SUBJECT:

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

INFORMATION AND SPECIAL INSTRUCTIONS:

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

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

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</table>
In Limits of Backfill Integral Abutment detail:

- Added vertical dimension of 1'-6" in two locations to indicate thickness of granular fill.

- Changed "1" THICK STYROFOAM SHEET" to "1" THICK PREFORMED CELLULAR POLYSTYRENE SHEET".

- Added horizontal dimension of 2'-0" for structure backfill and added "(INCLUDES 1" THICK PREFORMED CELLULAR POLYSTYRENE SHEET)".

- Added dimension line to indicate the bridge pay limit as per BD-628M.

- Added dimension to indicate location for Section A-A, Limits of Backfill, Wingwalls of Integral Abutments.

- Changed "GRANULAR FILL (TYP)" to "STRUCTURE BACKFILL (TYP), SEE NOTES 10 & 11 THIS SHEET".

- Changed "SUBBASE" to "STRUCTURE BACKFILL (TYP)".

In Limits of Backfill Wingwalls of Integral Abutments detail:

- Added "SECTION A-A".

- Changed "GRANULAR FILL (TYP)" to "STRUCTURE BACKFILL (TYP), SEE NOTE 10 THIS SHEET".

In General Notes:

- Added Note 12.

In Typical Layout detail:

- Deleted one bar in transverse joint for each lane.

- Revised distance between longitudinal shoulder joint and first coated dowel bar from 6" +/- 1" to 12" +/- 1" (2 locations).

- Added Note 14.

In plan views of Typical Expansion Joint Assembly and Typical Contraction Joint Assembly details:

- Revised distance between edge of pavement and center of epoxy coated dowel bar from 6" to 12" (4 locations).

- Revised distance between edge of pavement and lower side wire from 3" to 9" (4 locations).

In Typical Load Transfer Assembly table:

- Decreased values for overall unit length by 6" for each lane width.

- Decreased number of dowels by 1 for each lane width.

- Added "(MAX)" under the column heading "OVERALL UNIT LENGTH".

Added Sheet for Concrete Pavement Joints, 6:1 Skewed, Load Transfer Assemblies.
<table>
<thead>
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<th>Sheets 5-8</th>
<th>Added Sheets for Concrete Pavement Joints, Intersection Joint Layout.</th>
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<td>Sheets 9-12</td>
<td>Added Sheets for Concrete Pavement Joints, Roundabouts.</td>
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<tr>
<td>RC-25M Chips 1-7</td>
<td>Revised Notes regarding rumble strips.</td>
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<tr>
<td>Sheet 1</td>
<td>Revised Note 2 by deleting &quot;CONSIDER THE&quot; before &quot;PAYMENT&quot;.</td>
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<td></td>
<td>Added Notes 12 and 13.</td>
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<tr>
<td>Sheet 2</td>
<td>Deleted guide rail and vertical dimension (See Note 3) in typical sections for Type 4, Type 6, and Type 7 Shoulders.</td>
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<tr>
<td></td>
<td>Deleted Note 3; renumbered all subsequent Notes.</td>
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<tr>
<td>Sheet 3</td>
<td>In Concrete Shoulders Adjacent to Plain Concrete Pavement for Collectors and Local Roads detail, revised spacing of tie bars to make them graphically appear 30&quot; from the transverse roadway joint and the transverse shoulder joint.</td>
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<td>In Section B-B for Shoulder Relief Joints detail, modified the 1'-0&quot; wide pavement relief joint to indicate Superpave HMA binder course only (deleted Superpave HMA base course).</td>
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<tr>
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<td>Revised Note 9 regarding rumble strips.</td>
</tr>
<tr>
<td>Sheets 4-6</td>
<td>Revised Sheet title from &quot;SHOULDERS RUMBLE STRIPS&quot; to &quot;MILLED RUMBLE STRIPS SHOULDER RUMBLE STRIPS&quot;.</td>
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<tr>
<td>Sheet 7</td>
<td>Revised Note 11 regarding rumble strips.</td>
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<tr>
<td>RC-26M Sheet 1</td>
<td>Revised Note 2 to match RC-20M, Sheet 1, Note 4.</td>
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<td>In Section A-A, Typical Pavement Patching Joint detail:</td>
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<tr>
<td></td>
<td>- Removed one dowel bar from each side of centerline (also Plan View).</td>
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<td>- Revised distance between longitudinal joint and first coated dowel bar from 6&quot; to 12&quot;.</td>
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<td>- Revised distance between edge of pavement and first coated dowel bar from 6&quot; to 12&quot;.</td>
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<td>- Revised Note 6 regarding sealing joints.</td>
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<td>- Added Note 7.</td>
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<tr>
<td>Sheet 4</td>
<td>Revised new &quot;F&quot; pavement joints in three details to be shown as skewed along the centerline of the original joint.</td>
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<td>Added &quot;F&quot; for bottom center detail to indicate location of skewed joints along the centerline of the original joints (3 locations).</td>
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<td>Revised Note 5 to indicate &quot;...A NEW PAVEMENT JOINT AT THE LOCATION OF...&quot; rather than &quot;...A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF...&quot;.</td>
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<td>Deleted Note 7.</td>
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<tr>
<td>Sheet 5</td>
<td>For upper center and middle left details, rotated new pavement joint F counterclockwise about the center to the same angle as the centerlines of the original joints.</td>
</tr>
<tr>
<td>Sheet 6</td>
<td>Moved this sheet from Sheet 9 to Sheet 6. Renumbered Sheets 6-8 to Sheets 7-9. Added detail for Lane Widening Plan with skewed joints. Revised label of existing detail to indicate Lane Widening Plan with perpendicular joints.</td>
</tr>
<tr>
<td>Sheet 9</td>
<td>Revised Note 7 regarding spacing between dowels.</td>
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<tr>
<td>Sheet 10</td>
<td>Added sheet with details for cross-stitching.</td>
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<tr>
<td>Sheet 11</td>
<td>Added sheet with details for new pavement repair.</td>
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</table>
| RC-28M Sheet 1 | Replaced Overlay Transition with Paving Notch on Concrete and Bituminous Pavements detail with Typical Paving Notch detail. Added Legend for Typical Paving Notch detail:  
- Denoted a patterned area of the existing pavement to be milled.  
- Defined the minimum length of existing pavement to be milled for the wearing course (LW), binder course (LB), and leveling course (LL).  
- Noted that the variable depth milling is incidental to the paving item. Revised Table A to identify Roadway ESAL Level and Minimum Length of Milling. Deleted Notes 1 and 2. Renumbered all subsequent Notes. |
| RC-38M Sheets 1-3 | Issued new Standard Drawings (Sanitary Sewer Manholes). |
| RC-45M Sheet 1 | In General Notes, deleted Notes 1 and 2; renumbered all subsequent Notes. |
| Sheets 2-3 | Added unit in inches (") to indicate 3/8" diameter studs. |
| RC-46M All Sheets | Deleted Design Tables with metric units (Sheets 20-22, 32-34, 40-44). Renumbered Sheets 23-31 to Sheets 20-28, Sheets 35-39 to Sheets 29-33, and Sheet 45 to 34. Updated all sheet references where necessary. Removed references to "U.S. CUSTOMARY UNITS". |
| Sheet 1 | In General Notes, deleted Notes 1 and 2; renumbered all subsequent Notes. In Note 14, inserted second sentence to locate the top step 6" minimum below the top of the inlet box. Revised Index of Sheets to reflect reduction from 45 to 34 sheets. |
| Sheet 8 | In Section D-D, Top Slab with Shiplap Joint (Precast Only) detail:  
|         | -Changed dimension from "1" MIN." to "1 1/2" MIN." on the right side for the location of the bottom rebar. |
| Sheet 12 | In Section F-F, Transition Slab with Shiplap Joint (Precast Only) detail:  
|         | -Changed dimension from "1" MIN." to "1 1/2" MIN." on the left and right sides for the location of the bottom rebars. |
| **RC-50M** | **Sheet 1** | Added new Section D-D with Rock, Class R-4 in situations without inlet placement to protect the embankment from erosion, especially in the area behind guide rail posts.  
|         | In Elevation View for Typ. Concrete Bridge Barrier (Without Inlet Placement) detail:  
|         | -Added graphics for Rock, Class R-4 behind guide rail posts between end of concrete barrier and Post 6.  
|         | -Added "ROCK, CLASS R-4 SEE NOTE 3".  
|         | -Added arrows and letters to identify Section D-D.  
|         | Moved Note 3 to Note 1.  
|         | Inserted Note 3. |
| **Sheet 10** | In Section F-F, added "(A307) BOLTS (3 TOTAL)" for 1 1/16" oversized holes. |
| **Sheet 16** | Added the callout "SEE NOTE 3." in all three details.  
|         | Added Note 3 (was previously note with double asterisk); inserted "5/8 Ø" to define size of splice bolts. |
| **RC-65M** | **Sheet 1** | Deleted Note 6.  
|         | Added Roundabout Truck Apron Curb detail below Type A and Type B. |
| **RC-70M** | **Sheet 1** | Revised Note 5 to read, "PROVIDE MESH SUPPORT MEETING THE MATERIAL REQUIREMENTS AS SPECIFIED IN PUBLICATION 408, SECTION 865.2(b)." Section 865.2(b) identifies that mesh support can be metallic coated steel, 14.5 gage wire mesh, arranged in a maximum grid of 6 inches by 6 inches, or an acceptable, equivalent plastic mesh. |
| **Sheet 3** | For Compost Filter Berm Detail, revised slope from 2 MIN:1 to 1 MIN:1.  
|         | For Compost Filter Sock Detail, in Section View, added 32" size. |
Any comments or questions regarding the above revisions should be directed to the Highway Design and Technology Section, Highway Delivery Division, Bureau of Project Delivery.

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<tr>
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<td>Brian G. Thompson, P.E.</td>
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<td>Director, Bureau of Project Delivery,</td>
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**June, 2010 Edition**

* See Change #1 for June 10, 2013 Standard Revisions
** See Change #2 for Sept. 15, 2016 Standard Revisions
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

RECOMMENDED

RC-12M
BACKFILL AT STRUCTURES

FOUNDATION PREPARATION FOR RC BOX AND ARCH CULVETS ON FINE GRAIN SOIL ONLY
NOTE: EXCAVATE THE LAST 2'-0" WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM.
FOR CULVETS WITH SPANS LESS THAN 8'-0", BOTTOM MAY BE SLOPED IN ONE DIRECTION.

TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL
TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT

SEPT. 15, 2016
CHIEF, HWY. DELIVERY DIVISION
DIRECTOR, BUREAU OF PROJECT DELIVERY

BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES
1. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

2. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

3. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

4. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

5. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

6. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

7. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

8. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

9. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

10. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

11. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

12. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

GENERAL NOTES:

1. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

2. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

3. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.

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12. Place structure backfill and adjoining embankment simultaneously unless otherwise permitted by the engineer.
**TYPE C SLOPE LEGEND**
- PRIMARY GEOSYNTHETIC
- SECONDARY GEOSYNTHETIC
- CLASS 4, TYPE A GEOTEXTILE WRAP
- SLOPE ANGLE
- GEOSYNTHETIC ABOVE OR BELOW, WHICHEVER IS GREATER

**RECOMMENDED**
- PLACE ROCK LINING AND ASHRAO NO. 1 COARSE AGGREGATE IN LIFTS NOT EXCEEDING 4.5 FEET. NO MORE THAN 3 TIMES THE TOP SIZE OF ROCK SPECIFIED FOR ROCK LINING, MEASURED PERPENDICULAR TO THE SLOPE FACE.

**NOTE**
- DO NOT LEAVE GEOSYNTHETIC EXPOSED FOR MORE THAN 7 DAYS. PLACE A UV PROTECTIVE COVER OVER EXPOSED GEOSYNTHETIC FACE FOR MORE THAN 7 DAYS. PLACE A UV PROTECTIVE COVER OVER EXPOSED GEOSYNTHETIC FACE.

12˚ MINIMUM ASHRAO NO. 1 COARSE AGGREGATE

**TYPE C SLOPE**
- SLOPE ANGLE
- REQUIRED SLOPE ANGLE
- 500 YEAR FLOOD ELEVATION

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

**RECOMMENDED**
- PLACE ROCK LINING AND ASHRAO NO. 1 COARSE AGGREGATE IN LIFTS NOT EXCEEDING 4.5 FEET. NO MORE THAN 3 TIMES THE TOP SIZE OF ROCK SPECIFIED FOR ROCK LINING, MEASURED PERPENDICULAR TO THE SLOPE FACE.

**NOTE**
- DO NOT LEAVE GEOSYNTHETIC EXPOSED FOR MORE THAN 7 DAYS. PLACE A UV PROTECTIVE COVER OVER EXPOSED GEOSYNTHETIC FACE FOR MORE THAN 7 DAYS. PLACE A UV PROTECTIVE COVER OVER EXPOSED GEOSYNTHETIC FACE.

12˚ MINIMUM ASHRAO NO. 1 COARSE AGGREGATE
BUREAU OF PROJECT DELIVERY
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED
BENCHING REQUIREMENTS
FOR EXISTING SLOPE

CONSTRUCTION TOLERANCES
ELEVATION VIEW

EXISTING SLOPE

V max

+ 1/2" GABION FACE
+ 1/4" WIRE MESH FORM FACE

H max

+ 1" GEOTEXTILE WRAP
+ 1/2" GABION BASKETS
+ 1/2" PRIMARY AND SECONDARY REINFORCEMENT

CONSTRUCTION TOLERANCES
HORIZONTAL VIEW

H max

+ 1" GEOTEXTILE WRAP
+ 1/2" GABION BASKETS
+ 1/2" PRIMARY AND SECONDARY REINFORCEMENT

CONSTRUCTION TOLERANCES
PLAN VIEW

V max

+ 1/2" VERTICAL STEP
+ 1/2" GABION BASKETS
+ 1/4" WIRE MESH FORM FACE

H max

+ 1" GEOTEXTILE WRAP
+ 1/2" GABION BASKETS
+ 1/2" PRIMARY AND SECONDARY REINFORCEMENT

MEASURING THE EFFECTIVE LENGTH OF GEOGRID REINFORCEMENT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY
GEOSYNTHETIC REINFORCED SOIL SLOPE
EFFECTIVE LENGTH, CONSTRUCTION TOLERANCES, AND BENCHING REQUIREMENTS FOR EXISTING SLOPES
NOTES

1. PLACE A TUBE FROM A MANUFACTURER LISTED IN BULLETIN 15 OVER THE IMPACTED END OF ALL DOWEL BARS IN TYPE D JOINTS AND
USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15.

2. CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND RUNNING IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. MAKE THE TOP SURFACE SMOOTH AND
BROKEN OR CRUSHED OR FOR THE JOINT SEAL TO PROPERLY FIT
WITHOUT LOSS IN THICKNESS OF THE MATERIAL.

3. HIDE ALL TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE.

4. USE MINIMUM 1½" X 1½" LONG DOWEL BARS FOR PAVEMENT DEPTHS OF 12" OR LESS AND MINIMUM 1½" X 1½" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 12". USE MINIMUM 1½" X 18" DOWEL BARS HAVING MORPHANT TIES FOR BOTH TRANSVERSE JOINTS AND TRANSVERSE SHOULDER JOINTS.

5. USE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE PAVEMENT.

6. USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15.

7. WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN
PUBLICATION 408, SECTION 705.4.40, IS SELECTED FOR USE IN TRANSVERSE JOINTS, TYPE P OR TRANSVERSE SHOULDER JOINTS,
THE SEAL BETWEEN JOINT SEALING MATERIAL, AT THE EDGE OF THE JOINT, IS ALTERNATE TYPE E AND ALTERNATE LONGITUDINAL SHOULDER JOINTS.

8. PROVIDE MATERIALS AND METHODS OF INSTALLATION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408.

9. PROVIDE MATERIALS AND METHODS OF INSTALLATION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408.

10. ALT. CONCRETE PAVEMENT JOINTS WITH INLET JOINTS (CONCRETE JOINTS SHOWN IN FIG. D) TO AVERT THE TREATMENT OF A DOWEL BAR AND SEAL WITH ASPHALT SEALING MATERIAL.

11. VARIANCE IN DIMENSIONS ARE ALLOWED FOR BOTH STANDARD WIDTH PAVEMENT AND OTHER THAN PAVEMENT CAPS AS LONG AS THE PAVEMENT FROM THE EDGE OF PAVEMENT TO THE FIRST DOWEL IS NO LESS THAN 5" AND NO MORE THAN 15", AND THAT THE SPACING BETWEEN ALL DOWELS IS 12" ON CENTER.

RECOMMENDED DATE: SEPTEMBER 15, 2016
RECOMMENDED DATE: SEPTEMBER 15, 2016
RECOMMENDED DATE: SEPTEMBER 15, 2016

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BEDFORD PRODUCT DELIVERY

CONCRETE PAVEMENT JOINTS
**TYPICAL EXPANSION JOINT ASSEMBLY**

**SEPT. 15, 2016**

**TYPICAL SIDE FRAME DETAILS**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10&quot;</td>
<td>Thickness of the joint assembly</td>
</tr>
<tr>
<td>1984 lb</td>
<td>Load capacity of the assembly</td>
</tr>
</tbody>
</table>

**RECOMMENDED “A” DESIGN**

**SIDE SUPPORT THICKNESS**

<table>
<thead>
<tr>
<th>Width</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>794 lb</td>
<td>10&quot;</td>
</tr>
<tr>
<td>1984 lb</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

**LOAD TRANSFER ASSEMBLIES**

1. **WIRE TO “A” & “J”**
   - Wire to be placed in accordance with the designer's specifications.

2. **DOWEL TO WELD**
   - Dowel bars to be welded in place with a minimum clearance of 0.003".

3. **WIRE TOLERANCES PER ASTM 510M**
   - Wire tolerances specified at 0.003".

4. **CONCRETE PAVEMENT JOINTS QUALITY CONTROL PLAN FOR WELD SHEAR**
   - weld requirements as listed below and tested per manufacturer's specifications.

5. **WELD REQUIREMENTS AS LISTED BELOW**
   - Weld requirements as stated in the manufacturer's specifications.

6. **SIDE SUPPORT BAR KEEPER CLIPS**
   - Dowel bar keeper clips may be used in lieu of tie wires or ship wires for contraction and expansion joint assemblies.

7. **SIDE SUPPORT AND CENTER SUPPORT**
   - Provide side support and center support assemblies for expansion joint filler, anchor stakes and dowel bars.

8. **SIDE SUPPORT TOLERANCES**
   - Side support tolerances as specified in the manufacturer's specifications.

9. **SIDE SUPPORT CAPS IN THE FIELD**
   - Caps to be installed in the field as per manufacturer's specifications.

10. **SIDE SUPPORT DETAILS**
    - All details required for uniformity and compatibility.

11. **SIDE SUPPORT STAKES**
    - Side support stakes to be provided to secure the unit from movement.

12. **SIDE SUPPORT USAGE**
    - Side support usage to be provided per manufacturer's specifications.

13. **SIDE SUPPORT TOLERANCES**
    - Tolerances for side support as specified in the manufacturer's specifications.

14. **SIDE SUPPORT BAR KEEPER CLIPS**
    - Dowel bar keeper clips may be used in lieu of tie wires or shipping wires for stability.

15. **SIDE SUPPORT MATERIALS**
    - Materials to be provided per manufacturer's specifications.

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY CONCRETE PAVEMENT JOINTS 611 SKEWED LOAD TRANSFER ASSEMBLIES**

**TYPICAL LOAD TRANSFER ASSEMBLY**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Overall Length</th>
<th>No. of Dims</th>
</tr>
</thead>
<tbody>
<tr>
<td>9'-6&quot;</td>
<td>10'-0&quot;</td>
<td>10</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>10'-0&quot;</td>
<td>10</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>12'-0&quot;</td>
<td>10</td>
</tr>
</tbody>
</table>

**LOAD TRANSFER ASSEMBLY**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Upper &amp; Lower Side Support</th>
<th>Dowel to Joint Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>1,084 lb</td>
<td>1,994 lb</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1,190 lb</td>
<td>1,994 lb</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1,084 lb</td>
<td>1,994 lb</td>
</tr>
</tbody>
</table>

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY CONCRETE PAVEMENT JOINTS 611 SKEWED LOAD TRANSFER ASSEMBLIES**

**RECOMMENDED SEPT. 15, 2016**

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY CONCRETE PAVEMENT JOINTS 611 SKEWED LOAD TRANSFER ASSEMBLIES**

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY CONCRETE PAVEMENT JOINTS 611 SKEWED LOAD TRANSFER ASSEMBLIES**

**SECTION A-A EXPANSION JOINT ASSEMBLY**

**SECTION B-B CONTRACTION JOINT ASSEMBLY**

**PLAN**

**ELEVATION**

**EXPANSION JOINT ASSEMBLY**

**CONTRACTION JOINT ASSEMBLY**

**NOTES**

- This standard depicts the dimensions required for uniformity and compatibility.
- These dimensions are based on the manufacturer's specifications and should be followed closely.
- Proper side support usage is required for stability.
- All materials provided by the manufacturer should be used.
- Weld requirements as listed below and tested per manufacturer's specifications.
- Side support tolerances as specified in the manufacturer's specifications.
- Side support details for uniformity and compatibility.
- Side support usage to be provided per manufacturer's specifications.
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- Side support details for uniformity and compatibility.
**Commonwealth of Pennsylvania**

**Department of Transportation**

**Recommended**

**RC-20M**

**Definitions**

- **Lane Width**: Nominal

**Notes**

1. Provide materials and workmanship meeting the requirements of Publication 408.
2. Use a Type L Joint for all longitudinal joints. See Sheet 2 for details.
3. Use a Type A 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.

**Step 1:**

- Lay out the circumference return line, taper return line, and cross road return lines. 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.

**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 cross road. Place the transverse joint by starting from where the edge of pavement line intersects the cross road return line.

**Concrete pavement joints**

**Intersection Joint Layout**

**Notes:**

1. Provide materials and workmanship meeting the requirements of Publication 408.
2. Use a Type L Joint for all longitudinal joints. See Sheet 2 for details.
3. Use a Type A 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.
**PLAN - INTERSECTION**

**PLAN - SKewed INTERSECTION**

**LEGEND**

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

### Step 3

1. The maximum desirable joint spacing is 15' between transverse joints and 12' between longitudinal joints. No leg should be longer than 15'.
2. 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 doogles.
3. These joints do not extend past the "Circumference Return Line", "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 roads without curb, pavement joints terminate at the edge of pavement.
3. Center of edge of pavement radius (TYP.).
4. See detail A on Sheet 8.
5. Joint aligned with center of radius, see notes for Step 4.
6. Edge of pavement (TYP.).
7. See detail B on Sheet 8.
9. Less than the maximum desirable joint spacing (TYP.).

### Additional Notes:

- Additional transverse joint to eliminate areas that are longer than the maximum desirable joint spacing (TYP.). See notes for Step 2.
- 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 doogles in the main roadway edges.

---

**BUREAU OF PROJECT DELIVERY**

**CHIEF, HWY. DELIVERY DIVISION**

**DIRECTOR, BUREAU OF PROJECT DELIVERY**

**SEPT. 15, 2016**
NOTE:
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.

INTERSECTION JOINT LAYOUT

PLAN - INTERSECTION

PLAN - SKewed INTERSECTION

CONCRETE PAVEMENT JOINTS
INTERSECTION JOINT LAYOUT

NOTE:
* The isolation joint is to completely separate slabs constructed to allow movement in one direction from slabs constructed to allow movement in another direction. The isolation joint may be located along a different joint than what is shown for constructability. However, it is crucial to construct Type D and Type L joints similar to that of the adjacent pavement on each side of the isolation joint.
NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP MEETING THE REQUIREMENTS OF PUBLICATION 408.

2. THE JOINT LAYOUT METHODS ARE ACCEPTABLE FOR CONCRETE ROUNDABOUTS. THE ISOLATED CIRCLE JOINT LAYOUT TECHNIQUE IS PRESENTED IN THIS STANDARD DRAWING AND IS INTENDED TO COVER ROUNDABOUTS WITH EXPANSION JOINTS ALONG THE TRUCK APRON AND BETWEEN THE APPROACH LEGS. PROVIDE A DETAILED JOINT LAYOUT PLAN INCLUDING DETAILS FOR STAGING OF PAVING OPERATIONS FOR APPROVAL BY DISTRICT ENGINEERING.

3. CONSTRUCTION PRIOR TO CONCRETE PLACEMENT, FOLLOW THE GUIDANCE CONTAINED IN THESE STANDARD DRAWINGS AND SUBMIT A DETAILED JOINT LAYOUT PLAN FOR APPROVAL.

4. 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 AT THE CONTRACTOR'S OPTION.

7. CORRELATE LONGITUDINAL JOINTS WITH LANE LINES IF POSSIBLE.

8. AN ISOLATION JOINT MAY BE CONSTRUCTED BETWEEN THE CIRCUMFERENCE AND THE APPROACH LEGS ALONG THE TRUCK APRON MINIMUM DEPTH OF PCC PAVEMENT. THE ISOLATION JOINT IS TO BE AVOIDED. DEVELOP AN ALTERNATE LAYOUT THAT PROVIDES LOAD TRANSFER SUCH AS A LAYER OF ASPIRAL TIME-RESISTING FLEXIBLE BANDING.

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 PAVEMENT JOINT TIE BARS TO RETAIN JOINT SEALING MATERIAL FROM DISPLACEMENT. SEE NOTE 11.

11. PROVIDE A 2" DIAMETER CORE HOLE WHERE LONGITUDINAL JOINTS TERMINATE AT TRANSVERSE JOINTS. CUT EXPANSION JOINT FILLER MATERIAL TO FULL CORE HOLES WITH A HOLE DRILL. FULL DEPTH OF CORE HOLES ARE NOT PERMITTED. PROVIDE TOP OF JOINT TO PROVIDE A RESERVOIR FOR JOINT SEALING MATERIAL. SEE NOTE 12.

12. PAINT AND UTILITY LOCATIONS AS SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL LOCATIONS ARE AS DESIGNED. SEE NOTE 12 AND SHEET 12.

13. PAINT PLACEMENT, MARKERS AND SIGNS AS PER CONTRACT DOCUMENTS.

14. TRUCK APRON DESIGN AS PER CONTRACT DOCUMENTS.

15. TRUCK APRON TRANSVERSE JOINTS CAN BE SPACED INDEPENDENT FROM THE ROADWAY PAVEMENT JOINTS.

16. GUTTER WIDTH VARIES FROM 1' TO 3' ALONG SPLITTER ISLANDS OR IN ACCORDANCE WITH CONTRACT DOCUMENTS. SEE SHEET 12.

17. FOR CONCRETE PAVED SPLITTER ISLANDS, PROVIDE ISOLATION JOINT AT BACK OF CURB. PROVIDE TYPE P JOINTS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT JOINTS
ROUNDABOUTS
ISOLATED CIRCLE JOINT LAYOUT

NOTES
**LEGEND**

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

---

**SECTION A-A**

**CONTRACTION JOINT, SEE RC-65M**

**INSIDE EDGE OF CURB GUTTER (TYP)**

**2' MIN SLAB WIDTH (TYP)**

**BACK OF CURB GUTTER (TYP)**

**SECTION A-A**

**CONCRETE CURB GUTTER (TYP)**

**CORE HOLE 2" DIA (TYP)**

**JOINT SEALING MATERIAL, SEE NOTE 10, SHEET 9**

**EXPANSION JOINT FILLER, SEE NOTE 11, SHEET 9**

**CONCRETE MOUNTABLE CURB GUTTER, SEE SHEET 9, AND SHEET 11**

**ISOLATION JOINT, SEE NOTE 9, SHEET 9**

**TRUCK APRON, SEE NOTE 6, SHEET 9**

**SEE NOTES 5 AND 15, TYPE P JOINT**

**TIED TO TRUCK APRON, SEE SHEET 11**

**CONCRETE CURB OR CONCRETE CURB GUTTER TIED TO PAVEMENT, SEE SHEET 11**

**TIED TO CIRCULATORY ROADWAY (NOT**

**2'MIN (TYP)**

**SEE NOTE 3E, SHEET 9**

**SEE NOTE 16, SHEET 9**

**SEE NOTE 17, SHEET 9**

**CONCRETE MOUNTABLE CURB GUTTER, SEE SHEET 11**

**ISOLATION JOINT, SEE NOTE 11, SHEET 9**

**TIED TO TRUCK APRON**

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

**CONCRETE PAVEMENT JOINTS**

**ROUNDABOUTS**

**PINWHEEL JOINT LAYOUT**

**SEPT. 15, 2016**

**SEPT. 15, 2016**

**RC-20M**
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, extend the longitudinal joint at 30° away from the center of the manhole. If the distance is greater than 2', do not adjust the joint and saw as normal.
3. If distance from the edge of manhole to nearest transverse joint is 4' or less, redirect joint to intersect the center of the manhole. Avoid joint angles less than 60°. If distance is greater than 4', do not adjust the joint and saw as normal.
4. Align transverse joint with the face of curb gutter, practical, and when distance from edge of inlet to nearest transverse joint is less than 4'.
5. All of the joint details and joint placement on this sheet pertain to only the roundabout layouts as depicted on sheets 9 and 10.

Concrete pavement 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 when extended leg lines will intersect the circle lines. The extended leg lines should form a circle that is tangent to the edge of the circle.

Step 3: In the circle, add transverse joints radiating out from the center of the circle. Also, add transverse joints with manholes and utilities. Adjust transverse joints with manholes to intersect with the center of the manhole. Add transverse joints at locations and intersecting points avoidance 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, gutter, and/or covers so that joints can intersect these.

Step 4: On the legs, add transverse joints at all locations where a five channel occurs in the pavement, e.g., divided island approaches, designs and ends of curves, taps, tangents, curb returns, etc. Extend these joints through the back of curb gutter.

Step 5: Add transverse joints between and between these added in step 4. Space joints 8 in (203 mm) between other joints, making sure to not violate maximum joint spacing.

Step 6: Make adjustments for in-pavement objects, utilities, including fire hydrants, utilities, and manhole covers. Ensure that joint angles and locations, adjust as required.
NOTES

1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/ORSlugfilling AND/OR Compacting. Shaping
   is INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS
   INSUFFICIENT GRADED MATERIAL FROM THE SHAPING
   OPERATION, COMPLETE THE WORK OF EITHER ADDING ADDITIONAL
   AGGREGATE BASE COURSE MATERIAL MEETING THE REQUIREMENTS OF
   SUBGRADE SPECIFICATIONS. WHERE THERE IS INSUFFICIENT GRADED
   MATERIAL FROM THE SHAPING OR GRADING OPERATION, REMOVE THIS MATERIAL AS
   SOON AS POSSIBLE AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY
   ITEM.

2. FOR TYPE 1 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
   AND PAY FOR AS TONS OF SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS
   INSUFFICIENT GRADED MATERIAL FROM THE SHAPING
   OPERATION, COMPLETE THE WORK OF 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 PAY ITEM.

4. GRADING IS INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS
   INSUFFICIENT GRADED MATERIAL FROM THE GRADING OPERATION TO COMPLETE
   THIS SUBGRADE, USE MATERIAL MEETING THE REQUIREMENTS OF
   PUBLICATION 408, SECTION 350 OR MILLED BITUMINOUS MATERIAL.
   INCIDENTAL TO THE SHOULDER PAY ITEM. 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 NEEDED TO
   COMPLETE THE ITEM WHETHER INCLUDED IN OR NOT.

1. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.

3. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.

3. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.

3. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.

3. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.

3. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY
   SUPERPAVE, 9.5 mm OR 12.5 mm HMA OR WMA WEARING COURSE, 1" DEPTH
   (CROSS SECTIONS ARE NOT REQUIRED.)

6. SEE SHEETS 4 AND 5 FOR DETAILS OF MILLED RUMBLE STRIPS.

5. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL
   MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONS OF
   SELECTED
   MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408,
   INCIDENTAL TO THE SHOULDER PAY ITEM.
CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

REINFORCEMENT AT OPENINGS

SECTION A-A

CONCRETE SHOULDER EXPANSION JOINTS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

SHOULders (CONCRETE)

NOTES

1. EXPANSION JOINTS MAY BE SUBSTITUTED WITH OGS MATERIAL AS PER PUBLICATION 408, SECTION 501.3(m).

2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 506.1.

3. FOR JOINT DETAILS, SEE SHEET 6.

4. ALSO SEAL TRANSVERSE SHOULDER JOINTS TO ADJACENT PAVEMENT JOINTS.

5. SEE SHEET 1 FOR SHOULDER ROUNDING DETAIL ON END SIDE OF SUPERELEVATION.

6. AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED IN A TAPER, WITH A 6" MINIMUM TAPER, OR AT THE SAME DEPTH AS THE PAVEMENT, WITH NO ADDITIONAL EXPENSE TO THE DEPARTMENT.

7. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS WITHIN 6" OF SUBBASE MATERIAL INCIDENTAL TO THE SHOULDER.

8. WHEN THE SHOULDER IS STRUCTURALLY PART OF A BARRIER MOMENT RESISTANCE SLAB (i.e. BARRIER/SLAB ON AN MSE WALL) REINFORCEMENT AT OPENINGS

9. SEE SHEET 1 FOR SHOULDER ROUNDING DETAIL

10. FOR USE ON FULL DEPTH CONCRETE SHOULDERS. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 501 OR 506 OF PUBLICATION 408 PAVING QUANTITIES.

11. CONSTRUCT ONLY RCC SHOULDERS ADJACENT TO RCC PAVEMENT AND PCC SHOULDER ADJACENT TO RCC PAVEMENT UNLESS WHEN USING CONCRETE VEHICLES AS PER SHEET 1.

12. PROTECT TRANSVERSE JOINTS PRIOR TO PLACEMENT OF SHOULDERS AS PER PUBLICATION 408, SECTION 501.3(n).

13. ALIGN CONCRETE PAINTED JOINTS WITH INLET JOINTS, CURB JOINTS AND ANY OTHER ADJACENT STRUCTURES. COMPLETE THE EXPANSION JOINT SEALS AND SEAL WITH ASPHALT SEALING MATERIAL.
TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS

TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS

TYPICAL INTERSECTION DETAIL
FOR RUMBLE STRIP INSTALLATION

TYPICAL DRIVEWAY DETAIL
FOR RUMBLE STRIP INSTALLATION

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

SECTION DETAILS OF RUMBLE STRIP PATTERN

TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS

SECTION DETAILS OF RUMBLE STRIP PATTERN

RUMBLE STRIP PATTERN

RUMBLE STRIP PATTERN
1. **Detail A**
   - Acceleration Lane
   - Gore Area Rumble Strips

2. **Detail B**
   - Acceleration Lane
   - Outside Shoulder Rumble Strips

3. **Detail C**
   - Deceleration Lane
   - Outside Shoulder Rumble Strips

4. **Detail D**
   - Deceleration Lane
   - Gore Area Rumble Strips

**Notes**

1. If there is no actual pavement shoulder joint, measure from the pavement shoulder traffic line.
2. Do not construct shoulder rumble strips across a joint.
3. Construct rumble strips in accordance with Publication 408, Section 660.
4. Space contraction joints in uniform lengths or sections such that a continuous transverse joint is formed across markings, separators, and rumble pavement.
5. Minimum joint length from connecting sidewalk and rumble strips should be at least 8 feet and are avoided in some pavement where possible.
NOTES

1. Use materials and construction methods which meet the requirements of Publication 408, Section 501 or 658.

2. Begin and end pavement at mainline transverse saw and seal.

3. Place \( \frac{1}{8} \)" preformed expansion joint filler material at structures and at the midpoint.

4. Place \( \frac{1}{8} \)" preformed expansion joint filler material at the end of the work day. Cut material to conform to area adjacent to curb or to cross sectional area.

5. When ramp or lane width exceeds 14'-0", a Type L joint is required.

6. Construct grove pavement the same depth as mainline shoulder depth.

7. Tie grove to mainline shoulder pavement in accordance with RC-27M.

8. Place a \( \frac{1}{8} \)" full depth, polystyrene board bond breaker.

9. Install milled rumble strips in accordance with Sheet 6.

10. Do not use longitudinal tie bars to tie grove to ramp/shoulder pavement.

11. Install milled rumble strips in accordance with Sheet 6.

12. Use load transfer units if mainline shoulder is constructed using load transfer units. Install in accordance with RC-27M.

13. Place a \( \frac{1}{4} \)" full depth, polystyrene bond breaker.
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 "THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE ORIGINAL JOINT". PLACE AN APPROVED TUBE HAVING A MINIMUM 1" CLEARANCE FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4" HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4". 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 1/2" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". 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 PAVEMENT JOINT IS NO LESS THAN 6" AND NO MORE THAN 12", AND THAT THE SPACING BETWEEN ALL DOWELS ARE 12" ON CENTER.

3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SPACING FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 20/" INITIAL SAW CUT IS NOT REQUIRED FOR PAVEMENT UP TO D+2" UNLESS OTHERWISE PROHIBITED OR FOR CRC PATCHING. SAWCUTS AT THE PATCH LIMITS WILL BE PERMITTED TO EXTEND INTO THE ADJACENT ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL. FULL DEPTH COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, 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 IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR PROMPTING JOINT SERIALS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/2" TO 1/4" BELOW THE SURFACE OF THE PAWMENT.

5. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.

6. SAW A TEL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

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 "THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE ORIGINAL JOINT". PLACE AN APPROVED TUBE HAVING A MINIMUM 1" CLEARANCE FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4" HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4". 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 1/2" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". 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 PAVEMENT JOINT IS NO LESS THAN 6" AND NO MORE THAN 12", AND THAT THE SPACING BETWEEN ALL DOWELS ARE 12" ON CENTER.

3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SPACING FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 20/" INITIAL SAW CUT IS NOT REQUIRED FOR PAVEMENT UP TO D+2" UNLESS OTHERWISE PROHIBITED OR FOR CRC PATCHING. SAWCUTS AT THE PATCH LIMITS WILL BE PERMITTED TO EXTEND INTO THE ADJACENT ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL. FULL DEPTH COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, 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 IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR PROMPTING JOINT SERIALS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/2" TO 1/4" BELOW THE SURFACE OF THE PAWMENT.

5. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.

6. SAW A TEL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

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 "THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE ORIGINAL JOINT". PLACE AN APPROVED TUBE HAVING A MINIMUM 1" CLEARANCE FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4" HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 1/4". 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 1/2" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". 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 PAVEMENT JOINT IS NO LESS THAN 6" AND NO MORE THAN 12", AND THAT THE SPACING BETWEEN ALL DOWELS ARE 12" ON CENTER.

3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SPACING FROM THE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 20/" INITIAL SAW CUT IS NOT REQUIRED FOR PAVEMENT UP TO D+2" UNLESS OTHERWISE PROHIBITED OR FOR CRC PATCHING. SAWCUTS AT THE PATCH LIMITS WILL BE PERMITTED TO EXTEND INTO THE ADJACENT ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL. FULL DEPTH COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, 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 IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR PROMPTING JOINT SERIALS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 1/2" TO 1/4" BELOW THE SURFACE OF THE PAWMENT.

5. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.

6. SAW A TEL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.
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 length.

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 1/8" full depth, polystyrene jointing strip in the longitudinal joint of all patches 6'-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 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 6'-0" into next slab. If more than 6'-0" is required, remove a minimum of 6'-0" and provide new pavement joint at original joint location.
WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.

1. Do not leave less than 6'-0" of original pavement in place between patches or between joints.

2. When performing single lane pavement patching, or patching one lane at a time, place a 1/2" 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.

3. 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.

4. 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 paved is to conform to RC-20M or RC-27M for the specific type of pavement being placed. i.e., RCC or PCC.

5. These drawings are provided as examples of how certain patching criteria may not cover every field situation.

6. When performing multilane patching, for midslab problems, remove entire slab in both lanes.

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. BOTH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER 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 1/2" full depth, polystyrene board bond breaker in the longitudinal joint of all patches 65'-0" and less in length, prior to placing the new concrete in the patch area.

4. When patching adjacent to an existing joint, remove a minimum of 2'-0" of pavement in the next slab to avoid the existing dowel bars.

5. When replacing one full slab length and the deterioration extends more than 2'-0" into the next slab, remove a minimum of 6'-0" and install a new pavement joint perpendicular in the location of the original joint in the adjacent lane.

6. When performing multilane patching, and the patches are greater than two slab lengths and less than or equal to 500'-0", the joint spacing of the area being paved is to conform to RC-20M or RC-27M for the specific type of pavement being placed. i.e., RCC or PCC.

7. These drawings are provided as examples of how certain patching criteria may not cover every field situation.

8. 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)
NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE RECEPTIVE 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THE LENGTH IS THE LENGTH OF THE LONGEST 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 6'-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 6'-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.
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 1/2" full depth, polystyrene board bond breaker in the longitudinal joint of all patches 6'-0" and less in length, prior to placing the new concrete in the patch area.

4. When constructing 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 3'-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 multi-lane 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 multi-lane patching, for midslab problems, remove entire slab in both lanes.

NOTES

See NOTE 6

LEGEND

E Pavement Patching Joint, see sheet 1.

F New Pavement Joint, see RC-20M.

SKEWED JOINTS

RC-26M REHABILITATION

CONCRETE PAVEMENT

(MULTI-LANE PATCHING)

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF TRANSPORTATION

BUREAU OF PROJECT DELIVERY
NOTES

1. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE THEM EVENLY IN BETWEEN.
2. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE THEM EVENLY IN BETWEEN.
3. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE THEM EVENLY IN BETWEEN.
4. SPACE LOAD TRANSFER UNIT IN ACCORDANCE WITH RC-20M.
5. SPACE TIE BARS IN ACCORDANCE WITH RC-27M.  MATCH MAINLINE JOINT TYPE REQUIREMENTS. IF JOINTS ARE SPACED AT 20'-0", USE 20'-0" SPACING FOR WIDENING.
6. SPACE TIE BARS IN ACCORDANCE WITH RC-27M.  MATCH MAINLINE JOINT TYPE REQUIREMENTS. IF JOINTS ARE SPACED AT 20'-0", USE 20'-0" SPACING FOR WIDENING.

LANE WIDENING PLAN - PERPENDICULAR JOINTS

LANE WIDENING PLAN - SKewed JOINTS
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

SECTION A-A

SECTION C-C

SECTION B-B

DETAIL A

DETAIL B

RECOMMENDED

RECOMMENDED

ATTER

PATCHING JOINT DETAILS

REINFORCEMENT BAR DETAIL

TIED SPLICE

MIN

MIN

NEW REINF BARS

REPLACE IN KIND

SEE NOTE 5.

FULL DEPTH

PAVEMENT

REMOVAL

RECOMMENDED HERE

TIED SPLICE

TYPICAL SECTION

* SEE DETAIL B.

EXISTING PAVEMENT

NEW REINF BAR

PATCH LENGTH

SIZE

BAR

LENGTH

DEVELOPMENT

1'-0"

50'-0"

1"

#5 x 11'-6"

NEW REINF BAR

EXISTING

REPLACE IN KIND

SEE NOTE 2.

WELDED SPLICES BY 6".

OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 5%.

1. REMOVE 22" MIN BY HAND FOR TIED SPLICES. REMOVE 8" BY HAND FOR WELDED SPLICES.

2. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS. REMOVE 20" MIN BY HAND FOR TIED SPLICES. REMOVE 8" BY HAND FOR CONCRETE IS 2'-0".

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 1/4" TO 1/2" BELOW THE PAVEMENT SURFACE.

NOTES

MAINTAIN EXISTING EDGE CLEARANCE.

EXISTING REBAR AT 6" C TO C (TYP)

EXISTING REBAR AT 6" C TO C (TYP)

1" MIN SAW CUT

WELD " INITIAL " CONTINUOUS WELD

MIN SAW CUT

BELOW THE PAVEMENT SURFACE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

CONCRETE PAVEMENT REHABILITATION

(C R C PATCHING)

DIRECTOR, BUREAU OF PROJECT DELIVERY

CHIEF, HWY. DELIVERY DIVISION
BUREAU OF PROJECT DELIVERY

SEPT. 15, 2016

SHT 7 OF 11
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION

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

NOTE

TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT

CONCRETE PAVEMENT REHABILITATION (SLAB STABILIZATION DEFLECTION TESTING)
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
RECOMMENDED

WHEN NECESSARY
TAPE BOND BREAKER
EXISTING JOINT

H

TYPE 1

TYPE 2

EXISTING JOINT

REHABILITATED JOINT

SEE JOINT SPACING TABLE.

NOTES
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.

SEE NOTE 3.

JOINT SEALING MATERIAL,
SEE NOTE 3.

EXISTING STEEL PLATE,
SEE NOTE 1.

SEE NOTE 2.

JOINT SEALING MATERIAL,
SEE NOTE 3.

SEALANT RESERVOIR

SEALANT RESERVOIR

W

H

EXISTING
REHABILITATED
JOINT

JOINT REHABILITATION

WHEEL PATH

WHEEL PATH

3'-0" MIN

W

4'-0" MIN

H

12"-0" TYPICAL LANE WIDTH

BOLT CRACK AND SEAL WITH APPROVED JOINT SEALING MATERIAL PER PUB. 408, SECTION 527.

SEAL FACE OF JOINT OR CRACK WITH APPROVED JOINT SEALING MATERIAL.

PLACE DOWEL BAR AT THE MID-DEPTH OF THE THINNER PAVEMENT SLAB WHEN REPAIR AREA SPANS DIFFERENT PAVEMENT SLABS.

FOR DIFFERENT LANE WIDTHS, ADJUST SPACING FROM OUTSIDE BAR TO LANE EDGE AND SPACING BETWEEN CENTER BARS.

PLASTIC OR NON-METALLIC INSERT

DOWEL BAY CAP

PLASTIC OR NON-METALLIC INSERT

DOWEL BAY CAP

DOWEL RETROFIT

NOTES:
1. EXISTING STEEL PLATE IS EITHER 14 GAUGE WITH LAPPED TOP OR FLAT PLATE ¾" THICK.
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
3. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM ¾" TO ¼" BELOW THE SURFACE OF THE PAVEMENT.

JOINT SPACING

<table>
<thead>
<tr>
<th>JOINT SPACING</th>
<th>N</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot; to 6'-0&quot;</td>
<td>1&quot;</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>12'-0&quot; TYPICAL LANE WIDTH</td>
<td>3'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; MIN</td>
<td>1'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>

SECTION A-A

SECTION B-B

DOWEL RETROFIT

NOTES:

1. EXISTING STEEL PLATE IS EITHER 14 GAUGE WITH LAPPED TOP OR FLAT PLATE ¾" THICK.
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
3. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM ¾" TO ¼" BELOW THE SURFACE OF THE PAVEMENT.

JOINT SPACING

<table>
<thead>
<tr>
<th>JOINT SPACING</th>
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<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot; to 6'-0&quot;</td>
<td>1&quot;</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>12'-0&quot; TYPICAL LANE WIDTH</td>
<td>3'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot; MIN</td>
<td>1'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>
1. Provide distance of 18" minimum, 24" maximum between holes.
2. epoxy should run into hole. For length shown in table, provide 1" cover (typical) at surface and bottom. Assume drilling as designed 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" # holes at the end of the crack. Backfill hole with approved Rapid Set patching material as specified in Publication 408, section 505.
5. Make the top of the joint sealing material from 1/4" to 1/2" below the surface of the pavement.
NOTES
1. USE MINIMUM 1 1/4" x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1 1/2" 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" x 18" LONG DEFORMED TIE BARS FOR PAVEMENT DEPTHS 12" OR LESS AND MINIMUM 1 1/2" x 18" LONG DEFORMED TIE BARS FOR PAVEMENT DEPTHS GREATER THAN 12". 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.
OVERLAY TRANSITION FOR UNBONDED CONCRETE OVERLAYS TO MEET BRIDGE APPROACH SLABS OR MAINTAIN CLEARANCE UNDER BRIDGES
GENERAL NOTES:

1. USE THIS STANDARD FOR SANITARY SEWER MANHOLES.
2. DESIGN INFORMATION PROVIDED IN THIS STANDARD IS BASED ON CHART TYPE MANHOLE SYSTEM DESIGN. FORCED MANHOLE SYSTEM MANHOLES MUST BE DESIGNED BY ENGINEER.
3. DESIGN SPECIFICATIONS AND REQUIREMENTS:
   - ADJUST COMPLIANCE DESIGN SPECIFICATIONS AND AS SUPPLIED BY ENGINEER.
   - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
   - MINIMUM GAGE THICKNESS OF MANHOLES POLY CONCRETE MANHOLE DETAILS BASED ON THE INTERNAL DIAMETER
4. CONSTRUCTION SPECIFICATIONS:
   - THE CONTRACTOR IS RESPONSIBLE FOR DESIGN AND DETAILS IN ACCORDANCE WITH THIS STANDARD AND THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS AND REQUIREMENTS.
5. MANHOLES FOR MANHOLES, EXCEPTING CONES, REDUCERS, TOPS, LIDS, TRANSITION SLABS AND SHOE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/PLACED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
6. THIS STANDARD INCLUDES THE COMPONENTS REQUIRED FOR CONSTRUCTION AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURE OF MANHOLES, INSTALLATION OF MANHOLES, OR UTILIZATION OF MANHOLE DETAILING.
7. THE DESIGNER IS RESPONSIBLE FOR DETERMINING THE TYPE OF MANHOLE REQUIRED BASED ON THE INTERNAL DIAMETER AND PIPES OF MATERIAL. THE DESIGNER IS ALSO RESPONSIBLE FOR DETERMINING THE MANHOLE PAY ITEM FOR INSTALLATION.
8. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED MANHOLE ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED IN THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY. MANHOLE PAY ITEMS ARE NOT PERMITTED TO BE SUBSTITUTED OR NOT INCLUDED IN THE APPLICABLE MANHOLE PAY ITEMS.
9. MANHOLES THAT EXCEED THE MAXIMUM HEIGHT INDICATED REQUIRE SPECIFIC DESIGN AND DETAILS, CONSULT SPECIFICATIONS AND DRAWING TO THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY.
10. SHOW SEPARATION OF Fuse Pipe CONSTRUCTION SHEETS.
11. TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT MANHOLE SECTION.
12. PAY ITEMS ARE NOT PERMITTED IN SANITARY SEWER MANHOLES, MANHOLES MUST BE MANUFACTURED.
13. PROVIDE MANHOLE STEPS IN ALL MANHOLE ASSEMBLIES, SMALLER RECELS ON THE INSIDE FACE OF THE MANHOLE, NOT GREATER THAN 1/2 IN. DEPTH, PLACED BY THE CONTRACTOR. THE CONTRACTOR IS REQUIRED TO INTERFACE WITH THE MANUFACTURER AND DESIGNER. THE MANUFACTURER IS RESPONSIBLE FOR THE MANUFACTURE AND THE CONTRACTOR FOR THE INSTALLATION.
15. IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS, A DETAIL CONSTRUCTION PERMISSIBILITY CONDITIONAL PERMIT FOR SPECIFIC DETAILS MIGHT BE NEEDED IN THE MANUFACTURER'S CONTRACT OR PROJECT DELIVERY, MINIMUM DESIGN SPECIFICATIONS, AND THE SEWER AUTHORITY.
16. SEE TO SHEET TO THE BUREAU OF PROJECT DELIVERY, MINIMUM DESIGN SPECIFICATIONS.
17. GIVE DETAILS OF THE MANHOLE TO BE USED CONFORMING TO THE SEWER AUTHORITY SPECIFICATIONS AND REQUIREMENTS.
18. MATERIAL NOTES:

   1. PROVIDE THE FOLLOWING MANHOLE CLASS:
      - MANHOLE A - FULLY REINFORCED MANHOLE, 1500 LBS. MAXIMUM LOAD, TOP SLAB, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.
      - MANHOLE B - FULLY REINFORCED MANHOLE, 1500 LBS. MAXIMUM LOAD, TOP SLAB, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.
      - MANHOLE C - FULLY REINFORCED MANHOLE, 1500 LBS. MAXIMUM LOAD, TOP SLAB, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.
      - MANHOLE D - FULLY REINFORCED MANHOLE, 1500 LBS. MAXIMUM LOAD, TOP SLAB, COVER, ADJUSTMENT RINGS (IF REQUIRED) AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE MANHOLE FRAME AND COVER.

   2. CONSTRUCT OR PLACE MANHOLES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A SAND AGGREGATE PLACE IN 4" LAYERS TO A PROVIDE A 12" MINIMUM LAYER.
   3. PROVIDE MINIMUM LAP AND EMBEDMENT LENGTHS FOR REINFORCING BARS IN A LAYER OF CONCRETE CHANNEL, THEN EMBED REINFORCEMENT AND LAISER BARS IN A LAYER OF CONCRETE CHANNEL. THE CONTRACTOR IS RESPONSIBLE FOR THE MANUFACTURE AND THE DESIGNER FOR THE INSTALLATION.
   4. PROVIDE MANHOLE STEPS IN ALL MANHOLE ASSEMBLIES. SHALLOW RECESSES, ON THE INSIDE FACE OF THE MANHOLE, NOT GREATER THAN 1/2 IN. DEPTH, FORMED BY CAST-IN-PLACE CONCRETE MANHOLE DETAILS AND DESIGN TABLES.
   5. PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER BARS SIZE.
   6. PROVIDE GRADE ADJUSTMENTS RINGS.
   7. PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)3.
   8. PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, CONSTRUCTION NOTE 5.
   9. PROVIDE TOP MAT = 0.12 IN/FT EACH WAY.
   10. PROVIDE TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY.
   11. PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER BARS SIZE.
   12. PROVIDE MATERIALS FOR MANHOLES, EXCEPTING CONES, REDUCERS, TOPS, LIDS, TRANSITION SLABS AND SHOE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/PLACED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
   13. PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER BARS SIZE.
   14. PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)3.

FIELD CONSTRUCTION NOTES:

1. CONSTRUCT OR PLACE MANHOLES LEVEL, UNLESS OTHERWISE INDICATED ON THE CONTRACT DRAWINGS.
2. CONSTRUCT OR PLACE MANHOLES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A SAND AGGREGATE PLACE IN 4" LAYERS TO A PROVIDE A 12" MINIMUM LAYER.
3. PROVIDE REINFORCEMENT BARS OR MEMBERS TO MAINTAIN THE REINFORCEMENT IN SHAPE AND POSITION.
4. PROVIDE MATERIALS FOR MANHOLES, EXCEPTING CONES, REDUCERS, TOPS, LIDS, TRANSITION SLABS AND SHOE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/PLACED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
5. PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER BARS SIZE.
6. PROVIDE TOP MAT = 0.12 IN/FT EACH WAY.
7. PROVIDE TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY.
8. PROVIDE GRADE ADJUSTMENTS RINGS.
9. PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)3.
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11. PROVIDE TOP MAT = 0.12 IN/FT EACH WAY.
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13. PROVIDE MATERIALS FOR MANHOLES, EXCEPTING CONES, REDUCERS, TOPS, LIDS, TRANSITION SLABS AND SHOE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/PLACED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
14. PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER BARS SIZE.
15. PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b)3.
16. PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, CONSTRUCTION NOTE 5.
17. PROVIDE TOP MAT = 0.12 IN/FT EACH WAY.
18. PROVIDE TOP SLABS AND TRANSITION SLABS ARE NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS OR DIRECTED BY THE SEWER AUTHORITY.
19. PROVIDE MATERIALS FOR MANHOLES, EXCEPTING CONES, REDUCERS, TOPS, LIDS, TRANSITION SLABS AND SHOE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/PLACED IN ACCORDANCE WITH THIS STANDARD UNLESS OTHERWISE REQUIRED AND/OR REQUESTED BY THE SEWER AUTHORITY.
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 PIPE OPENING(S) IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONNECTOR’S MANUFACTURER.

3. PROVIDE KEYED CONSTRUCTION JOINTS BETWEEN CONCRETE POURS.

4. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME, UNLESS A TRANSITION SLAB OR REDUCER CONES ARE USED.

5. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED.

6. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE SEPARATE MANHOLE SIZES ARE USED.

7. CLEAR COVER FOR STEEL:
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"

8. PROVIDE ADDITIONAL REINFORCEMENT AROUND PIPE OPENINGS AS INDICATED OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS 1" OR LESS.

9. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE.

10. WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE A TRANSITION SLAB.

11. KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS THOROUGHLY BEFORE PLACING NEXT CONCRETE SLAB.

12. PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.

13. PROVIDE ADDITIONAL REINFORCEMENT AROUND PIPE OPENINGS AS INDICATED OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS 1" OR LESS.

14. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.

15. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.

16. SEGMENT HEIGHTS:
   - SEGMENT HEIGHTS: 1/2" (150MM)
   - SEGMENT HEIGHTS: 1/2" (150MM)

17. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

18. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

PRECAST CONCRETE MANHOLE NOTES:

1. CONSTRUCT MANHOLES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND THE APPLICABLE SEWER AUTHORITY SPECIFICATIONS.

2. PROVIDE PIPE OPENING(S) IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONNECTOR’S MANUFACTURER.

3. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN TWO SEPARATE MANHOLE SIZES ARE USED.

4. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE SEPARATE MANHOLE SIZES ARE USED.

5. CLEAR COVER FOR STEEL:
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"

6. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE SEPARATE MANHOLE SIZES ARE USED.

7. CLEAR COVER FOR STEEL:
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"
   - MINIMUM TRANSITION SLAB THICKNESS: 2 1/2" + 1/8"

8. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.

9. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE MANHOLE.

10. WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE A TRANSITION SLAB.

11. KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS THOROUGHLY BEFORE PLACING NEXT CONCRETE SLAB.

12. PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.

13. PROVIDE ADDITIONAL REINFORCEMENT AROUND PIPE OPENINGS AS INDICATED OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS 1" OR LESS.

14. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.

15. PROVIDE POLYVINYL CHLORIDE WATERSTOPS IN ALL JOINTS.

16. SEGMENT HEIGHTS:
   - SEGMENT HEIGHTS: 1/2" (150MM)
   - SEGMENT HEIGHTS: 1/2" (150MM)

17. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

18. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.
### Joint Details (Cast-in-Place)

#### Joint Construction Joint

**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.

#### Joint Widths

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<tr>
<th>Manhole Type</th>
<th>Width A</th>
<th>Width B</th>
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</thead>
<tbody>
<tr>
<td>TYPE 4</td>
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</tr>
<tr>
<td>TYPE 5</td>
<td>2</td>
<td>1/4</td>
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</tbody>
</table>

### Joint Details (Precast)

#### Joint Detail Between Bottom Slab and Wall

**NOTES:**

1. For notes, see Sheets 1 - 2.
2. For precast manhole details and design tables, see RC-39M, Sheets 20 - 23.
3. For cast-in-place manhole details and design tables, see RC-39M, Sheets 24 - 26.
4. Reinforcement not shown in joint details for clarity.
GENERAL NOTES:

1. USE THIS STANDARD FOR STORM WATER MANHOLES.
2. DESIGN SPECIFICATIONS AND REQUIREMENTS:
   - Concrete and Reinforcement Design as specified and as supplemented by the Design Manual, Part 4, Structures.
   - Sawcut and offset details provided in accordance with the Manual of Practice, Section 430.2.2.
   - FS-37, in accordance with the Load and Resistance Factor Design Methodology.
   - All reinforcement is made from ASTM A615 deformed bar.
   - All concrete is made from ASTM C150 Type I cement.

3. CONSTRUCTIONSPECIFICATIONS:
   - Provide shop drawings for all fabricated or cast-in-place reinforced concrete components with the item bonding reinforcement that will not replace the item in construction/fabricated in accordance with this standard.
   - The designer is responsible for determining the type of manhole required and the details of such manhole, including all integral items of cast-in-place reinforced concrete.
   - Sawcut and offset details provided in accordance with the Manual of Practice, Section 430.2.2.
   - Sawcut and offset details provided in accordance with the Manual of Practice, Section 430.2.2.

4. MANNHOLES FOR MANHOLE FRAMES, SUBSTRUCTURE DRAINS, SLAB, CHANNEL CONCRETE, BACKFILL AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED
   - The following items are incidental to the cost of manhole pay item (excluding connection for drain assembly, transition slab to manhole section). Design and details in accordance with the Department's requirements.

5. REINFORCEMENT STEEL:
   - Provide shop drawings for all reinforced concrete components with the item bonding reinforcement that will not replace the item in construction/fabricated in accordance with this standard.
   - The designer is responsible for determining the type of manhole required and the details of such manhole, including all integral items of cast-in-place reinforced concrete.

6. BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE, WITH ACCEPTABLE EMBANKMENT
   - After the base section is fabricated using Class AA cement concrete, modified.

7. THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE MANHOLE PAY ITEM:
   - Mortar:
   - Epoxy bonding compound:
   - Butyl rubber sealant:
   - Precast manholes:
   - Precast or cast-in-place manholes:
   - Precast or cast-in-place manholes:
   - Precast or cast-in-place manholes:
   - Precast or cast-in-place manholes:
   - Precast or cast-in-place manholes:

8. THE MATERIALS NOTED ABOVE ARE INCIDENTAL TO THE COST OF THE MANHOLE PAY ITEM (EXCLUDING CONNECTION FOR DRAIN ASSEMBLY, TRANSITION SLAB TO MANHOLE SECTION).

9. PRECAST MANHOLES:
   - The following items are incidental to the cost of the manhole pay item (excluding connection for drain assembly, transition slab to manhole section). Design and details in accordance with the Department's requirements.

10. MANHOLE TYPES:
    - Doghouse manholes - 1
    - Doghouse manholes - 2
    - Doghouse manholes - 3
    - Doghouse manholes - 4
    - Doghouse manholes - 5
    - Doghouse manholes - 6
    - Doghouse manholes - 7
    - Doghouse manholes - 8
    - Doghouse manholes - 9
    - Doghouse manholes - 10
    - Doghouse manholes - 11
    - Doghouse manholes - 12
    - Doghouse manholes - 13
    - Doghouse manholes - 14
    - Doghouse manholes - 15
    - Doghouse manholes - 16
    - Doghouse manholes - 17
    - Doghouse manholes - 18
    - Doghouse manholes - 19
    - Doghouse manholes - 20
    - Doghouse manholes - 21
    - Doghouse manholes - 22
    - Doghouse manholes - 23
    - Doghouse manholes - 24
    - Doghouse manholes - 25
    - Doghouse manholes - 26
    - Doghouse manholes - 27
    - Doghouse manholes - 28
    - Doghouse manholes - 29
    - Doghouse manholes - 30

FIELD CONSTRUCTION NOTES:

1. CONSTRUCT OF PLACE MANHOLE LEVEL, LESS THAN 12 IN. NOTE OF DIRECTION.
2. CONSTRUCT OF PLACE MANHOLE ON A SURFACE CONSTRUCTED OF COMPACTED SMA.
3. CONSISTENT LEVEL, LESS THAN 12 IN. NOTE OF DIRECTION.
4. CONSIDER TYPES VARIOUS OR ELONGATED CONNECTORS (GAGE).
CAST-IN-PLACE CONCRETE MANHOLE NOTES:

1. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME.
2. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE CALCULATED LOAD ON THE DEVICE.
3. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE CALCULATED LOAD ON THE DEVICE.

CAST-IN-PLACE CONCRETE MANHOLE NOTES:

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1. PROVIDE A TOP SLAB TO SUPPORT THE MANHOLE COVER AND FRAME.
2. PROVIDE A TRANSITION SLAB BETWEEN THE SEPARATE MANHOLE SIZES, WHEN THE CALCULATED LOAD ON THE DEVICE.
**CAST-IN-PLACE CONCRETE MANHOLE DESIGN TABLE NOTES:**

1. Base and side sections were designed based on an 8'-0" maximum height.
2. Welded wire reinforcement 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 half inch 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.

**DOGGHOLE 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:
   - When constructing a doghouse manhole over an existing pipe, pipe openings must be kept at least 4" but not more than 8" larger than the minimum area of steel, the requirement must meet the requirements of material notes 5, 6, and 7 on sheet 1.

**DOGGHOLE MANHOLE DESIGN TABLE NOTES:**

1. Riser and base sections were designed based on an 8'-0" maximum height.
2. The maximum size of steel is shown in the design table. Refer to the composition of welded wire reinforcement bars to meet the minimum area of steel. The requirement must meet the requirements of material notes 5, 6, and 7 on sheet 1.
3. Welded wire reinforcement is not permitted for the I-beams.

**Table: Doghouse Manhole Notes**

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>Steel Area Spacing (in.)</th>
<th>Steel Area (in.²)</th>
<th>Welded Wire Areas (in.²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W12.5</td>
<td>0.14</td>
<td>0.095</td>
<td>0.16</td>
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<tr>
<td>W10.5</td>
<td>0.13</td>
<td>0.084</td>
<td>0.15</td>
</tr>
<tr>
<td>W10</td>
<td>0.12</td>
<td>0.077</td>
<td>0.14</td>
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<tr>
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<td>0.11</td>
<td>0.070</td>
<td>0.11</td>
</tr>
<tr>
<td>W9</td>
<td>0.10</td>
<td>0.065</td>
<td>0.09</td>
</tr>
<tr>
<td>W8.5</td>
<td>0.09</td>
<td>0.055</td>
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<td>0.08</td>
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</tr>
<tr>
<td>W1</td>
<td>0.01</td>
<td>0.005</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Table: Reinforcement Bar Splice Lengths**

<table>
<thead>
<tr>
<th>Bar Size</th>
<th>Splice Lengths (in.)</th>
<th>Prestressed Concrete (Class AA, Modified) F’p = 6000 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4</td>
<td>2</td>
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</tr>
<tr>
<td>#5</td>
<td>3</td>
<td>6</td>
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<td>4</td>
<td>8</td>
</tr>
<tr>
<td>#7</td>
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</tr>
<tr>
<td>#8</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>#9</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

**Notes:**

1. Splice lengths based on uncoated reinforcing bars.
2. Splice lengths based on Class C splice.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

**STORM WATER MANHOLSES**

**GENERAL NOTES - 3**

**SEPT. 15, 2016**

**GEORGE ALBRIGHT, PROJECT MANAGER**

**GARY WRIGHT, BRIDGE ENGINEER**

**STORM WATER MANHOLSES**

**GENERAL NOTES - 3**

**SEPT. 15, 2016**

**GEORGE ALBRIGHT, PROJECT MANAGER**

**GARY WRIGHT, BRIDGE ENGINEER**
STORM WATER MANHOLES
MANHOLE TYPES

NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.
STORM WATER MANHOLES
MANHOLE ASSEMBLIES - 2

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 7.
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 7 & 10.
9. FOR ROAD TRANSITION SLAB DETAILS, SEE SHEETS 14 & 17.
10. FOR SQUARE TRANSITION SLAB DETAILS, SEE SHEETS 16 & 19.

1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 7.
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 7 & 10.
9. FOR ROAD TRANSITION SLAB DETAILS, SEE SHEETS 14 & 17.
10. FOR SQUARE TRANSITION SLAB DETAILS, SEE SHEETS 16 & 19.

STORM WATER MANHOLES
MANHOLE ASSEMBLIES - 2

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 7.
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.
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**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  

**STORM WATER MANHOLES**  
**SIZING RECOMMENDATIONS**

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**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 7.

---

**Table A**  
**Recommended Manhole Type Based on Reinforced Conc. Pipe Sizes**

<table>
<thead>
<tr>
<th>Manhole Type</th>
<th>Min. Pipe Inside Diameter (In.)</th>
<th>Max. Pipe Angle (&gt; 90° \text{ AND } &lt; 180°) (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>36</td>
<td>42</td>
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<td>8</td>
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<td>54</td>
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<tr>
<td>10</td>
<td>60</td>
<td>66</td>
</tr>
<tr>
<td>12</td>
<td>72</td>
<td>84</td>
</tr>
</tbody>
</table>

**Table B**  
**Recommended Manhole Type Based on Maximum Pipe Openings**

<table>
<thead>
<tr>
<th>Manhole Type</th>
<th>Min. Pipe Inside Diameter (In.)</th>
<th>Max. Pipe Angle (&gt; 90° \text{ AND } &lt; 180°) (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>65</td>
<td>66</td>
</tr>
<tr>
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<td>74</td>
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<tr>
<td>6</td>
<td>83</td>
<td>84</td>
</tr>
<tr>
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<td>93</td>
<td>94</td>
</tr>
<tr>
<td>8</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

**Notes:**

1. Tables A and B based on providing a 2" clearance between the pipe and the manhole.
2. RCP = Reinforced Concrete Pipe

---

**PLAN - Pipe Angle < 90°**

**PLAN - Pipe Angle > 90° and < 180°**

---

**PIPE OPENING**

**NOTE:**

- Table A and B based on providing a 2" clearance between the pipe and the manhole.
- RCP = Reinforced Concrete Pipe
GRADE ADJUSTMENT GENERAL NOTES:

1. USE PRECAST CONCRETE GRADE ADJUSTMENT RINGS FOR FINAL GRADE ADJUSTMENT.
2. PRECAST CONCRETE GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENT TOTAL DEPTH OF RINGS IS LIMITED TO 12" MAXIMUM. GRADE ADJUSTMENT RINGS ARE UNCONDITIONAL TO THE COST OF THE MANHOLE FRAME AND COVER PAY ITEM.
3. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. OR REHABILITATION PROJECTS.
4. PROVIDE ADJUSTMENT RINGS/RISERS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR PRODUCTS OR SERVICES WHICH ARE NOT SPECIFIED OR FOR WHICH THE DEPARTMENT REQUIRES ADDITIONAL INFORMATION.
5. PROVIDE ALTERNATE GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENTS IF REQUESTED BY THE CONTRACTOR AND ACCEPTED BY THE CONTRACT SPECIAL PROVISIONS.
6. PROVIDE ALTERNATE DETAILING WELDS BETWEEN THE MANHOLE FRAME AND COVER.
7. PROVIDE ADJUSTMENT RINGS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
8. PROVIDE ALTERNATE ADJUSTMENT RINGS FOR GRADE ADJUSTMENTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
9. PROVIDE ADJUSTMENT RINGS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
10. PROVIDE ADJUSTMENT RINGS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.

GRADE ADJUSTMENT RING NOTES:

1. USE PRECAST CONCRETE GRADE ADJUSTMENT RINGS FOR FINAL GRADE ADJUSTMENT.
2. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
4. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
5. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
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7. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
8. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
9. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
10. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
11. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
12. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

1. USE PRECAST CONCRETE GRADE ADJUSTMENT RINGS FOR FINAL GRADE ADJUSTMENT.
2. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
4. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
5. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
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7. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
8. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
9. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
10. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
11. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
12. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

STRUCTURAL STEEL ADJUSTMENT RISERS:

1. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
2. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
3. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
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11. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.
12. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(f) AND AS MODIFIED HEREIN.

STORM WATER MANHOLES GRADE ADJUSTMENT RINGS:

1. USE PRECAST CONCRETE GRADE ADJUSTMENT RINGS FOR FINAL GRADE ADJUSTMENT.
2. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
4. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
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6. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
7. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
8. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
9. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
10. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
11. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
12. PROVIDE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
MANHOLE COVER AND FRAME NOTES:

1. Provide manhole covers and frames meeting the requirements of Publication 408, Section 605.2(b).

2. Design manhole covers and frames for PHL-93 or HS-25 loadings. If manholes are not in or adjacent to roadway, design for all possible live loads as specified in Section 605.2(b).

3. Provide gray cast iron conforming to ANSI 350 and ANSI 351.

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, spool groove and continuous gasket, as indicated in detail A. To prevent leaks through the centerline of the manhole stem, when specified. Provide a rubberized felt Gasket to prevent leaks around the stem gasket, as indicated in place. Provide two lift holes at 180 degrees to facilitate cover removal for non-sealing manhole covers.

6. Provide two lift holes at 180 degrees to facilitate cover removal for non-sealing manhole covers.

7. Frame to have a minimum bearing seat of 1" for manhole frames.

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 3/8" threaded studs welded with hex nuts and lock washers. Use 5/8" threaded studs 2" maximum, protruding from the frame, to facilitate placement of grade adjustment rings. Provide a minimum of 1/2" dia. holes, 2" maximum, for guidance and alignment.

10. Set the base of the frame on a non-shrink grout pad to provide firm seating on the supporting surface. Non-sealing gasket is also permitted for cross slope adjustment. Provide an anti-theft bolt for security in accordance with Publication 408, Section 605.2(b).

CAST IRON MANHOLE COVER

1. PLATEN COVER.

2.ribbed covers.

CAST IRON MANHOLE COVER

PLAN VIEW

ELEVATION VIEW

PLAN VIEW

ELEVATION VIEW

MANHOLE COVER AND FRAME NOTES:

RECOMMENDED COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES
COVERS AND FRAMES
TYPICAL STEP CONFIGURATION

MANHOLE STEPS

MANHOLE STEP NOTES:
1. Provide manhole steps supplied by a manufacturer listed in bulletin 15.
2. Provide minimum 1" section dimension for metal steps. Provide 1/2" section dimension for non-ferrous material steps.
3. Securely embed manhole steps into inserts cast into the walls of preformed wells.
4. Provide uniform spacing of manhole steps within a manhole/inlet assembly.
5. See general note 12 on sheet 1.

WEEPHOLE DETAIL
(See general note 11 on sheet 1)

NOTES:
1. For notes, see sheets 1 - 3.

OPTIONAL CONNECTION DETAIL
FOR PAVEMENT BASE DRAIN

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES
MISCELLANEOUS DETAILS
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 E-E AND REINFORCEMENT REQUIREMENTS, SEE SHEET 12.
## Section G-G

*(Additional reinforcement not shown)*

### Top Slab with Keyed Joint

- **Top Slab with Shiplap Joint (Precast Only)**
- **Top Slab with Keyed Joint**

### Top Slab Reinforcement Plan

#### Top Slab with Keyed Joint (Cast-in-Place Concrete)

<table>
<thead>
<tr>
<th>Manhole Type</th>
<th>Slab Size</th>
<th>S1 Bar Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 4</td>
<td>6</td>
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</tr>
<tr>
<td>Type 5</td>
<td>6</td>
<td>#5</td>
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<tr>
<td>Type 6</td>
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<td>#5</td>
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<tr>
<td>Type 7</td>
<td>6</td>
<td>#5</td>
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<tr>
<td>Type 8</td>
<td>6</td>
<td>#5</td>
</tr>
<tr>
<td>Type 12</td>
<td>6</td>
<td>#5</td>
</tr>
</tbody>
</table>

#### Top Slab with Keyed Joint (Precast Concrete)

<table>
<thead>
<tr>
<th>Manhole Type</th>
<th>Slab Size</th>
<th>S1 Bar Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 4</td>
<td>6</td>
<td>#5</td>
</tr>
<tr>
<td>Type 5</td>
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<tr>
<td>Type 6</td>
<td>6</td>
<td>#5</td>
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<tr>
<td>Type 7</td>
<td>6</td>
<td>#5</td>
</tr>
<tr>
<td>Type 8</td>
<td>6</td>
<td>#5</td>
</tr>
<tr>
<td>Type 12</td>
<td>6</td>
<td>#5</td>
</tr>
</tbody>
</table>

### Notes:

1. For Notes, see Sheets 1 - 3.
2. Diameter of the slab to match outside diameter of manhole.
3. Align opening with inside face of manhole.
4. For joint details, see Sheets 20 or 24.
5. Any reinforcement bars less than 8" in length due to the location of the opening, are not required.
6. Slab thickness "Ts" is not permitted to be reduced due to configuration of the joint.
ALTERNATE CONCRETE INLET TOP UNITS

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
STORM WATER MANHOLES

PLAN - TOP SLABS FOR TYPE M OR S

CONCRETE INLET TOP UNITS

TOP UNITS
TYPE M OR TYPE S
2' - 3"
4' - 9'
(5 5')
3' - 9' (4 5')
MANHOLE & OPENING
OF OPENING
2'-0" (24") WIDTH

TOP UNITS
TYPE M OR TYPE S
1'-0"
1'-0"
OF OPENING
2'-0" (24") WIDTH

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

### SECTION I-I

**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 JOINT DETAILS, SEE SHEETS 20 OR 24.
5. ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
6. SLAB THICKNESS "S2" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.

---

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

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>D (IN.)</th>
<th>BAR SIZE</th>
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</thead>
<tbody>
<tr>
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<td>#6</td>
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<td>10</td>
<td>#10</td>
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<tr>
<td>TYPE 12</td>
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**TOP SLAB PRECAST CONCRETE**

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<td>#6</td>
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<td>#10</td>
</tr>
<tr>
<td>TYPE 12</td>
<td>12</td>
<td>#12</td>
</tr>
</tbody>
</table>

---

**TOP SLAB WITH KEYED JOINT**

- 2" x 6" x 6" "S2" BARS
- #4 @ 12"
- 1 EXTRA "S2" BAR BOTTOM

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

- 2" x 6" x 6" "S2" BARS
- #4 @ 12"
- 1 EXTRA "S2" BAR BOTTOM

---

**TOP SLAB WITH SHIPLAP JOINT**

- 2" x 6" x 6" "S2" BARS
- #4 @ 12"
- 1 EXTRA "S2" BAR BOTTOM

---

**NOTES:**
1. FOR NOTES, SEE SHEETS 1-3.
2. DIAMETER OF THE SLAB TO MATCH OUTSIDE DIAMETER OF MANHOLE.
3. ALIGN OPENING WITH INSIDE FACE OF MANHOLE.
4. FOR JOINT DETAILS, SEE SHEETS 20 OR 24.
5. ANY REINFORCEMENT BARS LESS THAN 8" IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
6. SLAB THICKNESS "S2" IS NOT PERMITTED TO BE REDUCED DUE TO CONFIGURATION OF THE JOINT.
TRANSITION SLAB WITH KEYED JOINT
TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

FOR TYPE 6 MANHOLE
FOR TYPE 7 MANHOLE
FOR TYPE 8 MANHOLE
FOR TYPE 10 MANHOLE
FOR TYPE 12 MANHOLE

PLAN - ROUND TRANSITION SLABS

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES
ROUND TRANSITION SLABS - 1

SECTION J-J
(TYPICAL)
ROUND TRANSITION SLAB REINFORCEMENT PLAN

TRANSITION SLAB WITH KEYED JOINT

SECTION K-K

TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

STORM WATER MANHOLES
ROUND TRANSITION SLABS - 2

RECOMMENDED SEPT. 13, 2016
RECOMMENDED SEPT. 15, 2016
DRAWN BY: M. D. MILLER
CHECKED BY: G. SUTHERLAND
REVISION DATE: SEPT. 15, 2016
DRAWN IN PENNSYLVANIA
NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. CUT 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 15.

PLAN - SQUARE TRANSITION SLABS

SECTION L-L
(TYPICAL)
**SQUARE TRANSITION SLAB REINFORCEMENT PLAN**

**SECTION M-M**

**TRANSITION SLAB WITH KEYED JOINT**

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

**NOTES:**

1. FOR NOTES, SEE SHEETS 1 - 3.
2. OUTPUT DIMENSIONS TO MATCH SIZE OF HOLE.
**SECTION N-N**

SAME SIZE MANHOLE FULL HEIGHT WITH TOP SLAB AND MANHOLE COVER AND FRAME

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

KEYED CONSTRUCTION JOINT

**NOTES**

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

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

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

**JOINT WIDTHS**

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>A (IN.)</th>
<th>B (IN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>31/8</td>
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<td>31/8</td>
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<tr>
<td>TYPE 10</td>
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<tr>
<td>TYPE 11</td>
<td>31/8</td>
<td>31/8</td>
</tr>
<tr>
<td>TYPE 12</td>
<td>4</td>
<td>31/8</td>
</tr>
</tbody>
</table>
NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATIONS 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, LOCATION BAR TO CLEAR PIPE OPENING.
7. FOR DESIGN TABLES, SEE SHEET 23.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

CAST-IN-PLACE MANHOLES WITH REINFORCEMENT BARS

SEPT. 15, 2016  SEPT. 15, 2016
NOTES:
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. THE ADDITIONAL REINFORCEMENT TO THE DESIGN REINFORCEMENT.
5. FOR REINFORCEMENT DETAILS, SEE SHEET 21.
6. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 2.
7. SPLICE LOCATIONS TO BE DETERMINED BY CONTRACT.
8. ALTERNATE SPLICE LOCATIONS.
**CAST-IN-PLACE CONCRETE STORM WATER MANHOLE SUMMARY TABLE**

### BASE SECTIONS

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>H (FT.)</th>
<th>D</th>
<th>T</th>
<th>SIZE</th>
<th>BAR</th>
<th>SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>16.0</td>
<td>4, 6</td>
<td>6-10</td>
<td>12</td>
<td>11</td>
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<td>12.0</td>
<td>4, 6</td>
<td>6-10</td>
<td>12</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 3</td>
<td>9.0</td>
<td>4, 6</td>
<td>6-10</td>
<td>9</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 4</td>
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<td>4, 6</td>
<td>6-10</td>
<td>6</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 5</td>
<td>3.0</td>
<td>4, 6</td>
<td>6-10</td>
<td>3</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>

### RISER SECTIONS

<table>
<thead>
<tr>
<th>MANHOLE TYPE</th>
<th>H (FT.)</th>
<th>D</th>
<th>T</th>
<th>SIZE</th>
<th>BAR</th>
<th>SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>16.0</td>
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<td>6-10</td>
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<td>11</td>
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</tr>
<tr>
<td>TYPE 2</td>
<td>12.0</td>
<td>8</td>
<td>6-10</td>
<td>8</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 3</td>
<td>9.0</td>
<td>8</td>
<td>6-10</td>
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<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 4</td>
<td>6.0</td>
<td>8</td>
<td>6-10</td>
<td>6</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>TYPE 5</td>
<td>3.0</td>
<td>8</td>
<td>6-10</td>
<td>3</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

SHT 25 OF 30

NOTES:

(WISER SECTIONS AND BASE SECTIONS)

VERTICAL WALL

REINFORCEMENT

HORIZONTAL WALL

FACE

INSIDE

FACE

OUTSIDE

FACE

INSIDE

FACE

OUTSIDE

FACE

THICKNESS

T = WALL

BETWEEN BARS MIN.

1" CLEAR

D = OUTSIDE DIAMETER OF BOTTOM SLAB

FTG

D = INSIDE DIAMETER

I

HORIZONTAL SECTION

OPTION 1

(KEYED JOINT)

OPTION 2

(EMBEDDED)

VERTICAL SECTION OF BASE SECTION

TOP MAT REINFORCEMENT

L-BAR

PRECAST MANHOLES - 2

FOR REINFORCEMENT DETAILS.

FOR CLARITY. SEE DETAIL B

REINFORCEMENT NOT SHOWN

NOTE:

1. FOR NOTES, SEE SHEETS 1 - 3.

2. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.

3. SPLINES:

MIN. SPICE LENGTH = LARGER OF 2 GRID SPACINGS OR 12" BARS FOR REINFORCEMENT BAR SPICE LENGTH. SEE SHEET 3.

4. PROVIDE A MAXIMUM OF TWO SPLICES PER LAYER.

5. ALTERNATE SPLICE LOCATIONS.

6. EQUALLY SPACE L-BARS AROUND THE PERIMETER. BARS ONLY, WWF NOT PERMITTED. LOCATE L-BARS TO CLEAR PIPE OPENINGS.

7. EXTEND VERTICAL REINFORCEMENT IN WALL TO TOP MAT REINFORCEMENT.

8. FOR DESIGN TABLES, SEE SHEET 28.

PRECAST MANHOLES

TYPICAL SECTION

WITH REINFORCEMENT BARS

OR WELDED WIRE FABRIC

DETAIL B

WITHOUT TOE

WITH TOE

OPTION 1

(KEYED JOINT)

OPTION 2

(EMBEDDED)

DETAIL D

OPTIONAL CONSTRUCTION JOINT, SEE DETAIL C

OPTIONAL JOINT TO CONSTRUCT TOE IF REQUIRED

L-BAR

TOP MAT REINFORCEMENT

L-BAR

BOTTOM MAT REINFORCEMENT

L-BAR

SPLICE

L-BAR (TYP.)
ALTERNATE REINFORCEMENT DETAILS

ADOPTED REINFORCEMENT DETAILS

ADDITIONAL REINFORCEMENT

ADJACENT TO PIPE OPENINGS IN WALL

Pipe Opening Location and Size as Required

NOTES:
1. For Notes, see Sheets 1 - 2.
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 4".
4. The additional reinforcement to the design reinforcement.
5. For reinforcement details, see Sheet 25.
6. Provide a bar to support the pipe opening during fabrication. Note: No. 11" long from top or bottom of the section cut bars in field prior to installing pipe.
7. For reinforcement bar splice length, see Sheet 2.
8. Splice locations to be determined by fabricator.
9. Alternate splice locations.
10. Provide #3 and diagonal bars spaced at 6" on each side of the pipe opening for the full height of the section. For adjacent pipe sections, provide #3 horizontal bars equally spaced between adjacent pipe openings for the full height of the section.
NOTES:
1. FOR NOTES, SEE SHEETS 1 - 3.
2. FOR MANHOLE ASSEMBLIES, SEE SHEETS 5 & 6.
### Precast Concrete Storm Water Manhole Summary Table

#### Riser Sections

<table>
<thead>
<tr>
<th>Manhole Type</th>
<th>Max. Lift (FT)</th>
<th>D1</th>
<th>D2</th>
<th>T</th>
<th>H</th>
<th>T</th>
<th>Horizontal</th>
<th>Vertical</th>
<th>Tip Mat (FT)</th>
<th>Bottom Mat (FT)</th>
<th>Num. of L-Bars</th>
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</thead>
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<tr>
<td>TYPE 1</td>
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#### Base Sections

<table>
<thead>
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<th>D1 (FT)</th>
<th>D2 (FT)</th>
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<th>T2</th>
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<th>T4</th>
<th>H</th>
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<th>T3</th>
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<td>0.12</td>
<td>0.14</td>
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<td>1</td>
<td>0.15</td>
<td>1</td>
<td>0.12</td>
<td>0.16</td>
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**NOTES:**
1. For details, see sheets 24 - 27.
2. For manhole types, see sheet 4.
3. For notes, see sheets 1 - 3.

**LEGEND:**
- V - Vertical reinforcement - Each line of horizontal reinforcement shall be assembled into a cage that shall contain sufficient vertical bars in position to maintain the reinforcement in shape and position within the form.

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

**STORM WATER MANHOLES**
**PRECAST MANHOLES**
**DESIGN TABLES**

**SEPT. 15, 2016**

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**SEPT. 15, 2016**

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**RC-39M**
**Type B - Doghouse Manhole**

*Without Bottom Slab*

(Precast Base Section Without Bottom Slab)

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**Setting Plan**

**Bottom Slab Reinforcement Plan**

(Cast-In-Place)

---

**Commonwealth of Pennsylvania**

**Department of Transportation**

**Bureau of Project Delivery**

**Director, Bureau of Project Delivery**

**Chief, Hwy. Delivery Division**

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**Storm Water Manholes**

*Doghouse Manholes - 2 (Type B)*

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**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 - 26.
5. Additional reinforcement adjacent to Pipe Opening is required when the pipe opening is greater than 15".
6. Any reinforcement bars in the Bottom Slab less than 4" in length, due to location of setting blocks, are not required.
**GENERAL NOTES:**

1. DESIGN SPECIFICATIONS:
   - All points under design specifications are as supplemented by the design work plan or any other agreements. Construction shall be in accordance with the load and resistance factor design (LRFD) guidelines.

2. CONSTRUCTION SPECIFICATIONS:
   - Provide materials and forms in accordance with the current version of the Pennsylvania Department of Transportation (PDDT) specifications. Special provisions may be provided in the contract documents.

3. SHOP DRAWINGS FOR INLET TOPS, GRATES, FRAMES, AND GRADE ADJUSTMENT RINGS:
   - Provide shop drawings for the fabrication or manufacturing. For deviations or modifications to the contract documents, consult the designer or manufacturer.

4. GENERAL NOTES:
   - If a required detail is not found in the standard or contract documents, provide a special submission requesting acceptance for the specified details.

5. FOR INLET BOX DETAILS: REFER TO RC-45M.

**PLACEMENT NOTES:**

1. EACH TYPE OF CONCRETE TOP UNIT OR FRAME IS SUITED FOR A PARTICULAR APPLICATION AS FOLLOWED:
   - TYPE D-H LEVEL CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS AND MOUNTABLE CURBS. TYPE D-H LEVEL CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS AND MOUNTABLE CURBS.

2. PROVIDE MATERIALLY AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

3. PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1001.2(d).

4. IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DOCUMENTS, A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS SHALL BE MADE TO THE DEPARTMENT OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION DEPARTMENT FOR REVIEW AND ACCEPTANCE.

5. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

6. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

7. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

8. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

9. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

10. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

11. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

12. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

13. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

14. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

15. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

16. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

17. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

18. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

19. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

20. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

**CONCRETE TOP UNIT NOTES:**

1. SHEETS 2 THROUGH 12 DEPICT THE DIMENSIONS REQUIRED FOR CONSTRUCTION AND INTERCHANGEABILITY. IF SHEETS 2 THROUGH 12 DEPICT THE DIMENSIONS REQUIRED FOR CONSTRUCTION AND INTERCHANGEABILITY.

2. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

3. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

4. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

5. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

6. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

7. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

8. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

9. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

10. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN SHEETS 2 THRU 4.

**GREATENOTE GRAITE NOTES:**

1. THE FOLLOWING TWO DIFFERENT GRAITE DESIGNATIONS ARE SPECIFIED IN THIS STANDARD:
   - STRUCTURAL STEEL GRAITE 3/4" DEPTH WITH 25,000 PSI.
   - CAST IRON VANE GRAITE.

2. THE SELECTION OF THE TYPE OF GRAITE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

4. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

5. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

6. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

7. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

8. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

9. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

10. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

**INLET TOPS, GRATES, AND FRAMES GENERAL NOTES:**

1. THE FOLLOWING TWO DIFFERENT GRAITE DESIGNATIONS ARE SPECIFIED IN THIS STANDARD:
   - STRUCTURAL STEEL GRAITE 3/4" DEPTH WITH 25,000 PSI.
   - CAST IRON VANE GRAITE.

2. THE SELECTION OF THE TYPE OF GRAITE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

4. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

5. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

6. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

7. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

8. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

9. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

10. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTION 1105.02(s).

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

**INLET TOPS, GRATES, AND FRAMES GENERAL NOTES**

1. THE FOLLOWING TWO DIFFERENT GRAITE DESIGNATIONS ARE SPECIFIED IN THIS STANDARD:
   - STRUCTURAL STEEL GRAITE 3/4" DEPTH WITH 25,000 PSI.
   - CAST IRON VANE GRAITE.

2. THE SELECTION OF THE TYPE OF GRAITE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.
SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

ALTERNATE ONE BAR OPTIONS FOR #4 HORIZONTAL U-BARS

PLAN VIEW - TYPE M

PLAN VIEW - TYPE S

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
**SECTION E-E**

**SECTION F-F**

**SECTION G-G**

**SECTION H-H**

**PLAN VIEW - TYPE C**

**SECTION E-E**

**SECTION F-F**

**SECTION G-G**

**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 MOUNT THE PLATE IN PLACE DURING FABRICATION. HOLES ARE NOT PERMITTED TO BE GREATER THAN 1/4" DIAMETER.

3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.

4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

**INLET TOPS, GRATES, AND FRAMES**

**CONCRETE TOP UNITS**

**TYPE C**

**RECOMMENDED**

**DETAIL 3**

**DETAIL 4**

**RC-45M**

**SHT 3 OF 20**

**SEPT. 15, 2016**

**CHIEF, HWY. DELIVERY DIVISION**
NOTES
1. FOR ADDITIONAL NOTES; SEE SHEET 1.
2. FOR TYPE C FRAME, SEE SHEET 14.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MEET SHAPE INDICATIONS; PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS THOREE AS REQUIRED.
TO MATCH SHAPE INDICATED.
PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
TO MATCH SHAPE INDICATED.
PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
TO MATCH SHAPE INDICATED.
PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
TO MATCH SHAPE INDICATED.
PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
TO MATCH SHAPE INDICATED.
PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
TO MATCH SHAPE INDICATED.
INLET TOPS, GRATES, AND FRAMES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

NOTES
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE DETAILS AND NOTES, SEE SHEET 7.
3. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 10.
4. UPSTREAM BAR GRATE IS NOT DESIGNED FOR FHWA-93.
5. DO NOT PLACE TYPE D-H INLETS IN A LOCATION WHERE FREQUENT IMPACTS FROM TRAFFIC IS LIKELY.

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE DETAILS AND NOTES, SEE SHEET 7.
3. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 10.
4. UPSTREAM BAR GRATE IS NOT DESIGNED FOR FHWA-93.
5. DO NOT PLACE TYPE D-H INLETS IN A LOCATION WHERE FREQUENT IMPACTS FROM TRAFFIC IS LIKELY.
**PLAN VIEW - TYPE D-H LEVEL**

**SECTION Q-Q**

**SECTION R-R**

**SECTION S-S**

**SECTION T-T**

**TYPICAL TYPE D-H LEVEL**

**INLET LOCATION AT CONCRETE MEDIAN BARRIER**

**NOTES**

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 15.
3. FOR CONCRETE BARRIER DETAILS, REFER TO RC-57M, SEE SHEET 12.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

**RECOMMENDED DATE:** SEPTEMBER 15, 2016

**DIRECTOR, BUREAU OF PROJECT DELIVERY**

**CHIEF, HWY. DELIVERY DIVISION**

**DATE:** SEPT. 15, 2016

**SHEET 6 OF 20**

**RC-45M**
SECTION C-C

SECTION D-D

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

DIRECTOR, BUREAU OF PROJECT DELIVERY
CAST IRON GRATE NOTES:

1. SHEETS 9 AND 10 DEPICT THE DIMENSIONS REQUIRED FOR UNIVERSITY AND INTERCHANGEABILITY. THEY DO NOT INCLUDE DETAIL REQUIREMENTS FOR FABRICATION OR MANUFACTURING.

2. PROVIDE BICYCLE SAFE GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION FOR AND THE CONTRACT SPECIAL PROVISIONS.

4. PROVIDE GRAY CAST IRON CONFORMING TO ASTM A48, CLASS 35B AND ASTM A538.

5. PROVIDE BICYCLE SAFE GRATES WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADSIDE IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND DESIGNATED AS BIKEWAYS OR BICYCLE KEY LANES. ALTERNATIVE BICYCLE SAFE GRATE DESIGNS MUST BE APPLIED AS SPECIFIED IN NOTE 1 AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION.

6. PROVIDE ADA COMPLIANT GRATES WHERE PEDESTRIAN TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADSIDE IN URBAN AREAS ALONG BIKEWAYS. ALTERNATIVE ADA COMPLIANT GRATE DESIGNS MUST BE APPLIED 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, HIGHWAY STEPS, AND INTERFACED AREAS.

8. REFER TO SHEET 10 FOR TWO PIECE CAST IRON GRATES.

CAST IRON GRATE - BICYCLE SAFE

ONE PIECE CAST IRON GRATE

INLET TOPS, GRATES, AND FRAMES

CAST IRON GRATES - 1
1. For cast iron grate notes, see Sheet 9.
2. For one piece cast iron grate details, see Sheet 9.

BICYCLE SAFE GRATE

NOTES
1. For cast iron grate notes, see Sheet 9.
2. For one piece cast iron grate details, see Sheet 9.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

CAST IRON VANE GRATE NOTES:

1. TWO SHEETS DETAIL THE DIMENSIONS REQUIRED FOR KERBS AND GRATES FABRICATED TO THE RULES AND REGULATIONS OF THE COMMONWEALTH OF PENNSYLVANIA. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.

2. PROVIDE CAST IRON VANE GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION FOR AND THE CONTRACT SPECIAL PROVISIONS.


5. INSTALL VANE GRATES WITH CURVED VANES FACING THE DIRECTION OF FLOW.

6. PROVIDE RADIUS OF 7/8" TYPICAL FOR ALL FILLETS AND BOUCLES, UNLESS NOTED.

7. CAST IRON VANE GRATES ARE PERMITTED TO BE USED AS AN ALTERNATIVE 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 ARE PERMITTED TO BE USED AS AN ALTERNATIVE 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 ARE PERMITTED TO BE USED AS AN ALTERNATIVE 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 ARE PERMITTED TO BE USED AS AN ALTERNATIVE 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.
GRADE ADJUSTMENT RING GENERAL NOTES:

1. SHEETS 12 AND 13 DEPICT THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURE OF MANUFACTURED ITEMS OR DEVIATIONS TO ACCEPTANCE OF THE MANUFACTURER. CIVIL JOB CORRESPOND TO THE BUREAU OF PROJECT DELIVERY. MATERIAL DELIVERY CHART FOR REVIEW AND ACCEPTANCE.

2. PROVIDE GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE MATERIALS AND REINFORCEMENTS IN ACCORDANCE WITH THE PUBLICATION 408 (ACIP) OR PUBLICATION 408 AND PUBLICATION D1.1 OR D1.5, AS APPLICABLE 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 - NOTE IN SHEET 10 GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENTS IF REQUESTED BY THE CONTRACTOR AND ACCEPTED BY PENNDOT PRIOR TO INSTALLATION. PROVIDE MASKS OR RUBBER GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

1. PRECAST CONCRETE ADJUSTMENT RINGS ARE PERMITTED FOR TYPE C, C ALTERNATE, M, S AND D-H CONCRETE TOP UNITS. DO NOT USE PRECAST CONCRETE ADJUSTMENT RINGS TO RAISE TYPE E RINGS.

2. ONLY ONE GRADE ADJUSTMENT RING IS PERMITTED FOR NEW CONSTRUCTION PROJECTS. GRADE ADJUSTMENT RINGS ARE SUBJECT TO THE COST OF THE TOP UNITS OR FRAMES.

3. PROVIDE GRADE ADJUSTMENT RING EQUIPMENT FOR IN SITU AND DOES NOT ALLOW EXTENSIVE MOVEMENT.

4. 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'-0" IN LENGTH.

5. PROVIDE CONCRETE COVER FOR REINFORCEMENT AT EACH END.

6. PROVIDE GRADE ADJUSTMENT RING MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR GRADE ADJUSTMENTS.

7. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH = f'c = 4,000 PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.

8. PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.

9. PROVIDE A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH = f'c = 4,000 PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.

10. PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.

11. PROVIDE GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

1. 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 FOR ANY OTHER TYPE OF UNIT.

2. ONLY ONE GRADE ADJUSTMENT RING IS PERMITTED FOR NEW CONSTRUCTION PROJECTS. GRADE ADJUSTMENT RINGS ARE SUBJECT TO THE COST OF THE TOP UNITS OR FRAMES.

3. PROVIDE GRADE ADJUSTMENT RING EQUIPMENT FOR IN SITU AND DOES NOT ALLOW EXTENSIVE MOVEMENT.

4. 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'-0" IN LENGTH.

5. PROVIDE CONCRETE COVER FOR REINFORCEMENT AT EACH END.

6. PROVIDE GRADE ADJUSTMENT RING MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR GRADE ADJUSTMENTS.

7. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH = f'c = 4,000 PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.

8. PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.

9. PROVIDE A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH = f'c = 4,000 PSI] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.

10. PROVIDE GRADE 60 DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615 OR ASTM A706.

11. PROVIDE GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 1

SECTION F-F

STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 2

SECTION G-G

SECTION H-H

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

RC-45M
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

INLET TOPS, GRATES, AND FRAMES
TYPE C FRAME

NOTES
1. FOR INLET FRAME NOTES, SEE SHEET 15.
RECOMMENDED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

RC-45M
SHT 15 OF 20

INLET FRAME NOTES:

1. SHEET 14 AND 15 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURE OR ASSEMBLY. OPERATION OF INTERPRETATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF PROJECT DELIVERY, HIGHWAY DELIVERY DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.

2. PROVIDE EITHER STRUCTURAL STEEL FRAMES OR CAST IRON FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AS TO BE DESIGNED HAVING CODE AND THE CONTRACT SPECIAL PROVISIONS.

4. PROVIDE TYPE C FRAME IN PLACE OF TYPE C ALTERNATE CONCRETE TOP UNIT.

5. PROVIDE TYPE M FRAME IN PLACE OF THE TYPE M ALTERNATE CONCRETE TOP UNIT.

6. STRUCTURAL STEEL FRAMES:
   - TYPE M FRAMES: PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270, GRADE 50 [ASTM A709, GRADE 50].
   - TYPE C 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.

7. CAST IRON FRAMES:

DUCTILE IRON CASTINGS CONFORMING TO ASTM A536, GRADE 60-40-18.

INLET TOPS, GRATES, AND FRAMES

TYPE M FRAME

SECTION C-C
(STRUCTURAL STEEL)

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

**INLET PLACEMENT NOTES:**

1. DETAILS SHOWN ON SHEETS 16 AND 17 ARE FOR INFORMATION ONLY. FOR ACTUAL PLACEMENT AND BARRIER DETAILS REFER TO THE CONTRACT DRAWINGS.

2. DESIGNER TO DETAIL BARRIER AND INLET PLACEMENT ON THE CONTRACT DRAWINGS.

3. FOR CONCRETE BARRIER DETAILS REFER TO RC-57M, RC-59M, AND THE CONTRACT DRAWINGS.

4. FOR ADDITIONAL NOTES, SEE SHEET 1.

**DETAIL A**

- Type M Frame
- Inlet Box
- Standard Inlet Box (Long Dir.)

**DETAIL B**

- Type M Frame
- Inlet Box
- Standard Inlet Box

**DETAIL C**

- Type M Frame
- Inlet Box
- Standard Inlet Box

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**INLET TOPS, GRATES, AND FRAMES**

**BUREAU OF PROJECT DELIVERY**

**DIRECTOR, BUREAU OF PROJECT DELIVERY**

**SEPT. 15, 2016**

**CHIEF, HWY. DELIVERY DIVISION**
1. FOR INLET PLACEMENT NOTES, SEE SHEET 16.

NOTES

% FOR INLET PLACEMENT NOTE: SEE SHEET 16.
SECTION E-E

SECTION F-F

SECTION G-G

SECTION H-H

PLANT VIEW - TYPE C

PLAN VIEW - TYPE C

PLAN VIEW - TYPE C

PLAN VIEW - TYPE C

PLAN VIEW - TYPE C

DETAIL 3

DETAIL 4

DETAIL 3

DETAIL 4

DETAIL 3

DETAIL 4

SECTION E-E

SECTION F-F

SECTION G-G

SECTION H-H

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

RECOMMENDED SEPT. 15, 2016
RECOMMENDED SEPT. 15, 2016
DATE 15 OF 20
DATE 15 OF 20

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

DIRECTOR, BUREAU OF PROJECT DELIVERY
SECTION K-K
FRONT ELEVATION

PLAN VIEW - TYPE C ALTERNATE

SECTION I-I

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

RECOMMENDED DATE: 09.15.2013
RECOMMENDED DATE: 09.15.2013
SHEET 20 OF 20

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR TYPE C FRAME, SEE SHEET 14.
3. IF FINAL GRADE ELEVATIONS CANNOT BE MADE WITH GRADE ADJUSTMENT DEVICES AS DETAILED IN THIS STANDARD, ADJUSTMENTS IS NOT PERMITTED. USE GRADE ADJUSTMENTS IS NOT PERMITTED. USE GRADE ADJUSTMENTS AS DETAILED IN THIS STANDARD.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

CAST-IN-PLACE = 2" PRECAST = 1 ¼" CLEAR (TYP)

8"

4 ½" BAR 3 @ 9"

3" MAX.

2" MIN.

4 ½" BAR 3 @ 9"

3" MAX.

2" MIN.

4 ½" BAR 3 @ 9"

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4 ½" BAR 3 @ 9"

3" MAX.

2" MIN.

4 ½" BAR 3 @ 9"

3" MAX.

2" MIN.
GENERAL NOTES:
1. **DESIGN SPECIFICATIONS AND REQUIREMENTS:**
   - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS and REQUIREMENTS (2001 Edition) shall be followed.
   - The structure is designed in accordance with the Load and Resistance Factor Design (LRFD) method.

2. **CONSTRUCTION SPECIFICATIONS:**
   - Provide materials and perform work in accordance with the current version of the Pennsylvania Department of Transportation (PennDOT) publications, and the contract specifications.

3. **EQUIPMENT NOTES:**
   - The equipment is designed for an average foundation pressure equal to 20 psi, to the nearest 0.1 psi.

4. **FIELD CONSTRUCTION NOTES:**
   - Provide the following concrete class:
     - Class-in-place class A: 4.75% cement content
     - Class-in-place class B: 2.0% cement content

5. **MATERIAL NOTES:**
   -课堂未提供材料注释。
PIPE LOCATION AND PIPE OPENING NOTES:

1. Locate the top of pipe at least 6" below the roadway subgrade elevation. For special conditions refer to R-924, SUBGRADE IS DEFINED AS THE TOP OF THE SUBGRADE.
2. Provide a minimum drop of at least 2" between the inlet pipe invert elevation to bottom of the specified pipe.
3. Provide pipe openings of at least 2" but not more than 4" larger than the outside diameter of the specified pipe.

LOCATE PIPE OPENINGS EXCEPT CORNER PENETRATIONS TO PROVIDE A MINIMUM 4" CONCRETE BETWEEN THE TOP OF THE INLET BOX AND THE TOP OF THE PIPE OPENING.

When project conditions require the pipe openings to be located within a standard or non-standard inlet box, the designer shall specify the following:

- Provide an additional #3 horizontal bar along the full width of the inlet box.
- Provide additional reinforcement bars around the pipe openings in accordance with the detail shown on sheet 34.
- The bottom slab thickness is permitted to be increased, as required, to maintain all clearance requirements.

CAST-IN-PLACE CONCRETE INLET BOX NOTES:

1. Construct inlet boxes in accordance with the requirements of publication 403, section 610.
2. Provide a transition slab to support the inlet top units M, S, and C, alternate each standard inlet box is not specified. Provide opening to accommodate transition slab. Provide a transition slab with a round opening for manhole cover when specified on the contract drawings.
3. Provide a transition slab between the separate inlet box sizes when two separate inlet box sizes are used. See transition slab notes.
4. Provide a transition slab between the separate inlet box sizes when two separate inlet box sizes are used. See transition slab notes.
5. Clean cover for steel:
   - Top cover: 6".
   - Bottom cover: 4".
6. Minimum slab and wall thickness:
   - Minimum slab thickness: 8".
   - Minimum wall thickness: 4".
   - Minimum bottom slab thickness: 8".
7. Thickness of walls must be maintained for the entire height of the inset box.

8. Provide either a shiplap or keyed joint between precast sections.
9. Provide either a shiplap or keyed joint between the transition slab and the top of the box.
10. Provide a keyed joint between the transition slab and the adjacent top and bottom sections.
11. Provide a transition slab between the transition slab and the adjacent top and bottom sections.
12. Provide a transition slab between the transition slab and the adjacent top and bottom sections.
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 the transition slab and the adjacent top and bottom sections.
15. Provide either a shiplap or keyed joint between the transition slab and the adjacent top and bottom sections.

TRANSITION SLAB NOTES:

1. Provide a transition slab to transition a larger inlet box size to a smaller size. See transition slab notes.
2. The designer is responsible for determining the maximum wall thickness required between the transition slab and the top of the box.
3. The transition slab is not permitted to be used in the interior of the box.
4. The transition slab is not permitted to be used in the interior of the box.
5. The transition slab is not permitted to be used in the interior of the box.
6. The transition slab is not permitted to be used in the interior of the box.

TRANSLATION NO. 2.

PRECAST CONCRETE INLET BOX NOTES:

1. Construct inlet boxes in accordance with the requirements of publication 403, section 610.
2. Provide precast concrete inlet boxes supplied by a manufacturer listed in bulletin 16.
3. Provide a transition slab between the separate inlet box sizes when two separate inlet box sizes are used. See transition slab notes.
4. Provide a transition slab between the separate inlet box sizes when two separate inlet box sizes are used. See transition slab notes.
5. Provide either a shiplap or keyed joint between the transition slab and the adjacent top and bottom sections.
6. Provide either a shiplap or keyed joint between the transition slab and the adjacent top and bottom sections.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

INLET BOXES
GENERAL NOTES - 2
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 3'-3".

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. 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.

6. The riser section is based on the required height.

7. The table.

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>CAST-IN-PLACE CONCRETE (CLASS A, MODIFIED)</th>
<th>PRECAST CONCRETE (CLASS AA, MODIFIED)</th>
</tr>
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<tr>
<td>#4</td>
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<tr>
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<tr>
<td>#9</td>
<td>0.41</td>
<td>0.62</td>
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</tbody>
</table>

**NOTES**

1. Splice length based on uncoated deformed bars.

2. Splice length based on class e deformed bars.
MIN. (TYP.)

THICKNESS 1'-0" MIN.

COARSE AGGREGATE

COMPACTED NO. 2A

FORMED WEEPHOLE 2"

1001.3 (c) & (d) PUB 408, SECTION IN GEOTEXTILE, CLASS 1

AT EACH WEEPHOLE WRAPPED NO. 57 COARSE AGGREGATE

CU. YD. OF INSIDE FACE THICKNESS WALL

RECOMMENDED LEVEL (SEE GENERAL NOTE 15 ON SHEET 1)

RC-46M COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

(STRUCTURAL STEEL SHOWN)

TYPE C FRAME

(CAST IRON SHOWN)

TYPE M FRAME

(STEEL SHOWN)

INLET BOX WITH TYPE M FRAME

CONCRETE TOP UNIT - TYPE S

CONCRETE TOP UNIT - TYPE C

CONCRETE TOP UNIT - TYPE M

INLET BOX WITH TYPE M FRAME

INLET BOX SUBBASE PREPARATION DETAIL

INLET ASSEMBLIES - 1

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF PROJECT DELIVERY

INLET BOXES INLET ASSEMBLIES - 1

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.

NOTE:

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

GRADE ADJUSTMENT RING, SEE NOTE 4.

INLET BOXES SUBBASE PREPARATION DETAIL

SEE FIELD CONSTRUCTION NOTES ON SHEET 11

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.

NOTE:

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

GRADE ADJUSTMENT RING, SEE NOTE 4.

INLET BOXES SUBBASE PREPARATION DETAIL

SEE FIELD CONSTRUCTION NOTES ON SHEET 11

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.

NOTE:

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

GRADE ADJUSTMENT RING, SEE NOTE 4.

INLET BOXES SUBBASE PREPARATION DETAIL

SEE FIELD CONSTRUCTION NOTES ON SHEET 11

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.

NOTE:

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

GRADE ADJUSTMENT RING, SEE NOTE 4.

INLET BOXES SUBBASE PREPARATION DETAIL

SEE FIELD CONSTRUCTION NOTES ON SHEET 11

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.

NOTE:

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

GRADE ADJUSTMENT RING, SEE NOTE 4.
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

SEPT. 15, 2016

BUREAU OF PROJECT DELIVERY
CHIEF, HWY. DELIVERY DIVISION
DIRECTOR, BUREAU OF PROJECT DELIVERY
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

PLAN - TOP SLABS

NOTE:

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

2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.

3. ETCH RING OR OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.

4. SEE SECTION D-D AND REINFORCEMENT REQUIREMENTS, SEE SHEET 6.

5. FOR ADDITIONAL REINFORCEMENT AROUND OPENING, SEE SHEETS 9 & 10.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BUREAU OF PROJECT DELIVERY

INLET BOXES
TOP SLABS - 1
OPENING IS PERMITTED.

2. FOR A STANDARD BOX, ONLY A 24" | 30" | 27" | 24" ARE PERMITTED:

1. THE FOLLOWING CIRCULAR OPENINGS:

- MAX. 4"
- #4 @ 12"
- CAST-IN-PLACE = 2"
- PRECAST = 1" CLEAR (TYP.) @ 6"

"S1" BARS

- MAX. 4"
- 3" MAX.
- 1" MIN.
- "S1" BARS @ 6"

FOR MANHOLE COVER:

- OPTIONAL ROUND OPENING
- PLAN - TOP SLAB WITH
- INLET BOX FOR ACCESS, IF POSSIBLE.

3. SET EDGE OF OPENING AT INSIDE FACE OF MATCH SIZE OF INLET BOX.

4. FOR ADDITIONAL REINFORCEMENT AROUND INLET BOX FOR DOUBLE TYPE M CONCRETE TOP UNIT:

- NOT APPLICABLE FOR STANDARD INLET BOXES
- INLET BOXES ONLY FOR TYPES 8, 9 OR 10 INLET BOXES ONLY

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.

FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.

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

RECOMMENDED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

SECTION D-D
(ADDITIONAL REINFORCEMENT NOT SHOWN)

INLET BOXES
TOP SLABS - 2

SEPT. 15, 2016

BUREAU OF PROJECT DELIVERY
CHIEF, HWY. DELIVERY DIVISION
DIRECTOR, BUREAU OF PROJECT DELIVERY
**FOR TYPE 4 AND 5 INLET BOXES**

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

**FOR TYPE D-H CONCRETE TOP UNITS**

**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 BY: RC-46M
DATE: SEP. 15, 2016

BUREAU OF PROJECT DELIVERY
CHIEF, HWY. DELIVERY DIVISION
DIRECTOR, BUREAU OF PROJECT DELIVERY
BOTTOM DIAGONAL BARS
8-#5
CAST-IN-PLACE = 2"
PRECAST = 1"
CLEAR (TYP.)

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 4.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

INLET BOXES
TOP SLABS - 4

FOR STANDARD INLET BOX
ADDITIONAL REINFORCING AT
ROUND OPENING IN TOP SLAB

FOR OTHER INLET BOXES
ADDITIONAL REINFORCING AT
RECTANGULAR OPENINGS IN TOP SLAB
FOR DOUBLE TYPE M CONCRETE TOP UNIT

FOR TYPE 5 INLET BOX
ADDITIONAL REINFORCING AT
RECTANGULAR OPENINGS IN TOP SLAB
FOR TYPE 6, 7, 8, 9 AND 10 INLET BOXES

FOR OTHER INLET BOXES
ADDITIONAL REINFORCING AT
RECTANGULAR OPENINGS IN TOP SLAB
FOR TYPE 5 INLET BOX

FOR OTHER INLET BOXES
ADDITIONAL REINFORCING AT
RECTANGULAR OPENINGS IN TOP SLAB
FOR TYPE 6, 7, 8, 9 AND 10 INLET BOXES
Additional reinforcing at openings in transition slab

Transition slab with keyed joint

Transition slab with shiplap joint (precast only)

Section F-F

Additional reinforcing not shown

Notes:
1. For additional notes, see sheets 1 - 3.
2. Cut to cut dimensions of transition slab to match size of lower inlet box.
3. Any reinforcing 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".

Commonwealth of Pennsylvania
Department of Transportation
Bureau of Project Delivery

Inlet Boxes
Transition Slabs - 2
AT CORNERS
BAR HOOK 12"
1-#4 HORIZONTAL
(TYP.)
CLEAR
2" (TYP.)
CLEAR
2"
(SEE NOTE 2)
1" MIN.
(SEE NOTE 5)
DIAGONAL BARS
4-#4

1-#4 HORIZONTAL
BAR HOOK 12"
AT CORNERS

GREATER THAN 6"
IS EQUAL TO OR
OPENING TO SIDE WALL
DISTANCE FROM PIPE
BAR REQUIRED WHEN
1-#4 VERTICAL

1-#4 HORIZONTAL
BAR HOOK 12"
AT CORNERS

1-#4 HORIZONTAL
BAR HOOK 12"
AT CORNERS

GREATER THAN 6"
IS EQUAL TO OR
OPENING TO SIDE WALL
DISTANCE FROM PIPE
BAR REQUIRED WHEN
2-#4 VERTICAL

1-#4 HORIZONTAL
BAR HOOK 12"
AT CORNERS

1-#4 HORIZONTAL
BAR HOOK 12"
AT CORNERS

PROVIDE 1-#4 HORIZONTAL
BAR AT CORNERS IF DISTANCE
PROVIDE A VERTICAL BAR WHEN THE DISTANCE
OPENING TO SIDE WALL IS LESS THAN 6".
DETAIL SHOWN WHEN THE DISTANCE FROM PIPE
OPENING TO SIDE WALL IS EQUAL TO OR GREATER THAN 6".

PROVIDE 1-#4 HORIZONTAL BAR (SEE NOTE 6)
BAR EXTENDS INTO SIDE WALL.

1-#4 VERTICAL BAR REQUIRED WHEN THE DISTANCE FROM PIPE OPENING TO SIDE WALL IS GREATER THAN 6"
(SEE NOTE 6)
PAST DIAGONAL (TYP.)
6" MIN.
(SEE NOTE 5)
DIAGONAL BARS
4-#4

(SEE NOTE 5)
DIAGONAL BARS
2-#4

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

INLET BOXES
CAST-IN-PLACE INLET BOXES - 3

RECOMMENDED DATE: 9-12-2017
RECOMMENDED DATE: 9-12-2016
DATE OF ISSUE: 9-12-2016
DATE OF ISSUE: 9-12-2016

RC-46M
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 CONTRACT.
4. FOR DESIGN TABLES, SEE SHEETS 17 - 19.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

SPLICE IN BOTTOM SLAB

SPLICE IN WALLS

TYPICAL SECTIONS
CAST-IN-PLACE (INLET) BOXES
W ith REINFORCEMENT BARS

VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE REINFORCEMENT

HORIZONTAL SECTION
WITH OUTSIDE FACE REINFORCEMENT

VERTICAL SECTION OF BASE SECTION
WITH INSIDE FACE REINFORCEMENT

HORIZONTAL SECTION
WITH INSIDE FACE REINFORCEMENT

CAST-IN-PLACE INLET BOXES
4 WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

CAST-IN-PLACE INLET BOXES
- 4 WITH OUTSIDE FACE REINFORCEMENT
### CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE

#### BOX TYPE - STANDARD

**RISER SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

**BASE SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

#### BOX TYPE - 4

**RISER SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

**BASE SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

#### BOX TYPE - 5

**RISER SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

**BASE SECTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |

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**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)
# CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE

## BOX TYPE - 6

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<th>BASE SECTIONS</th>
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</tr>
<tr>
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</tr>
<tr>
<td><strong>H</strong></td>
<td><strong>H</strong></td>
</tr>
<tr>
<td><strong>L</strong></td>
<td><strong>L</strong></td>
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</table>

<table>
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</thead>
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<th>BASE SECTIONS</th>
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## BOX TYPE - 8

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<th>BASE SECTIONS</th>
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<td><strong>H</strong></td>
<td><strong>H</strong></td>
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<td><strong>L</strong></td>
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</tbody>
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## Notes
1. For additional notes, see sheet 1 - 3.
2. For inlet box types, see sheet 4.
3. For details, see sheets 13 - 16.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 2
(Reinforcement Bars)
### Cast-In-Place Concrete Inlet Box Summary Table

#### Box Type - 3

<table>
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<tr>
<th>Size</th>
<th>Riser Sections</th>
<th>Base Sections</th>
<th>Top Bar</th>
<th>Vertical Bar</th>
<th>Horizontal Bar</th>
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<tr>
<td></td>
<td>Outside Face Reinforcement</td>
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<td>200</td>
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#### Box Type - 4

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<th>Riser Sections</th>
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<th>Top Bar</th>
<th>Vertical Bar</th>
<th>Horizontal Bar</th>
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</thead>
<tbody>
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<td>Outside Face Reinforcement</td>
<td>Inside Face Reinforcement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
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<td>200</td>
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<td>0</td>
</tr>
</tbody>
</table>

#### Box Type - 5

<table>
<thead>
<tr>
<th>Size</th>
<th>Riser Sections</th>
<th>Base Sections</th>
<th>Top Bar</th>
<th>Vertical Bar</th>
<th>Horizontal Bar</th>
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<td>Inside Face Reinforcement</td>
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<td></td>
<td></td>
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<tr>
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<tr>
<td>200</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Notes:**
1. For additional notes, see sheets 1 - 3.
2. For inlet box types, see sheet 6.
3. For details, see sheets 13 - 16.
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.

Notes:
- 1" Min. slab thickness
- Pipe and joint elevation
- Pipe opening
- Top of pipe
- Top of inlet box
- Bottom slab elevation
- Construction note 3 on sheet 1.

Commonwealth of Pennsylvania
Department of Transportation
Bureau of Project Delivery

Inlet Boxes
Precast Inlet Boxes - 2
ADDITIONAL REINFORCING

ADJACENT TO PIPE OPENINGS IN WALL

LOCATION OF PIPE OPENING

NOTES:
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. THE 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 4" BARS TO SUPPORT A PIPE OPENING DURING FABRICATION. LOCATE BARS 4" CLEAR FROM TOP OR BOTTOM OF THE SECTION. CUT BARS IN FIELD PRIOR TO INSTALLING PIPE.
PRECAST INLET BOXES  
WITH REINFORCEMENT BARS 

TYPICAL SECTIONS 
PRECAST INLET BOXES  
WITH REINFORCEMENT BARS 

OPTIONAL REINFORCEMENT DETAILS 

NOTES: 
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3. 
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 23. 
3. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR. 
NESTED WWF NOTES:
1. FACRICATION IS PERMITTED TO FABRICATE THE PRECAST CONCRETE INLET BOX USES NESTED WWF IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
   • THE TOP REVIEWS AND THE INSIDE REVIEWS OF WWF MUST MEET THE REQUIREMENTS ON THE WELDED WIRE FABRIC DESIGN TABLES SHOWN ON SHEETS 29 - 33.
   • THE CLEAR DISTANCE BETWEEN PARALLEL WIRES IS NOT PERMITTED TO BE LESS THAN 1/2".
   • ALL OTHER COVER AND CLEARANCE REQUIREMENTS APPLY.
2. A MAXIMUM OF TWO LAYERS OF WWF IS PERMITTED TO BE NESTED PER WALL.

BOTTOM MAT REINFORCEMENT (WELDED WIRE FABRIC)

OPTIONAL SPLICE DETAIL

NOTES:
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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

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

RECOMMENDED SEPT. 15, 2017
RECOMMENDED SEPT. 15, 2016
DATE OF ISSUE: 28
DATE OF ISSUE: 28

PRECAST INLET BOXES
WITH WELDED WIRE FABRIC

(TYPICAL SECTIONS)
PRECAST INLET BOXES - 5
WITH WELDED WIRE FABRIC

(TYPICAL SECTIONS)

NOTE: CLEAR DISTANCE BETWEEN PARALLEL WIRES IS NOT PERMITTED TO BE LESS THAN 1/2".

NOTES:
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.
NOTES:
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR ADDITIONAL INFORMATION, REFER TO INLET BOX DESIGN TABLE NOTES ON SHEET 3.
4. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
## PRECAST CONCRETE INLET BOX SUMMARY TABLE

### BOX TYPE - STANDARD

<table>
<thead>
<tr>
<th>HEIGHT (FT.)</th>
<th>H</th>
<th>L</th>
<th>T</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

### BOX TYPE - 4

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<th>T</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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### BOX TYPE - 5

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<tbody>
<tr>
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### BASE SECTIONS

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### NOTES:

1. For additional notes, see sheets 1 - 3.
2. For inlet box types, see sheet 4.
3. For details, see sheets 20 - 23.
### PRECAST CONCRETE INLET BOX SUMMARY TABLE

#### BOX TYPE - 6

#### RISER SECTIONS

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#### PRECAST CONCRETE INLET BOX SUMMARY TABLE

#### BOX TYPE - 7

#### RISER SECTIONS

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#### PRECAST CONCRETE INLET BOX SUMMARY TABLE

#### BOX TYPE - 8

#### RISER SECTIONS

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

**INLET BOXES**

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

**NOTES:**
1. For additional notes, see sheets 1 - 5.
2. For inlet box types, see sheet 6.
3. For details, see sheets 20 - 23.
### PRECAST CONCRETE INLET BOX SUMMARY TABLE

#### BOX TYPE - 9

<table>
<thead>
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<th>RISER SECTIONS</th>
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<td><strong>SIZE</strong></td>
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<td><strong>REINFORCEMENT</strong></td>
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<td><strong>HORIZONTAL</strong></td>
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<tr>
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<td><strong>VERTICAL</strong></td>
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<tr>
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#### BOX TYPE - 10

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<td><strong>SIZE</strong></td>
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#### BOX TYPE - D-H

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**NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 20 - 23.
## PRECAST CONCRETE INLET BOX SUMMARY TABLE
### BOX TYPE - STANDARD

#### BASE SECTIONS

<table>
<thead>
<tr>
<th>M (IN.)</th>
<th>H (IN.)</th>
<th>B (IN.)</th>
<th>W (IN.)</th>
<th>I (IN.)</th>
<th>WELDED WIRE FABRIC STEEL AREA (IN. /FT.)</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
<th>BOTTOM MAT REINFORCEMENT</th>
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<td>0.12</td>
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<td>0.36</td>
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#### RISER SECTIONS

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<th>UNIT HEIGHT (IN.)</th>
<th>M (IN.)</th>
<th>H (IN.)</th>
<th>B (IN.)</th>
<th>W (IN.)</th>
<th>I (IN.)</th>
<th>WELDED WIRE FABRIC STEEL AREA (IN. /FT.)</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
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### 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 - 5

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<th>B (IN)</th>
<th>V (IN)</th>
<th>DEPTH (FT)</th>
<th>WELDED WIRE FABRIC</th>
<th>STEEL AREA (IN2/FT)</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
<th>BOTTOM MAT REINFORCEMENT</th>
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<td>0.12</td>
<td>0.36</td>
<td>0.32</td>
<td>0.16</td>
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<tr>
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<th>B (IN)</th>
<th>V (IN)</th>
<th>DEPTH (FT)</th>
<th>WELDED WIRE FABRIC</th>
<th>STEEL AREA (IN2/FT)</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
<th>BOTTOM MAT REINFORCEMENT</th>
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<td>0.16</td>
<td>0.16</td>
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<tr>
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<td>72</td>
<td>12</td>
<td>8</td>
<td>8.0</td>
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<td>WWF 3x3-W10x8</td>
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<td>0.16</td>
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<tr>
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### Notes
1. For additional notes, see sheets 1 - 3.
2. For inlets box types, see sheet 6.
3. For details, see sheets 20 - 22 and 24.
### PRECAST CONCRETE INLET BOX SUMMARY TABLE
#### BOX TYPE - 7

**BASE SECTIONS**

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<th>D (IN.)</th>
<th>STEEL AREA (IN.²/FT.)</th>
<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
<th>BOTTOM MAT REINFORCEMENT</th>
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</thead>
<tbody>
<tr>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
</tr>
<tr>
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<td>WWF 3x3-W20xW8</td>
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<td>16.0</td>
<td>84</td>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
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**RISER SECTIONS**

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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
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<tr>
<td>12.0</td>
<td>84</td>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
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<tr>
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<td>84</td>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
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### PRECAST CONCRETE INLET BOX SUMMARY TABLE
#### BOX TYPE - 8

**BASE SECTIONS**

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<th>OUTSIDE FACE REINFORCEMENT</th>
<th>INSIDE FACE REINFORCEMENT</th>
<th>TOP MAT REINFORCEMENT</th>
<th>BOTTOM MAT REINFORCEMENT</th>
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<td>WWF 4x4-W20xW8</td>
<td>WWF 4x4-W20xW8</td>
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<td>WWF 4x4-W20xW8</td>
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<td>WWF 4x4-W20xW8</td>
<td>WWF 4x4-W20xW8</td>
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<td>WWF 4x4-W20xW8</td>
<td>WWF 4x4-W20xW8</td>
</tr>
</tbody>
</table>

**RISER SECTIONS**

<table>
<thead>
<tr>
<th>H (IN.)</th>
<th>B (IN.)</th>
<th>D (IN.)</th>
<th>0.40</th>
<th>WWF 4x3-W20xW12</th>
<th>WWF 4x3-W20xW10</th>
<th>WWF 4x3-W20xW10</th>
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</thead>
<tbody>
<tr>
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<td>8</td>
<td>0.12</td>
<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
</tr>
<tr>
<td>12.0</td>
<td>96</td>
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<td>0.12</td>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
</tr>
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<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
<td>WWF 3x3-W20xW8</td>
</tr>
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### COMMONWEALTH OF PENNSYLVANIA
**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

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

**NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
### PRECAST CONCRETE INLET BOX SUMMARY TABLE
#### BOX TYPE - 9

<table>
<thead>
<tr>
<th>BOX TYPE</th>
<th>BASE SECTIONS</th>
<th>RISER SECTIONS</th>
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<tbody>
<tr>
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**NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.

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

<table>
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**NOTES:**
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
### PRECAST CONCRETE INLET BOX SUMMARY TABLE
**BOX TYPE - D-H**

#### BASE SECTIONS

<table>
<thead>
<tr>
<th>SHEET LENGTH (FT.)</th>
<th>SHEET WIDTH (IN.)</th>
<th>MILL RIBS</th>
<th>VERTICAL WIRE (IN.)</th>
<th>HORIZONTAL WIRE (IN.)</th>
<th>STEEL AREA (IN.²/FT.)</th>
<th>ORTHOGONAL</th>
<th>VERTICAL</th>
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<tbody>
<tr>
<td>3.0</td>
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<tr>
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<td>WWF 3x4-W8x4</td>
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#### RISER SECTIONS

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<th>SHEET WIDTH (IN.)</th>
<th>MILL RIBS</th>
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<th>HORIZONTAL WIRE (IN.)</th>
<th>STEEL AREA (IN.²/FT.)</th>
<th>ORTHOGONAL</th>
<th>VERTICAL</th>
</tr>
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<tbody>
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<td>0.72</td>
<td>0.20</td>
<td>WWF 3x4-W8x4</td>
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<tr>
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<tr>
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<td>0.72</td>
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<tr>
<td>12.0</td>
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<td>0.20</td>
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#### NOTES:
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 4.
**Table A**

<table>
<thead>
<tr>
<th>INLET TYPE</th>
<th>MAXIMUM INSIDE WIDTH (IN.)</th>
<th>MAXIMUM INSIDE LENGTH (IN.)</th>
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<th>MAXIMUM PERMITTED PIPE DIAMETER ALONG LENGTH (IN.)</th>
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<td>72</td>
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<td>36</td>
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<td>48</td>
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<td>108</td>
<td>108</td>
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**Notes:**

1. For additional notes, see Sheets 1 - 3.
2. Refer to pipe location and pipe skewed pipe detail for opening notes on Sheet 2.

**Commonwealth of Pennsylvania**

**Department of Transportation**

**Bureau of Project Delivery**

**Chief, Hwy. Delivery Division**

**Director, Bureau of Project Delivery**

**Inlet Boxes**

**Miscellaneous Details**
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  

**RECOMMENDED**

**RC-50M**

**NOTES**

**FRONT SIDE**

**W-Beam Rail Element**

**Plan and Profile View for Guide Rail to Concrete Bridge Barrier Transition**

**Elevation View for Guide Rail to Concrete Bridge Barrier Transition**

**Typical Steel Spacer Tube Installation**

**Guide Rail to Typical Concrete Bridge Barrier Transition**

**Typical and Alternate Concrete Bridge Barrier Transition**

**Routing Offset Bracket**

**Post and Offset Bracket Details**

**W6 x 8.5 or 9 Post Details**

**Notes**

1. For approach transition post heights, see Sheets 1 and 2.
2. For additional notes, see Sheet 1.
3. For approach transition post size and length, see Table A, on Sheet 1.

---

**Commonwealth of Pennsylvania**  
**Department of Transportation**  
**Bureau of Project Delivery**

**Director, Bureau of Project Delivery**

**Chief, Hwy. Delivery Division**

**Sept. 15, 2016**
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER

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

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

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

NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.

2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.

3. FOR LOCATION WITH INLET PLACEMENT, POST 3 IS OMITTED.

4. FOR ADDITIONAL NOTES, SEE SHEET 1.

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER TRANSITION CONNECTION

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
**NOTES**

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

---

**TABLE C**

<table>
<thead>
<tr>
<th>POSTS</th>
<th>LENGTH</th>
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<td>W6x9</td>
</tr>
<tr>
<td>POST 6</td>
<td>8'-0&quot;</td>
<td>W6x9</td>
</tr>
<tr>
<td>POST 7</td>
<td>7'-0&quot;</td>
<td>W6x9</td>
</tr>
</tbody>
</table>

---

**ROUTE OFFSET BRACKET DETAILS**

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

---

**SECTION A-A**

**SECTION B-B**

---

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF PROJECT DELIVERY**

**GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS**

**THREE-BEAM TO PA BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS**

---

**RECOMMENDED**

**SEPT. 15, 2016**

**DIRECTOR, BUREAU OF PROJECT DELIVERY**

---

**Post Details**

<table>
<thead>
<tr>
<th>POSTS</th>
<th>LENGTH</th>
<th>SIZE</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>POST 6</td>
<td>8'-0&quot;</td>
<td>W6x9</td>
</tr>
<tr>
<td>POST 7</td>
<td>7'-0&quot;</td>
<td>W6x9</td>
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---

**Routed Offset Bracket Details**

1. FOR LOCATION OF POSTS, SEE SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
BEYOND POST 6
(at W-beam rail element)
* See note 7, sheet 1.
* For post details see RC-52M, sheet 1.

POSTS 5 AND 6
W/6" x 8" x 1'-6" routed offset bracket

POST 4
W/6" x 8" x 1'-6" routed offset bracket

POST 3
W/6" x 8" x 1'-6" Offset Bracket

POST 2
W/6" x 8" x 1'-6" Offset Bracket

POST 1
W/6" x 8" x 1'-6" Offset Bracket

POST DETAILS

POSTS 5 AND 6
W/6" x 8" x 1'-6" Offset Bracket

POST 4
W/6" x 8" x 1'-6" Offset Bracket

POSTS 1 THRU 3
W/6" x 8" x 1'-2" routed offset bracket

SECTION A-A

OFFSET BRACKET DETAILS

TABLE D

<table>
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<tbody>
<tr>
<td>1. THR 2</td>
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<td>W/6x15</td>
</tr>
<tr>
<td>3. THR 3</td>
<td>7 '-0&quot;</td>
<td>W/6x9</td>
</tr>
<tr>
<td>BEYOND 4</td>
<td>6 '-0&quot;</td>
<td>W/6x15</td>
</tr>
</tbody>
</table>

NOTES
1. For location of post, see sheet 12.
2. For additional notes, see sheet 1.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THREE-BEAM TO VERTICAL WALL
BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

SEPT. 15, 2016
SEPT. 15, 2016
THRIE-BEAM RAIL ELEMENT

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

RAIL ELEMENT
SECTION B-B

THRIE-BEAM RAIL ELEMENT
SECTION A-A

NEUTRAL AXIS
SYMMETRIC ABOUT C
THICK 12 GAGE GALVANIZED STEEL,
12" LAP
1'-8"
2" 4'
3'
3'-1"
6" THICK
10" 13'-6"
12'-6"
3'-1"
12"
10° AXIS
NEUTRAL
SYMMETRIC ABOUT C
BACKING PLATE
C 3/4" x 2"
C 3/16" x 1"
3'-1"
6" 7'
10° AX
SYMMETRIC ABOUT C
THICK 12 GAGE GALVANIZED STEEL,
12 GAGE GALVANIZED STEEL,
THRIE-BEAM TERMINAL SECTION
AT PA TYPE 10M BRIDGE BARRIER
SHOWN WITH CONNECTION PLATE ASSEMBLY

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

NOTES

1. USE THIS SHEET WITH SHEETS 4-15.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. PROVIDE 1/2" HEXAGON SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT FREE TO MOVE, TIGHTEN SPLICE BOLTS TO THE SUPPLIED TORQUE.
1. Provide materials and construction meeting the requirements of Publication 408, Section 633.

2. Install Type M Inlet with Concrete Mountable Curbs and locate inlet as shown on the drawings. Make the backslope traversable in the area of the inlet as indicated.

3. Space contraction joints to align with adjacent pavement joints to eliminate joint and牌concrete cracking, except as specified in Publication 408, Section 501.4(n).

4. Place thermoplastic expansion joint filler in 1/4" thick and conform to areas adjacent to curbs and other structures and at the end of the work day. Cut and fill joints to eliminate sawcut and sympathy cracking. Seal as space contraction joints to align with adjacent pavement.

5. Provide elongated islands not less than 4'-0" wide and 20'-0" long, except in special cases where space is severely limited.

CONCRETE MOUNTABLE CURBS

CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

4" plans may provide for a deeper face at curbs when an overlay is placed on the existing pavement. However, build exposed final face of curb at 2" maximum.

CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

4" half 1/2" long dowels at 5'-0" C to C driving and placement of 1" x 6" x 6" strength threaded stud, 1/16" in diameter, with similar bar configuration extending into the curb.

DETAIL A

CONTRACTION JOINT

4" plain concrete pavement

END DETAILS

CONTRACTION JOINT, SEE DETAIL A

TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS

CONCRETE MOUNTABLE CURBS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

SEPT. 15, 2016

BUREAU OF PROJECT DELIVERY

DIRECTOR, BUREAU OF PROJECT DELIVERY

CHIEF, HWY. DELIVERY DIVISION

SEPT. 15, 2016
SILT BARRIER FENCE, 18" HEIGHT

- See Table A

SILT BARRIER FENCE, 30" HEIGHT

- See Table A

SILT BARRIER FENCE JOINING DETAIL

Table A: Silt Barrier Fence Geotextile Selection

<table>
<thead>
<tr>
<th>Silt Barrier Fence Height</th>
<th>Type of Class 3 Geotextile Material</th>
<th>Nominal Geotextile Height</th>
<th>Post Spacing Between Mesh Support</th>
<th>Max Post Spacing Without Mesh Support</th>
</tr>
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<tbody>
<tr>
<td>18&quot;</td>
<td>A</td>
<td>30&quot;</td>
<td>8&quot;-0&quot;</td>
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</tr>
<tr>
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<td>42&quot;</td>
<td>NA</td>
<td>8&quot;-0&quot;</td>
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<tr>
<td>18&quot;</td>
<td>B</td>
<td>30&quot;</td>
<td>4&quot;-0&quot;</td>
<td>NA</td>
</tr>
<tr>
<td>30&quot;</td>
<td>B</td>
<td>42&quot;</td>
<td>NA</td>
<td>4&quot;-0&quot;</td>
</tr>
</tbody>
</table>

NA = NOT APPLICABLE
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
PERIMETER CONTROL DEVICES

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 GEOTEXTILE AND WIRE FABRIC ON LEVEL GROUND. EXCEED BOTH ENDS OF THE FENCE AT LEAST 8". UTILITY AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT BARRIER 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.

HEAVY DUTY SILT BARRIER FENCE

SILT BARRIER FENCE, AS REQUIRED

POSTS, AS REQUIRED

FILTER AT TOE OF SLOPE

FILTER AT INTERSECTION OF SILT BARRIER FENCE

NOTE: SILT BARRIER FENCE, AS REQUIRED

AASHTO NO. 1 COARSE AGGREGATE

AASHTO NO. 57 COARSE AGGREGATE

CROSS SECTION

POSITIVE SLOPE

MIN 6"

MIN 12"

MIN 6" SEE NOTE 2

36"

MIN SEE RC-60M SHEET 2

WIRE FABRIC (FOR INSTALLATION OF WIRE FABRIC SEE RC-60M SHEET 2)

GEOTEXTILE, CLASS 3, TYPE A

GEOTEXTILE, CLASS 3, TYPE A

FASTENERS (TYP)

FASTENERS (TYP)

POSTS, AS REQUIRED

POSTS, AS REQUIRED

7 GA. TENSION WIRE SEE RC-60M SHEET 2 (TYP)

7 GA. TENSION WIRE SEE RC-60M SHEET 2 (TYP)

COMPACTED EXCAVATED SOIL FILL

COMPACTED EXCAVATED SOIL FILL

FASTENERS (TYP), SEE NOTE 7

FASTENERS (TYP), SEE NOTE 7

AASHTO NO. 17 COARSE AGGREGATE

AASHTO NO. 17 COARSE AGGREGATE

FILTER AT INTERSECTION OF SILT BARRIER FENCE

FILTER AT TOE OF SLOPE

ROCK FILTER OUTLET

EXCAVATED TRENCH.
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. ERASE ANY EXCESSIVE REMAINING COMPOST FILTER SOCK/BERM AND ALTERNATE UPLIFT AT 45 DEGREES TO THE GRADE ALONG THE UPLIFT.

3. REPLACE REDECORABLE FILTER SOCK AFTER 6 MONTHS; PHOTODEGRADABLE AFTER 12 MONTHS.

COMPOST FILTER SOCK

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

PERIMETER CONTROL DEVICES