**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

**WEIGHT OF CASTINGS (lb)**

<table>
<thead>
<tr>
<th>Frame Type</th>
<th>2 Opening</th>
<th>3 Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover</td>
<td>Cover (Std.)</td>
<td>2-Piece Cover</td>
</tr>
<tr>
<td>Inside</td>
<td>Outside</td>
<td>Total</td>
</tr>
<tr>
<td>I</td>
<td>155</td>
<td>190</td>
</tr>
<tr>
<td>II</td>
<td>145</td>
<td>190</td>
</tr>
<tr>
<td>III</td>
<td>190</td>
<td>180</td>
</tr>
</tbody>
</table>

*Includes Type I Adjustable*

**NOTES (FRAMES, AND COVER)**

1. The standard cover is to be used for all frames Types I, II, III and the 2-piece cover, and is the replacement cover for all previous frames with 1/2' deep seats (traffic type). The 185 lb. cover (non-traffic type), 1984 Roadway and Traffic Design Standards Index 201, is the replacement cover for existing frames with 1/2' deep seats. Installation of frame with 1/2' deep seats is not permitted.

2. Use the 3-2' cover, unless the 2-piece cover is called for in the plans, except at inlets and manholes with sump bottoms use the 2-piece cover when the sump depth exceeds 5', unless otherwise noted.

**DESIGNER NOTE:**

Consider using the 2-piece cover where depths exceed 5' and manual entry may be required for cleaning. Clearly note the requirement for a 2-piece cover on the Drainage Structure sheets in the plans.
SECTION

1. Manhole top Type 7 slabs shall be of Class II concrete. Concrete as specified in ASTM C478 may be used for precast units; see General Note No. 3.

2. Manhole top Type 7 slabs may be of cast-in-place or precast construction. The optional key is for precast tops and in lieu of dowels. Frames and slab openings are to be omitted when top is used over a junction box.

3. Manhole top Type 8 may be of cast-in-place or precast concrete construction or brick construction. For precast construction, the concrete and steel reinforcement shall be the same as the supporting wall unit. An eccentric cone can be used.

4. Manhole tops shall be secured to structures by optimal construction joints as shown on Sheet 3.

5. Frames can be adjusted a maximum 12" height with brick or precast dowels. Frame and slab openings are to be omitted when top is used.

6. Substitution of manhole top Type 8 for manhole top Type 7 is allowed provided that minimum dimensions shown above are not reduced.

7. Substitution of manhole top Type 7 for Type 8 is allowed if the minimum thickness (h) above pipe opening cannot be maintained with manhole top Type 8.

**MANHOLE TOPS**

**NOTES (TOPS)**

**EYEBOLT AND CHAIN REQUIREMENTS**

1. Manhole top Type 7 should be specified in the plans when depths shown above can be maintained.

**EYEBOLT AND CHAIN FOR LOCKING GRATES TO INLETS**

1. Cost of pipe, fittings and sandbagging to be included in the contract unit price for inlets.

**FILTER FABRIC WRAP ON GROUTED PIPE TO STRUCTURE JOINT**

**BRICK OR CONCRETE PRECAST CONCENTRIC CONE**

**PRECAST ECCENTRIC CONE**

**TYPE 7**

**TYPE 8**

**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

**ALL PIPE TYPES**

**DRAINAGE STRUCTURE INVERT**

**PIPE TO SUBGRADE AND BASE**

**TEMPORARY DRAINS**

**PIPE TO STRUCTURE JOINT**

**FILTER FABRIC WRAP ON GROUTED PIPE TO STRUCTURE JOINT**

**SUMP BOTTOM**

**SUMP BOTTOM**

**FOR ALL STRUCTURES UNLESS EXCLUDED BY SPECIAL DETAIL**

**INDEX**

**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

**INDEX**

**LAST REVISION 01/01/17**

**REVISION**

**DESCRIPTION:**

**FY 2018-19 STANDARD PLANS**

**INDEX**

**SHEET**

**425-001**

2 of 5
Supplementary Details for Manholes and Inlets

Separate Riser Segments with Construction Joints Other Than Dowel Option

Segments may be inverted. Opening for pipe shall be the pipe OD plus 6" (±2" tolerance). If h cannot be attained, then a top or bottom slab must be attached to the segment as shown below.

Comparative Side Views

Minimum Dimensions for Box and Riser Segments

Note: h may be less than 6" when approved by the Engineer, but not for inlet segments at finish grade elevation.

Optional Construction Joints

Rebar Straight End Embedment for Top and Bottom Slabs

WALL REINFORCING SPLICE DETAILS
## GENERAL NOTES

1. For square or rectangular precast drainage structures, using either deformed or smooth WWR meeting the requirements of Specification Section 931, WWR shall be continuous around the box and lap spliced in accordance with Option 1 or 2 as shown in the Wall Reinforcing Splice Details.

2. Horizontal steel in the walls of rectangular structures shall be lap spliced in accordance with Option 1 or 2 as shown in the Wall Reinforcing Splice Details.

3. Welding of splices and laps is permitted. The requirements and restrictions placed on welding in AASHTO M259 shall apply.

4. Rebar straight end embedment of peripheral reinforcement may be used in lieu of ACI standard hooks for top and bottom slabs of 6" for vertical bars and 12" for horizontal bars. Wires smaller than W3.1 or D4.0 are permitted in the walls of ASTM C 478 round structure bottoms and round risers. The maximum spacing of 12" or three (3) times the wall thickness, with a maximum spacing of 18" for vertical bars and 12" for horizontal bars. Bar reinforcement shall show the minimum yield designation grade mark or increased by the squared ratio of increased steel area, but not to exceed 12:1. When a reduced area of reinforcement is provided, any maximum bar spacing shown must also be reduced as determined by the following equations, unless otherwise shown:

   - Max. Grade 40 Bar Spacing = Grade 60 Bar Spacing \times 0.74
   - Max. Deformed Welded Wire Spacing = Grade 60 Bar Spacing \times 0.86

   When an increased area of reinforcement is provided, then the maximum bar spacing may be increased by the square ratio of increased steel area, but not to exceed 12:1.

5. Fiber-reinforced concrete may be substituted for conventional steel reinforcement in accordance with the Structures Design Guidelines. Shop drawings corresponding to an approved fiber-reinforced concrete mix design must be submitted for approval to the State Drainage Engineer. The design strength of 65 ksi and deformed welded wire reinforcement will be recognized as having a design strength of 65 ksi and deformed welded wire reinforcement will be recognized as having a design strength of 70 ksi. The area of reinforcement required may be adjusted in accordance with the Equivalent Steel Area Table provided. For bars and spacings not given, the steel area required can be determined by the following equations:

   - Min. Steel Area Provided \leq Min. Steel Area Required \times \frac{A_{60 \times A_{60}}}{A_{65 \times A_{65}}}

   In no case will reinforcement with wires smaller than W3.1 or D4.0, or spacings greater than 8" be permitted. Bar reinforcement shall show the minimum yield designation grade mark or either the number 60 or one (1) grade mark line to be acceptable at the higher value. Maximum bar spacing shall not be greater than two (2) times the slab thickness with a maximum spacing of 12" or three (3) times the wall thickness, with a maximum spacing of 18" for vertical bars and 12" for horizontal bars. Wires smaller than W3.1 or D4.0 are permitted in the walls of ASTM C 478 round structure bottoms and round risers.

### EXAMPLE TABLE OF EQUIVALENT STEEL AREA

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>GRADE 60 REINFORCING BAR</th>
<th>EQUIVALENT GRADE 40 REINFORCING BAR</th>
<th>EQUIVALENT 65 KSI SMOOTH WELDED WIRE REINFORCEMENT</th>
<th>EQUIVALENT 75 KSI DEFORMED WELDED WIRE REINFORCEMENT</th>
<th>MIN. STEEL AREA (in²/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>#3 @ 60&quot; Cts.</td>
<td>0.20</td>
<td>3&quot; x 8-6/16 x 6</td>
<td>3&quot; x 5-5/16 x 4</td>
<td>0.1846</td>
</tr>
<tr>
<td></td>
<td>#3 @ 75&quot; Cts.</td>
<td></td>
<td>3&quot; x 10 x 12</td>
<td>3&quot; x 7-3/4 x 8</td>
<td>0.2215</td>
</tr>
<tr>
<td>B</td>
<td>#3 @ 55&quot; Cts.</td>
<td>0.24</td>
<td>3&quot; x 6-3/4 x 8</td>
<td>3&quot; x 4-3/8 x 6</td>
<td>0.257</td>
</tr>
<tr>
<td></td>
<td>#4 @ 70&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-11 x 12</td>
<td>3&quot; x 6-1/2 x 10</td>
<td>0.2889</td>
</tr>
<tr>
<td>Special 1</td>
<td>#3 @ 30&quot; Cts.</td>
<td>0.267</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.257</td>
</tr>
<tr>
<td></td>
<td>#4 @ 45&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.257</td>
</tr>
<tr>
<td>C</td>
<td>#3 @ 75&quot; Cts.</td>
<td>0.37</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.3171</td>
</tr>
<tr>
<td></td>
<td>#4 @ 65&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.3171</td>
</tr>
<tr>
<td>D</td>
<td>#4 @ 45&quot; Cts.</td>
<td>0.53</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.5453</td>
</tr>
<tr>
<td></td>
<td>#5 @ 70&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.5453</td>
</tr>
<tr>
<td>E</td>
<td>#5 @ 35&quot; Cts.</td>
<td>0.73</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.6257</td>
</tr>
<tr>
<td></td>
<td>#6 @ 55&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.6257</td>
</tr>
<tr>
<td>F</td>
<td>#6 @ 35&quot; Cts.</td>
<td>1.06</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.9096</td>
</tr>
<tr>
<td></td>
<td>#7 @ 45&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>0.9096</td>
</tr>
<tr>
<td>Special 2</td>
<td>#5 @ 55&quot; Cts.</td>
<td>1.24</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>1.0629</td>
</tr>
<tr>
<td></td>
<td>#6 @ 45&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>1.0629</td>
</tr>
<tr>
<td>G</td>
<td>#6 @ 35&quot; Cts.</td>
<td>1.46</td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>1.2514</td>
</tr>
<tr>
<td></td>
<td>#7 @ 50&quot; Cts.</td>
<td></td>
<td>3&quot; x 8-6 x 6.2</td>
<td>3&quot; x 6-7 x 6</td>
<td>1.2514</td>
</tr>
</tbody>
</table>
PICTORIAL VIEW

NOTE:
1. Submit Shop Drawings of corner openings for approval by the Engineer of Record.
2. $h_o$ may be less than 1'-0" when a minimum 1'-0" deep segment, 8" slab or curb inlet is provided above the corner opening.
3. For inlet segments at finish grade elevation substitute a #8 Bar for the top corner bar when 1'-0" $\leq h_o \leq$ 2'-0".

RECTANGULAR SEGMENT WITH PIPE OPENING AT CORNER

DESIGNER NOTE: Use only when round structures are not practical, engineer of record approval required.