Section for Manholes

TYPE I

WALL SECTION
For Curb Inlets Types 1, 2, 3, & 4

SECTION
For Curb Inlets Types 7 & 8

TYPE III

NOTES (FRAMES, AND COVERS)
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 (nontraffic type), 1984 roadway and Traffic Design Standards Index No. 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 2'-0" cover, unless the 2-piece cover is called for in the plans, except at outlets and manholes with sump bottoms use the 2-piece cover when the sump depth exceeds 2', 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.

WEIGHT OF CASTINGS

<table>
<thead>
<tr>
<th>Frame Type</th>
<th>2' Opening</th>
<th>3' Opening</th>
<th>2-Piece Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frame</td>
<td>Cover (Std.)</td>
<td>Frame</td>
</tr>
<tr>
<td>I</td>
<td>155 Lbs.</td>
<td>190 Lbs.</td>
<td>220 Lbs.</td>
</tr>
<tr>
<td>II</td>
<td>145 Lbs.</td>
<td>190 Lbs.</td>
<td>255 Lbs.</td>
</tr>
<tr>
<td>III</td>
<td>90 Lbs.</td>
<td>190 Lbs.</td>
<td>180 Lbs.</td>
</tr>
</tbody>
</table>
**EYEBOLT AND CHAIN REQUIREMENTS**

<table>
<thead>
<tr>
<th>Index</th>
<th>Type</th>
<th>Length Chain</th>
<th>Handling &amp; Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>217</td>
<td></td>
<td>4-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>218</td>
<td></td>
<td>3-8&quot;</td>
<td>Side Up Side &amp; Spin</td>
</tr>
<tr>
<td>219</td>
<td></td>
<td>4-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>220</td>
<td></td>
<td>4-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>221</td>
<td></td>
<td>4-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>230</td>
<td></td>
<td>5-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>223</td>
<td></td>
<td>2-6&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>224</td>
<td></td>
<td>4-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
</tbody>
</table>

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

- Bevel Cut Upper Shrub To Match Forming For Apron Face, Coping Or Plugging Of Upper Shrub Not Required (Provide Base Material A Side Shrub Opening Should Be Removed To Permit Covering Of Opening With Structural Course Material).
- Prior To Placing Base Material, Remove Riprap, Cement PVC Clip On Lower Shrub And Place Compacted Fill In Entrance.
- Riprap Entrance Top Of Subgrade
- 4" PVC Pipe, 45° Lateral And Skabs
- Grout Seal or Integral Coat

**SECTION**

- **NOTES (TOPS)**
  - Manhole top Type 7: shall be of Class II concrete. Concrete as specified in ASTM C 476 may be used for precast units as specified in General Note No. 3.
  - Manhole top Type 7 shall be of cast-in-place or precast construction. The option for precast tops and in lieu of shear keys, frame and side opening shall be omitted when top is used in a junction box.
  - Manhole bottom Type 8 may be of cast-in-place or precast concrete construction or brick construction. For concrete construction, the concrete reinforcement shall be required as the supporting wall. An eccentric core may be used.

**NOTE**

When Alternate "C" grate is specified, the chain, bolt, nuts, washer and cold shu are galvanized in accordance with Section 425 of the Standard Specifications.

**COST OF EYEBOLT AND CHAIN TO BE INCLUDED IN THE CONTRACT UNIT PRICE FOR INLETS.**

**TEMPORARY DRAINS FOR SUBGRADE AND BASE**
1. One or more types of joints may be used in a single structure, except brick wall structure. Brick wall construction is permitted on circular units only.

2. All grouted joints are to have a maximum thickness of 1".

3. Keyways are to be a minimum of 1/2" deep.

4. Joint dowels are to be 4/4 bars, 12" long with a minimum of 6 bars per joint approximately evenly spaced for circular structures or at maximum 12" spacing for rectangular structures. Bars may be either straight or deformed dowels in accordance with Specification Section 416, or placed approximately 6" into fresh concrete leaving the remainder to extend into the secondary cast. Welded wire fabric may be substituted for the dowel bar in accordance with the equivalent steel bars table on Sheet 4.

5. Minimum cover on dowel reinforcing bars shall be 2" to outside face of structure.

6. Joints between wall segments and between wall segments and top or bottom slabs may be sealed either by preferred plastic gasket material using the procedures given in Section 430-7.31 of the Specifications or by non-shrink joint grout, in accordance with Section 934 of the Specifications.

7. Approved joint inserts may be used in lieu of dowel embedment.

**OPTIONAL CONSTRUCTION JOINTS**

**SEPARATE RISER SEGMENTS WITH CONSTRUCTION JOINTS OTHER THAN DOWEL OPTION**

**SEGMENTS FOR SLAB TO WALL DOWEL CONSTRUCTION JOINTS OR MONOLITHICALLY CAST SEGMENTS**

**COMPARATIVE SIDE VIEWS**

**MINIMUM DIMENSIONS FOR BOX AND RISER SEGMENTS**

**REBAR STRAIGHT END EMBEDMENT FOR TOP AND BOTTOM SLABS**

**WALL REINFORCING SPlice DETAILS**
### EQUIVALENT STEEL AREA TABLE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>GRADE 60 REINFORCING BAR</th>
<th>EQUIVALENT GRADE 40 REINFORCING BAR</th>
<th>EQUIVALENT 60 KSI SMOOTH REINFORCEMENT</th>
<th>EQUIVALENT 70 KSI DEFORMED REINFORCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steel Area (in²)</td>
<td>Steel Size &amp; Spacing</td>
<td>Min. Steel Area (in²)</td>
<td>Min. Steel Area (in²)</td>
</tr>
<tr>
<td>A</td>
<td>0.20</td>
<td>#1 666 Chrs.</td>
<td>0.30</td>
<td>0.1846</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2 14 Chrs.</td>
<td></td>
<td>0.1714</td>
</tr>
<tr>
<td>B</td>
<td>0.24</td>
<td>#1 656 Chrs.</td>
<td>0.36</td>
<td>0.2251</td>
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<tr>
<td></td>
<td></td>
<td>#2 10 Chrs.</td>
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<td>0.2057</td>
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<tr>
<td>Special</td>
<td>0.268</td>
<td>#1 6 Chrs.</td>
<td>0.40</td>
<td>0.2465</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2 9 Chrs.</td>
<td></td>
<td>0.2289</td>
</tr>
<tr>
<td>C</td>
<td>0.37</td>
<td>#1 366 Chrs.</td>
<td>0.555</td>
<td>0.3145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2 4 Chrs.</td>
<td></td>
<td>0.3171</td>
</tr>
<tr>
<td>D</td>
<td>0.53</td>
<td>#1 466 Chrs.</td>
<td>0.795</td>
<td>0.4892</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2 7 Chrs.</td>
<td></td>
<td>0.4543</td>
</tr>
<tr>
<td>E</td>
<td>0.73</td>
<td>#1 356 Chrs.</td>
<td>1.095</td>
<td>0.6738</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2 5 Chrs.</td>
<td></td>
<td>0.6257</td>
</tr>
<tr>
<td>F</td>
<td>1.06</td>
<td>#1 366 Chrs.</td>
<td>1.59</td>
<td>0.9785</td>
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<tr>
<td></td>
<td></td>
<td>#2 4 Chrs.</td>
<td></td>
<td>0.9086</td>
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<tr>
<td>Special</td>
<td>1.24</td>
<td>#1 3 Chrs.</td>
<td>1.86</td>
<td>1.1446</td>
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<tr>
<td></td>
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<td>#2 8 Chrs.</td>
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<tr>
<td>G</td>
<td>1.46</td>
<td>#3 9 Chrs.</td>
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<td>1.3477</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#4 6 Chrs.</td>
<td></td>
<td>1.2914</td>
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</tbody>
</table>

### NOTES FOR PRECAST OPTIONS & EQUIVALENT REINFORCEMENT SUBSTITUTION

1. Details for optional precast lens construction up to depths of 15° are shown on the lens indexes.

2. When precast units are used in conjunction with Art. "A" Structure Bottoms, Index No. 200, the interior dimensions of an art. "B" Bottom can be adjusted to reflect these lens interior dimensions.

3. Concrete which meets the requirements of ASTM C478 or Class IV must be used for precast structures constructed with 6" wall or slab thickness.

4. Reinforcement can be either deformed bar reinforcement or welded wire reinforcement. Bar reinforcement other than 60 ksi may be used, however only two grades are recognized: Grade 40 and Grade 60. Smooth 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 sparcings not given, the steel area required can be determined by the following equations:

   \[
   \text{Grade 40 Steel Area} = A_{40} = \frac{60}{60} \times A_{60}
   \]

   \[
   \text{Smooth Welded Wire Reinforcement Steel Area} = A_{65} = \frac{60}{60} \times A_{60}
   \]

   \[
   \text{Deformed Welded Wire Reinforcement Steel Area} = A_{70} = \frac{60}{60} \times A_{60}
   \]

### GENERAL NOTES

1. For square or rectangular precast drainage structures, either deformed or smooth welded wire reinforcement may be used provided:
   a) The smooth welded wire reinforcement shall comply with ASTM A490 and deformed welded wire reinforcement shall comply with ASTM A497.
   b) Width and length of the unit is four times the spacing of the cross wires.
   c) Wire reinforcement shall be continuous around the box, and laped in accordance with Option 1, 2 or 3 as shown in the Wall Reinforcement Details.

2. Horizontal steel in the walls of rectangular structures shall be lap spliced in accordance with Option 1, 2 or 3 as shown in the Wall Reinforcement Details.

3. Welding of splices and laps is permitted. The requirements and restrictions placed on welding in ASTM A500 shall apply.

4. Rebar straight and embedment of peripheral reinforcement may be used in lieu of ASTM standard hooks for top and bottom slabs except when hooks are specifically called for in the plans or standard drawings.

5. Concrete as specified in ASTM C478/44000 psi may be used in lieu of Class II concrete in precast items manufactured in plants which meet the requirements of Section 440 of the Specifications.

6. Precast openings for pipe shall follow the pipe (3D plus 6" to 8" tolerance). Mortar used to seal the pipe into the opening shall at such a mix that shrinkage will not cause leakage into or out of the structure. Dry-pack mortar may be used in lieu of brick and mortar construction to seal openings less than 256" wide.

7. For all purposes, the height used to determine if a drainage structure is less than or greater than 20 feet shall be computed using (a) the elevation of the top of the menseline, (b) the grade elevation or the theoretical gutter grade elevation of an inlet, or (c) the outside top elevation of a junction box less the pipe elevation of the lowest pipe or to top of slope floor.

### 2010 FDOT Design Standards SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS
Top Corner Bar
(See Note 2 Below)

Provide 4 Extra #4 Bars
(Continuous Around Corner
Evenly Spaced). Tie To The
Outside 0.5 Vertical Wall Plane.
Swell Construction Joint Or
Monolithically Wall & Slabs

h ≤ 2 1/4” (See Note Below)

DESIGNER NOTE: Rectangular structures with corner openings are not recommended.
Use round structure bottoms when possible.

PICTORIAL VIEW

NOTE: 1. h≤ may be less than 1 1/4” when approved by the Engineer or when a minimum
1 1/4” deep segment, 8" slab or curb inlet is provided above the corner opening.

2. For inlet segments at finish grade elevation substitute a #8 Bar for the top
corner bar when h≤ is less than 2 1/4”.

3. Rectangular structures with corner openings must be approved by the Engineer.

RECTANGULAR SEGMENT WITH PIPE OPENING AT CORNER

PLAN VIEW FOR SKEWS ≤ 45°
(Not Centered)

PLAN VIEW FOR SKEWS > 45°
(Not Centered)

SECTION AA
(Pipes Not Shown For Clarity)

DETAILS FOR SKEWED PIPES IN RECTANGULAR STRUCTURES