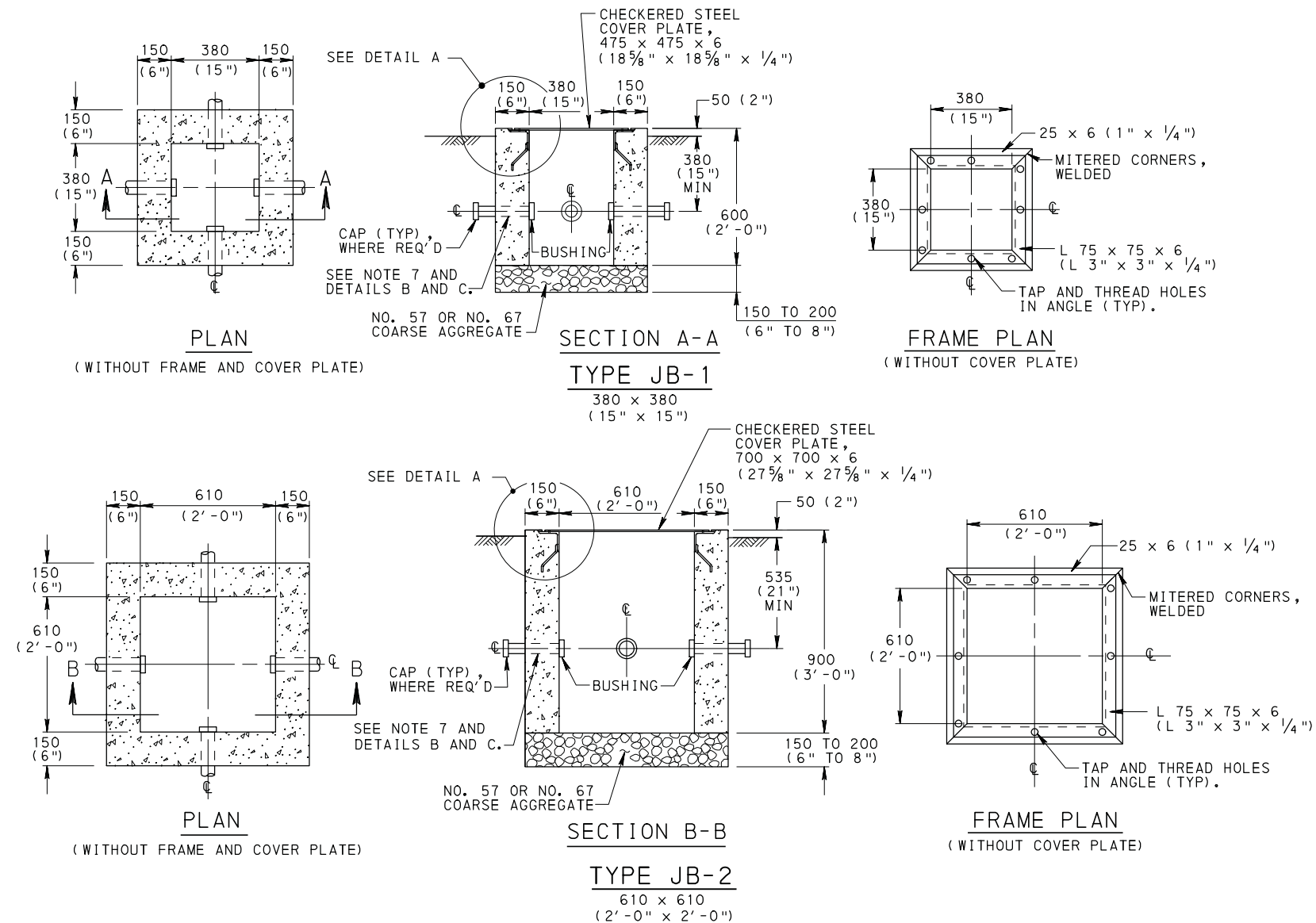
T. W. Hilly  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010

*Ben & Thyson*  
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

RC-80M



## NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC. USE JB-11 AND JB-12 JUNCTION BOXES IN OTHER LOCATIONS AS SHOWN ON RC-82M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME AND STEEL COVER PLATE. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
5. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
6. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") CHORD ALIGNED RADially (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
7. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 (6") C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL B, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL C AND LOCATE AS INDICATED IN DETAIL B. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
8. PROVIDE POSITIVE DRAINAGE 38 - 50 (1 1/2" - 2") NONMETALLIC CONDUIT FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN. SEE RC-82M, NOTE 5.
9. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36/A36M.
10. PROVIDE AS A MINIMUM :  
CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND  
CLASS AA CONCRETE FOR PRECAST BOXES.
11. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
12. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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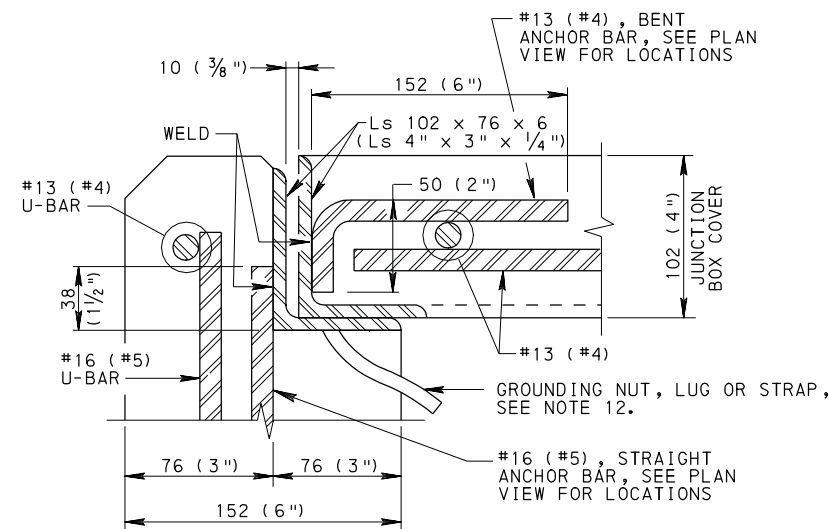
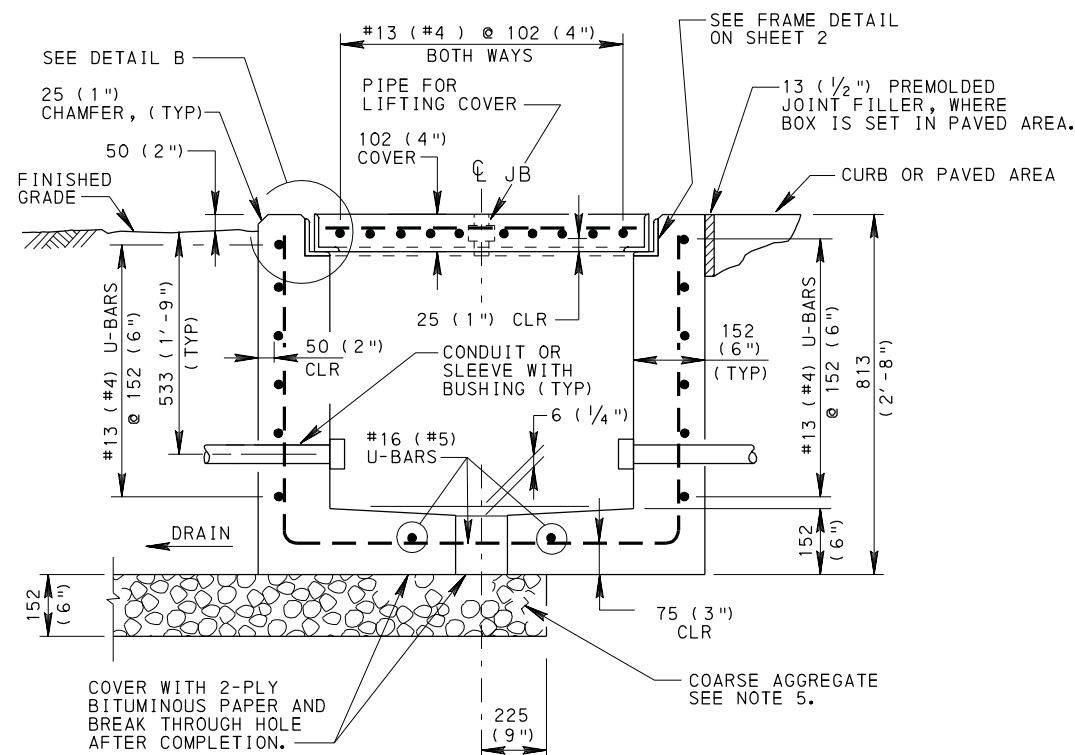
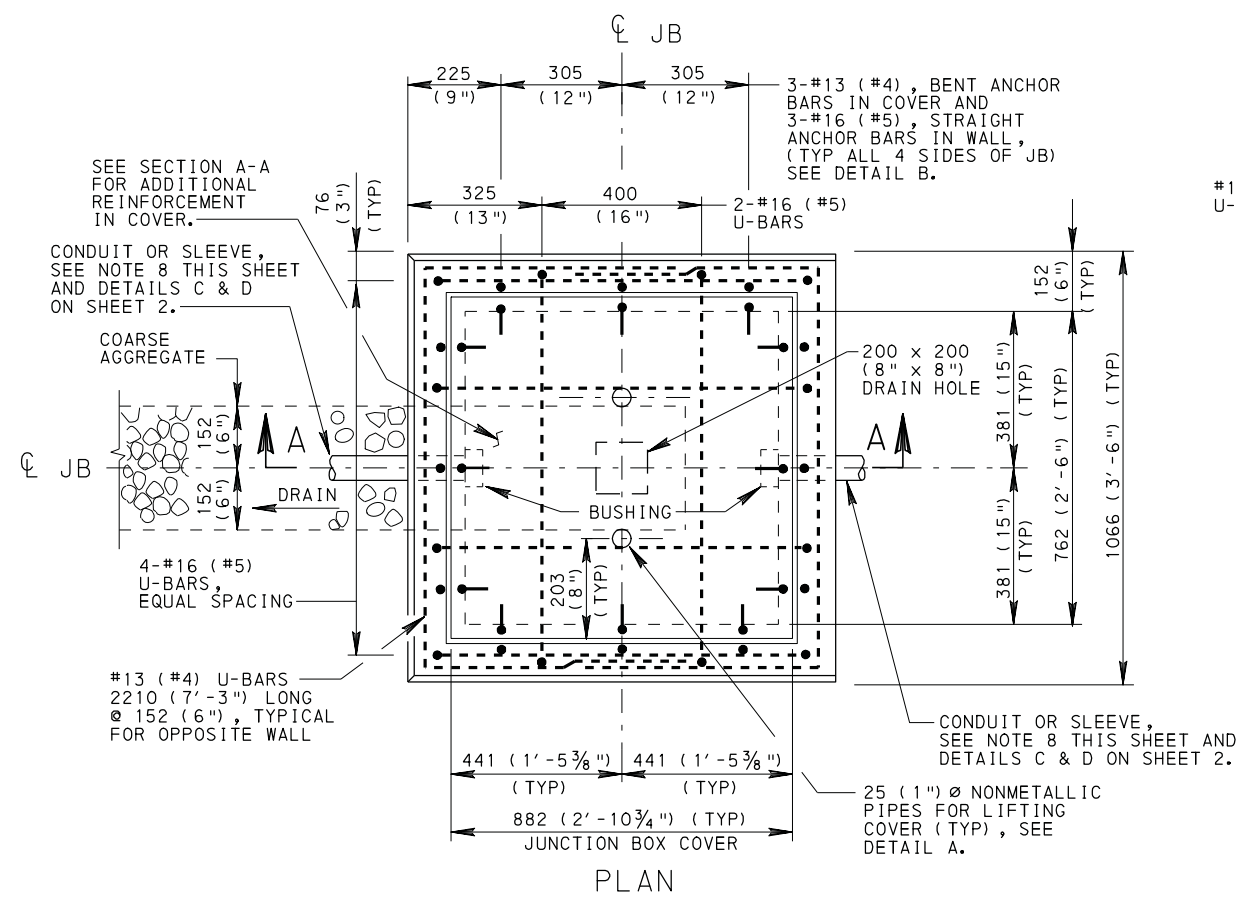
**HIGHWAY LIGHTING**  
**JUNCTION BOXES-LIGHT DUTY**  
**CAST-IN-PLACE OR PRECAST**

RECOMMENDED JUN. 1, 2010  
*R. W. Spill*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*Ann B. Thompson*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1  
**RC-81M**





DETAIL B

COVER FRAME AND  
SUPPORTING FRAME

## NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. USE JB-11 AND JB-12 JUNCTION BOXES IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICULAR LOADS. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(c).
5. PROVIDE 0.06 m<sup>3</sup> (2 FT<sup>3</sup>) OF NO. 57 OR NO. 67 COARSE AGGREGATE.
6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") CHORD ALIGNED RADially, PERPENDICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL C, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL D AND LOCATE AS INDICATED IN DETAIL C. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
9. PROVIDE POSITIVE DRAINAGE, 38 - 50 (1 1/2" - 2") NONMETALLIC CONDUIT, FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN.
10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM-A36/A36M. PROVIDE ALUMINUM CONFORMING TO ASTM-B221 ALLOY 6061 - T6.
11. PROVIDE AS A MINIMUM :  
CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND  
CLASS AA CONCRETE FOR PRECAST BOXES.
12. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
13. ALL REINFORCEMENT STEEL BARS SHOWN TO MEET ASTM A 615M, A 616M AND A 706M.
14. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
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HIGHWAY LIGHTING  
JUNCTION BOXES-HEAVY DUTY  
CAST-IN-PLACE OR PRECAST

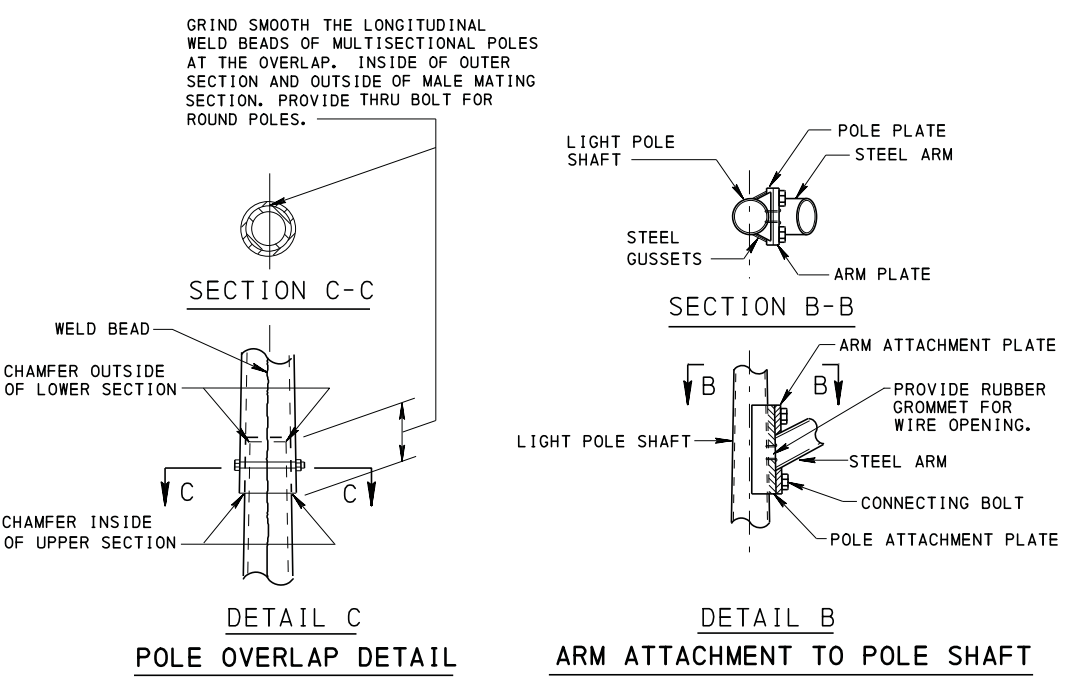
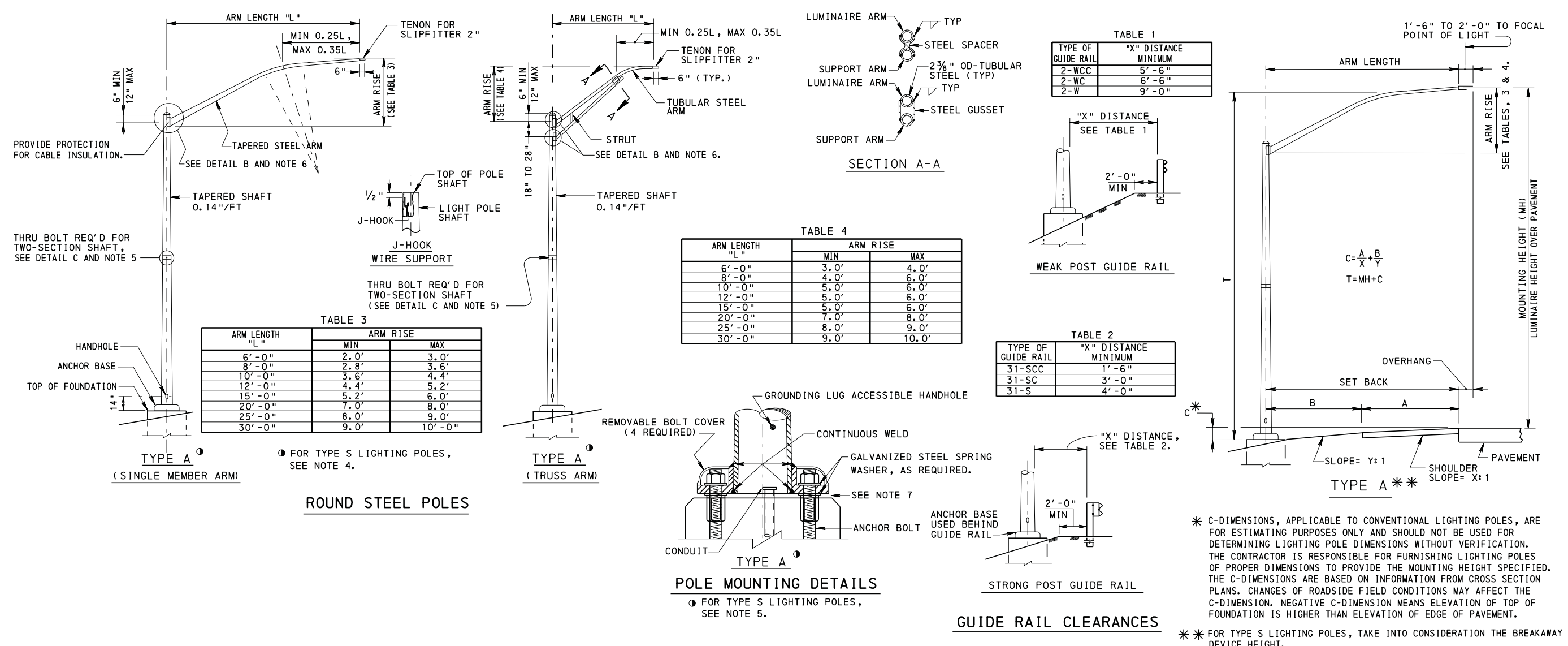
RECOMMENDED JUN. 1, 2010  
T. W. Hilly  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*Brian E. Thyson*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 2  
RC-82M







- NOTES**
1. PROVIDE MATERIALS, CONSTRUCTION AND MANUFACTURER'S CERTIFICATION OF COMPLIANCE WITH LOAD TESTS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
  2. SEE RC-80M FOR POLE FOUNDATION DETAILS.
  3. PROVIDE IDENTIFICATION AND DATE TAGS, AS SHOWN ON SHEET 2, FOR ALL POLES. DESIGNATE ID AS ON PROJECT PLANS.
  4. PROVIDE FHWA CERTIFIED BREAKAWAY BASES FOR TYPE S POLES MEETING THE LATEST AASHTO REQUIREMENTS FOR BREAKAWAY SUPPORTS. MOUNT TYPE S POLES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLACE WASHERS, FLAT OR SPRING TYPE, WHEN REQUIRED, AS RECOMMENDED, AND THREADED PARTS, TORQUED AS SPECIFIED.
  5. CONSTRUCT POLE SHAFTS 30'-0" OR LESS IN LENGTH OF ONE PIECE. POLE SHAFTS OVER 30'-0" IN LENGTH MAY BE TWO SECTIONS. MINIMUM SECTION LENGTH FOR TWO SECTION POLE SHAFT IS 15'-0".
  6. PROVIDE POLE ARM ATTACHMENT TO POLE SHAFT AS SHOWN IN DETAIL "B", WITH TWO, THREE OR FOUR ATTACHMENT BOLTS, AS REQUIRED FOR DIFFERENT ARM LENGTHS.
  7. PROVIDE A 1/8" TO 1/4" DRAINAGE GAP BETWEEN THE BASE AND THE FOUNDATION. USE HOT DIPPED GALVANIZED OR STAINLESS STEEL SHIMS OR WASHERS (FENDER OR USS), WITH A MINIMUM EQUIVALENT OD OF 2 1/2". WHEN TRANSFORMER BASES REQUIRE LARGER OD INSIDE WASHERS, PROVIDE BOTTOM WASHERS WITH THE SAME OD. REFER TO ASTM F84404 FOR THE WASHER SPECIFICATIONS. CAULK TO PREVENT CORROSION IF AN ALUMINUM BASE COMES IN CONTACT WITH A CONCRETE FOUNDATION; OTHERWISE, CAULKING IS NOT REQUIRED.
  8. FURNISH CONVENTIONAL STEEL LIGHTING POLES WITH SINGLE MEMBER BRACKET TYPE ARMS UNLESS OTHERWISE INDICATED OR SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.
  9. THE MOUNTING HEIGHT IS DEFINED AS THE HEIGHT OF THE LUMINAIRE ABOVE THE ROADWAY AND IS TO BE WITHIN 1'-0" OF THE MOUNTING HEIGHT SPECIFIED.
  10. WHEN PROVIDING ALUMINUM POLES, PROVIDE ALUMINUM POLES WITH TRUSS ARMS MEETING THE GENERAL SILHOUETTE REQUIREMENTS OF STEEL POLES.

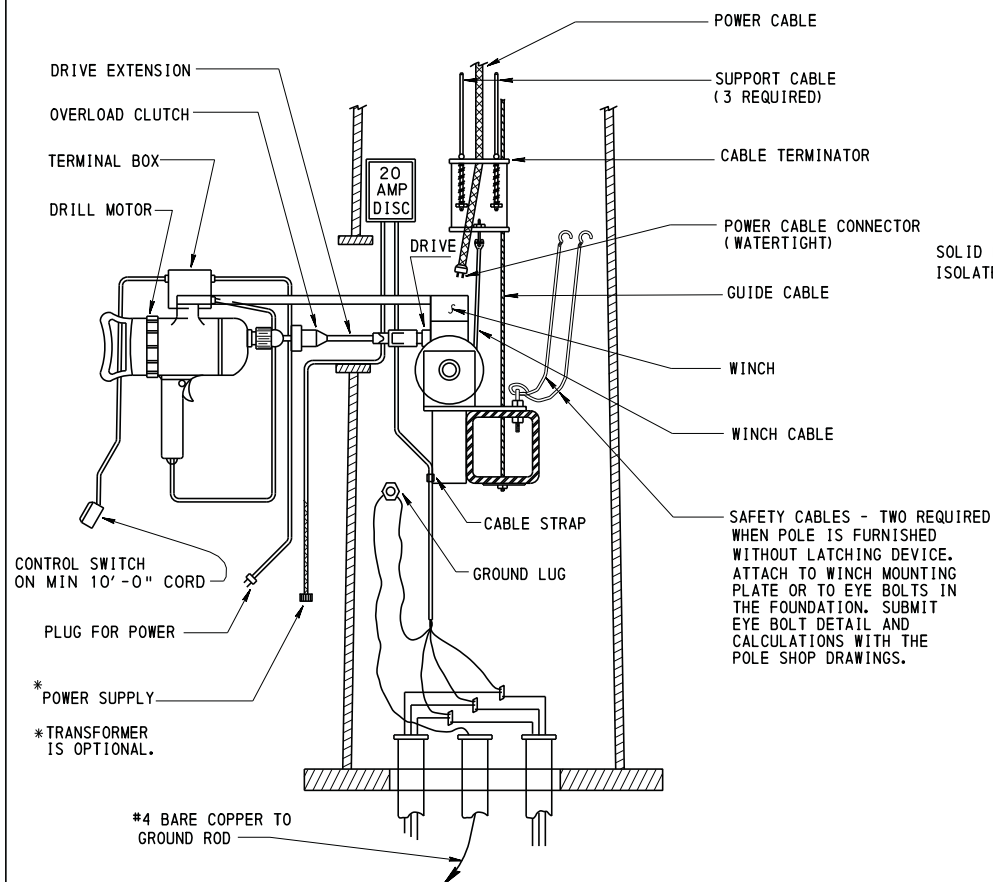
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**HIGHWAY LIGHTING**  
**CONVENTIONAL LIGHTING**  
**POLE DETAILS**

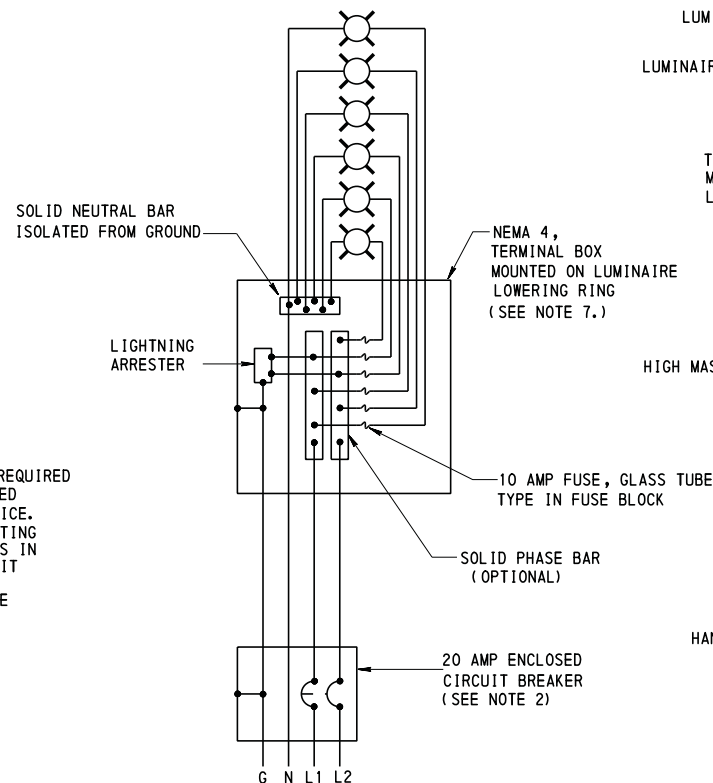
RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWM. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Betsch*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

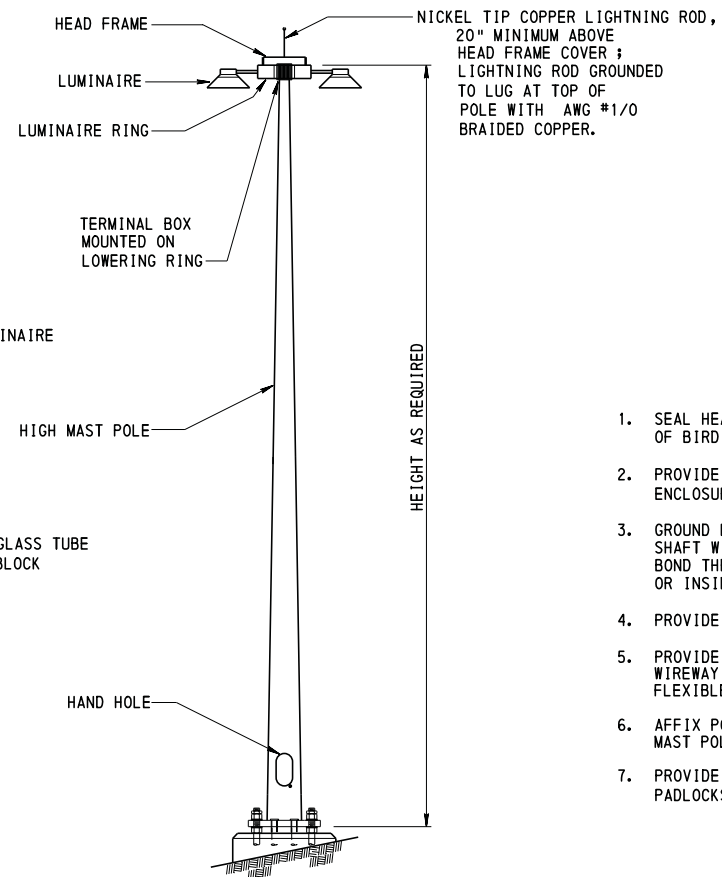
SHT 1 OF 2  
**RC-83M**



**TYPICAL LOWER SECTION MECHANISM**



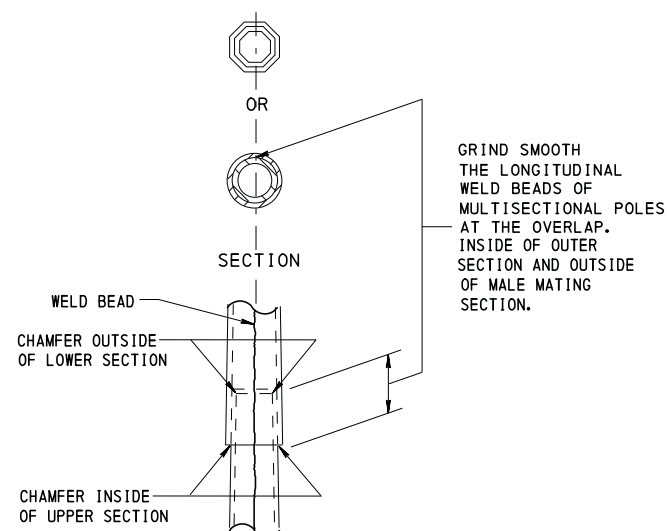
**TYPICAL CIRCUIT SCHEMATIC**



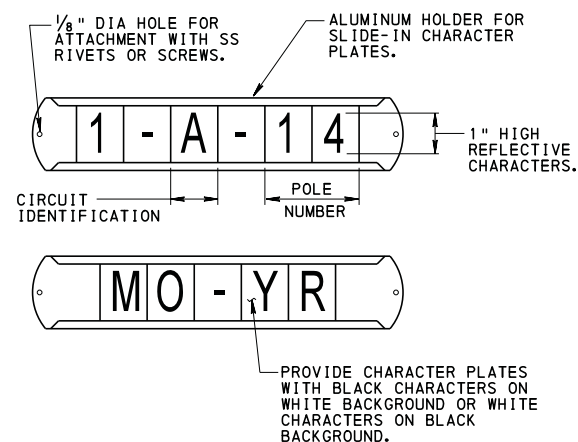
**TYPICAL HIGH MAST POLE**

**NOTES**

1. SEAL HEAD FRAME AND LUMINAIRE ASSEMBLIES TO PREVENT INTRUSION OF BIRD LIFE.
2. PROVIDE 2 POLE, CIRCUIT BREAKER DISCONNECT, IN NEMA 1 ENCLOSURE WITH EXTERNAL OPERATION.
3. GROUND LIGHTNING ROD GROUNDING CONDUCTOR DIRECTLY ON THE POLE SHAFT WITH LUGS PROVIDED BY THE MANUFACTURER OF LIGHTNING ROD. BOND THE NEUTRAL WIRE TO THE GROUND EITHER AT THE GROUND LUG OR INSIDE THE ENCLOSURE AT THE POLE BASE.
4. PROVIDE STAINLESS STEEL HARDWARE.
5. PROVIDE WIRING, FROM TERMINAL BOX TO LUMINAIRE, IN WIREWAY PROVIDED IN LUMINAIRE RING OR IN SEALTITE FLEXIBLE CONDUIT.
6. AFFIX POLE IDENTIFICATION AND DATE TAG TO EACH HIGH MAST POLE.
7. PROVIDE BOX AS PER PUBLICATION 408, SECTION 1101.11 (c). PADLOCKS ARE NOT REQUIRED.



**POLE OVERLAP DETAIL**



**POLE IDENTIFICATION AND DATE TAG DETAIL**  
FOR CONVENTIONAL AND HIGH MAST POLES

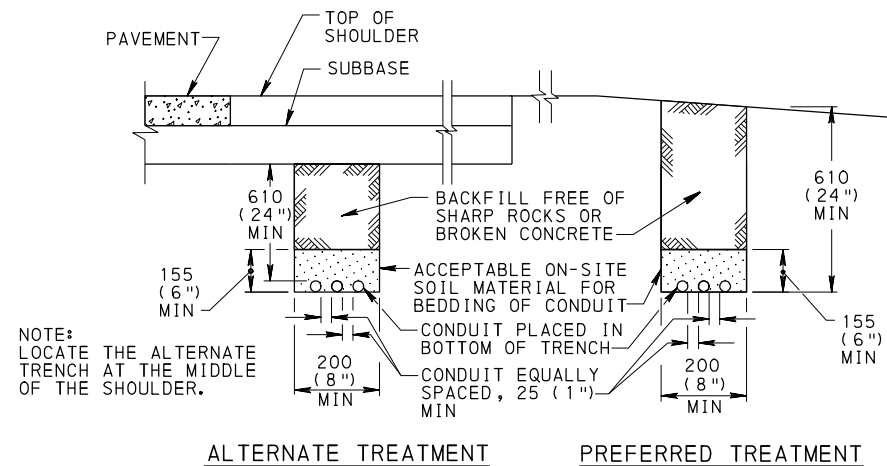
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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

HIGHWAY LIGHTING  
HIGH MAST LIGHTING  
POLE DETAILS

RECOMMENDED FEB. 8, 2019  
*Mark J. Chappell*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019  
*Melissa J. Betsch*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

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RC-83M

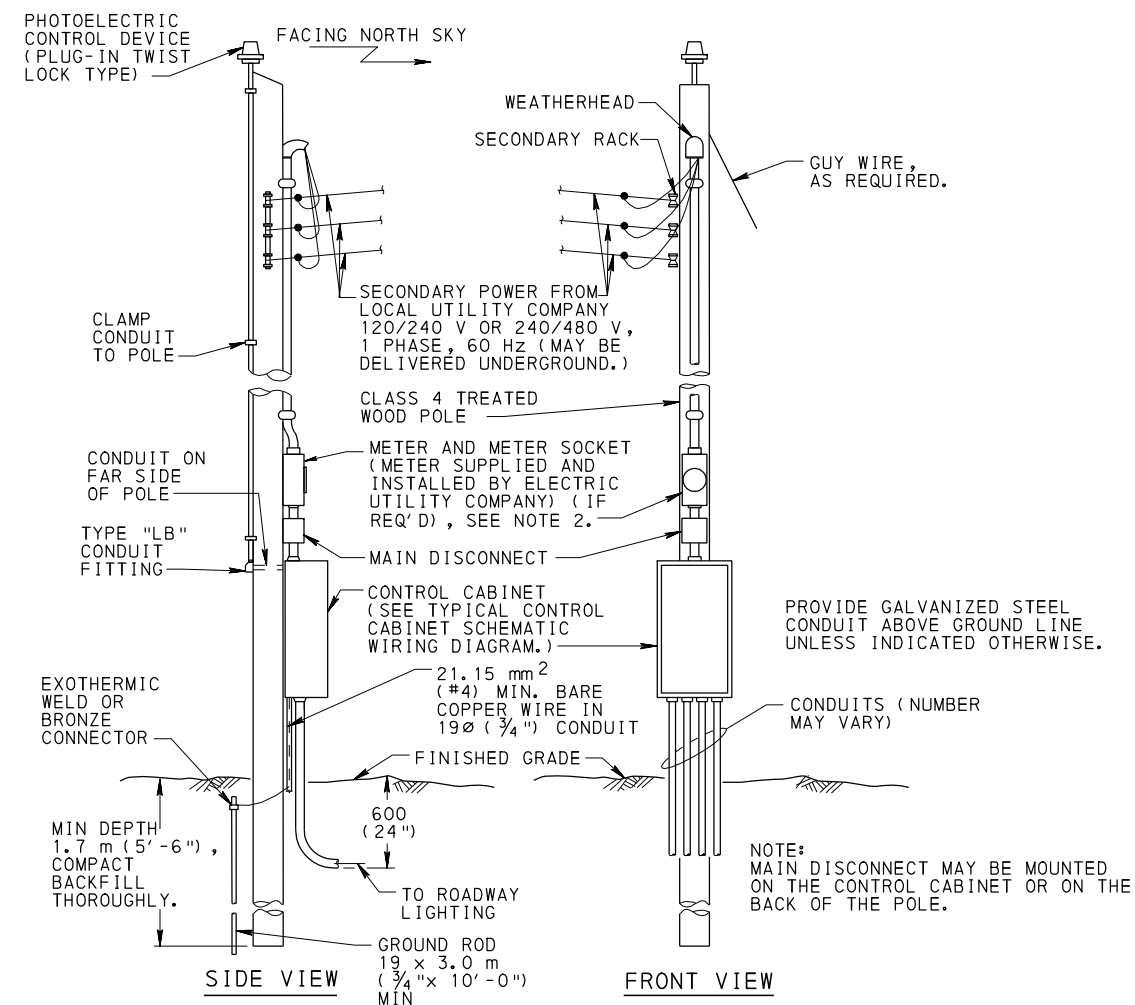
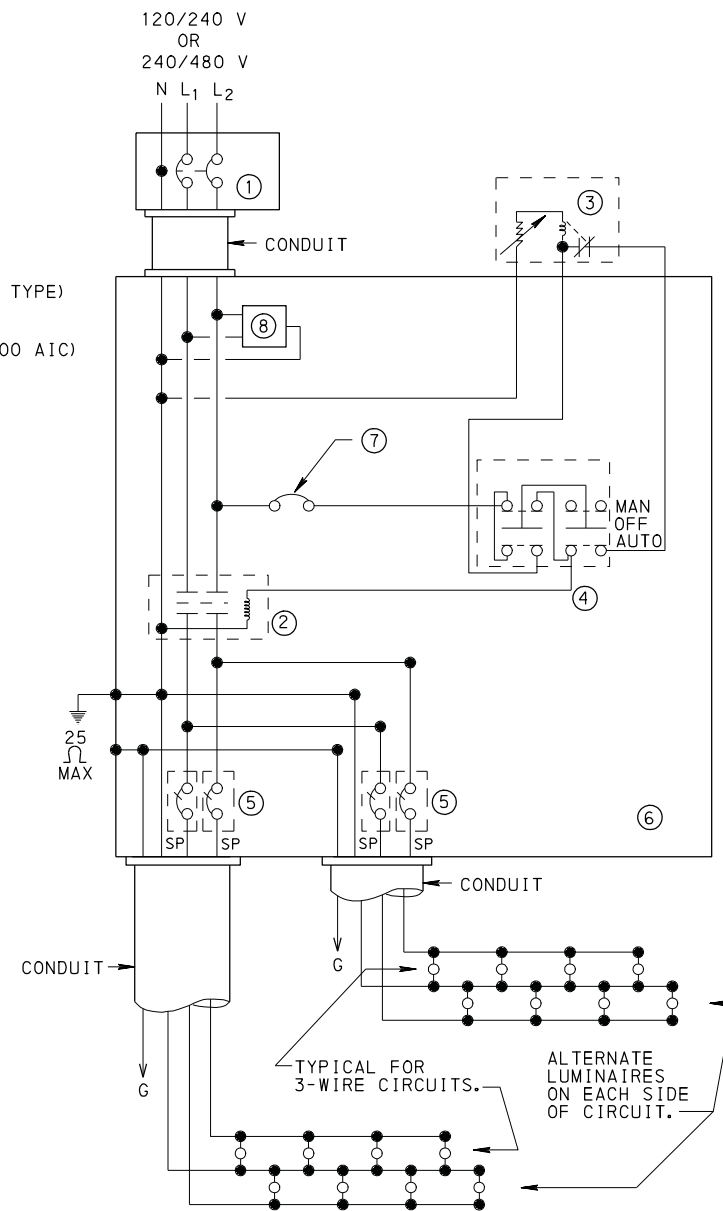


## NOTES FOR UNDERGROUND CABLE AND CONDUIT

- TRENCH ALONG THE GENERAL LINE SHOWN ON THE PLANS.
- DO NOT TRENCH IN GUIDE RAIL LINE.
- LOCATE UNDERGROUND CABLE AND CONDUIT WITH TEMPORARY PLASTIC MARKERS OR OTHER APPROVED METHODS WHERE THERE IS A POSSIBILITY OF DISTURBANCE BY GUIDE RAIL ERECTION OR SIMILAR CONSTRUCTION. VERIFY GUIDE RAIL LOCATIONS SHOWN ON THE LIGHTING PLANS.
- HAVE ALTERNATE TRENCH LINE, OTHER THAN AS SHOWN ON THE PLANS, APPROVED BY THE ENGINEER. IN NO CASE APPROVE AN ALTERNATE TRENCH LINE WHICH RESULTS IN INCREASING THE CIRCUIT LENGTH MORE THAN 5%.
- INSTALL CONDUIT TO PERMIT DRAINAGE TOWARDS NEAREST EARTH JUNCTION BOX AS APPLICABLE.
- PROVIDE PERMANENT MARKING TAPE IN THE LAST LIFT FOR THE ENTIRE TRENCH LENGTH.

- ITEMS

N - NEUTRAL  
L<sub>1</sub> - LINE 1  
L<sub>2</sub> - LINE 2  
M - MANUAL  
A - AUTOMATIC  
① - MAIN DISCONNECT  
② - CONTROL CONTACTOR  
③ - PHOTOELECTRIC CELL ( PLUG-IN TYPE )  
④ - SELECTOR SWITCH  
⑤ - DISTRIBUTION BREAKERS ( 10 000 AIC )  
⑥ - CONTROL CABINET  
⑦ - 15 A, SP BREAKER  
⑧ - LIGHTNING ARRESTER  
SP - SINGLE POLE  
DP - DOUBLE POLE



## NOTES

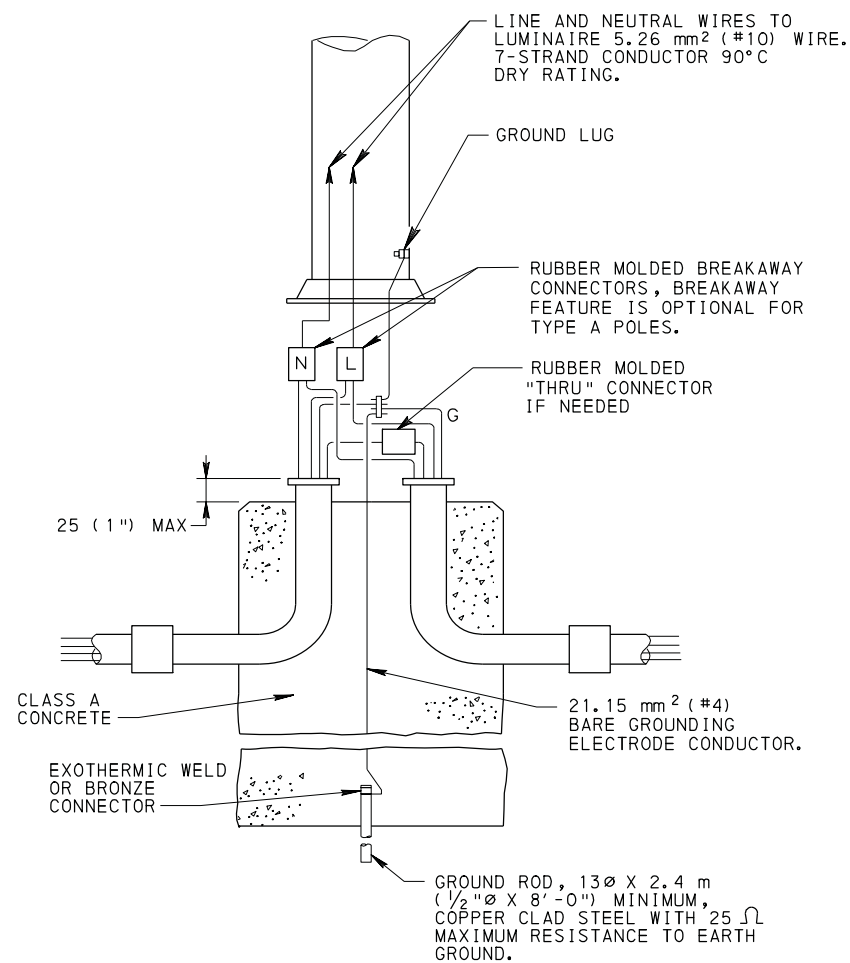
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE METERED ELECTRIC SERVICE EXCEPT WHERE DEPARTMENT APPROVED SPECIAL UNMETERED ENERGY ONLY RATE IS AVAILABLE.
3. MAKE SPLICES WITH PRE-MOLDED, DISCONNECTABLE CONNECTOR KITS. PROVIDE SPLICES WITH FUSES FOR TAPS TO LUMINAIRES FOR CONVENTIONAL LIGHTING. CONNECT THE GROUNDING ELECTRODE CONDUCTOR TO THE EQUIPMENT GROUNDING CONDUCTOR WITH A SPLIT BOLT CONNECTOR AND COAT WITH CORROSION INHIBITOR.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

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 BUREAU OF DESIGN

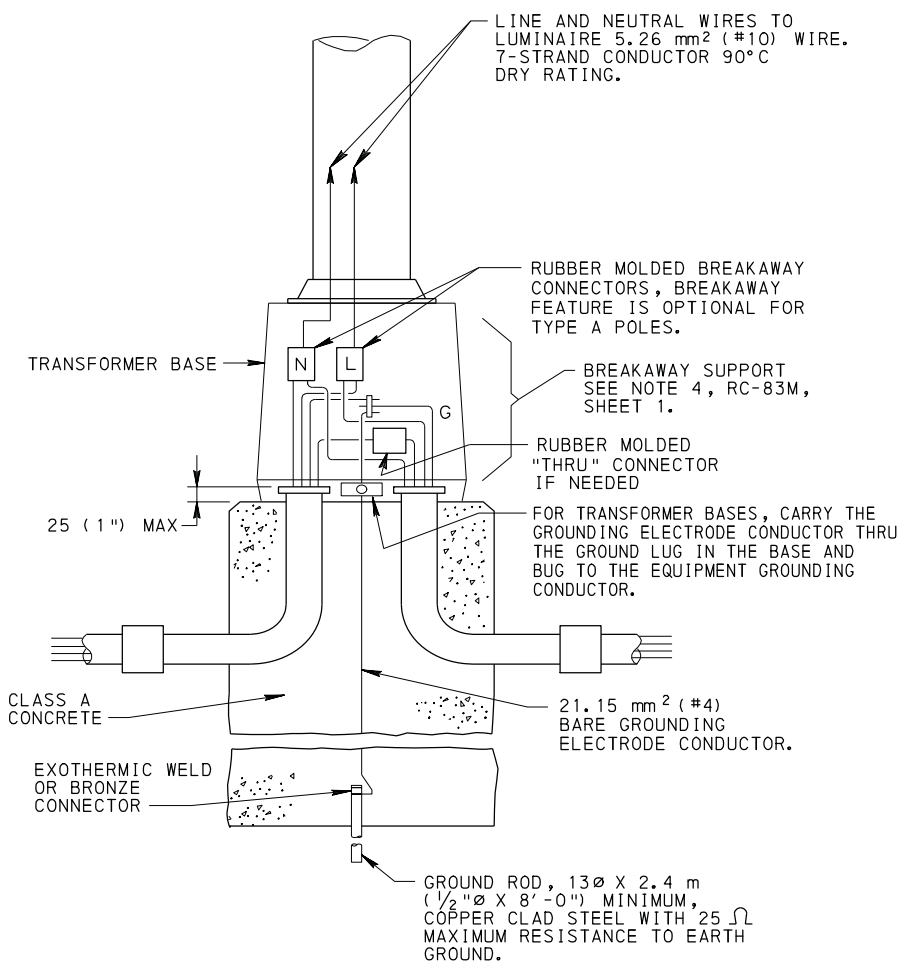
RECOMMENDED JUN. 1, 2010  
TR. W. Smith  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*Brian B. Thompson*  
DIRECTOR, BUREAU OF DESIGN

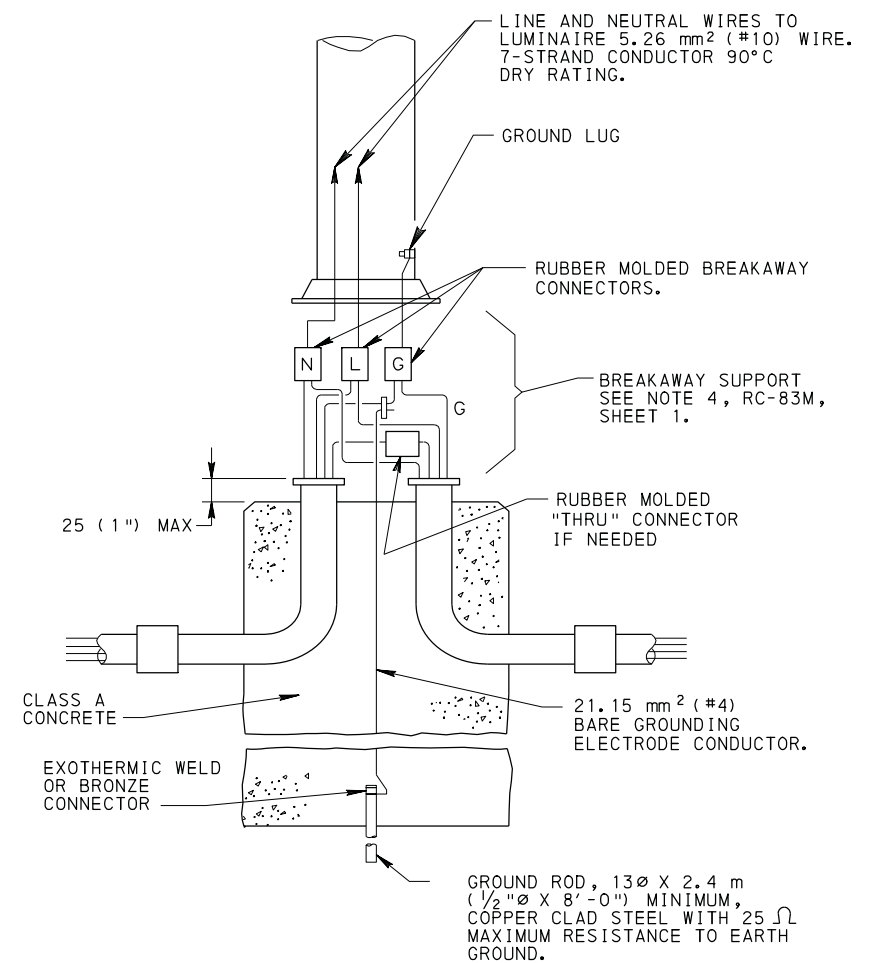
SHT 1 OF 2  
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TYPE A

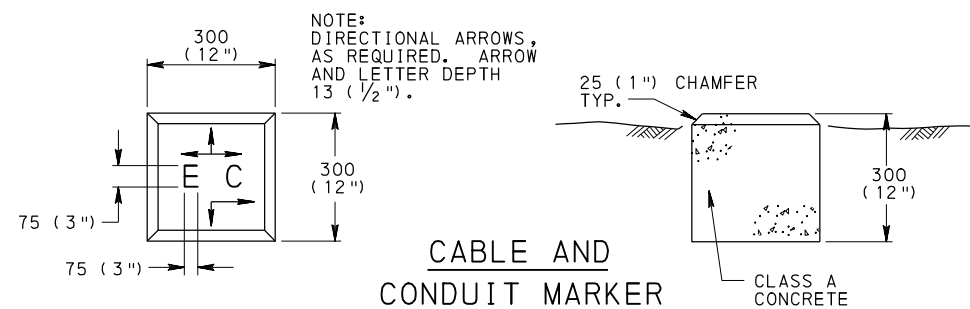


TRANSFORMER BASE



BREAKAWAY  
OTHER THAN TRANSFORMER BASE

# WIRING DETAILS



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION  
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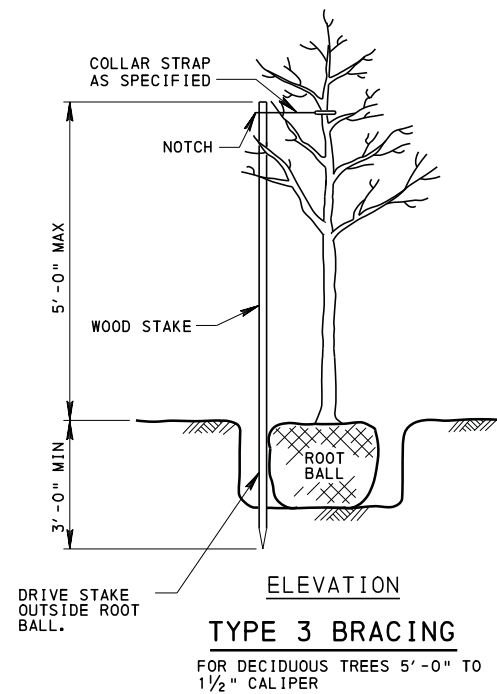
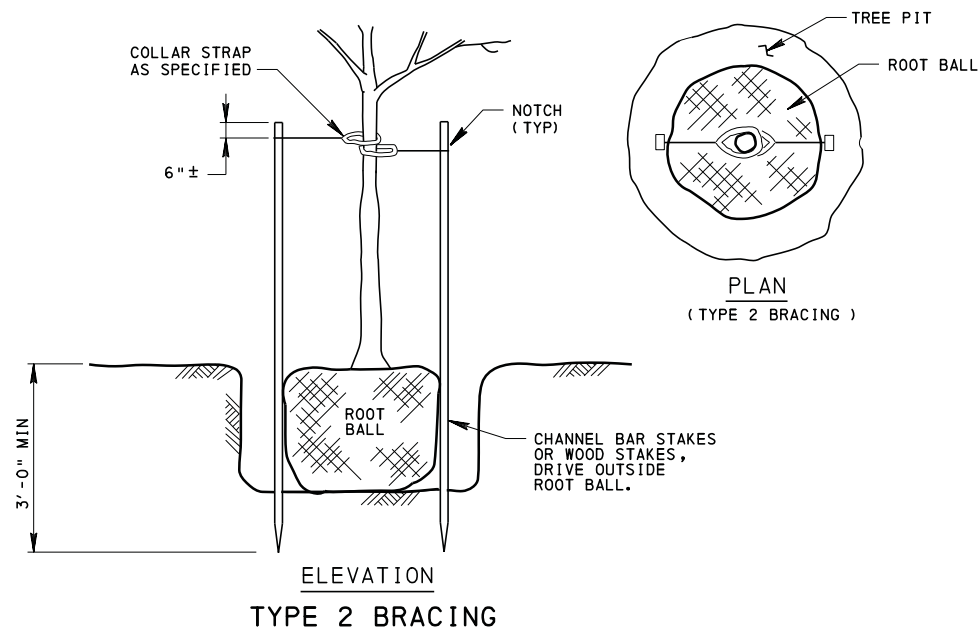
HIGHWAY LIGHTING  
LIGHTING AND ELECTRICAL DETAILS

RECOMMENDED JUN. 1, 2010  
*R. W. Willey*  
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010  
*David Thompson*  
DIRECTOR, BUREAU OF DESIGN

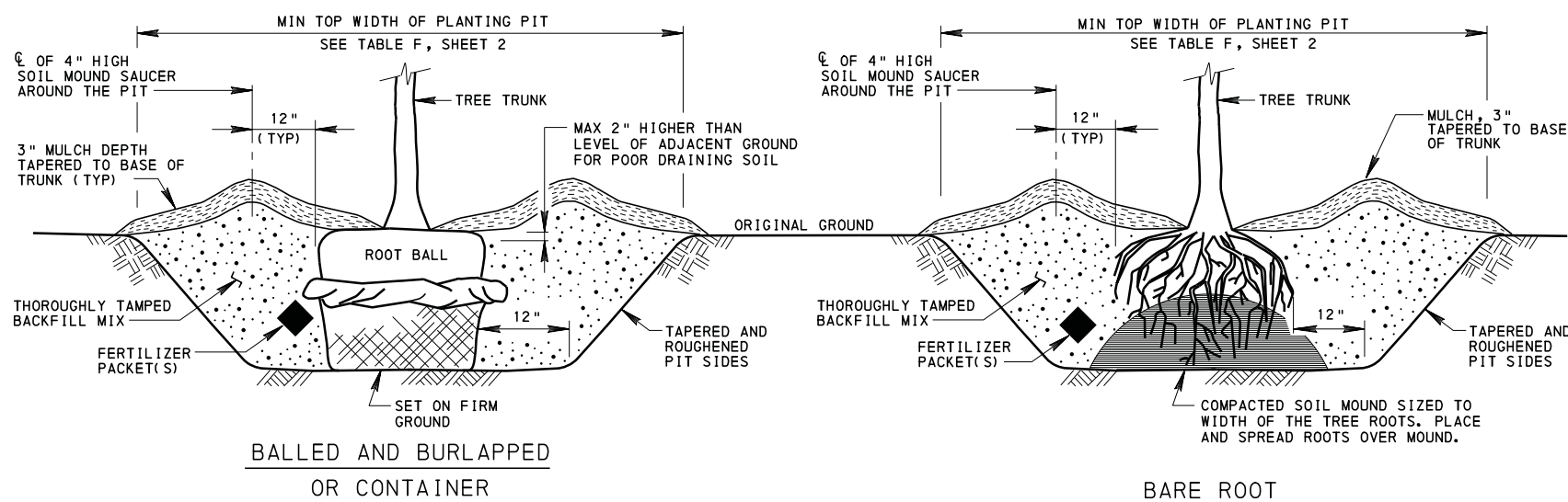
SHT 2 OF 2  
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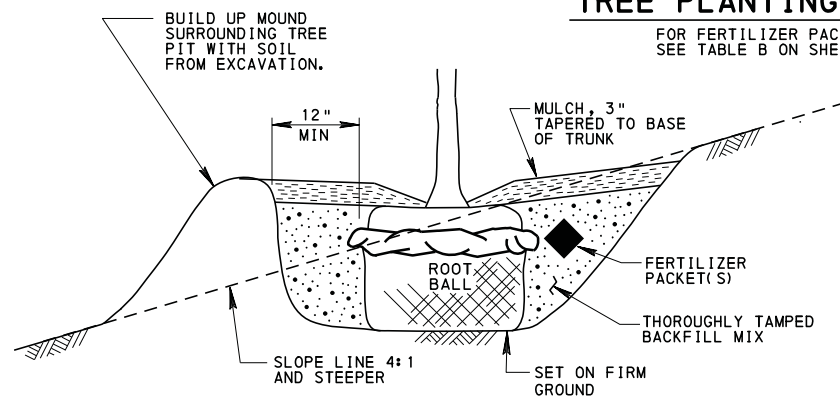
### BRACING DETAILS

FOR BRACING REQUIREMENTS SEE TABLES A AND D ON SHEET 2.



### TREE PLANTING DETAILS

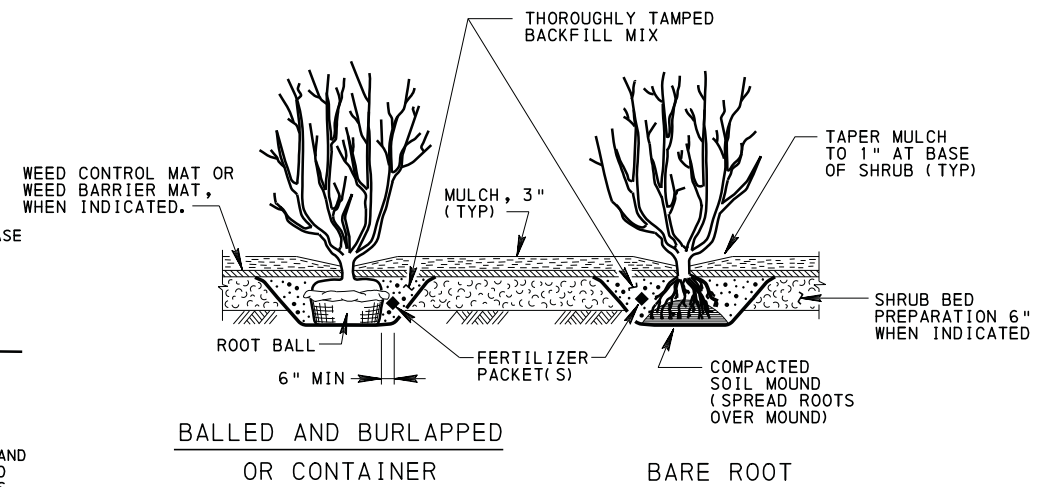
FOR FERTILIZER PACKET SCHEDULE SEE TABLE B ON SHEET 2.



- USE TYPE 2 OR TYPE 3 BRACING, AS REQUIRED.
- FOR FERTILIZER PACKET SCHEDULE SEE TABLE B ON SHEET 2.

### NOTES

1. ALL MOUNDS CREATED IN THE PLANTING PIT SHALL CONSIST OF SOIL MATERIAL FROM THE PIT EXCAVATION FREE OF ALL STONES AND FOREIGN MATERIAL 2" OR LARGER IN ANY DIMENSION.
2. SET TOP OF ROOT BALL 1" TO 2" HIGHER THAN SURROUNDING GROUND.
3. ATTACH COLLAR STRAPS TO THE TREE AT A POINT NOT LESS THAN 50% OF THE HEIGHT OF THE TREE.
4. SPACE ROOT CONTACT FERTILIZER PACKETS EQUALLY AROUND THE BALL OR ROOTS AND SET 6" TO 8" DEEP. PLACE FERTILIZER TABLETS AT THE ROOT ZONE APPROXIMATELY 3" TO 4" DEEP.
5. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 805 AND 808.



### SHRUB PLANTING AND SHRUB BED PREPARATION DETAILS

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

### BRACING AND PLANTING DETAILS

RECOMMENDED DEC. 17, 2019 <i>[Signature]</i> CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED DEC. 17, 2019 <i>[Signature]</i> DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 1 OF 3 RC-91M
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TABLE A  
BRACING REQUIREMENTS

BRACING TYPE	TREE SIZE		MINIMUM POST LENGTH	STAKE BRACE TYPE	REQUIRED POST SIZES†
	DECIDUOUS	EVERGREEN			
2	-----	4'-0" TO 6'-0" HEIGHT	6'-6"	CHANNEL BAR	1¼ LB POST H2-1
				WOOD	2" x 2" FULL DIM
2	1½" TO 2½" CALIPER	6'-0" TO 8'-0" HEIGHT	8'-0"	CHANNEL BAR	3 LB POST H2-2
				WOOD	2" x 2" FULL DIM
2	2½" TO 3½" CALIPER	-----	11'-0"	CHANNEL BAR	3 LB POST H2-2
				WOOD	3" x 3" FULL DIM
2	OVER 3½" CALIPER	-----	12'-6"	CHANNEL BAR	3 LB POST H2-3
				WOOD	3" x 3" FULL DIM
3	5'-0" HEIGHT TO 1½" CALIPER	-----	8'-0"	WOOD	2" x 2" FULL DIM

† ROUND WOOD STAKES MAY BE SUBSTITUTED AS FOLLOWS:  
2" x 2" = 2" DIAMETER ROUND STAKE AND  
3" x 3" = 3" DIAMETER ROUND STAKE.

TABLE B  
110 g, 16-8-16 ROOT CONTACT  
FERTILIZER PACKET SCHEDULE

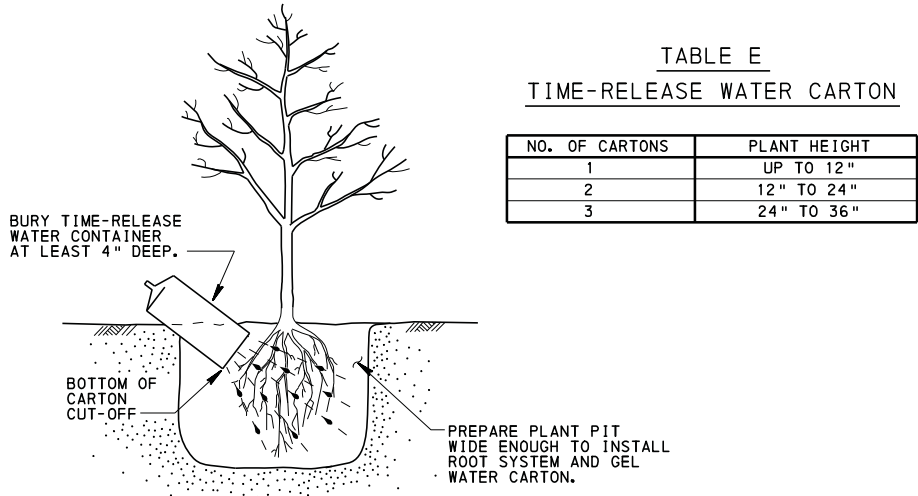
TREE SIZE		NUMBER OF PACKETS
DECIDUOUS	EVERGREEN	
UNDER 1" CALIPER	18" TO 36" HEIGHT	1
1" TO 2" CALIPER	3'-0" TO 6'-0" HEIGHT	2
2" TO 2½" CALIPER	6'-0" TO 8'-0" HEIGHT	3
2½" TO 3½" CALIPER	-----	4
3½" TO 4" CALIPER	-----	5
4" TO 5" CALIPER	-----	6
FLOWERING TREES		NUMBER OF PACKETS
5'-0" TO 10'-0" HEIGHT		3
SHRUBS		NUMBER OF PACKETS
12" TO 24" SPREAD OR HEIGHT		1
24" TO 36" SPREAD OR HEIGHT		2
3'-0" TO 5'-0" HEIGHT		3

TABLE C  
10 g, 20-10-5  
FERTILIZER TABLET SCHEDULE

ALL EVERGREEN/DECIDUOUS SEEDLINGS	1 TABLET
ALL GROUNDCOVER MATERIAL	1 TABLET

TABLE D  
COLLAR STRAP BRACING SCHEDULE

BRACING - RUBBER COLLAR STRAP SCHEDULE	
TREE SIZE	STRAP SIZE
TREES UNDER 2" CALIPER	MIN 1½" WIDE x 14" LENGTH
TREES 2" CALIPER OR LARGER	MIN 3" WIDE x 19" LENGTH
BRACING - FIBER COLLAR STRAP SCHEDULE	
ALL TREES 4" CALIPER AND SMALLER	MIN ¾" WIDE x APPROPRIATE LENGTH-WITHOUT GROMMETS
TREES 3" CALIPER AND SMALLER	MIN 1" WIDE x 18" LENGTH-WITH GROMMETS
TREES LARGER THAN 3" CALIPER	MIN 1" WIDE x 24" LENGTH-WITH GROMMETS
TREES 4" CALIPER AND SMALLER	MIN 1" WIDE x 34" LENGTH-WITH NAIL TACK



PLANTING METHOD B  
SEEDLING MATERIAL &  
SEEDLING TRANSPLANTS

TABLE E  
TIME-RELEASE WATER CARTON

NO. OF CARTONS	PLANT HEIGHT
1	UP TO 12"
2	12" TO 24"
3	24" TO 36"

TABLE F  
TREE PLANTING PIT SIZE CRITERIA

DECIDUOUS TREES					EVERGREEN TREES	
B&B, AND WIRE ROOT PROTECTION DEVICES			CONTAINER GROWN		TREE HEIGHT	MIN TOP DIAMETER OF PLANTING PIT
CALIPER	HEIGHT	MIN TOP DIAMETER OF PLANTING PIT	HEIGHT	MIN TOP DIAMETER OF PLANTING PIT		
1"	---	5'	4'	3'	3'-5'	5'
1½"	---	5'	#2 CONTAINER	3'		
2"	---	6'	5'	4'	6'-8'	6'
2½"	---	6'	#5 CONTAINER	4'		
3"	---	7'	6'	4'		
3½"	---	7'	#5 CONTAINER	4'		
4"	---	8'	1¼"	5'		
---	4'-8'	5'	#10 CONTAINER	5'		
			1½"	5'		
			#15 CONTAINER	5'		
BARE ROOT						
---	4'-8'	5'				

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BUREAU OF PROJECT DELIVERY

BRACING AND PLANTING  
DETAILS

RECOMMENDED DEC. 17, 2019

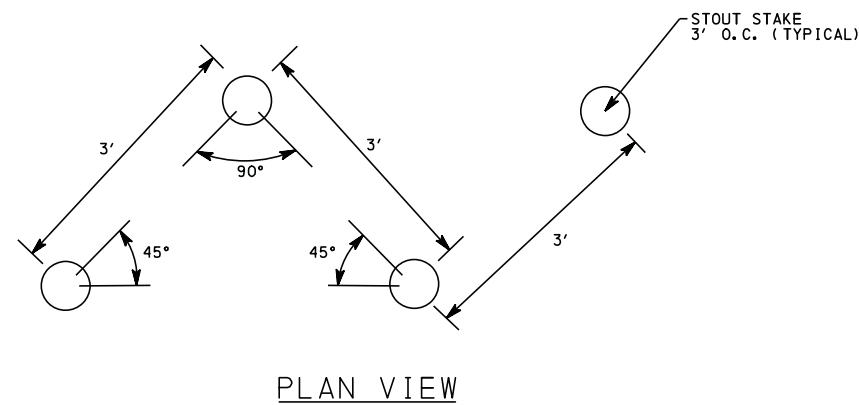
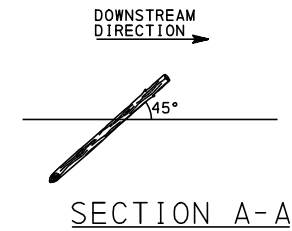
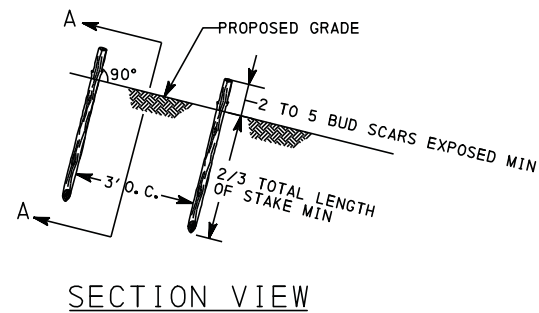
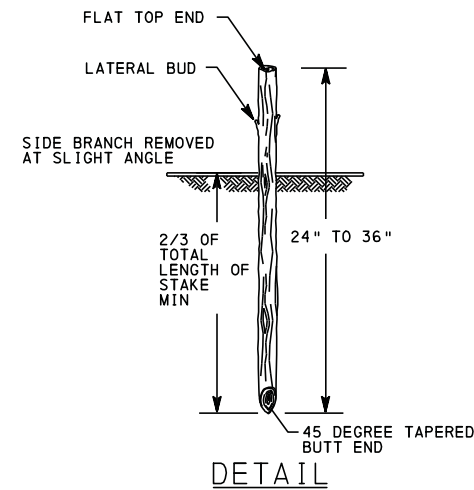
*[Signature]*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

*[Signature]*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 2 OF 3

RC-91M



## LIVE STAKE DETAILS

## NOTES

1. CREATE PILOT HOLE A MINIMUM OF 2/3 OF THE TOTAL LENGTH OF THE LIVE STAKE INTO EMBANKMENT SLOPE WHEN REQUIRED.
2. REMOVE REBAR AND DRIVE LIVE STOUT STAKES INTO PILOT HOLE A MINIMUM OF 2/3 OF THE TOTAL LENGTH INTO THE GROUND.
3. PROVIDE LIVE STAKES WITH A DIAMETER OF 1/2" TO 2".
4. SPACE LIVE STOUT STAKES 3' APART.
5. ANGLE LIVE STAKES AT A 45 DEGREE ANGLE POINTED DOWNSTREAM.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT DELIVERY

## BRACING AND PLANTING DETAILS

RECOMMENDED DEC. 17, 2019

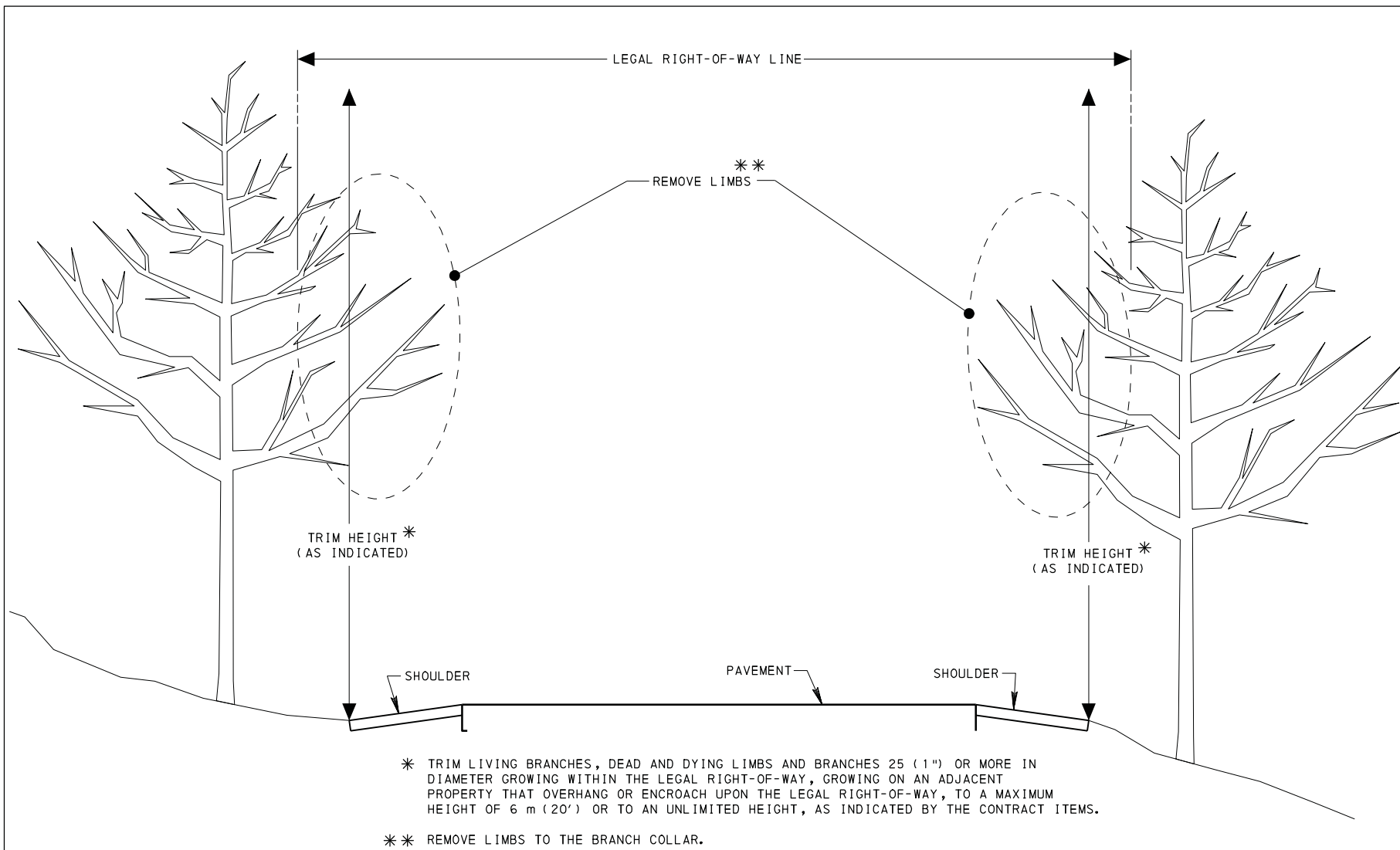
*9219 Chapel*  
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED DEC. 17, 2019

*Melvin J. Batah*  
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 3 OF 3

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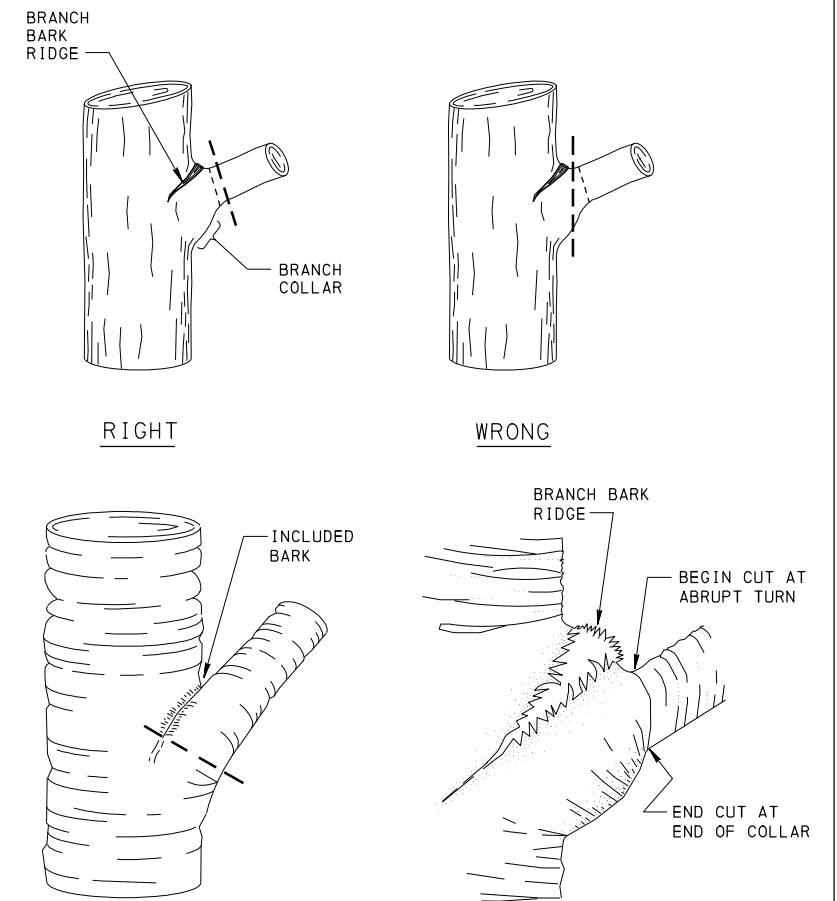


### TREE TRIMMING REMOVAL LIMITS

#### NOTES

1. COMPLETE TREE TRIMMING AS SPECIFIED IN PUBLICATION 408, SECTION 810.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

LEGEND  
--- POSITION OF CUT  
--- BOUNDARY BETWEEN TRUNK TISSUE AND BRANCH TISSUE



### BRANCH REMOVAL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

### REMOVAL LIMITS OF TREE TRIMMING

RECOMMENDED JUN. 1, 2010

*R. W. Kelly*  
CHIEF, HWY. & DIVISION

RECOMMENDED JUN. 1, 2010

*B. L. Thompson*  
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1

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