2008 FDOT Design Standards
Revision 207
07/01/05
Sheet No. 207
Index No. 101

NOTE: When alternate "G" grate is specified, the chain, bolt, nuts, washer and cold shutoff shall be galvanized in accordance with Section 426 of the Florida Department of Transportation Specifications.

Cost of eyebolt and chain to be included in the contract unit price for inlets.

### EYEBOLT AND CHAIN REQUIREMENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Inlet Type</th>
<th>Bolt Size</th>
<th>Chain Size</th>
<th>Handling &amp; Remarks</th>
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<tbody>
<tr>
<td>2004</td>
<td>1-2</td>
<td>4-0&quot;</td>
<td>10-0&quot;</td>
<td>Side &amp; Spin</td>
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<td>5-6</td>
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<td>2008</td>
<td>9-10</td>
<td>4-0&quot;</td>
<td>10-0&quot;</td>
<td>Side &amp; Spin</td>
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</tbody>
</table>

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

- Bevel Cut Upper Stud To Match Forming For Apron Face: Capping Or Plugging Of Upper Stud Not Required
- Required Flexible Base Material At Stud Starting Shall Be Removed To Permit Covering Of Opening With Structural Concrete Material

**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

**SECTION 7**

**BRICK OR CONCRETE MANHOLE TOPS**

**NOTES (TOPS)**

1. Manhole tops Type 7 slabs shall be of Class I or II concrete. Concrete as specified in ASTM C476 may be used for precast units see General Note No. 3.

2. Manhole tops Type 7 slabs may be of cast-in-place or precut construction. The optional key is for precut types and in lieu of dowels. Frame and side openings are to be formed when top is used over a junction box.

3. Manhole tops Type 8 may be of cast-in-place or precut concrete construction or brick construction. For concrete construction, the concrete and steel reinforcement shall be the same as the supporting vault. An eccentric cone may be used.

4. Manhole tops shall be locked by structures by optional construction joints as shown on Sheet 3 of 4.

5. Frames can be adjusted a minimum 12" height with brick or precast ASTM C476 grade rings.

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

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

**DESIGN NOTES**

1. Manhole tops Type 8 shall be specified in the plans if depths shown above can be maintained.

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

**ALL PIPE TYPES DRAINAGE STRUCTURE INVERT**

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

**TEMPORARY DRAINS FOR SUBGRADE AND BASE**

**MASONRY WALL DESCRIPTION**

- Mortar Per Specifications Section 425
- Brick Masonry Or Any Class Concrete Required For Gaps Greater Than 25"
TOP SLABS TO WALLS

WALL JOINTS

BOTTOM SLABS TO WALLS

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 3/8" deep.

4. Joint dowels are to be #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 Adhesive Bonded Dowels in accordance with Specification Section 426, 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 steelworks table on Sheet 4.

5. Minimum cover on dowel reinforcing bars is 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 preformed plastic gasket material using the procedures given in Section 430-7.8.1 of the Specifications or by non-shrink grout, in accordance with Section 934 of the Specifications.

7. Approved product 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

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

COMPARATIVE SIDE VIEWS

MINIMUM DIMENSIONS FOR BOX AND RISER SEGMENTS

REBAR STRAIGHT END EMBEDMENT FOR TOP AND BOTTOM SLABS

WALL REINFORCING SPLICE DETAILS

SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS
### EQUIVALENT STEEL AREA TABLE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>GRADE 40 REINFORCING BAR</th>
<th>EQUIVALENT GRADE 40 REINFORCING BAR</th>
<th>EQUIVALENT 65 KSI SMOOTH WELDED WIRE REINFORCEMENT</th>
<th>EQUIVALENT 70 KSI DETAILED WELDED WIRE REINFORCEMENT</th>
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<tbody>
<tr>
<td></td>
<td>Bar Size &amp; Spacing</td>
<td>Steel Area (in²/ft)</td>
<td>Bar Size &amp; Spacing</td>
<td>Steel Area (in²/ft)</td>
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### NOTES FOR PRECAST OPTIONS & WELDED WIRE REINFORCEMENT SUBSTITUTION FOR BAR REINFORCEMENT

1. Details for optional precast joint construction up to depth of 15' are shown on the joint index.
2. When precast units are used in conjunction with Art. "B" Structure Bottoms, Index No. 200, the interior dimensions of an Art. "B" Bottom shall be adjusted to reflect these joint interior dimensions.
3. Concrete which meets the requirements of ASTM C476 or Class IV must be used for precast structures constructed with 6" or more slab thickness.
4. Reinforcement may be either deformed bar reinforcement or welded wire reinforcement. Bar reinforcement other than Grade 40 or Grade 60 shall be acceptable at the higher value.
5. Maximum bar spacing shall be greater than 12' times the slab thickness with a maximum spacing of 16" for vertical bars and 12" for horizontal bars.

### 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 A495 and deformed welded wire reinforcement shall comply with ASTM A497.
   b) With length and width of the unit is four times the spacing of the cross wires.
   c) Wire reinforcement shall be continuous around the box, and lapped in accordance with Option 1 or 3 as shown in the Wall Reinforcing Splice Details.
2. Horizontal steel in the walls of rectangular structures shall be top and placed in accordance with Option 1, 2, or 3 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. Retarders and retardation of premix reinforcement may be used in lieu of 421 standard hooks for top and bottom slabs except where hooks are specifically called for in the plans or standard drawings.
5. Concrete as specified in ASTM C476, (4000 psi) may be used in lieu of Class II concrete in precast items manufactured in plants which meet the requirements of Section 449 of the Specifications.
6. Precast opening for pipe shall be the pipe OD plus 6" (1.5 - 2" tolerance). Mortar used to seal the pipe into the opening will be of such a mix that shrinkage will 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 298" wide.
7. For pay item purposes, the weight used to determine if a drainage structure is less than or greater than 10 feet shall be computed using:
   a) The elevation of the top of the embankment line.
   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 flow elevation of the lowest pipe or its top of vault floor.

### SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS
Pictorial View

1. If $h_y$ may be less than 1-0" when approved by the Engineer or when a minimum 1-0" deep segment, 8" slab or curb inlet is provided above the corner opening.

2. For inlet segments at high grade elevation substitute a #8 Bar for the top corner bar when $h_y$ is less than 2-0".

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

Rectangular Segment with Pipe Opening at Corner

Plan View for Skews $\leq 45^\circ$
(Not Centered)

Plan View for Skews $> 45^\circ$
(Not Centered)

Details for Skewed Pipes in Rectangular Structures

Supplementary Details for Manholes and Inlets

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