DESIGN STANDARDS
FOR DESIGN, CONSTRUCTION, MAINTENANCE AND UTILITY OPERATIONS ON THE STATE HIGHWAY SYSTEM
2008
TOPIC NO. 625-010-003
ENGLISH UNITS
NOTICE
These Design Standards are intended to support the various engineering obligations for designing, constructing, inspecting, maintaining and monitoring the highways, roads and streets on the State Highway System. They are prepared to encourage uniform application of designs and standard details in the preparation of project plans. These Standards may be adopted by other authorities for use on projects under their jurisdiction.

It is the responsibility of the Design Engineer of Record using these Standards to determine the fitness for a particular use of each standard in the design of a project. The inappropriate use of and adherence to these standards does not exempt the engineer from the professional responsibility of developing an appropriate design.

PATENTED DEVICES, MATERIALS AND PROCESSES
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The pdf version of these standards can be accessed on the following website:
http://www.dot.state.fl.us/rddesign/DesignStandards/Standards.htm

Copies of this document can be procured by contacting the following:
FLORIDA DEPARTMENT OF TRANSPORTATION
MAPS & PUBLICATION SALES
MAIL STATION 12
605 SUWANNEE STREET
TALLAHASSEE, FLORIDA 32399-0450
Phone (850) 414-4050
Fax Number (850) 414-8036
http://www.dot.state.fl.us/mapsandpublications/
CERTIFICATION STATEMENT
I hereby certify that this Design Standard Book was prepared under my responsible charge, compiled
from designs prepared, examined, adopted and implemented by the Florida Department of Transportation
in accordance with established procedures, and as approved by the Federal Highway Administration.

As To Structures
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17748
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As To Planning
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17900

As To ITS
Design Standards Nos.
18100-18305

As To Landscape Architecture
Design Standard No.
544

Manager, Traffic Data Section
Transportation Statistics Office
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Deputy State Traffic
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State Roadway Design Engineer
David C. O'Hagan
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State Transportation
Landscape Architect
Jeff H. Caster
LA0001592
A location reference notation added to the following indexes-210, 211, 212, 213, 214

BALES AND BALE

Under "WILDFLOWER SEEDING RATES" chart add the following footnote: Wildflower seeding rates are for restoring impacted wildflower areas.

Delete the "GRASS SEEDING RATES" table.

Above the "GENERAL NOTE" insert the following: "NOTE: All turf establishment shall be performed meeting the requirements of Section 570A of the Standard Specifications."

On the left side of "SECTION BB" delete the notation "Conventional Grassing" and insert "Turf".

"TREATMENT I", add with dimension of the sod strip as "3'-8" and the note "See Pattern Detail, TREATMENT II" and "Omission Option II", delete notations "Sod And Mulch" and insert "Turf".

"GENERAL NOTES", note "I B", delete the text of the note and substitute the following: "For the sod establishment of turf and topsoil and for back fill this material under Treatment I is to be included in the contract unit price for Performance Turf, SY." Note "2 D", delete the second sentence and insert the following: "Sod and other materials for Turf establishment shall be paid for as Performance Turf, SY."
<table>
<thead>
<tr>
<th>Index Number</th>
<th>Sheet Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>1, 2</td>
<td>Notations referencing &quot;covers&quot; revised to be &quot;grates&quot;.</td>
</tr>
<tr>
<td>216</td>
<td>2 of 3</td>
<td>SECTION 8B): Notation revised to &quot;The cost of the 4&quot; thick slab and the 6&quot;x6&quot; W2.5xW2.5 Min. Wobbled Wire Reinforcement in the middle of the slab to be included in the cost of the slab.</td>
</tr>
<tr>
<td>230</td>
<td>1 of 2</td>
<td>GENERAL NOTES: Note 5: deleted second sentence and substitute &quot;Sodding to be paid for under Contract unit price for Performance Turf, SY&quot;.</td>
</tr>
<tr>
<td>231</td>
<td>2 of 3</td>
<td>GENERAL NOTES: Note 6: delete &quot;Sodding and substitute &quot;Performance Turf&quot;.</td>
</tr>
<tr>
<td>232</td>
<td>2 of 6</td>
<td>GENERAL NOTES: delete text of Note 8 and substitute &quot;Sodding to be used around driveways not located in paved areas and paid for under contract unit price for Performance Turf, SY&quot;.</td>
</tr>
<tr>
<td>234</td>
<td>1 of 1</td>
<td>METHOD OF PAYMENT — Note 2: delete &quot;seeding and mulching disturbed grosses&quot; and substitute &quot;restoration of disturbed turf&quot;. Note 4: delete second occurrence of &quot;Sodding&quot; and substitute &quot;Performance Turf&quot;.</td>
</tr>
</tbody>
</table>
| 235          | 1 of 2      | GENERAL NOTES: Note 4: added "Exposed edges and corners shall be finished with a $2/$6 radius."
| 236          | 1 of 2      | GENERAL NOTES: Note 7: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 237          | 2 of 6      | GENERAL NOTES: Note 7: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 255          | 1 of 2      | GENERAL NOTES: Note 7: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 261          | 3 of 3      | GENERAL NOTES: Note 8: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 264          | 1 of 1      | GENERAL NOTES: In Note 6, delete the second sentence. |
| 266          | 1 of 1      | GENERAL NOTES: Note 5: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 270          | 1 of 1      | GENERAL NOTES: Note 5: second sentence: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 272          | 6 of 6      | GENERAL NOTES: Note 10: second sentence: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 273          | 6 of 6      | GENERAL NOTES: Note 15: second sentence: delete second occurrence of "Sodding" and substitute "Performance Turf". |
| 280          | 3 & 4       | Sheets 3 and 4 removed and details moved to Index 289 Sheets 6 & 7. |
| 281          | 2 of 2      | GENERAL NOTES: Note 2: revised and Note 10: added. |
| 285          | 2 of 2      | GENERAL NOTES: Notes 1: last sentence: delete "Sodding" and substitute "Performance Turf". |
| 286          | 2 of 2      | GENERAL NOTES: Note 5: revised. |
| 287          | 2 of 3      | GRANITE SUBDRAINAGE: notation Type SP (Traffic C) deleted and "Type SP Asphalt Concrete" replaced. |
| 289          | Sheets 1    | New Index added to replace Index 290: Concrete Box Culvert Details (LRFD). |
| 290          | thru 8      | Index deleted. |
| 292          | thru 14     | New Index Added: "SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS". Deleted references to Index 290 and changed "GLPRT" to "[Index No. 290." Added "or modified Class III Precaustic for slightly aggressive environments.

**Notes:**
- **Sheet 2 of 3:** Revised spacing of "Bars 0".
- **Sheet 2 of 2:** Added "Exposed edges and corners shall be finished with a $2/$6 radius."
<table>
<thead>
<tr>
<th>Index Number</th>
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</tr>
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</table>
| 400          | Sheet 1 of 24| "GENERAL NOTES": Note 6, add the following text as paragraph 5: "When an end treatment is attached to guardrail with Pedestrian Safety Treatment, only and treatment systems with timber posts are to be used."
| 402          | Sheet 23 of 24| Details are added to show the “Traffic Railing Barrier (Thru-Beam & Retractable)” to be installed on the outside of the “Guardrail Transitions for Existing Bridge Traffic Railing Replacements.” |
| 403          | Sheet 24 of 24| New Index: "GUARDRAIL TRANSITIONS FOR EXISTING BRIDGE TRAFFIC RAILING REPLACEMENTS". |
| 410          | Sheet 1 of 24| Changed pay item notes to agree with current pay item descriptions, either Median Barrier Concrete or Wall Shoulder Concrete Barrier Wall. |
| 411          | Sheet 1 thru 10 | "GENERAL NOTES": Add note 10 as follows: "40. Concrete barrier wall with New Jersey Safety Shape may not be substituted for the Standard F Shape Barrier." |
| 414          | Sheets 1 thru 15 | New Index: "VENT PROTECTION BARRIER". |
| 415          | Sheet 1 of 10 | "TEMPORARY CONCRETE BARRIER", "DEFLECTION SPACE REQUIREMENTS" are added as follows:

When Shielding Above Ground Hazards:
- **Design Speed**: Deflection Space
  - 45 mph or Less: 2’
  - 50 mph and Greater: 3’

When Shielding Dropoffs:
- **Design Speed**: Deflection Space
  - 45 mph or Less: 2’
  - 50 mph and Greater: 3’

When used as a Temporary Median Barrier separating opposing traffic lanes:
- **Design Speed**: Deflection Space
  - 45 mph or Less: 2’
  - 50 mph and Greater: 3’

These deflection space requirements also apply to approved options to the 415 barrier identified in General Note 1 of Sheet 1.

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**Index Number** | **Sheet Number** | **Description** |
|-----------------|-----------------|-----------------|
| 400             | Sheet 1 of 24   | "GENERAL NOTES": Note 6, add the following text as paragraph 5: "When an end treatment is attached to guardrail with Pedestrian Safety Treatment, only and treatment systems with timber posts are to be used."
| 402             | Sheet 23 of 24  | Details are added to show the “Traffic Railing Barrier (Thru-Beam & Retractable)” to be installed on the outside of the “Guardrail Transitions for Existing Bridge Traffic Railing Replacements.” |
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These deflection space requirements also apply to approved options to the 415 barrier identified in General Note 1 of Sheet 1.
### Sheet 1 of 3

- **Moved (#) & (##) notes to Traffic Rolling Notes and Detali "A" to Sheet 2, and Detali "B"**: Section thru Recessed V-Groove and Estimated Quantities block to Sheet 3. Added Trailing End Guardrail details to Plan and Elevation views. V-Groove Note and Reflector Markers Note to notes and Reflector Marker Table.

### Sheet 2 of 3

- **New Sheet from Sheet 1. Added W-Beam and Thrie-Beam Guardrail Trailing End Bolt dimensions to Detail "A" and View B-B and View C-C. Note instructions to Designer note. Changed Bars 5V & 5S spacing on View "C-C" and Clear to Cover all occurrences. Moved Alternate Reinforcing Steel (Welded Wire Reinforcement) Details and Conventional Reinforcing Steel-Bending Diagrams to Sheet 3 and changed WWR to WWF and Welded Wire Fabric to Welded Wire Reinforcement all occurrences and Clear to cover.**

### Sheet 3 of 3

- **New Sheet Added.**

### Sheet 1 of 3

- **Moved (#) & (##) notes to Traffic Rolling Notes and View C-C to Sheet 2. Added Trailing End Guardrail details to Plan and Elevation views. V-Groove note, Reflector Marker Note to notes, Reflector Marker Table and Retaining Wall references in various notes.**

### Sheet 2 of 3

- **Added W-Beam and Thrie-Beam Guardrail Trailing End Bolt details to View B-B and View C-C and Bars 5S, 5T & 5X note to Instructions to Designer note. Changed Bars 5T & 5X spacing on View C-C, and Clear to Cover all occurrences. Moved and Detail "A", Section thru Recessed V-Groove and Estimated Quantities block, Conventional Reinforcing Steel-Bending Diagrams to Sheet 3.**

### Sheet 3 of 3

- **New Sheet Added.**

### Sheet 1 of 3

- **Moved (#) & (##) notes to Traffic Rolling Notes, and Rolling End Details to Sheet 2. Added Trailing End Guardrail details to Plan and Elevation views. V-Groove note, Reflector Marker Note to notes, Reflector Marker Table and Retaining Wall references in various notes.**

### Sheet 2 of 3

- **Added W-Beam and Thrie-Beam Guardrail Trailing End Bolt dimensions to View B-B and View C-C and Bars 5S, 5T & 5X note to Instructions to Designer note. Moved Detail "A", Section thru Recessed V-Groove, Estimated Quantities block, and Conventional Reinforcing Steel-Bending Diagrams to Sheet 3. Changed Bars 5T & 5X spacing on Rolling End Detail, and Clear to Cover all occurrences.**

### Sheet 3 of 3

- **New Sheet Added.**

### Sheet 1 of 7

- **Added Reflective Railing Markers table and notes.**

### Sheet 1 of 7

- **Moved (#) & (##) notes to Traffic Rolling Notes, and View C-C to Sheet 2. Added Trailing End Guardrail details to Plan and Elevation views. V-Groove note, Reflector Marker Note to notes, Reflector Marker Table, and Retaining Wall references in various notes. Changed "SUPER-ELEVATED BRIDGES" in notes.**

### Sheet 2 of 3

- **Added W-Beam and Thrie-Beam Guardrail Trailing End Bolt dimensions to Detail "A", View B-B and View C-C, and Bars 5V, 5S & 5X note to Instructions to Designer note. Changed Bars 5V & 5S spacing on Detail "A" and View C-C, and Clear to Cover all occurrences.**

### Sheet 3 of 3

- **New Sheet Added.**

### Sheet 3 of 3

- **New Sheet Added.**

### Sheet 1 of 3

- **New Index - "OPTIONAL CRASH CUSHION DETAILS".**

### Sheet 1 of 1

- **Sheet 1 and 2**: "END VIEW" drawing delete the dimensions "O" Clear" and substitute "W/2" Cover Width." "GENERAL NOTES" Note 2. Add the following paragraph on paragraph 3: "When longitudinal reinforcing bars are encountered in the stem of existing barrier, shift the dowels to clear, maintaining the W/2 Clear Minimum to the face of the Opaque Visual Barrier."
<table>
<thead>
<tr>
<th>Index Number</th>
<th>Sheet Number</th>
<th>Description</th>
<th>Index Number</th>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEX 600 SERIES - NOTE</td>
<td>This correction applies to multiple Indexes as listed below. Under &quot;GENERAL NOTES&quot;, delete the note. All vehicles, equipment, workers (except flaggers) and their activities are restricted to one side of the roadway (or similar wording). This note appears as Note 1 on Indexes 602, 604, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622 and 623. It appears as Note 2 on Indexes 603, 605, 606, 613 and 655, and as Note 4 on Index 670.</td>
<td></td>
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</tr>
<tr>
<td>600</td>
<td>Sheet 1 of 1</td>
<td>Added Table 1.</td>
<td>850</td>
<td>Sheet 1 of 5</td>
<td>Added ADA Handrail notes; ALTERNATE DESIGN testing criteria &amp; RAILING MEMBER DIMENSIONS Table updated DESIGN SPECIFICATIONS note, deleted Elevation &amp; Typical Sections. Changed APPLICABILITY NOTE to DESIGN. Added permission for cutting of reinforcing steel for drilled hole installation in ANCHOR BOLT note.</td>
</tr>
<tr>
<td>Sheet 1 of 1</td>
<td>Changed &quot;Welded Wire Fabric&quot; &amp; &quot;WRF&quot; to &quot;Welded Wire Reinforcement&quot; &amp; &quot;WWR&quot;.</td>
<td>Sheet 1 of 4</td>
<td>Added tack welding to &quot;NOTE&quot;, and permitted cutting of reinforcing by drilled holes for anchor bolt installation in DETAIL. &quot;AT&quot; Add &quot;except that lengths less than 0.6 mm need only be continuous over 2 points&quot; to RAP, SPN2, SPN3 note.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 2 of 2</td>
<td>Changed DIMENSION TABLE, updated DESIGN SPECIFICATIONS note, deleted Elevation &amp; Typical Sections. Note for cutting of reinforcing steel for drilled hole installation in ANCHOR BOLT note.</td>
<td>Sheet 5 of 5</td>
<td>New Index Added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 3 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 4 of 5</td>
<td>New Sheet Added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 5 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 1 of 5</td>
<td>New Sheet Added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 2 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 4 of 5</td>
<td>Fixed embedment of joint sleeve in DETAIL. &quot;1&quot; and Set Screw note in DETAIL. &quot;C&quot; Added DETAIL. &quot;B&quot; &amp; SECTION &quot;B&quot; &amp; &quot;C&quot;-Moved ANCHOR BOLT TABLE &amp; DETAIL. &quot;A&quot; to Sheet 5, RAILING MEMBER DIMENSIONS Table to Sheet 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 5 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 1 of 5</td>
<td>Added DESIGN SPECIFICATIONS note; ALTERNATE DESIGN testing criteria, COATINGS note &amp; RAILING MEMBER DIMENSIONS TABLE, deleted Elevation &amp; Typical Sections, and Revised Round Tube post and railupon Changed PIPE TO PIPE &amp; POSTS notes Added permission for cutting of reinforcing steel for drilled hole installation in ANCHOR BOLT note.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 2 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 3 of 5</td>
<td>New Sheet Added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 4 of 5</td>
<td>New Sheet Added</td>
<td>Sheet 5 of 5</td>
<td>New Sheet Added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 1 thru 5</td>
<td>New Index Added - STEEL PIPE GUARDRAIL</td>
<td>Sheet 1 of 2</td>
<td>Added FOUNDATION note. Deleted the construction specifications from DESIGN SPECIFICATIONS notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 1 of 1</td>
<td>&quot;TYPICAL PANEL ELEVATION&quot; &quot;NOTE:&quot; Changed &quot;Smooth Welded Wire Fabric&quot; to &quot;Smooth or Deformed Welded Wire Reinforcement&quot; in TYPICAL PANEL ELEVATION.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 2 of 4</td>
<td>Added &quot;Formatted&quot; to PLAN view Back Face Panel Texture description note (x).</td>
<td>Sheet 2 of 4</td>
<td>Added &quot;Formatted&quot; to DETAIL. Back Face Panel Texture description Changed &quot;Smooth Welded Wire Fabric&quot; to &quot;Smooth or Deformed Welded Wire Reinforcement&quot; in TYPICAL PANEL ELEVATION.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet 4 of 4</td>
<td>Added &quot;Formatted&quot; to TYPICAL FORMING DETAIL. Back Face Panel Texture description.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Index Number</th>
<th>Sheet Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.205</td>
<td>Sheet 6 of 7</td>
<td>&quot;NOTES&quot;: Beneath Note 4, delete the address for State Contracting and Engineering, Corp., and substitute the following: &quot;State Contracting and Engineering Corp., 3800 North 29th Avenue, Hollywood, FL 33020.&quot;</td>
</tr>
<tr>
<td>5.220</td>
<td>Sheet 1 of 5</td>
<td>Moved &quot;TRAFFIC RAILING/SOUND BARRIER NOTES&quot; to Sheet 2 of 5. Added &quot;INSTRUCTIONS TO DESIGNER&quot; note and Five Hose Access Hole.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 5</td>
<td>New Sheet Added</td>
</tr>
<tr>
<td></td>
<td>Sheet 3 of 5</td>
<td>Moved Section thru Access V=Groove To Farm Letters and Figures details to Sheet 2. Moved Detail &quot;A&quot; &amp; Notes and Section C-C to Sheet 5.</td>
</tr>
<tr>
<td></td>
<td>Sheet 4 of 5</td>
<td>Moved HEADING / ENGINEERING DIAGRAM, ESTIMATED TRAFFIC RAILING / SOUND BARRIER VARIOUS and DETAIL &quot;W&quot; to Sheet 2.</td>
</tr>
<tr>
<td></td>
<td>Sheet 5 of 5</td>
<td>New Sheet Added</td>
</tr>
<tr>
<td>5.300</td>
<td>Sheet 1 of 10</td>
<td>Added CONSTRUCTION NOTE 16. Moved Typical Wall Sections to Sheet 2.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 19</td>
<td>New sheet added</td>
</tr>
<tr>
<td></td>
<td>Sheet 3 of 19</td>
<td>Added variable offset to back of panel in SECTION B-8 and &quot;Smooth or Textured Face of Panel&quot; label to SECTION 6-4 &amp; 6-4. Added &quot;Leveling&quot; to &quot;Buildup&quot; in Section 6-4, 1'-0&quot; to 1'-0&quot; Min. in Dim B equation.</td>
</tr>
<tr>
<td></td>
<td>Sheet 4 of 19</td>
<td>Added &quot;Min. Match Precast Panel&quot; to 6&quot; dimensional at back of panel. Changed 1'-0&quot; to 1'-0&quot; Min. in Dim B equation, &quot;Welded Wire Fabric&quot; to &quot;Welded Wire Reinforcement&quot;. Deleted chamfer on bottom face of C.I.P. Coping Ensurance in SECTION C-C.</td>
</tr>
<tr>
<td></td>
<td>Sheet 5 of 19</td>
<td>Changed &quot;Leveling&quot; to &quot;Buildup&quot; in PARTIAL ELEVATION VIEW, Note 8, JUNCTION SLAB NOTE 2, Expansion Joint annotation in PLAN VIEW, Height of Traffic Railing in ELEVATION VIEW, Bars 6C to 5G, Bars &quot;6A &amp; 8&quot; sp. to &quot;5A &amp; 1'-0&quot; sp., and referenced sheet numbers.</td>
</tr>
<tr>
<td></td>
<td>Sheet 6 of 19</td>
<td>Added &quot;Min. to Precast Coping width, variable offset to back of panel, &quot;Smooth or Textured Face of Panel&quot; in TYPICAL SECTION, and &quot;Flange&quot; F-Shape Traffic Railing.&quot; Changed EST QUANTITIES. Bars 6C to 5C, Bars &quot;6A &amp; 8&quot; sp. to &quot;5A &amp; 1'-0&quot; sp.&quot; and Sheet No. 6 to 19. Changed &quot;Leveling&quot; to &quot;Buildup&quot; in TYPICAL SECTION and Estimated Quantity for Concrete (C.I.P. Section Slab). Deleted 45 degree Chamfer to Junction Slab.</td>
</tr>
<tr>
<td></td>
<td>Sheet 7 of 19</td>
<td>Added &quot;Smooth or Textured Face of Panel&quot; callout to TYPICAL SECTION, and 42&quot; F-Shape Traffic Railing. Changed &quot;Precast&quot; to &quot;C.I.P.&quot; in copying dimension and offset to face of panel in TYPICAL SECTION and Bar 6l, lateral dim. to 4'-4&quot; for Precast Coping &amp; REIN. STEEL. Note 4, &quot;Fabric&quot; to &quot;Reinforcement&quot; and Bars 6C to 5C, Bars &quot;6A &amp; 8&quot; sp. to &quot;5A &amp; 1'-0&quot; sp. EST. QUANTITIES.</td>
</tr>
<tr>
<td></td>
<td>Sheet 8 of 19</td>
<td>New Sheet Added</td>
</tr>
<tr>
<td></td>
<td>Sheet 9 of 19</td>
<td>New Sheet Added</td>
</tr>
<tr>
<td></td>
<td>Sheet 10 of 19</td>
<td>New Sheet Added</td>
</tr>
<tr>
<td></td>
<td>Sheet 11 of 19</td>
<td>Changed &quot;Leveling&quot; to &quot;Buildup&quot; in PARTIAL ELEVATION VIEW and Note 2 &amp; 8, Expansion Joint annotation in PLAN VIEW, Bars 5A to 5A &amp; 1'-0&quot; sp.</td>
</tr>
<tr>
<td></td>
<td>Sheet 12 of 19</td>
<td>Changed 42&quot; Vertical Shape Traffic Railing and Note 6i. Changed &quot;Leveling&quot; to &quot;Buildup&quot; in PARTIAL ELEVATION VIEW and Note 2 &amp; 6b, Expansion Joint annotation in PLAN VIEW, Bars 5A to 5A &amp; 1'-0&quot; sp.</td>
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<tr>
<td>5.305</td>
<td>Sheet 13 of 19</td>
<td>Added &quot;Smooth or Textured Face of Panel&quot; callout to TYPICAL SECTION and 42&quot; Vertical Shape Traffic Railing. Changed offset to face of panel in TYPICAL SECTION, RAISED SIDEWALK NOTES 2 &amp; 3, REINFORCING STEEL NOTES 5 &amp; 6, Bars &quot;5A &amp; 6&quot; sp. to &quot;5A &amp; 1'-0&quot; sp.&quot; and ESTIMATED QUANTITIES.</td>
</tr>
<tr>
<td></td>
<td>Sheet 14 of 19</td>
<td>Added Bar 5Ml to top of Precast Coping in PARTIAL VIEW. Changed &quot;Leveling&quot; to &quot;Buildup&quot; in PARTIAL ELEVATION VIEW and Note 3. Deleted CROSS REFERENCE note.</td>
</tr>
<tr>
<td></td>
<td>Sheet 15 of 19</td>
<td>Added variable offset to back of panel &amp; &quot;Smooth or Textured Face of Panel&quot; callout to TYPICAL SECTION THRU PRECAST &amp; &quot;Leveling&quot; to &quot;Buildup&quot; in TYPICAL SECTION THRU PRECAST. Offset to face of panel in TYPICAL SECTION THRU C.I.P. &quot;Welded Wire Fabric to Welded Wire Reinforcement&quot;. Detail &quot;A&quot; to Detail &quot;C&quot; and position of center Bar 5Ml in top of Precast Coping.</td>
</tr>
<tr>
<td></td>
<td>Sheet 16 of 19</td>
<td>Changed Sheet No. to 13 of 16 &amp; sheet references in Note 11, Bars 5Ml to Bars 4Ml and Sheet No. references in Note 11. Deleted &quot;Bars 6A &amp; 5921&quot; from Note 10.</td>
</tr>
<tr>
<td></td>
<td>Sheet 17 of 19</td>
<td>Added &quot;Smooth or Textured Face of Panel&quot; callout to TYPICAL SECTION. Changed Bars 55J to Bars 55, Bars 55J to Bars 4Ml and Bars 55J to Bars 4Ml.</td>
</tr>
<tr>
<td></td>
<td>Sheet 18 of 19</td>
<td>Changed Sheet No. to 15 of 15, &quot;Fabric&quot; to &quot;Reinforcement&quot;, Bars 5Ml to Bars 4Ml and ESTIMATED QUANTITY for Reinforcing steel. Deleted &quot;at left&quot; from ESTIMATED QUANTITIES note.</td>
</tr>
<tr>
<td></td>
<td>Sheet 19 of 19</td>
<td>Changed coping offset to face of panel in SECTION A-4. Sheet references in REINFORCING STEEL. Note 3 &amp; 4 &amp; 7 REINFORCING STEEL NOTES 3 &amp; 4, Bars 55J to Bars 55, Bars 5A to Bars 5A and Retaining Wall Panel Width dimension to &quot;See Note 1.&quot;</td>
</tr>
<tr>
<td></td>
<td>Sheet 20 of 19</td>
<td>Changed: &quot;w法律&quot; and &quot;shall&quot; to &quot;in Notes. &quot;</td>
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<tr>
<td>5.501</td>
<td>Sheet 1 of 1</td>
<td>Changed: &quot;will&quot; and &quot;shall&quot; to &quot;in Notes. &quot;</td>
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<td></td>
<td>Sheet 1 thru 3</td>
<td>Index completely revised. Added new Text options.</td>
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<td></td>
<td>Sheet 1 thru 5</td>
<td>Index completely revised. Added new Text options.</td>
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<td>Sheet 1 thru 5</td>
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<td>Sheet 1 thru 5</td>
<td>Index completely revised. Added new Text options.</td>
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<tr>
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<td>Sheet 1 thru 8</td>
<td>Index completely revised. Added new Text options.</td>
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<tr>
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<td>Sheet 1 thru 8</td>
<td>Index completely revised. Added new Text options.</td>
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<tr>
<td></td>
<td>Sheet 1 thru 8</td>
<td>Index completely revised. Added new Text options.</td>
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<tr>
<td></td>
<td>Sheet 1 thru 17</td>
<td>Zee in note changed to hangar under &quot;SECTION AA DESIGN SPECIFICATION revised publication date revised to 2002. &quot;</td>
</tr>
<tr>
<td></td>
<td>Sheet 1 thru 17</td>
<td>Case VIII section added from detail.</td>
</tr>
<tr>
<td></td>
<td>Sheet 1 thru 17</td>
<td>Sign FTP section changed.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 thru 6</td>
<td>Sign FTP section changed.</td>
</tr>
<tr>
<td></td>
<td>Sheet 3 thru 6</td>
<td>Sign FTP section changed.</td>
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<tr>
<td></td>
<td>Sheet 4 thru 6</td>
<td>Sign FTP section changed.</td>
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<tr>
<td></td>
<td>Sheet 5 thru 6</td>
<td>Sign FTP section changed.</td>
</tr>
<tr>
<td></td>
<td>Sheet 6 thru 14</td>
<td>New Sheet added to SPECIAL MARKING AREAS. The following Sheets renumbered.</td>
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<tr>
<td>Index Number</td>
<td>Sheet Numbers</td>
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<tr>
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</tr>
<tr>
<td>17354</td>
<td>Sheet 1 and 2</td>
<td>Revised sign FTP numbers.</td>
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<tr>
<td>17355</td>
<td>Sheet 1 thru 1</td>
<td>Signs revised FTP numbers changed.</td>
</tr>
<tr>
<td>17356</td>
<td>Sheet 4 of 1</td>
<td>Signs FTP=22-04, in the sign text delete “P.S. 318:14” and insert “P.S. 318:18”.</td>
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<tr>
<td>17357</td>
<td>Sheet 6 of 1</td>
<td>Signs FTP=40-04 and FTP=41-04, in the sign text delete “$50” and insert “$100”.</td>
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<tr>
<td>18111</td>
<td>Sheet 1 thru 2</td>
<td>New Index - “STEEL CCTV POLE”.</td>
</tr>
<tr>
<td>18113</td>
<td>Sheet 1 of 1</td>
<td>New Index - “CONCRETE CCTV POLE”.</td>
</tr>
<tr>
<td>18202</td>
<td>Sheet 1 of 1</td>
<td>New Index - “FIBER OPTIC PULLBOX AND TRENCH DETAILS”.</td>
</tr>
<tr>
<td>18204</td>
<td>Sheet 1 of 1</td>
<td>New Index - “FIBER OPTIC splice Box and Pullbox”.</td>
</tr>
<tr>
<td>18110</td>
<td>Sheet 1 of 1</td>
<td>New Index - “CCTV CABINET &amp; SIGN WRITING AND BLOCK DIAGRAM”.</td>
</tr>
<tr>
<td>18301</td>
<td>Sheet 1 of 1</td>
<td>New Index - “CCTV CABINET LAYOUT”. Date 01-01-06 is added.</td>
</tr>
<tr>
<td>18302</td>
<td>Sheet 1 of 1</td>
<td>New Index - “TYPICAL CMS MOUNTING DETAILS”. Date 01-01-06 is added.</td>
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<tr>
<td>18303</td>
<td>Sheet 1 thru 2</td>
<td>New Index - “CCTV POLE &amp; CAGE MOUNTING DETAILS”. Date 01-01-06 is added.</td>
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<tr>
<td>18305</td>
<td>Sheet 1 thru 2</td>
<td>New Index - “CCTV POLE MOUNTING DETAILS”. Date 01-01-06 is added.</td>
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<tr>
<td>20150</td>
<td>Sheet 1 of 1</td>
<td>Added embedded bearing plates to allees.</td>
</tr>
<tr>
<td>20160</td>
<td>Sheet 1 of 1</td>
<td>Added embedded bearing plates to allees.</td>
</tr>
<tr>
<td>20172</td>
<td>Sheet 1 of 1</td>
<td>Added embedded bearing plates to allees.</td>
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<tr>
<td>20178</td>
<td>Sheet 1 of 1</td>
<td>Added embedded bearing plates to allees.</td>
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### Revised Index

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<tbody>
<tr>
<td>20501</td>
<td>Sheet 1 of 1</td>
<td>Added “When required” to Bevelled Bearing Plane B, callout. Changed Note 2 to require Embedded Bearing Plates A on AASHTO Type V, VI and FBT Beams: Note 3 to allow welding of Galvanized Caps after hot-dip galvanizing, drill and thread holes periscopic to the bottom of Plate A, eliminate the threaded holes in Plate A when Plate B is not required, and thread holes in Bearing Plane A only. Note 4, screw embedment to P and added: 1/2” max height and nominal 1” inside diameter for Galvanized Cap: Note 6 added “and the BEVELED BEARING PLATE DATA TABLE in the Structures Plan’/5) Panel Color Studs to 2-1/8” headed Anchor Studs in Note 7, PLAN and ELEVATION VIEWS: Tack weld to “Screw weld” in END ELEVATION.</td>
</tr>
<tr>
<td>20502</td>
<td>Sheet 1 of 1</td>
<td>Added “When required” to Bevelled Bearing Plane B, callout. Changed Note 2 to require Embedded Bearing Plates A on AASHTO Type V, VI and FBT Beams: Note 3 to allow welding of Galvanized Caps after hot-dip galvanizing, drill and thread holes periscopic to the bottom of Plate A, eliminate the threaded holes in Plate A when Plate B is not required, and eliminate the threaded holes in Bearing Plane A only: Note 4, screw embedment to P and added: 1/2” max height and nominal 1” inside diameter for Galvanized Cap: Note 6 added “and the BEVELED BEARING PLATE DATA TABLE in the Structures Plan’/5) Panel Color Studs to 2-1/8” headed Anchor Studs in Note 7, PLAN and ELEVATION VIEWS: Tack weld to “Screw weld” in END ELEVATION.</td>
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<tr>
<td>20503</td>
<td>Sheet 1 of 1</td>
<td>Added “When required” to Bevelled Bearing Plane B, callout. Changed Note 2 to require Embedded Bearing Plates A on AASHTO Type V, VI and FBT Beams: Note 3 to allow welding of Galvanized Caps after hot-dip galvanizing, drill and thread holes periscopic to the bottom of Plate A, eliminate the threaded holes in Plate A when Plate B is not required, and eliminate the threaded holes in Bearing Plane A only: Note 4, screw embedment to P and added: 1/2” max height and nominal 1” inside diameter for Galvanized Cap: Note 6 added “and the BEVELED BEARING PLATE DATA TABLE in the Structures Plan’/5) Panel Color Studs to 2-1/8” headed Anchor Studs in Note 7, PLAN and ELEVATION VIEWS: Tack weld to “Screw weld” in END ELEVATION.</td>
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### New Details Added

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<tr>
<td>20622</td>
<td>Sheet 1 of 1</td>
<td>New Index Added-“ELEC INSTRUMENTATION FOR SQUARE PRESTRESSED CONCRETE PILES”</td>
</tr>
<tr>
<td>20612</td>
<td>Sheet 1 of 1</td>
<td>Changed dowel dimensions on Section D-0 and Section E.</td>
</tr>
<tr>
<td>20630</td>
<td>Sheet 1 of 1</td>
<td>Added dimension “4”-“0” Solid Section — Typical for Pile &amp; “11”-“0” Solid Section — Typical for Splice Section” to ELEVATION, and “Head &amp; Top” to “2”-“0” Hole in PILE SPICE DETAILS. Changed 4-“0” Solid Section to “11”-“0” Solid Section &amp; changed Note 1. Deleted 2” hole in tip solid section. Deleted “1” diameter hole in opposite sides of pile. Expanded Note 5 for approval of alternate Diagonal Ties.</td>
</tr>
<tr>
<td>20631</td>
<td>Sheet 1 of 1</td>
<td>Added 1” dia. hole to Section thru Pile of Pipe Cap and Detailed of Pipe Colar. Changed Note 1 and 2” dia. hole in tip of pile. Deleted Vent hole, note and dimension from the Elevation View.</td>
</tr>
<tr>
<td>20654</td>
<td>Sheet 1 of 1</td>
<td>Deleted “GENERAL SPECIFICATIONS” note from NOTES.</td>
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### New Indexes

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<th>Index Number</th>
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<tr>
<td>20662</td>
<td>Sheet 2 of 2</td>
<td>Added “Precast/Post-Tensioned” to Spliced Pipe Section dimension and “Bars or #20 Wire Ties” to No. 4 Closed Tie column in Drivable Unforsen Field Splice Detail. Added “Wire” to W1 and #20 column in details. Changed Dowels column to details to Bars.</td>
</tr>
<tr>
<td>Index Number</td>
<td>Sheet Number</td>
<td>Description</td>
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<td>-------------</td>
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<tr>
<td>20660</td>
<td>Sheet 1 of 2</td>
<td>Change number of vent holes notes. Deleted &quot;GENERAL SPECIFICATIONS&quot; note from NOTES.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 2</td>
<td>Added &quot;Post-Tensioned&quot; to Spliced Pile Section dimension and &quot;Bars of #20 Wire Ties&quot; to No.4 Closed Tie callout in Drivable Underwater Splice Detail. Added &quot;Wire&quot; to #11 and #20 callout in details. Changed Dewater callout details to Bars.</td>
</tr>
<tr>
<td>20900</td>
<td>Sheet 1 of 2</td>
<td>Added note &quot;9. CONCRETE&quot; to General Notes and 3/4&quot; additional concrete thickness note to Section 4A. Deleted &quot;(FC-6)&quot; from Note 7, and redundant &quot;1/4&quot; (10mm)&quot; dimension in Section 4A.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 2</td>
<td>Changed &quot;Welded Wire Fabric&quot; to &quot;Welded Wire Reinforcement&quot;.</td>
</tr>
<tr>
<td>20910</td>
<td>Sheet 1 of 2</td>
<td>Added note &quot;9. CONCRETE&quot; to General Notes.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 2</td>
<td>Changed &quot;Welded Wire Fabric&quot; to &quot;Welded Wire Reinforcement&quot;.</td>
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<tr>
<td>2110</td>
<td>Sheet 1 of 2</td>
<td>New Index - &quot;POURED JOINT WITH BACKER ROD EXPANSION JOINT SYSTEM&quot;.</td>
</tr>
<tr>
<td></td>
<td>Sheet 2 of 2</td>
<td>Added note to define RFL location on fender. Changed Mid Fender RFL Light location.</td>
</tr>
<tr>
<td>21600</td>
<td>Sheets 1 thru 7</td>
<td>New Index Added - &quot;TEMPORARY DETOUR BRIDGE GENERAL NOTES AND DETAILS&quot; to provide general notes and bearing details for temporary bridge applications.</td>
</tr>
<tr>
<td>21610</td>
<td>Sheets 1 thru 3</td>
<td>New Index Added - &quot;TEMPORARY DETOUR BRIDGE DETAILS TIMBER PILE FOUNDATIONS&quot; to provide bearing and backwall details for timber pile foundations.</td>
</tr>
<tr>
<td>21620</td>
<td>Sheets 1 and 2</td>
<td>New Index Added - &quot;TEMPORARY DETOUR BRIDGE DETAILS STEEL PIPE PILE FOUNDATIONS&quot; to provide bearing and backwall details for steel pipe pile foundations.</td>
</tr>
<tr>
<td>21630</td>
<td>Sheets 1 thru 3</td>
<td>New Index Added - &quot;TEMPORARY DETOUR BRIDGE DETAILS STEEL PIPE PILE FOUNDATIONS&quot; to provide bearing and backwall details for steel pipe pile foundations.</td>
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<tr>
<td>21900</td>
<td>Sheet 1 and 2</td>
<td>New Index Added - &quot;FENDER SYSTEM GENERAL NOTES AND LAYOUT&quot; to provide general notes and details for Heavy, Medium, and Light Duty Fender Systems.</td>
</tr>
<tr>
<td>21910</td>
<td>Sheets 1 thru 5</td>
<td>New Index Added - &quot;FENDER SYSTEM - HEAVY DUTY&quot; to provide details for the Heavy Duty Fender System.</td>
</tr>
<tr>
<td>21920</td>
<td>Sheets 1 thru 5</td>
<td>New Index Added - &quot;FENDER SYSTEM - MEDIUM DUTY&quot; to provide details for the Medium Duty Fender System.</td>
</tr>
<tr>
<td>21930</td>
<td>Sheets 1 thru 5</td>
<td>New Index Added - &quot;FENDER SYSTEM - LIGHT DUTY&quot; to provide details for the Light Duty Fender System.</td>
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619  Multihole, Mobile Operations Work On Shoulder, Work Within Travel Way
620  Multihole Divided, Temporary Division Connection (2 Sheets)
621  Multihole Undivided, Temporary Division Connection
622  Multihole, Work Near Intersection—Temporary Division Connection—35 MPH or Less
628  Two Way Left Turn Lane Closure
630  Crossover For Paving Train (Operations, Rural (2 Sheets)
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660  Pedestrian Control/For Closure Of Sidewalks
665  Limited Access, Temporary (Opening
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790  Roadside Offsets (2 Sheets)

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5202 Precast Sound Barriers—Texture Options
5203 Precast Sound Barriers—Flush Panel Option (4 Sheets)
5204 Precast Sound Barriers—Pre-Made Access Hole & Drainage Details
5205 Precast Sound Barriers—Pre and Post Reinforcing Steel (7 Sheets)
5206 Precast Sound Barriers—Pre-Depth and Reinforcing Summary
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5224 Traffic Railing/Sound Barrier L-Shaped Spread Footing (4 Sheets)
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5300 Permanent Retaining Wall Systems (19 Sheets)
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17329 Typical Signing For Truck Weigh & Inspection Stations
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17345 Interchange Markings (4 Sheets)
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20412 Precast Concrete Sheet Pile Type “A” - 12 Inch Thick
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20440 Precast Concrete Sheet Pile Type “C” - Right Angle Corner Pile

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20502 Beveled Bearing Plate Details - Prestressed AASHTO And Bulb-T Beams

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20660 Square Prestressed Concrete Pile Splices
20662 EDC Instrumentation For Square Prestressed Concrete Piles
20672 12” Square Prestressed Concrete Pile
20684 14” Square Prestressed Concrete Pile
20698 18” Square Prestressed Concrete Pile
20692 20” Square Prestressed Concrete Pile
20684 24” Square Prestressed Concrete Pile
20650 30” Square Prestressed Concrete Pile
20630 35” Square Prestressed Concrete Pile
20656 High Moment Capacity 35” Square Prestressed Concrete Pile
20654 54” Prestress/Post-Tensioned Concrete Cylinder Pile (2 Sheets)
20650 60” Prestressed Concrete Cylinder Pile (2 Sheets)

APPREACH SLABS
20900 Approach Slabs (Flexible Pavement Approaches) (2 Sheets)
20910 Approach Slabs (Rigid Pavement Approaches) (2 Sheets)

BRIDGE EXPANSION JOINTS
22110 Strip Seal Expansion Joint (3 Sheets)

STRUCTURES LIGHTING AND UTILITIES
22120 Light Pole Details (2 Sheets)
22220 Utility Conduit Details (2 Sheets)
22230 Navigation Light System Details (Fixed Bridges) (2 Sheets)
22140 Maintenance Lighting For Box Girder (2 Sheets)

STANDARD BAR BENDING DETAILS
22300 Standard Bar Bending Details

TEMPORARY DETOUR BRIDGES
22610 Temporary Detour Bridge General Notes And Details (7 Sheets)
22620 Temporary Detour Bridge Details (Timber Pile Foundations) (3 Sheets)
22630 Temporary Detour Bridge Details (Steel Pipe Pile Foundations) (3 Sheets)

POST-TENSIONING DETAILS
22850 Post-Tensioning Vertical Profiles (2 Sheets)
22850 Post-Tensioning Anchorage Protection
22853 Post-Tensioning Anchorage And Grouting Details (3 Sheets)

FENDER SYSTEMS DETAILS
22900 Fender System General Notes And Layout (2 Sheets)
22910 Fender System Heavy Duty (5 Sheets)
22920 Fender System Medium Duty (5 Sheets)
22930 Fender System Light Duty (5 Sheets)
The abbreviations listed are the standard for contract plans production. This list is not all inclusive. Other Department accepted abbreviations may be used when deemed more appropriate. Where special abbreviations are used a descriptive tabulation may be necessary in the plans.
Some abbreviations listed in the table are used in contract plans production. This list is not all-inclusive. Other Department accepted abbreviations may be used when deemed more appropriate. Where special abbreviations are used a descriptive tabulation may be necessary in the plans.
The abbreviations listed are the standard for contract plans production. This list is not all inclusive. Other Department abbreviations may be used when deemed appropriate. Where special abbreviations are used a descriptive tabulation may be necessary in the plans.
STANDARD SYMBOLS FOR KEY MAP

1. Symbols on this Index are intended for use on all Roadway, Signing And Marking, Signalization, and Lighting projects. For work zone traffic control symbols refer to Index 600. When additional or similar symbols are used, legends or notations may be required for clarity.

GENERAL NOTE
GENERAL SYMBOLS

Curb
Curb And Gutter
Water Well, Spring
Levee
Road Drain
Roadside Ditch
Roadside Ditch w/ Guardrail
Box Culvert-Median Drain
Pipe Culvert-Median Drain
Pipe Culvert-Straight Endwall
Pipe Culvert-U-Type Endwall
Pipe Culvert-

EXISTING
PROPOSED

STANDARD SYMBOLS FOR PLAN SHEETS

UTILITY ADJUSTMENT SYMBOLS

Manhole
Fire Hydrant
Water Main
Sanitary Sewer
Buried Electric
Buried Telephone
Buried Cable Television
Buried Fiber Optic

Water Mains
Water Main
Sanitary Sewer
Buried Electric
Buried Telephone
Buried Cable Television
Buried Fiber Optic

Overhead Electric
Overhead Telephone
Overhead Cable Television
Overhead Fiber Optic

See General Note, Sheet 1 of 3
# STANDARD SYMBOLS FOR PLAN SHEETS

## TRAFFIC SIGNALS SYMBOLS

<table>
<thead>
<tr>
<th>EXISTING</th>
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<tbody>
<tr>
<td><img src="image1" alt="Traffic Signal Head (Span Wire Mounted)" /></td>
<td><img src="image2" alt="Traffic Signal Head (Span Wire Mounted)" /></td>
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<tr>
<td><img src="image3" alt="Traffic Signal Head (Pedestal Mounted)" /></td>
<td><img src="image4" alt="Traffic Signal Head (Pedestal Mounted)" /></td>
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<td><img src="image7" alt="Vehicle Detector (Loop)" /></td>
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<tr>
<td><img src="image9" alt="Traffic Signal Head (Mast Arm Mounted)" /></td>
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<td><img src="image17" alt="Controller Cabinet (Base Mounted)" /></td>
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<tr>
<td><img src="image19" alt="Controller Cabinet (Pole Mounted)" /></td>
<td><img src="image20" alt="Controller Cabinet (Pole Mounted)" /></td>
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</tbody>
</table>

### W - D W
- **Walk** = Don't Walk
- **FDW** = Flashing Don't Walk
- **S** = Signal Face Number
- **L** = Signal Lens
- **P** = Programmed Signal Head
- **M** = Messenger Wire
- **†** = Pole Tabulation Cross Reference
- **‡** = Pole Tabulation Cross Reference (Joint Use Pole)
- **@** = Signal Phase

## LIGHTING SYMBOLS

<table>
<thead>
<tr>
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<tr>
<td><img src="image21" alt="Traffic Light Pole &amp; Luminaire" /></td>
<td><img src="image22" alt="Traffic Light Pole &amp; Luminaire" /></td>
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<td><img src="image23" alt="Existing Pole &amp; Luminaire To Be Removed" /></td>
<td><img src="image24" alt="Existing Pole &amp; Luminaire To Be Removed" /></td>
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<td><img src="image25" alt="High Mast Lighting Tower" /></td>
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<tr>
<td><img src="image27" alt="City Or Utility Owned Luminaire &amp; Pole" /></td>
<td><img src="image28" alt="City Or Utility Owned Luminaire &amp; Pole" /></td>
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<tr>
<td><img src="image29" alt="PVC (Polyvinyl Chloride) Lighting Conduit And Conductors" /></td>
<td><img src="image30" alt="Rigid Galvanized Lighting Conduit And Conductors" /></td>
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<tr>
<td><img src="image31" alt="Lighting Pull-Box" /></td>
<td><img src="image32" alt="Light Distribution Point" /></td>
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<td><img src="image33" alt="Joint Use Pole" /></td>
<td><img src="image34" alt="Pier Cap Underdeck Luminaire" /></td>
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<td><img src="image35" alt="Pendant Hung Underdeck Luminaire" /></td>
<td><img src="image36" alt="Pendant Hung Underdeck Luminaire" /></td>
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## SIGNING AND PAVEMENT MARKING SYMBOLS

- **Pavement Arrow**
- **Single Solid Line**
- **Double Solid Line**
- **Skip Line**
- **Stop Bar**
- **Traffic Sign (Post Mounted)**
- **Traffic Sign (Overhead)**
- **Sign Number**
- **Sign Item Number**
- **Traffic Flow Arrow**

See General Note, Sheet 1 of 3

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2008 FDOT Design Standards

Last Revision Sheet No. 07/01/05

Index No. 002
Note:
Slope drain pipe to be paid for as Slope Drains (Temporary) LF, based on linear feet of pipe or conduit installed. Payment to be made for one installation per site, including one stub and elbow or one intake flume or flashing. Sump construction and maintenance and curtains to be included in cost for Slope Drains (Temporary). Sandbags to be paid for as Sandbagging CY.

Temporary Slope Drains (Estimate At 400’)
Spacing On Grades 1’ Or Greater, Final Spacing To Be As Directed By The Engineer.
Slope Drains To Be Replaced By Permanent Overlapped Sod Flume After Final Shoulder Grade Is Established.

Slopes Varies
Anchor For Corrugated Pipe As Directed By The Engineer.
Sump Wall
Sandbag Cut-Off Wall
ImperVIOUS Curtain (To Be Removed With Stub And Elbow Or Conduit Relocation)
Bag Height Sufficient To Contain Pipe Discharge At Ditch Locations
Apron Contoured To Natural Grade In Absence Of Ditch

Temporary Berm
Stub Pipe And Elbow Or Conduit To Be Relocated As Progresses
Intermediate Sump And Drain To Be Constructed As Progresses As Directed By The Engineer. Earth Berm May Be Used In Lieu Of Sandbagging
Slope Drains To Be Replaced By Permanent Overlapped Sod Flume After Final Shoulder Grade Is Established.

Sod Flume (Sodding Overlapped) (To Be Installed As Filled Construction Progresses As Directed By The Engineer.)
Slope Varies
Temporary Sump And Drain To Be Constructed As Progresses As Directed By The Engineer. Earth Berm May Be Used In Lieu Of Sandbagging
Slope Drains To Be Replaced By Permanent Overlapped Sod Flume After Final Shoulder Grade Is Established.

Slope Drains To Be Installed As Filled Construction Progresses As Directed By The Engineer.
**GENERAL CONSTRUCTION NOTES**

1. Fence materials shall be aluminum or concrete only.
2. Aluminum posts shall be 3" diameter minimum. Aluminum rail braces shall be in accordance with Index No. 802. Concrete posts and rail braces shall be in accordance with Index No. 801. All posts to be set in concrete.
3. Fabric shall be installed to inside of posts and rail braces, and tied to posts and braces at 6" centers.
4. For additional details on fencing, see Index Nos. 801 and 802.
5. All basin slopes to be 1:1 unless detailed otherwise in the plans.
6. Sediment basins to be constructed prior to commencement of upland construction. Maintenance and clean out to be by the Contractor upon acceptance of project by the Engineer.

**DESIGN NOTES**

1. Basins should be as deep as practicable with a minimum depth of 2.0 feet.
2. In Type A, when the top of endwall is below high water, fence also will be required along the top of the endwall.
3. In Type B, the weir shall be located as far from the endwall as practical. On steep ditch grades two or more weirs may be required. Intermediate weirs shall be constructed without settling basins.
4. In Type B, the 6" PVC shall be constructed unless shown otherwise in the plans.

**GENERAL NOTES**

1. The cost for Type A and Type B trash retainer and sediment basins shall include the cost for riprap, fencing, baffles, piping and for sump and weir earthwork over and above ditch excavation called for in the plans. Payment for both Type A and Type B shall be under the contract unit price for Sediment Basins. Each Cleanout as called for in the plans shall be paid for under the contract unit price for Sediment Basin Cleanouts, CO.

---

TRASH RETAINER AND SEDIMENT BASIN

---
NOTE: Spacings shown in this chart are based on having the ground line at the upstream barrier at the same elevation as the overflow at the downstream barrier as shown above. Spacings should be adjusted based on actual site performance.

CHART I

RECOMMENDED SPACING FOR SYNTHETIC BALES OR BALE TYPE BARRIERS AND TYPE III SILT FENCE
Where the slope length exceeds 25 feet, construct one row of bale barriers at 0/ longitudinal grade midway up the slope. Construct two rows of bale barriers where the slope length exceeds 50 feet.

Notes:

- See Below For Protection At Toe Of Slope
- Where the slope length exceeds 25 feet, construct one row of bale barriers at 0/ longitudinal grade midway up the slope.
- Construct two rows of bale barriers where the slope length exceeds 50 feet.

Plan Overlap Ends

Natural Ground

50' On Centers (Typ.)

As Required

PLAN

Overlap Ends

At Toe Of Slope

Barriers For Fill Slopes

Rocks

Proposed Inlet

PARTIAL INLET

Sidewalk

Curb & Gutter

Rack Bags

Ditch

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Curb & Gutter

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SILT FENCE APPLICATIONS

NOTES FOR SILT FENCES

1. Type III Silt Fence to be used at most locations. Where used in ditches, the spacing for Type III Silt fence shall be in accordance with Chart L, Sheet 1.

2. Type IV Silt Fence to be used where large sediment loads are anticipated. Suggested use is where 1/2 slope is 1/2 or steeper and length of slope exceeds 25 feet. Avoid use where the detained water may back into travel lanes or off the right of way.

3. Do not construct silt fences across permanent flowing watercourses. Silt fences are to be at upland locations and turbidity barriers used at permanent bodies of water.

4. Where used as slope protection, Silt Fence is to be constructed on 0% longitudinal grade to avoid channeling runoff along the length of the fence.

5. Silt Fence to be paid for under the contract unit price for Staked Silt Fence, LF.1.
Floating Turbidity Barriers

Legend:
- Pile Locations
- Dredge Or Fill Area
- Mooring Dolly w/Anchor
- Anchor
- Barrier Movement Due To Current Action

Notes:
1. Turbidity barriers are to be used in all permanent bodies of water regardless of water depth.
2. Number and spacing of anchors dependent on current velocities.
3. Deployment of barrier around pile locations may vary to accommodate construction operations.
4. Navigation may require segmenting barrier during construction operations.
5. For additional information see Section 104 of the Standard Specifications.

Staked Turbidity Barrier

Notes:
- Turbidity barriers for flowing streams and tidal creeks may be either floating or staked types or any combinations of types that will suit site conditions and meet erosion control and water quality requirements.
- The barrier type(s) to be installed at the Contractor's option unless otherwise specified in the plans, however payment will be under the pay items established in the plans for Floating Turbidity Barrier and/or Staked Turbidity Barrier. Posts in staked turbidity barriers to be installed in vertical position unless otherwise directed by the Engineer.

General Notes
1. Floating turbidity barriers are to be paid for under the contract unit price for Floating Turbidity Barrier, LF.
2. Staked turbidity barriers are to be paid for under the contract unit price for Staked Turbidity Barrier, LF.
DIVIDED NARROW MEDIAN WITH OR WITHOUT CURBED MEDIAN

DIVIDED WIDE MEDIAN WITH OR WITHOUT CURBED MEDIAN

UNDIVIDED FLUSH SHOULDER

UNDIVIDED CURBED

DIVIDED CURBED

LEGEND

1. Wildflower Group #1
2. Wildflower Group #2
3. Turf (To Limit of Construction)
4. Selective Clearing And Grubbing
5. Limits Of Construction
6. Turf

GENERAL NOTES

1. All turf establishment shall be performed meeting the requirements of Section 570 of the Standard Specifications.

2. Activities such as clearing, grading, and excavating that will disturb one or more acres of land require coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction Activities from the Florida Department of Environmental Protection, and implementation of appropriate pollution prevention measures to minimize erosion and sedimentation and properly manage stormwater.

3. Confirm compatibility of wildflower with Seeding Zones.

WILDFLOWER SEEDING RATES

<table>
<thead>
<tr>
<th>Common Name (Botanical Name)</th>
<th>Group</th>
<th>#1 Group</th>
<th>#2 Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-Eyed Susan (Rudbeckia hirta)</td>
<td>#1</td>
<td>2</td>
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<td>10</td>
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<tr>
<td>Fire Wheel (Gailardia pulchella)</td>
<td>#1</td>
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<td>Softhair Coneflower (Rudbeckia mollis)</td>
<td>#1</td>
<td>2</td>
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<td>Crimson Clover (Trifolium incarnatum)</td>
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<td>Annual Phlox (Phlox drummondi)</td>
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<td>Mass Verbenas (Verbena tenax)</td>
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Note: Wildflower seeding rates are for restoring impacted wildflower areas.
Sod To Toe Of Front Slope When Algebraic Difference In Roadway Grades Exceeds 4 /\n(Both Sides)

Low Point Of Sag
Sodding (Overlapped) See Overlapped Sod Flume (Below) (Both Sides)

32" Sod Strip

Sho ulder Point

SECTION AA
(Symmetrical About Roadway)

SHOULDER AND SLOPE TREATMENT FOR SUPERELEVATED ROADWAYS

SHOULDER AND SLOPE TREATMENT IN SAG VERTICAL CURVES
TREATMENTS FOR PROTECTION FROM CONCENTRATED ROADWAY RUNOFF EROSION AND SHOULDER RAVELING

CRITERIA FOR PAVING SHOULDER ON DIVIDED AND UNDIVIDED FACILITIES

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
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<th>Note</th>
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<td>30</td>
<td>7° Or Greater</td>
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<tr>
<td>50</td>
<td>4° Or Greater</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>3° Or Greater</td>
<td></td>
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<tr>
<td>65</td>
<td>3° Or Greater</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>2° Or Greater</td>
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</table>

5' Shoulder Pavement
32" Sod Strip

Turf

Roadway

Sho ulder Point

Sodding (Overlapped)

SECTION BB
(Symmetrical About Roadway)

RURAL DIVIDED

CRITERIA FOR PAVING SHOULDER ON DIVIDED AND UNDIVIDED FACILITIES

Failure to meet the criteria specified shall be paved where erosion of the shoulder or shoulder pavement is evident or anticipated.

1. These treatments are applicable to new construction, reconstruction and RRR projects. Project requirements for shoulder pavement and sodding that exceed the limits of this standard take precedence.

2. For sodding adjacent to ditches and at headwalls, see Index No. 281.

3. All front slopes steeper than 1:3 are to be sodded.

RURAL UNDIVIDED

SHOULDER AND SLOPE TREATMENT FOR SUPERELEVATED ROADWAYS

NOTES

1. These treatments are applicable to new construction, reconstruction and RRR projects. Project requirements for shoulder pavement and sodding that exceed the limits of this standard take precedence.

2. For sodding adjacent to ditches and at headwalls, see Index No. 281.

3. All front slopes steeper than 1:3 are to be sodded.

SHOULDER AND SLOPE TREATMENT FOR SUPERELEVATED ROADWAYS

PHOTO DESIGN STANDARDS

07/01/07

Sheet No. 2 of 2

Index No. 104
GENERAL NOTES

1. Treatment I:
   A. If trenching under soil is necessary to achieve the required 1" drop-off, excavated turf and topsoil are to be used for filling voids and low areas at the edge of pavement or for flush along the edge of soil. Excess material to be uniformly distributed over the shoulder.
   B. Payment for sod, excavation of turf and topsoil, and for backfill of this material under Treatment I is to be included in the contract and price for Performance Turf, SY.

2. Treatment II:
   A. Borrow shall meet requirements for a "Select" material in accordance with Index 505 and Section 120 of the Standard Specifications.
   B. Borrow may be used in lieu of excavated turf and topsoil when economically feasible, however the upper 6" shall meet the requirements of Section 162 "Finished SoilLayer". There will be no additional payment for substituting borrow for excavated turf and topsoil.
   C. When existing turf and topsoil do not meet the requirements of Section 162 "Finished SoilLayer", provide additive materials as necessary in the upper 6" to meet the requirements of Section 162. There will be no additional payment for additives.
   D. Payment for Treatment II with under Finished SoilLayer. Soil and other materials for turf establishment shall be paid for as Performance Turf, SY.

3. Special attention is to be directed to the construction of the required 1" drop-off at the edge of pavement.

4. Activities such as clearing, grading, and excavating that will disturb one or more acres of land require coverage under the General Permit for Stormwater Discharge from Large and Small Construction Activities. For the Florida Department of Environmental Protection, and implementation of appropriate pollution prevention measures to minimize erosion and sedimentation and properly manage stormwater.

5. Turf Establishment:
   A. Wildflowers destroyed by shoulder sodding and turf operations are to be reestablished under the seeding rates prescribed for permanent wildflower #2 Group shown by table on Index 104.
   B. Turf establishment shall be performed meeting the requirements of Section 570 of the Standard Specifications.
1. A Soil Tracking Prevention Device (STPD) shall be constructed at locations designated by the engineer for points of access from unstabilized areas of the project to public roads where off-site tracking of mud could occur. Traffic from unstabilized areas of the construction project shall be directed thru a STPD. Barriers, flagging, or other positive means shall be used as required to limit and direct vehicular egress across the STPD.

2. The Contractor may propose an alternative technique to minimize off-site tracking of sediment. The alternative must be reviewed and approved by the Engineer prior to its use.

3. All materials spilled, dropped, or tracked onto public roads (including the STPD aggregate and construction mud) shall be removed daily, or more frequently if so directed by the Engineer.

4. Aggregates shall be as described in Section 901 excluding 901-2.3. Aggregates shall be #7. If this size is not available, the next available smaller size aggregate may be substituted with the approval of the Engineer. Sizes containing excessive small aggregate will track off the project and are unsuitable.

5. The sediment pit shall provide a retention volume of 3600 cubic feet/acre of surfac area draining to the pit. When the STPD is isolated from other drainage areas, the following pit volumes will satisfy this requirement:
   - 15' x 50' x 150 ft. \(^3\)
   - 30' x 50' x 300 ft. \(^3\)

   As an option to the sediment pit, the width of the swale bottom can be increased to obtain this volume. When the sediment pit or swale volume has been reduced to one foot, it shall be cleaned. When a swale is used, synthetic bales or sift fence shall be placed along the entire length.

6. The swale ditch draining the STPD shall have a 0.02/ft minimum and a 1.0/ft maximum grade along the STPD and to the sediment pit.

7. Filtered sections are not required when the side drain pipe satisfies the clear zone requirements.

8. The STPD shall be maintained in a condition that will allow it to perform its function. To prevent off-site tracking, the STPD shall be rinsed daily, or in use to move accumulated mud downward thru the stone. Additional stabilization of the vehicular route leading to the STPD may be required to limit the mud tracked.

9. A STPD shall be paid for under the contract unit price for Soil Tracking Prevention Device, Type A. The unit price shall constitute full compensation for construction, maintenance, replacement of materials, removal, and restoration of the area utilized by the STPD, including but not limited to excavation, grading, temporary pipe (including mesh pipe), when required, filter fabric, aggregate, paved turnout (including asphalt and base construction), ditch stabilization, approach route, sediment removal and disposal, water, rinsing and cleaning of the STPD and cleaning of public roads, grading and sod. Synthetic Baile or Baile Type Barrier shall be paid for under the contract unit price for Synthetic Baile, LF. Sift fence shall be paid for under the contract unit price for Staked Silt Fence, LF.

10. The nominal size of a standard STPD is 15' x 50' unless otherwise shown in the plans. If the volume of entering and existing vehicles warrants, a 30' width STPD may be approved by the Engineer. When a double width (30') STPD is used, the pay quantity shall be 2 for each location.
## STANDARD CRITERIA

<table>
<thead>
<tr>
<th>CLASS</th>
<th>APPLICATION DESCRIPTION</th>
<th>INDEX NO.</th>
<th>PERMITTIVITY</th>
<th>ADS SIZE</th>
<th>MIN. GRADE TENSION STRENGTH</th>
<th>MIN. SEWN TENSION STRENGTH</th>
<th>MIN. PUNCTURE</th>
<th>MIN. PROVWED Tensile Strength</th>
<th>MIN. WIDE APERTURE TENSION STRENGTH</th>
<th>MIN. UV RESISTANCE</th>
<th>COMMENTS</th>
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<tr>
<td>D-1</td>
<td>Revetment (Special)</td>
<td>(See D-2)</td>
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<td>0.25</td>
<td>50 500</td>
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### Table 1

- **Notes:**
  - (1) Type refers to FDOT class and application.
  - (2) Test scores for geotextiles are in Section 985. Physical criteria for each application is provided by this standard in conjunction with those sections.

### General Notes

1. Specifications for geotextiles are in Section 985. Physical criteria for each application is provided by this standard in conjunction with those sections.
2. Values except ADS are MINIMUM AVERAGE values. Values for ADS are MAXIMUM AVERAGE values.
3. ASTM test methods are in parentheses. See Test Method in Table 1.
4. Minimum tension strength is expressed in units of kN/m, in machine direction and cross direction, as MD x CD.

### Design Notes

1. The Designer shall review this criteria and adjust the values as necessary to satisfy project requirements. These adjustments shall be noted in the plans or contained in the project specifications.
2. UV Resistance: The value represents the percent minimum tensile strength retained (ASTM-D-4632) after weathering per ASTM-D-4355 for the test period hours.
3. Sheet stress limits for plastic erosion mat determined by 30 minutes sustained flow in unvegetated states as determined by tests performed by Utah State University, Texas Transportation Institute or an independent testing laboratory approved by the State Drainage Engineer.

### Table 1

<table>
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<th>Test</th>
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<tr>
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<td>Elongation</td>
<td>%</td>
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<td>Maximum Design Velocity</td>
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**2006 FDOT Design Standards**

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**GEOTEXTILE CRITERIA**

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**NOTES**

1. The Designer shall review this criteria and adjust the values as necessary to satisfy project requirements. These adjustments shall be noted in the plans or contained in the project specifications.
2. UV Resistance: The value represents the percent minimum tensile strength retained (ASTM-D-4632) after weathering per ASTM-D-4355 for the test period hours.
3. Use design shear stress as ±100 Pa.
TOP SLAB REINFORCING STEEL DIAGRAM (ALTERNATE A)

NOTE:
Not Applicable For Type A, B, C, D & E Ditch
Bottom Ditch Or Type S & V Gutter Ditches
See Index No. 220, 221, 230, 231 & 239

SECTION A-A
(ALTERNATE A)

TOP SLAB REINFORCING STEEL DIAGRAM (ALTERNATE B)

NOTE:
When the inside diameter of a round structure is not more than 1'-6" larger than the opening in the riser or top slab, the top of the structure or riser shall be constructed according to the "Special Top Slab" details on this sheet.

SECTION B-B
(ALTERNATE B)

SPECIAL TOP SLAB
**ROUN D STR UC T URE B OTTOMS (ALTERNAT E A) & ROU N D R IS E R S—TA B LE 1**

Wall Thickness \( (t_1 \) & \( t_2 \) ) and Vertical \& Horizontal Areas of Reinforcement \( (A_1 \) & \( A_2 \) )

| Type | Wall Thickness \( (t_1 \) & \( t_2 \) ) | Reinforcing Schedule | Precast Items | ASTM C479
|------|---------------------------------|----------------------|---------------|-------------
| \( P \) | \( 0.30 \) | \( 0.20 \) | \( 0.20 \) | \( 0.20 \)
| \( P \) | \( 0.20 \) | \( 0.20 \) | \( 0.06 \) | \( 0.06 \)
| \( J \) | \( 0.12 \) | \( 0.08 \) | \( 0.12 \) | \( 0.12 \)
| \( J \) | \( 0.06 \) | \( 0.04 \) | \( 0.04 \) | \( 0.04 \)

**TABLE 1 NOTES:**
- Provide 0.20 sq. in./ft. at each face, 12" max. bar spacing.
- \#0 minimum wall thickness.
- \#2 min. for stirrups for reinforced concrete.
- \#4 for stirrups for cast-in-place concrete.
- Areas of reinforcement are based on 40° reinforcing bars.

**TABLE 2 NOTES:**
- See Table 1 for Reinforcing Schedule.

**SQU AR E & R EC T AN GUL AR S TR UC TURES (ALTERNATIVE B)—TABLE 2**

| Type | Wall Thickness \( t_1 \) | Reinforcing Schedule | Precast Items | ASTM C479
|------|-----------------|----------------------|---------------|-------------
| \( P \) | \( 0.30 \) | \( 0.20 \) | \( 0.20 \) | \( 0.20 \)
| \( P \) | \( 0.20 \) | \( 0.20 \) | \( 0.06 \) | \( 0.06 \)
| \( J \) | \( 0.12 \) | \( 0.08 \) | \( 0.12 \) | \( 0.12 \)
| \( J \) | \( 0.06 \) | \( 0.04 \) | \( 0.04 \) | \( 0.04 \)

**GENERAL NOTES**

1. Standard structure bottoms 4"-0" diameter and smaller (4" A) and 3"-0" square (4" B) are designated Type P.
2. Larger standard structure bottoms are designated Type J. Risers are permitted for all structures. Round risers are designated Type A, square risers are designated Type B.
3. Walls of circular structures (4" A) constructed in place may be of brick or reinforced concrete. Precast and rectangular structures (4" B) shall be constructed of reinforced concrete only.
4. Walls and bottom slab thickness and reinforcement shall be for precast and cast-in-place construction. All concrete shall be of Class II concrete, except use Class IV concrete when shown in the plans, for special applications of structures located in extremely aggressive environments. Concrete as specified in ASTM C479 (ACI 400G) may be used in lieu of Class II concrete for precast items manufactured in accordance with Specifications Section 449.
5. All reinforcement shown is ASTM A615/A615M Grade 60 steel deformed bar. Equivalent areas Grade 46 steel or equivalent area ASTM A615 (smooth) or ASTM A616 (deformed) are permitted according to Index No. 201, unless otherwise noted.
6. Alt. A or Alt. B structure bottoms may be used in conjunction with curb inlet tops Types 1, 2, 3, 4, 5, 6, 9, and 10, and any manhole or joint box unless otherwise shown in the plans or other standard drawings. Alt. B structure bottoms may be used in conjunction with curb inlet tops Types 7 & 8, or any sheet joint bottom unless otherwise shown in the plans or other standard drawings.
7. Rectangular structures may be rotated as directed by the Engineer in order to facilitate connections between the structure walls and storm sewer pipes.
8. Except when ALT. hooks are specifically required, reinforcement in top and bottom slab shall be straight embedment.
9. Alt. reinforcement must have 2" minimum cover except for 3"-0" diameter precast circular units manufactured under ASTM C479, curved construction joints, and pipe openings must have 66" minimum cover, unless otherwise shown. Additional bars used to restrain hole formers for precast structures may be left flush with the hole former. In circular structures, all pipe openings must be made with a minimum 2" minimum radius.
10. The corner fillers shown are necessary for rectangular structures used with circular risers and inlet throats and when used on skew with rectangular risers, inlets and inlet throats. Fillers will be required in the top slab of the Alt. A structure bottoms when used with the Alt. B risers. Each filler shall be reinforced with two #3 bars.
11. Inlet walls, throats, risers or manhole tops shall be secured to structures as shown on Index No. 201 (Sheet 3 of 5) Structural Construction Joints.
12. Structures with depths over 14" below the mean high water table are to be checked for flotation by the designer of the drainage project.
13. Units larger than specified standards may be substituted at the contractor's option when these units will not cause or increase the severity of utility conflicts. Such larger units shall be furnished at no additional cost to the Department. Larger Alt. A units cannot replace Alt. B units without approval of the Engineer. This note applies to this Index only.
14. For manhole and junction box tops, for frames and covers, and, for supplementary details see Index No. 201.
15. Type J structure bottoms must have a minimum 6"-0" wall height when possible, for maintenance access.
### TABLE 1 - MINIMUM STRUCTURE SIZES FOR SINGLE PIPE CONNECTIONS PER SIDE

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<td>15-18</td>
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</table>

**TABLE 1 NOTES:**
1. For Round Structures sizes with variable angles between pipes and variable pipe sizes, refer to the FOOT Storm Drain Handbook.
2. For 3'-6" Precast Square Structure Bottoms, 50" Pipes with similar invert elevations are not permitted in adjacent walls. Use 4'-0" Side Dimensions when 30" pipe openings are required on adjacent walls and the difference in Raw PIPES is less than 1'-0".
3. For 4'-0" Precast Square Structure Bottoms, 50" Pipes with similar invert elevations are not permitted in adjacent walls. Use 5'-0" Side Dimensions when 36" pipe openings are required on adjacent walls and the difference in Raw PIPES is less than 1'-0".
4. For 7'-0" Precast Square Structure Bottoms, 60" Pipes with similar invert elevations are not permitted in adjacent walls. Use 8'-0" Side Dimensions when 66" pipe openings are required on adjacent walls and the difference in Raw PIPES is less than 1'-0".

### TABLE 2 - MINIMUM WALL LENGTHS FOR RECTANGULAR STRUCTURE BOTTOMS

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>SPACING</th>
<th>MAXIMUM WALL LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>3-6</td>
<td>6-9</td>
</tr>
<tr>
<td>24&quot;</td>
<td>4-6</td>
<td>8-12</td>
</tr>
<tr>
<td>36&quot;</td>
<td>5-8</td>
<td>10-15</td>
</tr>
<tr>
<td>42&quot;</td>
<td>6-8</td>
<td>12-18</td>
</tr>
<tr>
<td>60&quot;</td>
<td>8-9</td>
<td>15-21</td>
</tr>
<tr>
<td>72&quot;</td>
<td>10-12</td>
<td>18-25</td>
</tr>
<tr>
<td>84&quot;</td>
<td>11-14</td>
<td>20-26</td>
</tr>
</tbody>
</table>

**TABLE 2 NOTES:**
1. Minimum wall lengths based on precast structures, using concrete pipe with maximum skew angles per Table 3.
2. Wall lengths exceeding 25'-0" require special designs.

### MAXIMUM PIPE SKEW FOR PRECAST ROUND OPENINGS

**PLAN VIEW**

- Double Layer Horiz. Wall Reinforcement (Vertical Wall Reinforcement Not Shown For Clarity)
- Single Layer Horiz. Wall Reinforcement (Single Wall Reinforcement Not Shown For Clarity)

### TABLE 3 - MINIMUM WALL LENGTHS FOR PRECAST ROUND OPENINGS

<table>
<thead>
<tr>
<th>WALL THICKNESS</th>
<th>MAXIMUM PIPE SKEW ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>10°</td>
</tr>
<tr>
<td>6&quot;</td>
<td>15°</td>
</tr>
</tbody>
</table>

**TABLE 3 NOTES:** These values are based on 2" clearance for precast structures. Larger skews are possible for Cast-In-Place Structures or elliptical pipe openings when approved by the Engineer.
### Slab Designs - Square and Rectangular Structures (Table 6)

#### Short Way
<table>
<thead>
<tr>
<th>Slab Depth (Bars A)</th>
<th>Slab Schedule (Bars B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-0.5'</td>
<td>60</td>
</tr>
<tr>
<td>4-0'</td>
<td>60</td>
</tr>
<tr>
<td>3-40'</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Long Way
<table>
<thead>
<tr>
<th>Slab Depth (Bars A)</th>
<th>Slab Schedule (Bars B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-0.5'</td>
<td>60</td>
</tr>
<tr>
<td>4-0'</td>
<td>60</td>
</tr>
<tr>
<td>3-40'</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Size: 3'-6" x Unlimited

### Slab Designs - Round Structures (Table 7)

#### Slab Depth

<table>
<thead>
<tr>
<th>Slab Thickness</th>
<th>Slab Reinforcement (2-Way)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-6&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>4'-0&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>5'-0&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>6'-0&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>7'-0&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>8'-0&quot; Diameter</td>
<td></td>
</tr>
<tr>
<td>Size: 3'-6&quot; Diameter</td>
<td></td>
</tr>
</tbody>
</table>

### Slab and Wall Design Table Notes

1. Size is the inside dimension(s) of a structure.
2. Slab reinforcement is appropriate for top, intermediate, and bottom slabs.
3. Bottom slab reinforcement for cast-in-place rectangular structures at 10" depth or less, may be 3/8" thick.
4. Slab depth is measured between finished grade and top of slab.
5. Wall thickness is measured at the top of the bottom slab for boxes and to the top of the Intermediate slab for risers.
6. Wall height is the distance between top of upper slab to bottom of lower slab.
7. Wall lengths exceeding 6'-0" require two layers of reinforcing in the horizontal/vertical bars to the inside and outside faces for each layer.
8. Wall lengths exceeding the dimensions or depths shown in Table 8, or 12'-0" diameter require a special design.
9. Wall thickness and reinforcing for rectangular structures is the same for both long and short sides.
10. Reinforcing schedules with larger areas of steel may be substituted for schedules with smaller bar or wire spacing, except that Schedule 60 may not be substituted for Schedule 40.
### WALL DESIGNS - RECTANGULAR STRUCTURES (TABLE 8)

#### Vertical Reinforcing

<table>
<thead>
<tr>
<th>Wall Depth</th>
<th>Schedule</th>
<th>Schedule Length</th>
<th>Schedule Width</th>
<th>Schedule Height</th>
<th>Schedule Area</th>
<th>Schedule Volume</th>
<th>Schedule Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-6&quot; &amp; Risers</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
</tr>
</tbody>
</table>

#### Horizontal Reinforcing

<table>
<thead>
<tr>
<th>Wall Depth</th>
<th>Schedule</th>
<th>Schedule Length</th>
<th>Schedule Width</th>
<th>Schedule Height</th>
<th>Schedule Area</th>
<th>Schedule Volume</th>
<th>Schedule Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-6&quot; &amp; Risers</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
<td>20'+</td>
</tr>
</tbody>
</table>

---

### REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>Grade 60 Bars or 65 KSI &amp; 70 KSI Welded Wire Fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
</tr>
<tr>
<td>Grade 60 Bars</td>
</tr>
<tr>
<td>WWF Equiv.</td>
</tr>
</tbody>
</table>

#### Option 1

- Lap Splice
- All Quarter Point (30 bar Diameters Or Vertical Wire Spacing 2" For WWF)

#### Option 2

- Lap Splice
- With Standard 90° Hooks
- At Corners (8" For #4s, 10" For #5's, #6" #6's)

---

**WALL REINFORCING SPlice DETAILS (ALTERNATE B)**

**Structure Wall**

- 4" Lap Splice
- Single Layer Wall Reinforcing

**Double Layer Wall Reinforcing**

- Option 3
- Lap Splice
- Corner Spliced Bar (30 bar Diameters, But Not Less Than Two Vertical Wire Spacers Plus 2" For WWF)
- Half Plan
- Double Layer Wall Reinforcement

---

**REFERENCES**

- 2008 Foot Design Standards
- Sheet 4
Top View
- For Manholes
  - Type I
  - 2-Piece Cover
  - CAST IRON FRAMES

Wall Section
- For Curbs
  - Types 1, 2, 3, & 4
  - Type II

Section
- For Manholes
  - Type III

Walls Section
- For Curbs
  - Types 7 & 8

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 3 1/2" deep seats (traffic type). The 255 lb. cover (non-traffic type), 1984 Roadway and Traffic Design Standards, Index No. 201, is the replacement cover for existing frames with 5 1/2" deep seats. Installation of frame with 5 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 inlets 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frame</td>
<td>Cover (Std.)</td>
</tr>
<tr>
<td></td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>I</td>
<td>155 lbs.</td>
<td>190 lbs.</td>
</tr>
<tr>
<td>II</td>
<td>145 lbs.</td>
<td>180 lbs.</td>
</tr>
<tr>
<td>III</td>
<td>90 lbs.</td>
<td>180 lbs.</td>
</tr>
</tbody>
</table>
TOP SLABS TO WALLS

- Inside Face
- Outside Face
- Continuous Reinforcement
- Cold Cast Joint
- Dowel
- Grout

WALL JOINTS

- Cold Cast Joint

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 1/2".
3. Keyways are to be a minimum of 1/2" deep.
4. Joints between wall segments and between wall segments and top or bottom slabs may be sealed with grout or by preformed plastic gasket material, using the procedures given in Section 430-7.3.1 of the Specifications.
5. Minimum cover on dowel reinforcing bars is 2" outside face of structure.
6. Joints between wall segments and between wall segments and top or bottom slabs may be sealed with grout or by preformed plastic gasket material, using the procedures given in Section 430-7.3.1 of the Specifications.
7. Approved product inserts may be used in lieu of dowel embedment.

OPTIONAL CONSTRUCTION JOINTS

- Keyway with Grout (When Present)
- Top of Segment

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.

SEPARATE RISER SEGMENTS WITH CONSTRUCTION JOINTS OTHER THAN DOWEL OPTION

Riser Or Inlet Opening (Location Varies)

- Dowel Construction
- Or Monolithically Cast Only

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

2008 FOOT Design Standards
SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS
When precast units are used in conjunction with Alt. B, the required concrete strength of the precast units can be determined by the design strength of the precast units. 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:

**General Notes**

1. For square or rectangular precast drainage structures, either deformed or smooth weld wire reinforcement may be used provided:
   - The smooth weld wire reinforcement shall comply with ASTM A495 and deformed weld wire reinforcement shall comply with ASTM A487.
   - When a reduced area of reinforcement is provided, any maximum bar spacing shown shall be reduced in accordance with Option 2 or 3 as shown in the Reinforcing Spacing Details.
   - Horizontal steel in the walls of rectangular structures shall-type is to be used in accordance with Option 1.2 or 3 as shown in the Wall Reinforcing Spacing Details.
   - Welding of splices and laps is permitted. The requirements and restrictions placed on welding in AASHTO M259 apply.
   - Rebar straight and embedded peripheral reinforcement may be used in lieu of ASTM standard hooks for toe and bottom laps except when hooks are specifically called for in the plans or standard drawings.
   - Concrete as specified in ASTM C477, (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.

**Notes for Precast Options & Welded Wire Reinforcement Substitution for Bar Reinforcement**

1. Details for optional precast inlet construction up to depths of 5' are shown on the inlet indexes.
2. When precast units are used in conjunction with Alt. B, the interior dimensions of the Alt. B Bottom can be adjusted to reflect these inlet interior dimensions.
3. Concrete which meets the requirements of ASTM C477 or Class IV shall be used for precast structures constructed with 5" water slab thickness.
4. Reinforcement can be either deformed bar reinforcement or weld wire reinforcement. Bar reinforcement other than 60 ksi may be used only when 60 ksi is recognized.
5. Reinforcement shall be of such mix that carries which meet the requirements of Section 449 of the Specifications.
6. Precasting for pipe shall be the pipe ID plus 6" (± 1") tolerance. Mortar used to seal the pipe into the structural pipe may be used in lieu of brick and mortar construction to seal pipe openings less than 25" wide.
7. For pay item purposes, the height 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 manifold, (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 line elevation of the lowest pipe or top of sump floor.

---

**Equivalent Steel Area Table**

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>Bar Size &amp; Spacing</th>
<th>Steel Area (lf/ft)</th>
<th>Bar Size &amp; Spacing</th>
<th>Steel Area (lf/ft)</th>
<th>Style Designation</th>
<th>Min. Steel Area (lf/ft)</th>
<th>Style Designation</th>
<th>Min. Steel Area (lf/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6 x 6 ft Chs.</td>
<td>0.20</td>
<td>6 x 6 ft Chs.</td>
<td>0.30</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.286</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td></td>
<td>6 x 6 ft Chs.</td>
<td>0.24</td>
<td>6 x 6 ft Chs.</td>
<td>0.36</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.286</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>Special</td>
<td>6 x 6 ft Chs.</td>
<td>0.267</td>
<td>6 x 6 ft Chs.</td>
<td>0.40</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.265</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>B</td>
<td>6 x 6 ft Chs.</td>
<td>0.31</td>
<td>6 x 6 ft Chs.</td>
<td>0.35</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.315</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>C</td>
<td>6 x 6 ft Chs.</td>
<td>0.37</td>
<td>6 x 6 ft Chs.</td>
<td>0.39</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.345</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>Special</td>
<td>6 x 6 ft Chs.</td>
<td>0.53</td>
<td>6 x 6 ft Chs.</td>
<td>0.75</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.482</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>D</td>
<td>6 x 6 ft Chs.</td>
<td>0.73</td>
<td>6 x 6 ft Chs.</td>
<td>1.095</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.675</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>Special</td>
<td>6 x 6 ft Chs.</td>
<td>1.06</td>
<td>6 x 6 ft Chs.</td>
<td>1.59</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.975</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>E</td>
<td>6 x 6 ft Chs.</td>
<td>1.24</td>
<td>6 x 6 ft Chs.</td>
<td>1.86</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>1.145</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
<tr>
<td>G</td>
<td>6 x 6 ft Chs.</td>
<td>1.46</td>
<td>6 x 6 ft Chs.</td>
<td>2.19</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>1.347</td>
<td>3 x 3 x 4.6 x 4.6</td>
<td>0.174</td>
</tr>
</tbody>
</table>

---

**Notes**

When a reduced area of reinforcement is provided, any maximum bar spacing shown shall be reduced in accordance with the following equations, unless otherwise shown:

- Max. Bar Spacing = Grade 60 Bar Spacing
- Max. Smooth Welded Wire Spacing = Grade 60 Bar Spacing x 0.86
- Max. Deformed Welded Wire Spacing = Grade 60 Bar Spacing x 0.74

In no case with reinforcement with wires smaller than 3/8 or 5/32, or spacings greater than 8" shall lap spliced bar reinforcement shall be considered. The minimum yield designation grade mark as required by the number 60 or one (1) grade mark line to be acceptable at the higher value. The maximum bar spacing shall be greater than two (2) times the bar thickness, with a maximum spacing of (1) or three (3) times the wall thickness, with a maximum spacing of (18") for vertical bars and (10") for horizontal bars.

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**Supplementary Details for Manholes and Inlets**

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2008 FDOT Design Standards

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2008 FDOT Design Standards

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2008 FDOT Design Standards

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2008 FDOT Design Standards

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2008 FDOT Design Standards
Provide 4 Extra #4 Bars (Continuous Around Corner Evenly Spaced) Top To The Outside Of Vertical Wall/Rein.

Design Joint Or Monolithically Wall & Slabs

hy = 1'-0" (See Note Below)

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

Pictorial View

Note: 1. hy 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 finish grade elevation substitute a #8 Bar for the top corner bar when hy 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 ≤ 45° (Not Centered)

Plan View for Skews > 45° (Not Centered)

Details for Skewed Pipes in Rectangular Structures

Supplementary Details for Manholes and Inlets
The coarse aggregate shall be placed in 6 inch lifts and compacted sufficiently as to be firm and unyielding. The coarse aggregate shall be gravel or stone meeting the requirements of Standard Specification Section 302.1 or 302.3 respectively. The gradation shall meet Section 302.1.4, Grades 4, 487, 55, or 57 unless restricted in the plans. The filter fabric shall be Type 0-1 (See Index No. 109). The cost of furnishing and installing the extra aggregate and filter fabric shall be included in the cost of the culvert.

ASPHALTIC CONCRETE BASE

Note: Extra materials is required when cross culverts are located on facilities subject to high speed traffic (255 mpm) or high traffic volumes (3,900 AADT) and the cover is less than 12 inches for concrete pipe, 15 inches for corrugated steel pipe, and 18 inches for corrugated aluminum pipe, corrugated polyethylene, and corrugated polyvinyl chloride pipe.

EXTRA MATERIAL FOR CROSS CULVERTS UNDER FLEXIBLE PAVEMENTS

GENERAL NOTES

1. The tabulated values are recommended minimum dimensions to withstand anticipated highway traffic loads. Additional cover may be required to support construction equipment loads or highway traffic loads before pavement is completed. Some size thickness combinations may require minimum cover greater than those listed above. See Sheets 2, 3, 4

2. Less than the tabulated minimum cover may be used provided suitable methods are detailed in the plans.

3. Values shown in parenthesis are for 5" x 1" corrugations which must be specified to utilize the lesser cover.

4. The tabulated values in the brackets apply to Type 1-R (Spiral Rib) pipe which must be specified to utilize the lesser cover.

5. Commercial and noncommercial refers to typical vehicular utilization of unpaved roads and drives where rutting and cover displacement may occur.

6. For Pipe Class 5, with diameters of 12" to 30", the minimum height of fill measured from top of finished grade to outside top of pipe is 3 feet.
### Round Pipe Dimensions

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-36&quot;</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>36&quot;-54&quot;</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>60&quot;-72&quot;</td>
<td>7</td>
<td>11</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>84&quot;-96&quot;</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:** At the option of the pipe supplier or the contractor, a Pipe Class with greater strength may be substituted for the Pipe Class designated in the plans.

### Elliptical Pipe Dimensions

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-36&quot;</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>36&quot;-54&quot;</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>60&quot;-72&quot;</td>
<td>7</td>
<td>11</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>84&quot;-96&quot;</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:** At the option of the pipe supplier or the contractor, a Pipe Class with greater strength may be substituted for the Pipe Class designated in the plans.

### Maximum Cover Heights Concrete Pipe

**Note:** Height of fill (maximum cover) is measured from top of finished grade to outside top of pipe.

### Polyethylene Pipe

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Height of Maximum Fill (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-60&quot;</td>
<td>17</td>
</tr>
</tbody>
</table>

### Polyvinyl Chloride Pipe

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Height of Maximum Fill (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-48&quot;</td>
<td>17</td>
</tr>
</tbody>
</table>

### Elliptical Pipe Installations (All Sizes)

<table>
<thead>
<tr>
<th>Installation</th>
<th>Maximum Height of Fill (ft)</th>
<th>Pipe Class</th>
<th>Grading Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pipe Dimensions Concrete Pipe

For Informational Purposes Only. Do not specify Wall Thickness. Option B Walls in industry Standard.

---

**For Informational Purposes Only**

---

**Maximum Cover for Plastic PIPE**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Height of Maximum Fill (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-60&quot;</td>
<td>17</td>
</tr>
</tbody>
</table>

---

**Maximum Cover for Plastic PIPE**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Height of Maximum Fill (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-48&quot;</td>
<td>17</td>
</tr>
<tr>
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### Round Pipe - 3" x 1" Corrugation

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### Round Pipe - 5" x 1" Corrugation

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### Notes:
- Increase the minimum cover values shown on Sheet 1 of 6 by 6" for gage and size combinations below the heavy line. 6000 psi gage and thicker material.
- Limited availability of this product. Check availability before specifying. (generally limited to 3" x 1" corrugation pipe arch fabricated from 60" and smaller diameter round pipe in 12 ga. and thicker material).
- 360° perforated pipe arch (french drain pipe) is not recommended. Do not specify without checking suitability and availability.
- 5" x 1" corrugated pipe is currently not manufactured for the Florida market. Check availability before specifying.
- 0.109 in (12 gage) for spiral rib, 8" maximum cover, 3" x 1" x 11/2" rib spacing (3 rib) only.
Notes:

- Special installation required. Refer to AASHTO Standard Specifications for Highway Bridges or ASTM 8788-88 and manufacturer's recommendations.

Maximum Cover for Corrugated Aluminum Alloy Round Pipe and Pipe Arch

Notes:

1. Limited availability of this product. Check availability before specifying.
2. 30° perforated pipe (French drain pipe) is not recommended in the pipe arch shape. Do not specify without checking both for suitability and availability.
3. This size and gage combination must be certified during installation per manufacturer's recommendations. Extra care will be required during handling and installation.
4. Use of this size and gage combination must be approved by the State Drainage Engineer.
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**Combination Metal Thickness, Reinforcing Rib Type, and Rib Spacing**

Arch Shape - HS 20 Live Load

Round Shape - HS 20 Live Load

* Number in ( ) below combination indicates maximum cover for the given combination plate thickness, rib type and rib spacing. Aluminium cover depths are given in feet. (See Note Number 2 Under Structural Plate Notes Sheet 6 of 6).
**Aluminum Structural Plate**

**Height of Cover Limits**

**Combination Metal Thickness, Reinforcing Rib Type, and Rib Spacing**

**Underpass Shape- HS 2G Live Load**

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**Minimum Height of Cover (Ft.)**

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**Aluminum Structural Plate Notes**

1. Allowable cover (minimum & maximum) is measured from the outside valle of crown plate to the bottom of flexible pavement or from the outside valley of the crown plate to the top of rigid pavement. Minimum cover must be maintained in unpoxed areas. Maximum cover is measured at the fillet radius and/or the highest pavement elevation.

2. To find the minimum required materials for the aluminum structural plate structure:
   a. Select the span in the left hand column that is equal to or larger than structure thickness required.
   b. Select the cover in the right hand column that is equal to or larger than required for the site.
   c. Intersect appropriate span and cover to find the appropirate plate.
   1. Example: Round Pipe, Span=17'-0", Height of Cover=2'-7".
   2. Select 2.5 ft. in table. Area 0.125-IV-18 = 0.125-IV-18.
   3. The table selections show metal thickness, rib type, rib spacing and live load plate. The supporting soil foundation must be checked to ensure that they do not react against these pressures to avoid inducing excessive strain in plate.

**Design Notes**

1. The plate must colllas size, metal thickness, reinforcing rib type and rib spacing.

2. Pipe-arch and underpass shapes will generate higher corner bearing pressures against the sidefill and foundation. The height of cover is directly affected by these bearing pressures. The surrounding soil foundation must be checked to ensure that they do not react against these pressures to avoid inducing excessive strain in plate.

---

**Minimum and Maximum Cover for Aluminum Structural Plate**

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* Number in ( ) below combination indicates maximum cover for the given combination plate thickness, rib type and rib spacing. Maximum cover depths are given in feet. (See Note 2 Under Structural Plate Notes)
1. Trench drain is intended for use in gutters and driveways as shown on the typical locations on Sheet 2. Type I is intended for use in
2. PREFORMED POLYETHYLENE ALTERNATE
3. ROUNDCSP ALTERNATE
4. POLYETHYLENE
5. ALTERNATE
6. Payment to be made under the contract unit price for Trench Drain, LF.
7. Where placed adjacent to reinforced concrete barrier wall or median barrier wall, the designer shall detail the plans through a
8. Trench excavation must allow for a minimum of 6" of concrete to be placed under and alongside the trench drain channel system.
9. Concrete backfill shall meet the requirements of Section 347 of the Standard Specifications. At the end of all units (Type I or II), the
10. Transverse bars for Type I Trench Drain shall be spaced 4" to 6" on center.
11. Whenever the work disturbs existing conditions or work already completed, restore the same to its original condition in every detail.
12. Unless shown in the plans, outlet pipes and preformed channel/invert shall be placed at a minimum of 0.67/174" wide (transverse to the
13. A cleanout port shall provide an opening to exceed 6" minimum past the end of the drain opening.
14. Transverse bars for Type I Trench Drain shall be spaced 4" to 6" on center.
15. Concrete backfill shall be placed under and alongside the trench drain channel system. Concrete backfill shall meet the requirements of
16. Where cleanouts are placed adjacent to raised curb or separator, the curb or separator shall be formed around the cleanout. The cleanout
17. Rendered Grade
18. Round pipe alternate is available in 12, 18, 24 and 36 inch
WITHIN TYPE E CURB

WITHIN TYPE F CURB

WITHIN DROP CURB

WITHIN VALLEY GUTTER

ADJACENT TO SHOULDER BARRIER WALL

ADJACENT TO TRAFFIC SEPARATOR

ROUND PIPE ALTERNATE SHOWN, BUT PREFORMED POLYETHYLENE ALTERNATE ACCEPTABLE

TYPICAL LOCATIONS FOR TYPE I

TYPICAL LOCATIONS FOR TYPE II

* As Necessary To Provide 6" of Concrete On This Side Of Drain

2008 FDOT Design Standards

Sheet No. 2 of 2

Index No. 206
PLAN (INLET TYPE 2 SYMMETRICAL ABOUT J)

SECTION BB (INLET TYPE 2 SYMMETRICAL ABOUT J)

INLETS TYPES 1 AND 2

DIMENSIONAL SECTION

REINFORCING SECTION

3'-6" DIA. STRUCTURE BOTTOM (SECTION AA)

TRANSVERSE SECTIONS FOR INLETS TYPES 1, 2, 3 & 4

GENERAL NOTES

1. The finished grade and slope of the inlet tops are to conform with the finished cross slope and grade of the proposed sidewalk and/or border.

2. When inlets are to be constructed on a curve, refer to the plans to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.

3. All steel in inlet tops shall have 114" minimum cover unless otherwise shown. Inlet tops shall be either cast-in-place or precast concrete.

4. The rear wall portion of inlet types 1, 2, 3 & 4 may be constructed with brick. Dowels to top slab required.

5. For supplemental details see Index No. 217.

6. Only round concrete support post will be acceptable.

7. These inlets are designed for use with standard curb and gutter Types E and Type F. Locate inlet outside of pedestrian crosswalks.

8. For structure bottoms see Index No. 200.

9. Inlet to be paid for under the contract unit price for inlets (Curb) Type J, Each.
1. The finished grade and slope of the inlet tops are to conform with the finished cross slope and grade of the proposed sidewalk and/or border.

2. When inlets are to be constructed on a curve, refer to the plans to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.

3. Reinforcing steel shall have 3/8" minimum cover unless otherwise shown. Inlet tops shall be either cast-in-place or precast concrete.

4. Precasting of this inlet top is permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawing approval shall be directed to the State Drainage Engineer.

5. Concrete meeting the requirements of ASTM C478 (4,000 PSI) may be used in lieu of Class I concrete for precast units, manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

6. The corner fillets shown for rectangular throats are necessary only when throats are to be used in conjunction with circular inlet bottoms or when used on skew with rectangular inlet boxes.

7. For inlet bottoms see Index No. 200. 4" and larger bottoms are to be used with 3/4" riser.

8. These inlet tops are designed for use with standard curb and gutter Type E and Type F. Locate inlet outside of pedestrian crosswalks.

9. See Index No. 201 for supplemental details.

10. All steel used for frame and grate shall meet the requirements of ASTM A36/A36M.

11. Either cast-iron grates or steel grates may be used.

12. When Alternate "G" grate is specified in the plans either the cast-iron grate and galvanized steel frame or the galvanized steel grate and frame must be used. Grates are to be grouted in accordance with the grouting detail shown on sheet 2 of 2, in lieu of tack welding.

13. Inlet to be paid for under the contract unit price for Inlets (Curb) Type E, Each.
GENERAL NOTES

1. This inlet is used in Traffic Separators Types I and II or, in separators constructed with Curbs Types A, B and E and sidewalk paving, which cannot accommodate Inlets Types 1, 3, 4, 5, or 6. Use of this inlet on through traffic side of the separator is not permitted in medians with Curb Types A and B and sidewalk paving, which cannot accommodate Inlets Types 1, 2, 3, 4, 5, or 6. Use of this inlet on through traffic side of the separator is not permitted in medians with Curb Types A and B.

2. Reinforcing to be Grade 60 bars with 2" min. cover unless otherwise shown. See Index No. 201 for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe when necessary. Bars to clear pipe by 1 1/4".

3. Recommended maximum pipe sizes are 24" longitudinal and 30" transverse. For larger pipe, Inlets with A or B bottoms, Index No. 200 are recommended.

4. For supplementary details see Index No. 202.

5. All dimensions are for both precast and cast-in-place Inlets unless otherwise shown.

6. Inlet to be paid for under the contract unit price for Inlets (Curb) (Type 1) Each.

2008 FDOT Design Standards

CURB INLET TYPE 7
1. This inlet is to be used only in Traffic Separators Types IV and V or, in separators constructed with Curbs Types D and F and sidewalk paving, which cannot accommodate inlets Types 1, 2, 3, 4, 5 or 6. Use of this inlet on the through traffic side of the separator should be avoided in medians constructed with Curbs Types D (Curbs inlets Types 9 or 10 are recommended). Locate inlet outside of designated pedestrian travel way.

2. All reinforcing to be Grade 60 bars with 2" min. cover unless otherwise shown. See Index No. 201 for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe when necessary. Bars to clear pipe by 2 1/2".

3. Recommended maximum pipe sizes are 24" longitudinal and 30" traverse. For larger pipe, inlets with 4B bottoms, Index No. 200 are recommended.

4. For supplemental details see Index No. 201.

5. All dimensions are for both precast and cast-in-place inlets unless otherwise shown.

6. Inlet to be paid for under the contract unit price for Inlets (Curb) Type B, Each.
This inlet is primarily intended for locations with light to moderate flows where right of way does not permit the use of throated Curb Inlets Types 1 through 6. The typical application is on curb returns to city streets.

This inlet to be located outside of curb ramp area in vertical faced curbs such as Curb and Gutter Type F. Grate shall be oriented with vanes directed toward predominate flow.

For structure bottoms see Index No. 200. For supplemental details see Index No. 201.

All steel in slob tops shall have 1 1/4" minimum cover unless otherwise shown. Tops shall be either cast-in-place or precast concrete.

For Alternate B applications, top slob openings shall be placed such that 2 edges of inlet frame will be located directly above bottom wall or riser wall.

When used on a structure with dimensions larger than those detailed above and risers are not applied, the top slab shall be constructed using Index No. 200 with the slab opening adjusted to 24" x 36". The "Special Top Slab" on Index No. 200 is not permitted.

Frame may be adjusted with one to six courses of brick.

Cast iron frame grate and hood to be U.S. Foundry 5301-6016, Neenah Foundry R-3057-L, or approved equal. Inlet and grate detail shown is Neenah R-3057-L. Vaned grates with approximately equal openings will be permitted that satisfy AASHTO HS-20 loading. Grates shall be reversible, right or left.
1. This inlet is primarily intended for locations with light flows where right of way does not permit the use of throated Curb Inlets Types 1 through 6. The typical application is on curb returns to city streets. The inlet grate is suitable for pedestrian and bicycle traffic.

2. This inlet to be located outside of curb ramp area in vertical faced curbs such as Curb and Gutter Type F. Grate shall be oriented with vanes directed toward predominate flow.

3. For structure bottoms see Index No. 200. For supplemental details see Index No. 201.

4. Steeplin slab tops shall have 1/4" minimum cover unless otherwise shown. Tops shall be either cast-in-place or precast concrete.

5. For Alternate B applications, top slab openings shall be placed such that 2 edges of inlet frame will be located directly above bottom or riser walls.

6. When used on a structure with dimensions larger than those detail above and risers are not applied, the top slab shall be constructed using Index No. 200 with the slab opening adjusted to 24"x36". The "Special Top Slab" on Index No. 200 is not permitted.

7. Frame may be adjusted with one to six courses of brick.

8. Cast iron frame grate and hood to be U.S. Foundry 5161-6019, Neenah Foundry R-3065-L, or approved equal. Inlet and grate detail shown is Neenah R-3065-L. Vaned grates with approximately equal openings will be permitted that satisfy AASHTO HS-20 loading. Grates shall be reversible.

GENERAL NOTES:

- Top slab shall be constructed using Index No. 200 with the slab opening adjusted as necessary.
- Frame may be adjusted with one to six courses of brick.
- Cast iron frame grate and hood to be U.S. Foundry 5161-6019, Neenah Foundry R-3065-L, or approved equal.
GENERAL NOTES

1. The finished grade and slope of the inlet top are to conform with the finished cross slope and grade of the proposed sidewalk and/or border.

2. When inlets are to be constructed on a curve, refer to the plans to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.

3. All steel shall have 2\frac{1}{2}" minimum cover unless otherwise shown. Inlets can be either cast-in-place or precast concrete. Chamfer all exposed edges 2\frac{1}{2}".

4. All reinforcement is ASTM A615/A615M Grade 60 steel, either smooth or deformed. Equivalent area grade 40 steel or 65 ksi welded wire fabric may be substituted.

5. Inlets to be paid for under the contract unit price for Inlets (Closed Flume) EA.

DESIGN NOTES

1. These inlets are designed for use with Type F curb and gutter only. Locate inlet outside of curb ramp area.

The Single Barrel Flume is intended for locations with light to moderate flows. Multiple Barrel Flumes must be selected to meet design heavy flows.

2. Designer must specify Flume Type, "D" dimension, number of barrels and girding requirements in plans.

3. Designer must specify where energy dissipating bricks are required.
Curb & Gutter: To dissipate energy when called for in plans, bricks to be included in the cost of the inlet.

Bricks to be included in the cost of the inlet.

Existing Ground:

The cost of the 4" thick slab and the 6"x6" W2.5xW2.5 Min. welded wire reinforcement in the middle of slab to be included in the cost of the inlet.

Single Barrel Flume Depicted

Slopes, Ditch Apron and Endwalls

See Plans for Guiderrail Requirements

Closed Flume Inlet

Guiderrail for Flume in Sidewalk
**CAST-IN-PLACE CEMENT PRODUCTS**

**HORIZONTAL WALL REINFORCEMENT SCHEDULE**

<table>
<thead>
<tr>
<th>WALL</th>
<th>INLET</th>
<th>SCHEDULE</th>
<th>#4 BARS</th>
<th>PRECAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-3</td>
<td>42</td>
<td>0.20</td>
<td>1 2&quot;</td>
<td></td>
</tr>
<tr>
<td>3'-6</td>
<td>46</td>
<td>0.20</td>
<td>1 2&quot;</td>
<td></td>
</tr>
<tr>
<td>6'-9</td>
<td>65.5</td>
<td>0.24</td>
<td>1 5&quot;</td>
<td></td>
</tr>
<tr>
<td>9'-12</td>
<td>66.5</td>
<td>0.37</td>
<td>1 6&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

1. Inlet Descriptions:
   - Type 1: Single throat, one side of barrier wall.
   - Type 2: Double throats, one side of barrier wall.
   - Type 3: Two single throats, opposite sides of barrier wall.
   - Type 4: Two double throats, opposite sides of barrier wall.
   - Type 5: Double throats, one side of barrier wall, and single throat on other side of barrier wall.

2. For grate details, see Index No. 220. The parallel grate shall be used unless the reticuline grate is specified. For bicycle traffic, a suitable grate for pedestrian traffic is required.

3. A sloped edge and corners shall be chamfered to 1" radius. For standard concrete barrier dimensions and for dimensions of concrete barrier wall incorporating light standards, see Index No. 240.

4. For standard concrete barrier wall dimensions and for dimensions of concrete barrier wall incorporating light standards, see Index No. 240.

5. Reinforcing steel shall have 2" minimum cover. Horizontal reinforcement must be placed 3" from the inside face unless otherwise shown.

6. All reinforcing is Grade 60. See Index No. 240 for equivalent area of welded wire fabric. For Inlets, Longitudinal steel bars extend over full height of concrete barrier wall transition. Tie bars @ 12" cts. Reinforcing to be paid for under contract unit price for Concrete Barrier Wall, LF.

7. For supplemental details, see Index No. 201.

8. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

Sections for Inlets Types 1 & 2 (Pipe Opening Shown)

Sections for Inlets Types 3, 4 & 5 (Non-Symmetrical Section Shown)
GENERAL NOTES

1. This inlet is primarily intended for use adjacent to concrete barrier walls on paved shoulders. Use of the inlet adjacent to other wall types shall be approved by the Drainage Engineer. The inlet is suitable for bicycle and occasional pedestrian traffic, but should not be placed in a designated pedestrian travelway. It is not intended for use in curb and gutter or other areas where threatened inlets are required, nor areas subject to high debris.

2. Inlets located in embankments constructed with earth anchored retaining wall shall be designed with minimum depths to reduce adverse impact on the anchorage system. Runs of pipe parallel to and near anchored wall shall be avoided wherever possible. Special coordination must be exercised during the design and construction of storm water systems within anchored walls.

3. Inlet bottoms and/or tops may be either precast or cast-in-place. Whether cast as a single unit or as multiple segments, and whether precast or cast-in-place, the upper 2-3" of the inlet shall be reinforced in accordance with sections CC, DD, EE.

4. All exposed edges and corners shall be 3/4" chamfered or toolied to 1/4" radius.

5. When Alternate G grate is specified in the plans, the grate is to be hot-dip galvanized after fabrication. Paid installation of the filter bar called for in Inlet B shall not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting, or, matching grate to structure prior to galvanizing.

6. All reinforcing is Grade 60 bars. See Index No. 201 for equivalent area of welded wire fabric.

7. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

8. For supplemental details see Index Nos. 202 and 204.

9. Inlets to be paid for under the contract unit for Inlets (Barrier Walls). Each.

INLET WITH STRUCTURE BOTTOM

### Recommended Maximum Pipe Sizes

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Inlet Inside Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-11&quot; or 3'-3&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>4'-0&quot; or 2'-10&quot;</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom diagram below and Index No. 500.

### Horizontal Wall Reinforcing Schedule (Table 1)

<table>
<thead>
<tr>
<th>Area</th>
<th>Schedule (in/ft²)</th>
<th>No.</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-0&quot;</td>
<td>0.20</td>
<td>12&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.20</td>
<td>6&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>9'-12&quot;</td>
<td>0.24</td>
<td>30&quot;</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

### General Notes

1. The Inlet is intended for use in shoulder gutter on facilities subject to heavy wheel loads. The parallel bar grate shown shall be used on limited access facilities. On other facilities the reticulated grate shall be used. Locate inlet outside of designated pedestrian travelway.

2. All reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. See Index No. 201 for equivalent area of welded wire fabric. Bars to be cut or bent for 3/4" minimum clearance around pipe.

3. All exposed edges and corners shall be sharp 3/4" radius or holed to 3/4" radius.

4. When Alternate G grate is specified in plans, the grate is to be hot-dip galvanized after fabrication.

5. For supplementary details see Index Nos. 200 and 201.

6. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

7. Debit to be paid for under the contract unit price for inlets (Gutter Type 5, 6) Cost of concrete or asphalt apron at terminal inlets to be included in the cost of the inlet.

---

### Section BB

See Inset A for Precast Inlet (Typ.)

1. Precast Grate Box is shown in the inset for reference, but not included in the general dimensions.

2. All reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. See Index No. 201 for equivalent area of welded wire fabric. Bars to be cut or bent for 3/4" minimum clearance around pipe.

---

### Section AA

CAST IN PLACE INLET

1. Precast Grate Box is shown in the inset for reference, but not included in the general dimensions.

2. All reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. See Index No. 201 for equivalent area of welded wire fabric. Bars to be cut or bent for 3/4" minimum clearance around pipe.

---

### Section CC

**SHAPE GUTTER TRANSITION**

1. A bumper strip is placed on the outside of the gutter.

2. The theoretical gutter line is shown.

### Section DD

**SHAPE GUTTER TRANSITION**

1. A bumper strip is placed on the outside of the gutter.

2. The theoretical gutter line is shown.

### Section FF

**STEEL GRATE**

1. The theoretical gutter line is shown.

---

### Inlet With Structure Bottom

General Notes:

1. Use precast or cast-in-place inlets unless otherwise noted.

2. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

3. Debit to be paid for under the contract unit price for inlets (Gutter Type 5, 6) Cost of concrete or asphalt apron at terminal inlets to be included in the cost of the inlet.
Apron To be Constructed At The Most Downstream Inlet In A Run Of Shoulder Gutter

CONCRETE APRON AT TERMINAL INLETS

SECTION BB
(Enlarged)

SECTION AA
(Enlarged)

5'-0" Concrete Apron

PICTORIAL VIEW
ALT. A STRUCTURE BOTTOM FOR INLET TYPE S
NOTE: #8 Structure Bottom Only. See Index No. 200 for structure bottom details and hole reinforcement. (For Pipes 3' or 3' and Larger)

RECOMMENDED MAXIMUM PIPE SIZES

<table>
<thead>
<tr>
<th>Inlet Inside Width</th>
<th>Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-11&quot; or 3'-3&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>3'-4&quot; or 3'-10&quot;</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom details above and Index No. 200.

GENERAL NOTES

1. This inlet is suitable for village streets, ditches, or other areas subject to heavy wheelloads, minimum debris, and bicycle traffic. This inlet may be placed in areas subject to occasional pedestrian traffic such as landscaped areas and pavement areas where pedestrians can walk around the inlet.

2. When alternate "G" grate is specified in plans, the grate is to be hot dip galvanized after fabrication.

3. Reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. See Index No. 203 for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe to clear pipe 2 1/2".

4. All exposed edges and corners shall be chamfered or tooled to 45° radius.

5. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

6. For supplementary details see Index No. 201.

7. Inlet to be paid for under the contract unit price for Inlets (Gutter Type V), EL.

<table>
<thead>
<tr>
<th>WALL DEPTH</th>
<th>SCHEDULE</th>
<th>AREA (in.²/ft.)</th>
<th>MAX. SPACE (bars/ft.)</th>
<th>BAR SIZES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5&quot;</td>
<td>400</td>
<td>0.20</td>
<td>12&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>5&quot; - 9&quot;</td>
<td>46</td>
<td>0.20</td>
<td>6&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>9&quot; - 12&quot;</td>
<td>44</td>
<td>0.20</td>
<td>4&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>9&quot; - 15&quot;</td>
<td>85.5</td>
<td>0.24</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
</tr>
</tbody>
</table>

HORIZONTAL WALL REINFORCING SCHEDULE (Table 1)

STEEL GRATE

Steel Grate: Manufactured by Borden Florida Steel, U.S. Foundry, Reliance, Gruleich, Or Equivalent.

INLET MARKINGS

Pipe Opening Shown

<table>
<thead>
<tr>
<th>PIPE OPENING SHOWN</th>
<th>SECTION AB</th>
<th>PIPE OPENING SHOWN</th>
<th>SECTION AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Pipe Opening Not Shown)</td>
<td>SECTION BB</td>
<td>(Pipe Opening Not Shown)</td>
<td>SECTION AA</td>
</tr>
</tbody>
</table>

PLAN

CAST-IN-PLACE INLET ShOWN WITHOUT GRATE/PRECAST INLET SIMILAR

SECTION AB

CAST-IN-PLACE INLET ShOWN PRECAST INLET SIMILAR

SECTION AA

CAST-IN-PLACE INLET

PRECAST INLET
TOP SLAB REINFORCING DIAGRAM

Centered Opening
Round Structure Bottom
See Index No. 200 For Structure Bottom Details and Hole Reinforcement.

TOP SLAB REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>SLAB DEPTH</th>
<th>SLAB THICKNESS</th>
<th>REINFORCING (2 WAYS) SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-11&quot; to 4'-0&quot; Min. To B'-0&quot; Max.</td>
<td>2'-11&quot; to 4'-0&quot; Min. Length</td>
<td></td>
</tr>
<tr>
<td>95/8&quot; For 8'-0&quot; Structure Bottoms</td>
<td>115/8&quot; For 8'-0&quot; Structure Bottoms</td>
<td></td>
</tr>
</tbody>
</table>

SECTION AA

ALT. A STRUCTURE BOTTOM FOR INLET TYPE V

GUTTER INLET TYPE V
**RECOMMENDED MAXIMUM PIPE SIZES**

<table>
<thead>
<tr>
<th>Ditch Inside Width</th>
<th>Pipe Size</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-6&quot;</td>
<td>18&quot;</td>
<td></td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>24&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom detail and Index No. 200.

**GENERAL NOTES**

1. This inlet is designed for ditches, medians, or other areas subject to heavy wheel loads on limited access facilities where debris may be a problem. This inlet is not for use in areas subject to pedestrian and/or bicycle traffic.

2. All reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. Cut or bend bars out of way of pipe to clear pipe by 3/4". See Index 201 for equivalent area of welded wire fabric.

3. All exposed edges and corners shall be 3/4" chamfer or tooled to 1/4" radius.

4. When alternate "G" grate is specified in plans, the grate is to be hot-dip galvanized after fabrication.

5. Cost of ditch paving to be included in the cost of Inlet. Sodding to be paid for under contract unit price for Performance Turf, SY.

6. For supplemented details see Index No. 201.

7. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

8. Inlet to be paid for under the contract unit price for inlets (Cut Out Type A), EA.
### Top Slab Opening Schedules

<table>
<thead>
<tr>
<th>Diameter (Min. to Max.)</th>
<th>Opening Size</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot; To 8'-0&quot;</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3'-0&quot; Or 2'-0&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4'-0&quot; Min. To 8'-0&quot; Max.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Top Slab Reinforcing Diagram

- **Bar Each Corner**: 12'-0" Min. Length
- **2 Way Reinforcement**: See Tables

### Top Slab Reinforcing Schedule

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>SLAB WIDTH</th>
<th>STL.</th>
<th>REINFORCING (2 WAYS)</th>
<th>SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Top Slab with Centered Opening

- **Top Slab with Centered Opening**
- **Round Structure Bottom**
- **Details and Hole Reinforcement**

### ALT. A Structure Bottom for Inlet Type A

- **Ditch Bottom Inlet Type A**
- **Section AA**
- **Section BB**
**GENERAL NOTES**

1. The general purpose of the inlet top designs are:
   a. For ditches, medians or other areas subject to heavy wheel loads. This inlet may be placed in areas subject to occasional pedestrian traffic such as landscaped areas and pavement areas where pedestrians can walk around the inlet.
   b. Provide full grate and horizontal slot designs for new construction.
   c. Provide full grate and horizontal slot designs for replacing the vertical slot tops on existing Inlets Type B and Type X that are in locations subject to occasional pedestrian traffic.

2. Air reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. See Index No. 201 for equivalent area of welded wire fabric. Bars to be cut or bent for min. 2½" clearance around pipe.

3. All exposed edges and corners shall be ¼" chamfer or tooled to ½" radius.

4. When alternate G grades are specified in the plans, the grates are to be hot-dip galvanized after fabrication.

5. Cost for constructing traversable tops on new inlet boxes shall be included in the contract unit price for Inlets (GT) B/T (Type B), E4, and shall include the cost for surrounding concrete inlet pavement.

Existing Inlets Type (B and Inlets Type X) that are converted to traversable inlet tops shall be paid for under the contract unit price for Inlets (GT) B/T (Type B) (Partial), E4. Unit price and payment shall be full compensation for inlet conversion and shall include the removal and disposal of any existing concrete inlet pavement; the removal and stockpiling or disposal of sufficient material from the existing inlet box to facilitate construction of the required inlet top; construction of the required inlet conversion backfill; construction; construction of concrete inlet pavement; replacing, supplementing, or replacing grates as required by plans or as directed by the Engineer; any required earthwork for ditch restoration within 30' of the ditch and restoration of disturbed turf.

6. Ditch pavement shall be paid for, separate from the inlet and concrete inlet pavement, by pavement types and units as called for in the plans.

7. Sod will be paid for under the contract unit price for Performance Turf, SY.

8. For supplementary details see Index No. 201.

9. All dimensions are for both precast and cast-in-place inlets unless otherwise noted.

**DESIGN NOTES**

1. The type of top (single or double slots) depends on the approach ditch configuration and the hydraulic requirements of the site. The designer will stipulate in the plans the type of top to be constructed at each individual inlet location.

2. For existing inlets, conversion grates shall be constructed at the original grate elevations unless other elevations are called for in the plans. When plans call for the inlet top to be constructed to support storm water detention, details for ditch modifications and underdrains shall be shown in the plans.

**MAINTENANCE NOTES**

1. Traversable inlet tops that are constructed by maintenance contract or by maintenance forces may cause the existing grates that are determined by the Maintenance Engineer to be functionally sound and their reuse is so directed by the Maintenance Engineer. Existing grates approved for reuse and new grates may be mixed, matched or replaced as directed by the Maintenance Engineer.
TOP VIEW

SECTION AA

ALT. A STRUCTURE BOTTOM FOR INLET TYPE B

SECTION BB

ALT. A STRUCTURE BOTTOM FOR INLET TYPE B
Steel grates are required on inlets with traversable slots. Steel grates are not to be used in areas subject to infrequent traffic loadings, such as landscaped areas and pavement areas where pedestrians can walk around the inlets. Steel grates may be used on off-road inlets without slats where bicycle traffic is anticipated.

Steel grates shall be used on all inlets where bicycle traffic is anticipated. Steel grates are to be used on all inlets with traversable slots. Either cast iron or steel grates may be used on inlets without slots where bicycle traffic is not anticipated. Either cast iron or steel grates may be used on all inlets without traversable slots. Subject to the selection described above, when a trapezoidal grate is specified in the plans, either the steel grate, hot dip galvanized after fabrication, or the cast iron grate may be used, unless the plans stipulate the particular type.

Recommended maximum pipe sizes shown are for concrete pipe. Sizes for other types of pipe must be checked for fit.

All exposed edges and corners shall be rounded to a 3/8" radius.

Concrete inlet pavement to be used on inlets without slots and inlets with non-traversable slots only when called for in the plans, but required on all traversable slot inlets. Cost to be included in contract unit price for inlets. Quantities shown are for information only.

GENERAL NOTES:
1. These inlets are suitable for bicycle traffic and are to be used in streets, medians and other areas subject to infrequent traffic loadings but not to be placed in areas subject to heavy wheel loads. These inlets may be placed in areas subject to occasional pedestrian traffic such as landscaped areas and pavement areas where pedestrians can walk around the inlet.

2. Inlets subject to minimal debris shall be constructed without slots. Slotted inlets should be constructed with slots. Slotted inlets clear zones and areas subject to debris and shall have traversable slots. The traversable slot modification is not acceptable to Inlet Type H. Slates may be constructed at either or both ends as shown on plans.

3. Steel grates are to be used on all inlets where bicycle traffic is anticipated. Steel grates are to be used on all inlets with traversable slots. Either cast iron or steel grates may be used on inlets without slots where bicycle traffic is not anticipated. Either cast iron or steel grates may be used on all inlets without traversable slots. Subject to the selection described above, when a trapezoidal grate is specified in the plans, either the steel grate, hot dip galvanized after fabrication, or the cast iron grate may be used, unless the plans stipulate the particular type.

4. Recommended maximum pipe sizes shown are for concrete pipe. Sizes for other types of pipe must be checked for fit.

5. All exposed edges and corners shall be rounded to a 3/8" radius.

6. Concrete inlet pavement to be used on inlets without slots and inlets with non-traversable slots only when called for in the plans, but required on all traversable slot inlets. Cost to be included in contract unit price for inlets. Quantities shown are for information only.

7. Traversable slots constructed in outlet inlets shall be paid for as inlets partial. For conversion work and method of payment see TRAVERSABLE SLIT INLETS (PARTIAL) FOR EXISTING INLETS.

8. Slotting to be used on all inlets not located in paved areas and paid for under contract unit price for Performance Type SY.

9. For supplementary details see Index No. 20X.

10. All reinforcing is Grade 60 bars with 2" Ash over unless otherwise noted. Bars to be set or bent for 3" clearance around pipe opening. Provide one additional 4" bar above and at each side of pipe opening.
**PLAN VIEW**

**SECTION AA**

**SECTION BB**

**SECTION CC**

**Pavement and Sodding Quantities for Traversable Slots**

<table>
<thead>
<tr>
<th>Slot</th>
<th>Pavement</th>
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**TRAVERSABLE SLOTS**

2008 FDOT Design Standards

DITCH BOTTOM INLET

TYPES C, D, E & H
**SECTION AA**

**SECTION BB**

**DITCH BLOCK FOR INLETS WITH OR WITHOUT SLOTS**

**SODDING AND PAVEMENT FOR INLETS WITHOUT SLOTS AND INLETS WITH NONTRAVERSABLE SLOTS**

**NOTE:** See General Notes Nos. 6 and 7.

**PLAN**

**SECTION AA**

**SECTION BB**

**PAVEMENT AND SODDING QUANTITIES FOR TRAVERSABLE SLOTS**

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**SINGLE SLOT SHOWN (DOUBLE SLOTS SYMMETRICAL ABOUT CENTERLINE)**

**SECTION CC (CASE I)**

**TRAVERSABLE SLOTS FOR EXISTING INLETS**

**NOTE:** For plan view and additional details see sheet 2 of 5.

For payment see General Notes Nos. 6 and 7.

**2008 FDOT Design Standards**

**DITCH BOTTOM INLET TYPES C, D, E & H**
Section BB

Section AA

Notes:
1. Pavement and/or sod to be used only where noted for in the plans.
2. Cost of paving to be included in cost of inlet.

Pavement and Sodding

Type F

Recommended Maximum Pipe Sizes

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<tr>
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Note: Recommended sizes are for concrete pipes. Sizes for other types of pipe must be verified for PSI in accordance with index No. 500 for larger pipe sizes, see Note 3.

Type G

Recommended Maximum Pipe Sizes

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Note: Recommended sizes are for concrete pipes. Sizes for other types of pipe must be verified for PSI in accordance with index No. 500 for larger pipe sizes, see Note 3.
Table Notes:
See Sheet No. 1 of 2 for dimension "L" location.
See Steel Grate Plan View for dimension "S" location.
Flat Bar

Ola.

Long Hex Bolt, Fender Washer, Fender Washer, And Look Nut, all Stainless Steel. (6 Required Per Skimmer)

Bolt & Flat Washer

Front Panel

SIDE PANEL

Flat Bar

Side Panel

Front Panel

VIEW A

PLAN

Expansion Anchor Spacing Varies, See Sheet 2

Design Note 2

Front Panel

SIDE VIEW


PICTORIAL VIEW

GENERAL NOTES

1. This skimmer is intended for use on Type C, D, or E ditch bottom inlets that are used as outlet control structures of stormwater management facilities.

2. The skimmer shell height (dimension H) and the sides where the weir slots and skimmers are located. The skimmer shell height must be one of the dimensions shown in the table on Sheet 2. The skimmer should not be used on structure sides with outside dimensions greater than 6'-4".

3. To minimize hydraulic losses across the skimmer, the flow area under the skimmer should be three times larger than the flow area of the weir slot. The distance between the pond bottom at the structure and the skimmer shall be not less than 1 foot.

4. The configuration of skimmers may be subject to regulatory requirements. The designer should coordinate the outlet control structure details with the permitting agencies.

5. Where this skimmer is used, the designer should reference this index with the outlet control structure details. Where a different skimmer design is needed, the designer should provide skimmer details in the plans.

6. The designer must show the configuration of the weir slots in the outlet control structure details.

DESIGN NOTES

1. The designer shall evaluate if a grate is needed for safety reasons. Where a grate is not needed for safety reasons and it is not desirable for hydraulic or other reasons, the designer may omit the grate by stating so in the outlet control structure details.

2. The designer shall evaluate if a grate is needed for safety reasons. Where a grate is not needed for safety reasons and it is not desirable for hydraulic or other reasons, the designer may omit the grate by stating so in the outlet control structure details.

3. The designer shall evaluate if a grate is needed for safety reasons. Where a grate is not needed for safety reasons and it is not desirable for hydraulic or other reasons, the designer may omit the grate by stating so in the outlet control structure details.
### Dimensions

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**Notes:**

- Flange thickness is 1/2" with **FLAT BAR**
- Six Holes for Expansion Anchors
- Top Flange Cut Away
- Steel Sheet 0.1345" Thick (10 Gauge)
- Side View and Front Panel Width Varies; See General Notes

---

**Diagram:**

- Top View
- End View (Front)
- Side View
- Front View
- Front Panel
- Side Panel

---

**Details:**

- Holes for expansion anchors
- Steel sheet 0.1345" thick (10 Gauge)
- Top flange cut away
- Flattened bar

---

**Legend:**

- Holes for Expansion Anchors
- Top Flange Cut Away
- Flattened Bar
- Steel Sheet 0.1345" Thick (10 Gauge)
The backs of skimmers must conform to the shape of the basin walls on which they are mounted. Show, in the plans, the radius required for curved-back skimmers.

Applies to both skimmer types.

1. Place neoprene gasket material between the skimmer and the catchbasin at all points of contact. Trim the gasket neatly to extend 1 inch beyond the joint on all sides.

2. Skimmer baffle, cleanout pipe and angles shall be primarily constructed of either galvanized steel, aluminum, polyvinyl chloride, polyethylene, fiberglass or acrylonitrile butadiene styrene. All steel components, other than stainless, shall be hot-dip galvanized.

3. Mounting hardware, hinges and latches shall all be stainless steel. Loss prevention device shall be either stainless steel chain or riveted nylon strap.

4. Material used in construction of skimmer bodies (baffles and cleanout pipe) shall comply with Standard Specification 943 for steel, 945 for aluminum or 948 for plastics.

5. All costs for furnishing and installing a Frenchdrain skimmer shall be included in the cost of the basin in which it is installed. Retrofit skimmers shall be paid for as modify existing structure.

6. Plastic Skimmers shall contain a minimum of 1.5% by weight of carbon black for UV protection.

1. The contractor may submit an alternative design prefabricated Frenchdrain Skimmer for approval by the Engineer.

2. Show, in the plans, the location of the basin and indicate the interior side(s) of the basin on which a skimmer will be installed.

3. Type I Skimmer dimensions shall be based on the outlet pipe diameter as shown in the dimension table.

4. Type II Skimmers are to be used only with outlet pipe diameters of 15", 18", and 24".

GENERAL NOTES

1. The Frenchdrain Skimmer is a hooded cover, mounted over an outlet in a catchbasin, that prevents oil and floating debris from exiting the basin. Use this skimmer in Frenchdrain Catchbasins and in other locations where there is a need to prevent oil, debris or other floating contaminants from exiting Catchbasins through outlet pipes.

2. Place neoprene gasket material between the skimmer and the catchbasin at all points of contact. Trim the gasket neatly to extend 1 inch beyond the joint on all sides.

3. Skimmer baffle, cleanout pipe and angles shall be primarily constructed of either galvanized steel, aluminum, polyvinyl chloride, polyethylene, fiberglass or acrylonitrile butadiene styrene. All steel components, other than stainless, shall be hot-dip galvanized.

4. Mounting hardware, hinges and latches shall all be stainless steel. Loss prevention device shall be either stainless steel chain or riveted nylon strap.

5. Material used in construction of skimmer bodies (baffles and cleanout pipe) shall comply with Standard Specification 943 for steel, 945 for aluminum or 948 for plastics.

6. All costs for furnishing and installing a Frenchdrain skimmer shall be included in the cost of the basin in which it is installed. Retrofit skimmers shall be paid for as modify existing structure.

7. Plastic Skimmers shall contain a minimum of 1.5% by weight of carbon black for UV protection.

DESIGN NOTES

1. The contractor may submit an alternative design prefabricated Frenchdrain Skimmer for approval by the Engineer.

2. Show, in the plans, the location of the basin and indicate the interior side(s) of the basin on which a skimmer will be installed.

3. Type I Skimmer dimensions shall be based on the outlet pipe diameter as shown in the dimension table.

4. Type II Skimmers are to be used only with outlet pipe diameters of 15", 18", and 24".
Concrete Apron (1/2" Max.)
Curb & Gutter
Slope Veries
Grout
Curve Underdrain To Box
Curve Underdrain To Box
Grout
Concrete Apron
A Maximum Of Two (2) Adjustment Washers On Each Side Will Be Permitted
Top Opening, One Or More Slots, See Plans For Measurements. Grout Fill To Be Included In Cost Of Box.
Concrete Apron
Grout
Curb Or Field Cut 4" Wide Slots (2) For Hinge Covers. Grout Around Hinge Covers.
Concrete Apron
Grout
3" Concrete Apron
Slope Veries
Outlet Pipe
TYPICAL INSTALLATION ON SLOPES

TYPICAL URBAN INSTALLATION
PERMISSIBLE TOP ADJUSTMENT

TYPICAL TOP AND APRON

TYPICAL INSTALLATION ON SLOPES

TOP VIEW

COVER REMOVAL

HINGE DETAIL

GENERAL NOTES


2. Box to be Class I Concrete, reinforced with No. 3 bars on 8" centers both ways, sides and bottom.

3. Concrete apron to be included in the contract unit price for Underdrain Inspection Box.

4. All covers shall be furnished with pivot lugs. Filled lugs or supplies are not permitted.

5. Manhole Type C Alternate A, Index No. 200, with Type I Frame and Cover, Index No. 201, may be used in lieu of the box designed on this sheet, and is recommended where high ADT increases chance of the repeated vehicle loadings.
ENDWALL DIMENSIONS (EXCLUSIVE OF MULTIPLE PIPE SPACING)

ENDWALL POSITIONS FOR SINGLE AND MULTIPLE PIPE AND SPACING FOR MULTIPLE PIPE

GENERAL NOTES

1. Endwall dimensions, locations and positions are for round and elliptical concrete pipe and for round and pipe-arch corrugated metal pipe. Round concrete pipe shown.

2. Front slope and ditch transitions shall be in accordance with Index No. 2.80.

3. Endwalls may be cast in place or precast concrete. Reinforcing area shall be Grades 40 or 60. Additional reinforcement necessary for handling precast units shall be determined by the Contractor or the supplier. Cost of reinforcement shall be included in the contract unit price for concrete (endwalls).

4. All exposed corners and edges of concrete are to be chamfered.

5. Concrete meeting the requirements of ASTM C418/4000 psi may be used in lieu of Class I concrete in precast items manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

6. On soft subsoils with side slopes flatter than 6:1, provide 20° transitions from the endwall to the flatter side slopes, right of way permitting.

7. For sodding around endwalls see Index No. 2.81.

8. Payment for concrete quantities for endwalls skewed to the pipe shall be made on the following basis:

   Endwall Skew To Pipe Use Tabulated Value
   0° to 5°  0°
   6° to 10° 30°
   11° to 20° 60°
   21° or over 90°

9. Pipe length plan quantities shall be based on the pipe end locations shown in the standard location control end view, or lengths based on special endwall locations called for in the plans.

10. Payment for pipe in pipe culverts shall be based on plan quantities, adjusted for endwall locations subsequently established by the Engineer.

11. Endwalls to be paid for under the contract unit price for Class 2 Concrete (Endwalls), CY.
1. Straight concrete endwalls are intended for use outside the clear zone.

2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index, design specifications AASHTO 1989. Precast construction which adheres to this Index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approval. Deviations from this Index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 210 for opening and girding details.

3. Reinforcing steel shall be either Grade 40 or 60.

4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 476 (4000 PSI) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

5. Chamfer: Exposed edges and corners to be chamfered ¾" unless otherwise shown.

6. That portion of corrugated metalpipe in direct contact with the concrete slab and extending 12" beyond shall have a continuous bituminous coating of .004" minimum thickness applied prior to placing of the concrete.

7. Sliding shall be in accordance with Index No. 211 and paid for under the contract unit price for Performance Part 51.

8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index, Concrete and reinforcing steel shall be paid for under the contract unit prices for Class II Concrete (Endwells), NY, and Reinforcing Steel (Roadway) LB.

- Optional Entrance for Concrete Pipe

- Bill of Reinforcing Steel

- General Notes

- Elevation

- Section BB

- Section AA
1. Straight concrete endwalls are intended for use outside the clear zone.

2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index, design specifications, and standard specifications. Precast construction which adheres to this Index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approvals. Deviations from this Index for precast units shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and grouting details.

3. Reinforcing steel shall be either Grade 40 or 60.

4. Concrete shall be Class II except concrete meeting the requirements of ACI 476 (4000 psi) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the State Operating Procedures for the inspection of precast drainage products.

5. Chamfer all exposed edges and corners to be chamfered 1/4" unless otherwise shown.

6. That portion of corrugated Metalpipe in direct contact with the concrete slab and extending 12" beyond shall have a continuous bituminous coating of 0.004" minimum thickness applied prior to placing of the concrete.

7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Performance Turf, SY.

8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Class II Concrete (Endwalls), CY and Reinforcing Steel (Roadways), LB.

GENERAL NOTES

STRAIGHT CONCRETE ENDWALLS
SINGLE AND DOUBLE 6" PIPE
1. Straight concrete endwalls are intended for use outside the clear zone.

2. Endwalls may be cast-in-place or precast construction. Cost-in-place endwalls shall conform to the details on this index, design specifications AASHTO 1989. Precast construction which adheres to this Index, including any additional rebar requirements for handling which shall be determined by the Contractor or supplier, must undergo additional approvals. Deviations from the Index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 203 for opening and grouting details.

3. Reinforcing steel shall be either Grade 40 or 60.

4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 476 4000 PSI may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

5. Chamfer: All exposed edges and corners to be chamfered 3/4" unless otherwise shown.

6. That portion of corrugated Metal pipe in direct contact with the concrete slab and extending 12" beyond shall have a continuous bituminous coating of 0.004" minimum thickness coated applied prior to placing of the concrete.

7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Performance Turf, SY.

8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Class II Concrete (Endwalls), CY and Reinforcing Steel (Roadway), LB.

**GENERAL NOTES**
1. Straight concrete endwalls are intended for use outside the clear zone.

2. Endwalls may be cast-in-place or precast construction. Concrete-place endwalls shall conform to the details on this Index; design specifications ACI 308-1989. Precast construction which adheres to this Index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approval. Deviations from this Index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and growing details.

3. Reinforcing steel shall be either Grade 40 or 60.

4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 476 (4500 PSI) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the Inspection of precast concrete drainage products.

5. Chamfer exposed edges and corners to be chamfered 3/8" unless otherwise shown.

6. That portion of corrugated metal pipe in direct contact with the concrete slab and extending 12" beyond shall have a continuous bluffs absorbent coating of 0.004" minimum thickness applied prior to placing of the concrete.

7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Performance Turf, CST.

8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Class II Concrete (Endwalls), CST and Reinforcing Steel (Roadway), LB.
SECTION YY

TABLE OF DIMENSIONS AND QUANTITIES FOR ONE ENDWALL

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<th>C</th>
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GENERAL NOTES

1. Straight sand-cement endwalls are intended for use outside the clear zone.
**GENERAL NOTES**

1. This endwall shall be used only in the clear zone for the drainage of medians and other areas having low design velocities and negligible debris.

2. Reinforcing steel: All bars are size #4. Spacings shown are center to center. Laps to be 12" minimum. Clearance is 2" except as noted. Square welded wire fabric (two cages max.) having an equivalent cross sectional area W = 20 sq. in. may be substituted for bar reinforcement.

3. Grates shall be ASTM A242/A242M, A572/A572M or ASTM A588/A588M, Grade 50 steel. When "Alt. G" grates are specified in the plans, grates shall be galvanized in accordance with Section 962 and 425.3.2 of the Standard Specifications.

4. Endwall to be paid for under the contract unit price for U-Endwall. Each. Payment shall include cost of concrete, reinforcing steel, grate, and accessories. Quantities shown are for estimating purposes only.

5. Sod slopes 5' each side and above endwall. Sodding to be paid for under contract unit price for Performance Turf, SY.

6. Precasting of this endwall will be permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawings approval shall be directed to the State Drainage Engineer. Use Index No. 201 for opening and grading details.

7. Concrete meeting the requirements of ASTM C 471 (4,000 P.S.I.) may be used in lieu of Class I Concrete for precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
GENERAL NOTES

1. Baffles to be constructed only when called for in plans.

2. When steel grating is required on endwall see Sheet 3 or 3 for details.

3. All reinforcing No. 4 bars with 2" clearance except as noted.

4. All angles, channels and bars shall be ASTM A36/A36M, A572/A572M, Grade 50 steel. When designated Alternate G in the plans galvanize in accordance with Section 962 and 425-3.2 of the Standard Specifications.

5. Channel section C 3 x 6 may be substituted for C 4 x 5.4 channel.

6. Precasting of this endwall will be permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawing approval shall be directed to the State Drainage Engineer. Use Index No. 201 for opening and grouting details.

7. Concrete meeting the requirements of ASTM C-418 (4000 psi) may be used in lieu of Class I concrete in groups units manufactured in plants which are under the Standard Operating Procedures for the Inspection of precast drainage products.

8. Sodding shall be in accordance with Index No. 281, and paid for under the contract unit price for Performance Turf, SY.

9. Endwall to be paid for under the contract unit price for U-endwall, Each. Payment shall include cost of concrete, reinforcing steel, and when called for in plans, steel grating, baffles and accessories. Quantities shown are for estimating purposes only.
**REINFORCING DETAILS**

**SIDE VIEWS AND BACKWALL SECTIONS**

**SIDE VIEWS ANO BACKWALL SECTIONS**  REINFORCEMENT DETAILS

**ENDWALLS WITH AND WITHOUT BAFFLES FOR 1/3, 1/4 AND 1/6 SLOPES**

---

**DIMENSIONS AND QUANTITIES FOR ONE U-ENDWALL**

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<th>Concrete Reinf. Area</th>
<th>Reinf. Steel Class I Steel</th>
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**DIMENSIONS AND QUANTITIES FOR BAFFLES**

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<th>Length</th>
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<th>Reinf. Steel Class I Steel</th>
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**PLAN**

**SECTION AA**

**END VIEW**

**BENDING DIAGRAM**

---

**U-TYPE CONCRETE ENDWALLS**

**BAFFLES AND GRATE OPTIONAL - 15" TO 30" PIPE**

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**2003 FDOT Design Standards**

**Sheet No. 2 of 3**
STEEL GRATING USE CRITERIA

1. Grates to be used on pipe culvert endwalls located within the designated clear zone. Positive debris control shall be provided at all upgradient openings. Grates shall not be used unless one or more of the following conditions exist:
   A. Drainage area to culvert consists of median or infield areas or areas where debris and/or drift is negligible.
   B. Runoff to outfall is by sheet flow or in such defined channels that debris transport is not considered a major problem.
   C. Runoff to culvert is minor except on an infrequent basis (10 to 15 year frequency); for example a drainage basin in flat sandy terrain with normally low ground water table.
   D. Areas where culvert blockage with resultant backwater would not seriously affect roadway embankment, traffic operation or upland property.

2. Steel grating to be used only where called for in plans.

TABLE OF DIMENSIONS AND QUANTITIES FOR ONE GRATE

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<thead>
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STREET GRATE
CONCRETE ENDWALL WITH U-TYPE WINGS FOR PIPE CULVERTS

### TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES

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<th>Wall</th>
<th>footing</th>
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### GENERAL NOTES
1. Winged concrete endwalls are intended for use outside the clear zone.

2. chamfer all exposed edges.

3. Concrete meeting the requirements of ASTM C-418 (1985) or shall be used in lieu of Class I concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

4. Endwall to be paid for under the contract unit price for Class II concrete.

5. sodding to be in accordance with index No. 114 and paid for under the contract unit price for Performance Turf, SY.
Sand-Cement Riprap. Cost Of
Be Included In Around And Below Type D-4

(See Index No. 199)

SECTION

ENDWALLS

GENERAL NOTES
1. U-Type Sand-Cement Endwalls Are Intended For Use Outside The Clear Zone.

DIMENSIONS AND QUANTITIES FOR METAL PIPE ARCH CULVERTS

<table>
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<tr>
<th>Dimensions</th>
<th>Quantity of Sand-Cement Riprap In Cu. Yds. For One Endwall</th>
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<tr>
<td>X</td>
<td>For 1/2 slopes</td>
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<td>Y</td>
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DIMENSIONS AND QUANTITIES FOR ROUND PIPE CULVERTS

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<td>For 1/2 slopes</td>
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U-TYPE SAND-CEMENT ENDWALLS
**GENERAL NOTES**

1. Flared end sections shall conform to the requirements of ASTM C67 with the exception that dimensions and reinforcement shall be as prescribed in the table above. Circular reinforcement may consist of either one cage or two cages of steel. Compressive strength of concrete shall be 4000 psi. Shop drawings for flared and sections having dimensions other than those specified shall be submitted for approval to the State Engineer.

2. Connections between the flared end section and the pipe culvert may be of the following types unless otherwise shown on the plans:
   - Joints meeting the requirements of Section 941-1.5 of the Standard Specifications (D-Ring Gasket).
   - Reinforced concrete jackets shall be used at all locations where high velocities and/or highly erosive soils may be expected.
   - Reinforced concrete jackets shall be used at all locations where high velocities and/or highly erosive soils may be expected.
   - Reinforced concrete jackets shall be used at all locations where high velocities and/or highly erosive soils may be expected.

3. Toe sections shall be constructed when shown on the plans or at locations designated by the Engineer. Toe sections shall be cast-in-place with Class I Concrete and paid for under the contract unit price for Class I Concrete (with reinforcement) (D-Ring Gasket).

4. On shored pipe culverts the flared end sections shall be placed in line with the pipe culvert. Side slopes shall be warped as required to fit the flared end sections.

5. Flared end sections to be placed in line with the pipe culvert. Side slopes shall be warped as required to fit the flared end sections.

**DESIGN NOTES**

1. Flared end sections are intended for use outside the clear zone on median drain and cross drain installations, except that flared end sections for pipe sizes 0.50 to 0.75 are permitted within the clear zone. When the flared section penetrates the 0.50 to 0.75 flared end sections may be located with the cover opening as close as 8.0 beyond the outside edge of the shoulder.

2. Reinforced concrete jackets shall be used at all locations where high velocities and/or highly erosive soils may cause dislodging. These locations are to be shown on the plans.

3. Toe walls shall be used whenever the anticipated velocity of discharge or soil type are such that erosion action would occur. Toe walls are not required where other methods of erosion control are provided, except when dislodging would occur if the ditch pavement should fail.
### Dimensions and Quantities

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<tr>
<th>F</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>N</th>
<th>QTY</th>
<th>CONCRETE SLAB (CY/ )</th>
<th>SQUARING INDICATION</th>
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</table>

- See General Note No. 3. See Sheet 5 of 6 For 3'3" Slab Quantities
- Values shown for estimating pipe quantities and are for information.

### Notes
- Reinforced with WWF 6x6-W1.4xW1.4
- Concrete Slab, 3'3" or 5'3" Thick
- Reinforced With WWF 6x6-W1.4xW1.4

---

**CROSS DRAIN MITERED END SECTION - SINGLE AND MULTIPLE CORRUGATED METAL PIPE-ARCH**

**2008 FDOT Design Standards**

[Sheet No. 3 of 6]
### Dimensions & Quantities

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<th>C</th>
<th>E</th>
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**Notes:**
- See General Note No. 3, See Sheet 5 Of 6 For 3" Slab Quantities.
- Values shown for estimating pipe quantities and are for information only.

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**CROSS DRAIN MITERED END SECTION**

**SINGLE AND MULTIPLE ELLIPTICAL CONCRETE PIPE**

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**2008 FDOT Design Standards**

**Sheet Number:** 02

**Printed Sheet:** 4 of 6

---

**SECTION**

- Pipe Joint Permitted: Under Approved By Engineer
- Pipe To Be Included Under Unit Price For Mitered End Section
- See Sheet 6 For Details And Notes.
### QUANTITIES FOR 3" THICK CONCRETE SLABS (CY)

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### ROUND-CMP

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### CMP-ARCH

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### ELLIPTICAL-CONCRETE

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GENERAL NOTES

1. Mitered end sections for pipe sizes 15", 18" and 24" must be used with all cross drain pipe. All connections shall be located with the current opening as close as 5' beyond the outside edge of the shoulder.

2. Slope and ditch transitions shall be used when the normal roadway slope must be flattened to place end section outside clear zone. See detail left.

3. The reinforced concrete slab shall be constructed for all sizes of cross drain pipe and cast in place with Class 2 concrete. Slabs shall be 5" thick unless 3" thickness called for in plans.

4. Concrete pipe used in the assembly of mitered sections shall be selected for the required strength.

5. Corrugated metal pipe joining that is damaged during bending and perforating for mitered section shall be repaired.

6. The portion of corrugated metal pipe in direct contact with the concrete slab and extending 6" beyond shall be bituminous coated before placing the concrete slab.

7. Unless otherwise specified, the pipe at mitered end sections may be used with any type of cross drain pipe; corrugated steel pipe, reinforced concrete pipe or aluminum pipe only.

8. When the mitered end section is constructed to the cross drain pipe, a concrete jacket shall be constructed in accordance with Standard Index 280.

9. When existing multiple cross drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered end sections shall be constructed independent of any pipe or concrete pipe.

10. The deck of all sections, hangers, reinforcing, connectors, anchors, concrete, sections, jackets, and coupling bands shall be included in the cost for the mitered end section. Siding shall be paid for separately under the plans and price of Performance Turf, S
t.

11. Mitered and end sections shall be paid for under the contract unit price for Mitered End Section (CD). Each, based on each independent pipe end.

CONCRETE PIPE CONNECTOR

All bars, bolts, nuts and washers are to be galvanized steel. Bolt diameters shall be 7/8" for 15" to 24" pipe and 1 1/4" for 24" to 72" pipe. Two connectors required per joint, located 60° right and left of bottom center of pipe. Two nuts in pipe shell are to be utilized.

ANCHOR DETAIL

Salt nut to be used with concrete slab. Bend anchor where required to center in concrete slab. Damaged surfaces to be repaired after bending. Anchors to be used in situations where anchor is not provided. Place the anchors in the outside crest of the concrete slab. Bolt washers to be placed on inside wall of pipe. Holes in the mitered end of pipe are to be drilled or punched, burning not permitted.
### Dimensions & Quantities

<table>
<thead>
<tr>
<th>D</th>
<th>X</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
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</table>

**Grate Sizes**

**Concrete (Cu. Yds.)**

**Sodding (Sq. Yds.)**

- Dimensions permitted to allow use of 8' standard pipe lengths.
- Dimensions permitted to allow use of 12' standard pipe lengths.
- Concrete slab shall be deepened to form bridge across crown of pipe. See section below.

- Values shown for estimating pipe quantities and are for information only.

**Values Known for Estimating Pipe Quantities and Are for Information Only.**

- O - Concrete slab shall be deepened to form bridge across crown of pipe. See section below.

---

**TOP VIEW - SINGLE PIPE**

**TOP VIEW - MULTIPLE PIPE**

**SECTION**

**Side Drain Mitered End Section**

**Single and Multiple Round Concrete Pipe**

---

Note: See Sheets 5 and 6 for details and general notes.
### DIMENSIONS & QUANTITIES

| D | X | A | B | C | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| 6" | 8" | 2.5" | 2.5" | 5.75" | 5.75" | 7.25" | 7.25" | 3.25" | 3.25" | 4.75" | 4.75" | 6.25" | 6.25" | 7.75" | 7.75" | 10" | 10" | 10" | 10" | 10" | 10" | 10" | 10" | 10" | 10" | 10" | 10" |
| 8" | 8" | 2.5" | 2.5" | 6.75" | 6.75" | 8.25" | 8.25" | 5.75" | 5.75" | 7.25" | 7.25" | 8.75" | 8.75" | 10.25" | 10.25" | 13" | 13" | 13" | 13" | 13" | 13" | 13" | 13" | 13" | 13" | 13" | 13" |
| 1" | 3" | 1.5" | 1.5" | 4.75" | 4.75" | 6.25" | 6.25" | 7.75" | 7.75" | 9.25" | 9.25" | 10.75" | 10.75" | 12.25" | 12.25" | 14" | 14" | 14" | 14" | 14" | 14" | 14" | 14" | 14" | 14" | 14" | 14" |
| 4" | 4" | 1.5" | 1.5" | 7.75" | 7.75" | 9.25" | 9.25" | 10.75" | 10.75" | 12.25" | 12.25" | 13.75" | 13.75" | 15.25" | 15.25" | 16.75" | 16.75" | 18" | 18" | 18" | 18" | 18" | 18" | 18" | 18" | 18" | 18" |

### REMARKS

These sizes are restricted to inlet and outlet treatment for water management systems or similar applications.

*Note: See Sheet 5 and 6 for details and general notes.*
**DIMENSIONS & QUANTITIES**

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<th>Quad, Pipe</th>
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<th>SODDING (Sq. Yds.)</th>
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**Slope:**
- 2% for ASA 2008 Foot Design Standards
- 2% for Mile 3000' and smaller
- 1% for 35' and larger

**Values shown for estimating pipe quantities and are for information only.**

**Features:**
- Reinforced or Round Corners
- Construction Joint Permitted
- Concrete Slab, 3" Thick, Reinforced with WWP 6x6-WEL-WEL

**Notes:**
- See Sheets 5 and 6 for details and general notes.

**Sections:**
- Side Drain Mitered End Section - Single and Multiple Corrugated Metal Pipe-Arch
### Dimensions & Quantities

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<th>Span</th>
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**NOTES:**
- See Sheets 5 and 6 for details and general notes.
- Construction joint permitted.
- Pipe joint permitted unless approved by the engineer.
- To be included in unit price for mitered end sections.
- Values shown for estimating pipe quantities and are for information only.
**GENERAL NOTES**

1. Unless otherwise designated in the plans, concrete pipe walled end sections may be used with any type of side drain pipe; corrugated steel pipe walled end sections may be used with any type of side drain pipe except steel pipe. When bitumen-coated metal pipe is specified for side drain pipe, walled and sleeveless shall be constructed with like pipe or concrete pipe. When the walled and sleeveless pipe is dissimilar to the side drain pipe, a concrete jacket shall be constructed in accordance with Index No. 280.

2. Concrete pipe used in the assembly of walled and sleeveless shall be of sufficient length to avoid excessive connections.

3. Corrugated metal pipe galvanizing that is damaged during bending and perforating for walled and sleeveless shall be repaired.

4. That portion of corrugated metal pipe in direct contact with the concrete slab and extending 8" beyond shall be bitumen-coated prior to placing the concrete.

5. Corrugated polyethylene pipe (CPE) for side drain equivalents of 2", 3", 8", or 6" in diameter shall utilize either corrugated metal or concrete walled and sleeveless. 

   a. When used in conjunction with corrugated steel walled and sleeveless, connection shall be established with either a formed metal band specifically designed for CPE pipe and metal pipe or other similar approved by the District Drainage Engineer. When used in conjunction with a concrete walled end section, connection shall be by concrete jacket constructed in accordance with Index No. 280.

6. When existing multiple side drain pipes are spaced other than the dimensions shown in this detail, or in non-regular axes, or have non-uniform sections, the walled and sleeveless shall be constructed either separately as single pipe walled and sleeveless sections or collectively as multiple pipe and sleeveless as directed by the Engineer; however, walled and sleeveless will be paid for separately per the specifications of each independent pipe end.

7. In addition to the requirements of Section 430-4, side drain outlets shall comply with the cover requirements shown in Index No. 205.

8. The reinforced concrete slab shall be constructed for all sizes of side drain pipe and in place with Class I concrete.

9. Round pipe sizes 30" or greater, pipe-upon size 35"- 84" and greater and spiral pipe 15"-30" or greater shall be grouted unless excepted in the plans. Smaller sizes of pipe shall be grouted only when needed for in place. The lower grade on a satisfactory basis in divided hedges shall be exceeded.

10. Grotes are to be fabricated from steel A357, Grade B, pipe. The lower grade on an air traffic approach ends shall be Schedule 80 and all remaining grooves shall be Schedule 40. Grotes subject to soil, water, or corrosive environments shall be fabricated from galvanized pipe, with base metal exposed during fabrication required as specified in Section 580. Grotes subject to soil, water, or corrosive environments shall be hot dip galvanized after fabrication in accordance with ASTM A53.

11. Grotes shall be used on grooves in excess of 3% as directed by the Engineer, where a minimum spacing of 30" will not result between the two points of the walled and sleeveless sections.

12. The project engineer shall consult the District Drainage Engineer for possible alternate treatment prior to constructing side drain walled and sleeveless sections where a minimum spacing of 30" will not result between the two points of the walled and sleeveless sections.

13. The cost of all pipe (i.e., grooves, fasteners, reinforcing, connecters, anchors, concrete, kettle bands, and coupling bands) shall be included in the cost for the walled and sleeveless. Grooves shall be paid for separately under the contract unit price for Performance Type T11.5.

14. Walled end sections shall be paid for under the contract unit price for Walled End Section 150.5, etc., based on each independent pipe end.

**DESIGN NOTES**

1. In critical hydraulic locations, grooves shall not be used until potential debris transport has been evaluated by the drainage engineer and appropriate adjustments made.

2. Ditch grooves in excess of 3% or pipe with less than 1.5" of cover and grooves in excess of 1% will require such an evaluation (General Note 91).  

3. The design engineer shall determine the alternative type of walled end section will not be permitted. The restriction shall be based on corrosive or structural requirements.
**SCHEDULE OF BELL REINFORCEMENT**

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<th>Overlap</th>
<th>Spigot</th>
<th>Elliptical</th>
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**Overlap 2'**

Pipe Bell

**ELLiptical**

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<td>30 0.26</td>
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</table>

**DETAIL OF BELL & SPIGOT CONCRETE PIPE JOINT USING ROUND OR PROFILE RUBBER GASKET**

**ROUND RUBBER GASKET SHOWN**

**CONCRETE COLLAR FOR EXTENSION OF EXISTING PIPE CULVERTS**

**CONCRETE COLLAR FOR JOINING MAINLINE PIPE AND STUB PIPE**

**MISCELLANEOUS DRAINAGE DETAILS**
Ditch
Grade

For use only where side slopes are 1:4 or are to be the same.

Riprap (Sod - Cement)
Miscellaneous Asphalt
Riprap
Concrete

5' BW Ditch 9' 0 14' 2
1:6 Front Slopes 1:4 Back Slope

12 20 2 13' 2
0 .61' 0.58' 0.54'
6 5 3
Ditch Width Varies
40'

Iterative
Longitudinal Section

Section Mating for Ditch

Weep Holes

50 Max
Erosion Slopes

Shingles Not More
Than 3 Centers

6' Min. Overlap

One Row Of Staples
Each Side Of Overlaps,
On Outer Edges At Not
More Than 18' Centers
(Typical)

10 C. to C

SECTION EE

When Width Is Greater
Than 4', Const. Weep
holes half-way Up The
Side In Line With
Bottom Weep Holes

Lip (13"

Filter Fabric

Sodded Ditch Paved Ditch
1.0 Deep 1.0' Deep

Weep Hole Arrangement

2' Sod

2' Sod

5' Deep

Sodded Ditch

Paved Ditch End Treatment

General Notes

1. Type of ditch pavement shall be as shown on plans.
2. In concrete ditch pavement, contraction joints are to be spaced at 25 maximum intervals, or as directed by the Engineer. Contraction joints may be either formed (construction joints) or locked. No open joints will be permitted in concrete ditch pavement.
3. Lip at end of ditch pavement shall normally be located adjacent to open joints at intervals of not more than 240'.
4. Toe walls shall be used on all ditch paving. A toe wall is required adjacent to drainage structures.
5. When directed by the Engineer, weep hole spacing may be reduced to 5' minimum.
6. For junction of R&W ditch, slipway and lateral ditch, sides of paving to be 1' high minimum.
7. For ditch pavements requiring filter fabric, the fabric shall be placed directly beneath the pavement for the entire length and width of the pavement. When weep holes with aggregate are used, the filter fabric shall be placed below the aggregate to form a mat continuous with or underlapping the pavement fabric. (See Index No. 199 for fabric type and application.)
8. Ditch pavement requiring reinforcement shall be detailed in the plan.
9. Cost of plastic filter fabric to be included in the contract unit price for Performance Turf, SY
10. Surfacing to be paved for under contract unit price for Performance Turf, SY

Ditch Pavement: 2008 Foot Design Standards
2008 FDOT Design Standards

07/01/07
Sheet No. 281
1 of 2

Ditch Pavement & Sodding
To each endwall to be determined by the designer from this detail.

\begin{footnotesize}
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\hline
\textbf{Slope} & \textbf{Slope} & \textbf{Slope} & \textbf{Slope} & \textbf{All Slopes} \\
\hline
\hline
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1.6 & 2 & 2.2 & 2.4 & 2.6 & 2.8 & 3 & 3.2 & 3.4 & 3.6 & 3.8 & 4 & \textbf{TOTAL} \\
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Note: Either option may be used unless otherwise called for in the plans.

\textbf{GEOTEXTILE PLACEMENT AT CONCRETE STRUCTURE}

\textbf{U ENDWALL WITH SOD DING}

\textbf{12" Bit Coating On Face Of Concrete}

\textbf{6" Fold Minimum}

\textbf{6" Fold Min.}

\textbf{No Adhesive Above Here}

\textbf{Nailed To Surface}

\textbf{1"x2" Pressure Treated}

\textbf{DIAGRAMS}

\textbf{SOD QUANTITIES (SY)}

\textbf{FLARED END SECTION}

\textbf{INDEX NO. 270}

\textbf{INDEX NO. 281}

\textbf{DITCH PAVEMENT & SODDING}

\textbf{2008 FDOT Design Standards}

\textbf{2 of 2}

\textbf{Sheet No. 281}
Notes:

1. Yard drains to be located outside the R/W. Drainage area should not exceed 750 SF (Irregular Flow Plains). Drainage area should be a minimum of 3'-0" x 3'-0".
2. Yard drains may be located in the center of the property, as shown on the plans.
3. Maximum pipe size shall be 2" diameter.
4. R/F yard drains shall be horizontal, and shall be installed at a 2% grade in the direction of the flow of water.
5. Yard drain to be paid for under the yard drain unit price for each yard drain (Modified) as directed by the Engineer.

**Graphic Illustrations:***

- **Plan View:** Shows the layout of the sidewalk with buffer and sidewalk joint details.
- **Section BB:** Provides a sectional view of the sidewalk with buffer and handrail details.
- **Section AA:** Details the sidewalk joint and slab reinforcement sections.

**Tables:**

- **Yard Drain Item Includes:**
  - 2" x 2" x 3" Concrete Slab
  - 24" x 24" x 3" Concrete Slab

**Examples:**

- **Flow Line Of Water To:** Shows the path of water flow through the drainage system.
- **Shallow Ditches:** Depicts shallow ditch designs with buffer and sidewalk joint details.

**Special Concrete Endwall:**

- **Plan:** Shows the placement of the endwall, as well as the general layout of the sidewalk.
- **Elevation:** Details the endwall elevation and reinforcement requirements.

*Disclaimer:* This diagram is for illustrative purposes only and should be reviewed in conjunction with the applicable design standards and specifications.
Provide Approximately a Minimum of 0.02% Grade on Surf. Slightly Gently. The Surface of the Median Pavement if Necessary, Which Includes the Median Curbs or Curb and Surf. Construct a Drainage Flume or Flumes at the Point or Points of Low Grade. See Details.

Median Width as Indicated in Detail Plans

Provide Approximately a Minimum of 0.20% Grade on Gutter, Slightly Warping the Surface of the Median Pavement If Necessary, Within Limits of the Median Curb or Curb and Surf. Construct a Drainage Flume or Flumes at the Point or Points of Low Grade. See Details.

Slope to Approx. Match That Of Adjoining Pavt. (Breakover 0.02 Min., 0.05 Max.)

Provide Smooth Section To Match Existing Grade

5' Wide Sod unless Other Treatment Called for in Plans

SECTION AA

SECTION BB

(May Drain From Any Point Designated in the Plans or As Adjusted by The Engineer During Construction)

5' For Types A & E Curbs

6' For Type F Curbs

7' for Type A Curb

10' for Types A & F Curbs

SECTION CC

FLUME DETAIL

GENERAL NOTES

1. These details are to apply to projects which provide for the conversion of 2-lane sections to 4-lane divided highway sections and for superelevated sections of new 4-lane divided highways. Layout does not illustrate examples. Cost of Flumes to be included in the contract price for Curb or Curb and Surf. Sod to be paid for under the contract unit price for Performance Turf, SY.

2. Flumes to be located at low point of roadway at each point as designated in the plans. The locations may be adjusted by the Engineer during construction.

Provided as a third-party translation and may not be 100% accurate. For legal or precision purposes, please refer to the original source.
1. Spillway to be paid for as shoulder gutter.
2. If spillway empties into a shallow or median ditch, the detail should be modified as necessary.

DETAIL OF CONCRETE SPILLWAY AT END OF SHOULDER GUTTER
(TO BE USED WHERE INLETS, PIPES & ENDWALLS ARE IMPRACTICAL)
GENERAL NOTES

1. Pipe invert should be at or above the water table whenever possible.

2. French drains with minor dimensional changes or otherwise different from the standard cross-section shall be either described or detailed in the plans. French drains with significantly different cross-sections shall be detailed in the plans.

3. Materials in (a) shall be paid for under the contract unit price for French Drains, LF. The unit price shall include the cost of pipe, pipe plugs, and fittings. The unit price shall also include the cost for trench excavation, backfill, and compaction.

4. The contractor shall submit, at least 7 days prior to the start of construction, the types and quantities of all materials to be used in the construction of the French drain.

DESIGN NOTES

1. Pipe invert should be at or above the water table whenever possible.

2. French drains with minor dimensional changes or otherwise different from the standard cross-section shall be either described or detailed in the plans. French drains with significantly different cross-sections shall be detailed in the plans.

3. The contractor shall submit, at least 7 days prior to the start of construction, the types and quantities of all materials to be used in the construction of the French drain.
SLOTTED PIPE OPTIONS

ELLIPICAL PIPE

<table>
<thead>
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<th>Pipe Size</th>
<th>Slot Cut</th>
<th>Opening</th>
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<tbody>
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<tr>
<td>18&quot;x20&quot;</td>
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</table>

ROUND PIPE

<table>
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<th>Pipe Size</th>
<th>Slot Cut</th>
<th>Opening</th>
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<td>18&quot;</td>
</tr>
<tr>
<td>24&quot;x24&quot;</td>
<td>15&quot;</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>

Pipe Size Opening

Min. Max.

15" 12" 18"
18" 16" 22"
20" 18" 22"
22" 22" 26"
24" 24" 26"
26" 26" 30"

Coarse

Underdrain Pipe

TYPE I

Fine Aggregate

7. The designer should specify the flow line
5. Type
3. Type
I. Type III underdrain is intended for maximum water removal conditions. Filter fabric
6. (a) J Type
underdrain Types I and III. When required, fabric
notes 2 and 3. Design note 3 applies for
filtration
The designer should
of underdrain pipes and outlet pipes.
underdrain inspection boxes, (d) underdrain
and
cleanouts for Type
I, II, and III underdrain. (e) Nonstandard locations of Type I
and III underdrain will be as
shown in the plans.

All filter fabric joint shall overlap a minimum of 1'. The internal filter fabric of Type
underdrain shall overlap into the
standard, or

When Type I is used, a filter fabric and meeting Section 946 is required.

See Index No. 500 for the standard location of Type II underdrain. The location of
Type II underdrain and nonstandard locations of Type II underdrain will be as
described in the plans.

Filter fabric to be used. A minimum of 1' of all filter fabric joints shall overlap a minimum of 1'.

Underdrain outlet pipes shall be furnished with a corrugated
interior equivalent to
smooth interior tubing unless

except when prohibited by the plans, the use of an inert material and/or
reactive
Chemical clogging,

Underdrain outlet pipes shall be furnished with a corrugated
interior equivalent to
smooth interior tubing unless

90 deg. bends shall be made using

minimum
90 deg. bends shall be constructed with two 45 deg. elbows separated by at least 1' of straight pipe. Outlet pipes shall be furnished with

except when prohibited by the plans, the use of an inert material and/or
reactive
Chemical clogging,

All filter fabric joints shall overlap a minimum of 1'. The internal filter fabric of Type II
underdrain shall overlap into the coarse aggregate or the fine aggregate a minimum of 1'.

All filter fabric joints shall overlap a minimum of 1'. The internal filter fabric of Type II
underdrain shall overlap into the coarse aggregate or the fine aggregate a minimum of 1'.

The contract unit price for Underdrain, L.F. shall include the cost of pipe, fittings, aggregate, sock, filter fabric, underdrain cleanouts, and concrete aprons.

The contract unit price for Underdrain Outlet Pipes, L.F. shall be full compensation for trench excavation, pipe and fittings, concrete aprons, hardware cloth for concrete aprons, stubbing into drainage structures, backfill in pipe, and disposal of excess materials.

The contract unit price for Underdrain Inspection Box, EA, shall be for the number completed and accepted.

GENERAL NOTES

1. The underdrain pipe shall be either 4' smooth or 5' corrugated tubing unless otherwise shown
in the plans. The size to be furnished will be based on the nominal internal diameter of a
pipe with a smooth interior wall. Except when prohibited by the plans, the size specified in
this standard, pipe with a corrugated interior wall may be provided based on the following
size equivalencies:

- 4' smooth equivalent to 3' corrugated interior
- 5' smooth equivalent to 5' corrugated interior
- 6' smooth equivalent to 5' corrugated interior

2. Fine aggregate shall be quartz and meeting the requirements of Sections 902-1 through 902-3 of
the Standard Specifications.

3. Coarse aggregate shall be gravel or stone meeting the requirements of Sections 902-2 or 902-3.
The gradation shall meet Section 901, Grades A, B, C, 5, 50, or 57 unless otherwise shown
restricted in the plans.

4. Underdrain Types I, II, and III shall be in accordance with Section 446.

5. Filter fabric shall be Type D-3. (See Index No. 999.) The internal filter fabric of Type II
underdrain shall have a permeability of 0.7 in/sec, and an AOS of 0.45 slv/sec.

6. When Type I is used, a filter fabric and meeting Section 946 is required.

7. See Index No. 502 for the standard location of Type II and III underdrain. The location of
Type II underdrain and nonstandard locations of Type II underdrain will be as
described in the plans.

8. Pay Item 10. Underdrain Inspection Box. EA. shall be for the number completed and accepted.

DESIGN NOTES

1. The type of underdrain should be selected to meet design water removal rates and soil conditions.
Caution is advised in the use of these typical sections since special designs may be required to
satisfy project conditions.

2. Type I underdrain is intended for minimum water removal conditions.

3. Type II underdrain is intended for moderate water removal conditions. Where reactive conditions
may create sheeted clogging, the use of an inert material and/or elimination of the filter fabric
may be necessary.

4. Type III underdrain is intended for maximum water removal conditions. Filter fabric
is required between the coarse aggregate or fine aggregate including those described in general
notes 2 and 3. Design note 3 applies for reactive conditions.

5. Type III underdrain is intended for use in detention basins and other locations which require a
filtration system. The standard fine aggregate specified for Type III underdrain conforms to
filtration standards requirements of Chapter 60-20 FAC.

6. The designer shall detail in the plans, the location of:

(a) Type I underdrain, (b) nonstandard locations of Type II underdrain, (c) underdrain inspection boxes, (d) cleanouts for Type II underdrain, and (e) underdrain outlet pipes.

The designer shall specify the flow line elevations at the beginning, bands, junctions and ends of underdrain pipes and outlet pipes.

8. The designer shall ensure whether an external filter envelope is required around
underdrain Types I and II. When required, fabric shall be specified in the plans.
Alignment of Outlet Pipe

Hole Pattern in Accordance With The Standard Specifications

Hole Pattern Duplicated On Top Side Of Pipe

OUTLET PIPE APRON

4" Dia. Minimum Outlet Pipe (Nonperforated) Length Varies

Filter Fabric (4' Cross For Outlet Pipe)

45° Elbow Or 9° Bend

Concrete Pavement Subdrainage

2. Concrete pavement subdrainage shall be constructed adjacent to the low edge of the roadway pavement and under "no travel" auxiliary pavement and shoulders as shown in the plans. When the low edge shifts between outside and inside edges of pavement the concrete pavement subdrainage shall extend 50 beyond and begin 50 before the five point 1/102 slope.

3. Concrete pavement subdrainage shall be placed on the low side of ramps of crossroad termini.

4. Inlet pipes shall be constructed on a grade parallel with the edge of pavement except, on embankments for a distance of one-tenth percent (0.10%) of the opposite edge of pavement shall be constructed on a grade of one-tenth percent (0.10%).

5. Inlet pipes shall be stubbed into existing inlets or into existing ditches at a maximum of 50' intervals. Elbows or bends shall be used to connect the outlet pipe to the concrete pavement subdrainage pipe. The elbows or bends shall be of the same material or outlet pipe but compatible with the pipe.

6. Concrete pavement subdrainage shall be full compensation for removal of existing shoulder pavement, trench excavation, pipe and fitting, concrete apron, hardware cloth, and filling into existing inlets and paved ditches, restoration of ditch pavement, backfill in pipes, and disposal of excess materials.
At The Contractor's Option, this area may be constructed of optional base material or special stabilized subbase, to be paid for under contract unit price for special stabilized subbase. To be paid for under contract unit price for Special Stabilized Subbase.

FULL DEPTH CONCRETE SHOULDER PAVEMENT (DEPTH VARIES)

NEW CONSTRUCTION

ASPHALT SHOULDERS

REHABILITATION

NOTES FOR DRAINCRETE PAVEMENT SUBDRAINAGE

1. The edgdrain sections for DRAINCRETE SUBDRAINAGE are applicable to pavement construction identified as RIGID PAVEMENT on Index No. 505, Sheet 2 and 3.

2. The contractor shall confine the construction of draincrete edgdrain to an area in which the entire operation can be carried out in five (5) work days, unless another construction period is called for in the plans, with sufficient time allowed for the draincrete to set before placement of pavement.

METHOD OF PAYMENT

NEW CONSTRUCTION:

1. The unit contract price for Edgdrain (DRAINCRETE) LF shall be full compensation for trench excavation, disposal of excess materials, filter fabric, draincrete edgdrain pipe and fittings and draincrete.

Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 3.

FOR REHABILITATION:

1. The contract unit price for Edgdrain (DRAINCRETE) LF shall be full compensation for removal of existing shoulder pavement, trench excavation, disposal of excess materials, filter fabric, draincrete edgdrain pipe and fittings, and draincrete, necessary for edgdrain construction.

Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 3.

Shoulder pavement shall be paid for under the contract unit price for Type SP, Asphaltic Concrete.

Shoulder joint seal shall be paid for under the contract unit price for Pavement Joint, LF.
GENERAL NOTES FOR TREATED PERMEABLE BASE EDGEDRAIN
(NEW CONSTRUCTION)

1. The contractor shall confine the construction of edgdrain to an area in
which the entire operation can be carried out in 15 work days, unless another
construction period is called for the plans.

METHOD OF PAYMENT

NEW CONSTRUCTION

1. Payment shall be full compensation for trench excavation, disposal of excess materials,
filter fabric, pipe and fittings, necessary for concrete pavement
subdrainage construction. Payment shall be included in the cost for Asphalt Treated Permeable Base,
CT or Cement Treated Permeable Base, CT.

Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 3.
**MINIMUM VALID WING WALL RANGE**

For non-skewed wingwalls they are located adjacent to the exterior face of the exterior barrel or the exterior face of skewed wingwalls when the angle is less than 50°. For angles greater than 50°, footings permitted adjacent to the exterior barrel and construction joints in barrels of culverts with skewed wingwalls may be placed parallel to the headwalls and the reinforcing steel and the stabs may be cut provided that the cut reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with Table 1 on this sheet. The cost of construction joints and additional reinforcing shall be at the expense of the Contractor.

**CONSTRUCTION EXTENSIONS:** For cut backs and ties into existing concrete box culverts see Sheet 6 of 7.

**REINFORCING STEEL:** ASTM A615, see the “Box Culvert Data Tables” in the Contract Plans for grade and bar spacing. See the Reinf orcing Bar List in the Contract Plans for bar sizes and bar bending details.

**GENERAL NOTES:**

**DESIGN SPECIFICATIONS:** AASHTO LRFD Bridge Design Specifications, 3rd Edition.

**LIVE LOAD:** HL-93.

**CONSTRUCTION LOADING:** It is the construction Contractor’s responsibility to provide for supporting construction loads that exceed AASHTO HL-93 and any construction loads applied prior to 2 feet of compacted fill placed above the top slab.

**SURFACE FINISH:** All concrete surfaces shall receive a general surface finish.

**SKewed CONSTRUCTION JOINTS:** Construction joints in barrels of culverts with skewed wingwalls may be placed parallel to the headwalls and the reinforcing steel and the stabs may be cut provided that the cut reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with Table 1 on this sheet. The cost of construction joints and additional reinforcing shall be at the expense of the Contractor.

**CULVERT EXTENSIONS:** For cut backs and ties into existing concrete box culverts see Sheet 6 of 7.

**CONSTRUCTION JOINTS in barrels of culverts with skewed wingwalls:** For cut backs and ties into existing concrete box culverts see Sheet 6 of 7.

**NOTE:** The live load is HL-93.

**INSTRUCTIONS TO DESIGNER:**

1. Designs for box culverts shown in this Index are to be produced only by computer analysis utilizing the Department’s LRFD Box Culvert Program. Designs are to be limited to the live loads and dimension/restraints shown in the General Notes of this Index and to the index of the barrel(s), as shown in the Contract Plans.

2. Headwalls with skew angles less than 50° or greater than 50° require special design authorization. Other design options should be considered. Contact the District Drainage Engineer to obtain authorization.
NOTES:
1. See Contract Plans for Culvert location, Culvert skew angle and roadway cross section.
2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail C (Sheet S).

SINGLE BARREL BOX CULVERT
(Skewed Culvert With Parallel Wingwalls Shown)

LONGITUDINAL SECTION THRU CULVERT
(Transverse Top & Bottom Slab Reinforcing Not Shown For Clarity)
PARTIAL PLAN TOP SLAB
(Left Side, Left Skew)

MULTIPLE BARREL BOX CULVERT
(Skewed Culvert With Skewed Wingwalls Shown)

PARTIAL PLAN BOTTOM SLAB
(Right Side, Right Skew)

NOTES:
2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail C (Sheet 5).

2008 FDOT Design Standards
Sheet No. 4 of 7

CONCRETE BOX CULVERT DETAILS (LRFD)
Remove Wingwalls and Footings Sufficient To Construct Culvert Extension

Box Culvert Steel To Be Extended Longitudinal Reinforcing Bottom Slab Cut Walls, Top Slope & Bottom Slope

OUTSIDE WALLS OF BOXES

INTERIOR DOUBLE WALLS OF BOXES

INTERIOR SINGLE WALLS OF BOXES

PLAN VIEWS

FLARED ENDWALL

1'-0" (Min.) Embankment

Existing Slab or Wall Thickness

Wrap Filter Fabric Around Construction Joint (2'-0" Min. Width)

Existing Footing & Headwall

Existing Endwall

1'-0" (Min.) Embankment

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

NOTES:

1. The Box Culvert Data Tables and Reinforcing Bar List do not include the additional quantities needed for dowel connections or transitions from double walls of existing concrete box culvert. The cost for additional reinforcement and the thickened concrete within the transitional area shall be included in the costs for concrete and steel in the culvert extension.

2. Cost for removal and disposal of materials from existing headwalls, wingwalls, and box, and cost of cleaning, straightening and extending or doweling longitudinal reinforcing steel should be included in the cost for concrete and steel in the culvert extension.

3. Remove existing concrete while avoiding damage to existing reinforcement. Clean and straighten existing reinforcement, lap and tie into extension reinforcement.

4. Dowel in #2 bars @ 2'-0" max. spacing into center of wall/slab when there is a single mat of existing reinforcing steel, otherwise splice 1"-0" as shown for inside reinforcement. Use an Adhesive Bonding Material System in accordance with Specifications Section 416 & 937.

DETAIL "M" - TRANSITION FOR INTERIOR DOUBLE WALLS OF BOX CULVERTS

CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS

DETAIL "L" - TRANSITION FOR EXTERIOR WALL/SLAB EXTENSION
PERMITTED PRECAST ALTERNATE BOX SECTIONS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SINGLE BARREL</th>
<th>MULTIPLE BARRELS</th>
<th>DESIGN NOTES</th>
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<tr>
<td>A</td>
<td></td>
<td></td>
<td>Index No. 292 or Contractor Design</td>
</tr>
<tr>
<td>B</td>
<td>Single Cell Monolithic (Four Sided)</td>
<td>Three Fold section</td>
<td>Contractor Design</td>
</tr>
<tr>
<td>C</td>
<td>Not Applicable</td>
<td></td>
<td>Contractor Design</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

1. Specifications:
   - FDOT Standard Specifications for Road and Bridge Construction; Section 410 (current edition, and supplements thereof).
   - Concrete (Precast): Class III or Class II Modified (15,000 psi) for slightly aggressive environments.
   - Concrete (Cast-In-Place): Class II (13,400 psi) for slightly aggressive environments.

2. Prestressing Steel: 400 Grade 60, deformed bar unless otherwise noted, with a minimum clearance of 2" for slightly and moderately aggressive environments or 3" for extremely aggressive environments, unless otherwise shown. Equal area substitution of welded wire (WW) reinforcement is permitted.

3. Work this Index with the Cast-In-Place Concrete Box Culvert Details and Data Tables shown in the plans, Index No. 289 and the Precast Concrete Box Culverts shown in the shop drawings.

4. All joints between precast sections must be tongue & groove and shall have longitudinal reinforcing extending from top, bottom, & both side slabs of the precast box tied to the cost-in-place reinforcement. Single barrel culverts may have precast headwalls cast integrally with the end segment when approved by the Engineer.

5. Extension of existing multiple barrel culverts with multiple single cell precast box culverts is not permitted unless approved by the District Structures Engineer. Precast joint details must be shown in the shop drawings when approved.

INSTRUCTIONS TO DESIGNER:

1. Show Differential Settlement (DS) and Effective Length (L) for single curvature deflection in the Contract Plans where significant long-term settlement is anticipated.

2. See Sheet 5 of 8 for details.

DETAIL E

PICTORIAL VIEW OF EXTERIOR WALL/SLAB TRANSITION

(Double Barrel Culvert shown, Single or Multiple Barrel Culvert similar)

EXPLODED VIEW OF CONNECTIONS AT END OF CULVERT

(Double Barrel Culvert shown, Single or Multiple Barrel Culvert similar)
PRECAST SEGMENT TO SEGMENT TONGUE & GROOVE TRANSVERSE JOINTS

SECTION A-A
(2" Cover – Thin Wall Detail)

SECTION A-A
(2" Cover – Thick Wall Detail)

SECTION A-A
(3" Cover – Thin Wall Detail)

SECTION A-A
(3" Cover – Thick Wall Detail)

ALTERNATE BOTTOM SLAB TRANSVERSE JOINT
TYPICAL SECTION
(DOUBLE-SIDED TONGUE & GROOVE JOINT)
(All reinforcing not shown for clarity)

NOTE:
Bottom Slab Joints in Type B Boxes may be single tongue & groove joints as shown in Section A-A when the Top Slab Joints are oriented as shown in Schematic A.

SCHEMATIC A
TYPE B BOX SECTION PLACEMENT
FOR SINGLE TONGUE & GROOVE JOINTS

TWO-PIECE PRECAST SEGMENT
ADDITIONAL JOINT DETAILS
(TYPE B BOX)

SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS

2008 FDOT Design Standards
Project No. 07/01/06
Sheet No. 2 of 5
**C-I-P HEADWALL DETAILS AND CONNECTION TO PRECAST BOX**

**SECTION C-C**

Face of C-I-P Wingwall/Headwall

**SECTION D-D**

C-I-P End Section & Construction Joint

1'-6" Chamber

Cutoff wash reinforcement (Typ.)
(See C-I-P design in plans)

**SECTION E-E**

SECTION D-B

TOP SLAB TO WALL JOINT
(KEGED JOINT)

Provide minimum width to satisfy shear strength requirements at joint

TYPE B BOX LONGITUDINAL JOINTS

**SECTION B-B**

TOP SLAB TO WALL JOINT
(HAUNCH JOINT)

Provide adequate width to satisfy shear strength requirements at joint

**SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS**

2008 PUDC Design Standards

ISS. No. 73.07.02

Sheet No. 291
1. Provide Bond Beams to mitigate settlement of precast box culverts when the differential settlement shown in the plans exceeds the following limits:

\[ L = \frac{1.0}{R} \frac{W}{2} \]

Where:
- \( L \) = Maximum Long-Term Differential Settlement (ft.)
- \( R \) = Exterior height of Box Culvert (ft.)
- \( W \) = Length of Box Culvert Segment (ft.)
- \( L \) = Effective length for single curvature deflection (ft.)

2. Extend Bond Beams to back face of headwalls and to limits of existing box culverts for extensions.

3. Multiple single barrel Two-Piece (Type BI) precast box culverts are not permitted when Bond Beams are required. For single barrel Two-Piece (Type BI) precast box culverts, construct Bond Beam along bottom edge of box culvert.

**NOTE**
- All bar dimensions are out to out.
- Lap splice length for Bars 7M is 3'-0" minimum.
- Bars may be substituted for Bars 7M & 8L for precast box widths (B) less than 7 ft.

**DESIGN BEAMS**

1. Bond beam design limitations are:
   - Max. Design Earth Cover (H) = 30'
   - Max. Precast Unit Width (W) = 8'
   - Max. Precast Unit Length (L) = 14'
   - Max. Flattened Shear Stress/Beam = Edge Beam = 100 kips
   - Spherical Beam = 200 kips

2. The precast unit length, width or earth cover limitations may be exceeded provided that the following equation is satisfied:

\[ H \times W \times L \leq 3360 \]

3. Bond Beams are required when joint openings from differential settlement exceed 1½" as determined in Bond Beam Note 1. The maximum design force is based on 50% of the earth cover loads.

**ESTIMATED BOND BEAM QUANTITIES**

**UNIT**

**QUANTITY PER BEAM EDGE INTERIOR**

- Class II or IV Concrete (Cylindrical)
- 0.565
- 0.167

**REINFORCING STEEL (ROADWAY)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Quantity Per Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinf. Steel</td>
<td>lb. ft.</td>
<td>25.88</td>
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</table>

**REINFORCING STEEL BENDING DIAGRAMS**

**NOTE**
- All dimensions are out to out.
- Lap splice length for Bars 7M is 3'-0" minimum.
- Bars may be substituted for Bars 6M & 8L for precast box widths (B) less than 7 ft.

**SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS**

- **2004 FDOT Design Standard**
- **ISSUED NO. 07/01/06**
- **Revised No. 08/2008**
**GENERAL NOTES:**

1. These precast designs may be substituted for cast-in-place box culverts designed to AASHTO (AHP) Bridge Design Specifications, 3rd Edition. Designs are based on the design criteria shown in FDOT Structures Design Guidelines (January 2005 edition).

2. Loading: H = 63 & any fill heights between the minimum & maximum shown.

3. Only one design of precast box culvert is to be used for any installation.

4. Reinforcing steel must consist of smooth or deformed welded wire reinforcement (WWR) conforming to ASTM A495 or A497. Longitudinal reinforcement may consist of ASTM A615 Grade 60 bars. Minimum cover must be 2" unless otherwise shown. The spacing of circumferential wires must not be less than 2" nor more than 4". The spacing of longitudinal wires or bars must not be more than 3".

5. All longitudinal wires must have a minimum cross-sectional area of 40% of the circumferential wires, but not less than a #2 WWR or #3 bars for ASTM A615 deformed bars.

6. Welding of reinforcement must be limited to the locations shown in ASTM C1577 and in accordance with AWS/D1.4, "Structural Welding Code – Reinforcing Steel."

---

### TABLE 1A – STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) – 3' & 4' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (ft.)</th>
<th>WALL THICKNESS</th>
<th>REINFORCEMENT AREAS (sq. in./ft.)</th>
<th>ALL EXT LENGTH (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3' x 3'</td>
<td>7</td>
<td>7</td>
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<tr>
<td></td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 1B – STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) – 3' & 4' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (ft.)</th>
<th>WALL THICKNESS</th>
<th>REINFORCEMENT AREAS (sq. in./ft.)</th>
<th>ALL EXT LENGTH (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' x 3'</td>
<td>7</td>
<td>7</td>
<td></td>
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<tr>
<td></td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. See Sheet 1 for Reinforcing Details and dimension locations.

2. See Sheet 14 for WWR Bending Diagram.
### TABLE 2A - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 5' & 6' SPANS

<table>
<thead>
<tr>
<th>SPAN x PIECE (ft)</th>
<th>SLAB / WALL THICKNESS (in.)</th>
<th>DEPTH ABOVE (ft)</th>
<th>DESIGN EARTH COVER (in.)</th>
<th>REINFORCEMENT AREAS (sq in./ft)</th>
<th>40' EFT LENGTH (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5' x 3'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 4'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 5'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 6'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

### TABLE 2B - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 5' & 6' SPANS

<table>
<thead>
<tr>
<th>SPAN x PIECE (ft)</th>
<th>SLAB / WALL THICKNESS (in.)</th>
<th>DEPTH ABOVE (ft)</th>
<th>DESIGN EARTH COVER (in.)</th>
<th>REINFORCEMENT AREAS (sq in./ft)</th>
<th>40' EFT LENGTH (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5' x 3'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 4'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 5'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>5' x 6'</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>
### TABLE 3 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 7' SPANS

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Slab / Wall Thickness</th>
<th>Design</th>
<th>Reinforcement Areas</th>
<th>4x4 ft Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 4'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.35 - 0.50</td>
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<tr>
<td>5</td>
<td>0.35 - 0.35</td>
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<tr>
<td>10</td>
<td>0.35 - 0.35</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>0.35 - 0.35</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>0.40</td>
<td></td>
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<tr>
<td>8</td>
<td>0.60</td>
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<tr>
<td>5</td>
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<td>10</td>
<td>0.60</td>
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<tr>
<td>12</td>
<td>0.60</td>
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</tbody>
</table>

### TABLE 4 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 8' SPANS

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Slab / Wall Thickness</th>
<th>Design</th>
<th>Reinforcement Areas</th>
<th>4x4 ft Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 4'</td>
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<tr>
<td>8</td>
<td>0.35 - 0.50</td>
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<tr>
<td>5</td>
<td>0.35 - 0.35</td>
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<tr>
<td>10</td>
<td>0.35 - 0.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0.35 - 0.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.40</td>
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<td>5</td>
<td>0.40</td>
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<tr>
<td>10</td>
<td>0.40</td>
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<tr>
<td>12</td>
<td>0.40</td>
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<td>5</td>
<td>0.60</td>
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<td>10</td>
<td>0.60</td>
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<tr>
<td>12</td>
<td>0.60</td>
<td></td>
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</tbody>
</table>

### Notes
1. See Sheet 1 for reinforcing details and dimension locations.
2. See Sheet 2 for General Notes.
3. See Sheet 14 for welded wire reinforcement bending diagram.
TABLE 5 SPAN x RISE
(SJ
(RJ

(ft.)

SLAB / WALL THICKNESS
DESIGN
TOP
BOT. SIDE HAUNCH EARTH COVER
ABOVE
(TtJ
(HJ
!Tb!
<TwJ
TOP SLAB
((n.J
(in. J
(in. J
(in. J
9.5

1

9 x 5

1

STANDARD PRECAST BOX CULVERT DESIGNS (2" COVERJ -

9

9.5

9

9

4

to

9

12
9.5
10.5
9.5

1

9 x 6

1

9

9.5
11
9.5

9

9
9
9

to

8

12
4

to

9

12
9.5
10.5
9.5

9'x 7'

9

9.5
11
9.5

9

9
9
9

to

8

12
4

to

9

12
9.5
10.5
9.5

9 x 8
1

1

9

9.5
11
9.5

9

9
9
9

to

8

12
4

to

9

12

91x 91

9.5

9.5

J0.5

11

9.5

9.5

9

9

9
9
9

to

8

12
4

12
9.5
10.5

JO
11

9
9

8

20

1

25'
30'
0.33' - (21
2'- (3'
3'- (5'
5' - JO'
15'

20

1

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5' - JO'
15'

20

1

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5' - JO'
15'

20

1

25'
30'
0.33' - <2'

2'- <3'

to

9

0.33' - (2'
2'- (3'
3'- (5'
5' - JO'
15'

to
12

3'- (5'

5' -

JO'

15'

20 1
25 1
30'

REINFORCEMENT AREAS

(sq. in./ft.J
Asl
0.41
0.44
0.39
0.35
0.50
0.65

0.77
0.81
0.38
0.43
0.37
0.35
0.49
0.65

0.76
0.80
0.37

0.42
0.37
0.36
0.50

0.66
0.77
0.81
0.37

0.42
0.37
0.38
0.53
0.68
0.81
086
0.38
0.43
0.38
041
0.57
0.73
0.83
0.93

As2
0.62
0.65
0.53
0.42
0.56
0.75
0.92
1.05
0.64
0.67
0.55
0.45
0.60
0.80
0.98

l.JO
0.67
0.69
0.58
0.47
0.63
0.84
1.02
1.15
0.68
0.71
0.60
0.49
0.66
0.88
1.07
1.20
0.70
0.73
0.62
0.50
0.69
0.92
1.11
1.25

As3
053
0.54
0.51
0.44
055
0.73
0.90
1.02
0.56
057
0.54
0.47
0.59
0.78
0.95
1.08
0.59
0.60
0.56
0.49
0.63
0.80
1.00
1.13
0.61
0.62
0.59
0.51
0.66
0.87
1.05
1.18
0.63
0.65
0.61
0.53

0.70
0.91
1.09

1.23

As4

As5

As6

0.22
0.11
0.11
0.11
0.11
0.11
0.11
0.11
0.23
0.11
011
0.11
0.11
0.11
0.11
011
0.22
0.11
0.11
0.11
0.11
0.11
0.11
0.11
0.22
0.11
0.11
0.11
0.11
0.11
0.11
0.11
0.22
0.15
0.15
0.14
0.12
0.11
0.11
0.11

0.23

0.23

As7
0.34

As8
0.38

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0.23

0.23

TABLE 6 -

9'SPANS

As9

Asl EXT.
LENGTH
(MJ
(in. J
54
49
49
44
44
44
44
54
49
49
44
44
44
44

cc;

0.23

0.32

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0.31

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0.32

0.38

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72
72
59
49
49
44
44

0

Ci
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0.23

0.37

4

10' x 5

1

JO

JO

to

JO

12
10.5
11.5

10.5
12

JO
JO

to

8

12

-

-

0.23

(ft.)

SLAB / WALL THICKNESS
DESIGN
TOP
BOT. SIDE HAUNCH EARTH COVER
ABOVE
(TtJ
(TwJ
(HJ
!Tb!
TOP SLAB
(in. J
(in.J
(in. J
(in. J

-

0.37

0.37

SPAN x RISE
(SJ
(RJ

STANDARD PRECAST BOX CUL VERT DESIGNS (2" COVERJ -

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©
V;

4

JO' x 6

1

JO

JO

to

JO

12
10.5
11.5

10.5
12

JO
JO

to

8

12

-

59
54
49
44
44
44
44

4

lO'x 7'

JO

JO

to

JO

12
J0.5
11.5

J0.5
12

JO
JO

to

8

12

-

59
59
54
44
44
44
44

4

10' x 8

1

JO

JO

to

JO

12

J0.5
11.5

J0.5
12

JO
JO

to

8

12
4

10' x 9 1

JO

JO

to

JO

12

J0.5

11

11.5

12

JO
JO

to

8

12
4

10' x 10'

JO

JO

to

JO

12
10.5
11.5

11
12

JO
JO

8

to
12

0.33' - (2'
2'- (3'
3'- (5'

(sq. in./ft.J
Asl
0.46
0.46

0.42

5'- JO'

0.38

15'
20'
25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5'- JO'
15'

0.52
0.69
0.81
0.87
0.44
0.44
0.39
0.37
0.51
0.67
0.79
0.85
0.43
0.43
0.38
0.37
0.52
067
0.79
0.84
0.43
0.43
0.38
0.38
0.53
0.68
0.81
0.86
0.43
0.43
0.39
0.40
0.56
0.71
0.82
0.90
0.44
0.44
0.40
0.44
0.60
0.76
0.86
0.97

20

1

25'
30'
0.33' - <2'
2'- (3'
3'- (5'

5'- JO'
15'

20

1

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5'- JO'
15'
20'
25'
30'
0.33' - <2'
2'- <3'
3'- (5'
5'- JO'
15'

20 1
25 1
30'
0.33' - (2'
2'- <3'
3' - (5'
5'- JO'
15'

20'
25'
30'

JO' SPANS

REINFORCEMENT AREAS

As2
0.62
0.62
0.54
0.46
0.59
0.78
0.97
1.11
0.64
0.64
0.57
0.48
0.62
0.83
1.02
1.17
0.66
0.66
0.59
0.50
0.66
0.87
1.07
1.22
0.68
0.68
0.62
0.52
0.69
0.91
1.12
1.27
0.70
0.70
0.64
0.54
0.72
0.95
1.15
1.32
0.71
0.71
0.65
0.56
0.75
0.99
1.20
1.36

As3
0.52
0.52
050
0.49
058
0.76
0.93
1.11
0.54
0.54
0.52
0.52
0.61
0.80
0.99
1.14
0.57
0.57
0.55
0.54
0.65
0.85
1.04
1.19
0.60
0.60
0.57
0.57
0.68
0.89
1.09
1.25
0.62
0.62
0.60
0.59
0.72
0.94
1.13
1.30
0.64
0.64
0.62
0.61
0.76
0.99
1.18
1.35

As4

As5

0.24

0.24

As6
0.24

As7
041

As8
0.45

0.12
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As9

Asl EXT.
LENGTH
(MJ
(in. J
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58
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64
58
52
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NOTES'
1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 2 for Genera! Notes.
3. See Sheet 14 for WWR Bending Diagram.

@

2008 FOOT Design Standards

STANDARD PRECAST CONCRETE BOX CULVERTS

Lest
Revision

Sheet No.

07/01/07

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### TABLE 7: STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 11' SPANS

<table>
<thead>
<tr>
<th>Span x Rise (in.)</th>
<th>Top Out (in.)</th>
<th>Side Out (in.)</th>
<th>Bottom Out (in.)</th>
<th>Wall Thickness (in.)</th>
<th>Molding (in.)</th>
<th>Design Earth Cover Above Top Slab (in.)</th>
<th>Reinforcement Areas (sq. ft./lin. ft.)</th>
<th>Steel Eff. Length (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2' x 4'</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>0.33 - 0.60</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>60</td>
</tr>
<tr>
<td>5' x 10'</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>0.50 - 0.75</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>60</td>
</tr>
<tr>
<td>10'</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>0.50 - 0.75</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>60</td>
</tr>
</tbody>
</table>

### TABLE 8: STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 12' SPANS

<table>
<thead>
<tr>
<th>Span x Rise (in.)</th>
<th>Top Out (in.)</th>
<th>Side Out (in.)</th>
<th>Bottom Out (in.)</th>
<th>Wall Thickness (in.)</th>
<th>Molding (in.)</th>
<th>Design Earth Cover Above Top Slab (in.)</th>
<th>Reinforcement Areas (sq. ft./lin. ft.)</th>
<th>Steel Eff. Length (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2' x 4'</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>0.33 - 0.60</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>75</td>
</tr>
<tr>
<td>5' x 10'</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>0.50 - 0.75</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>75</td>
</tr>
<tr>
<td>10'</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>0.50 - 0.75</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>75</td>
</tr>
</tbody>
</table>

**NOTES:**
1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 2 for General Notes.
3" Min. ~ 6" Max Tongue length (8" to 15" bevel)

2" Min cover outside, 1" Min cover inside at joint

Final joint gap as per sealant manufacturer's recommendations

4" Min. ~ 8.5" Max Tongue length (8" to 15" bevel)

SECTION A-A

SECTION B-B

TYPICAL SECTION THRU JOINT

NOTES:
1. Work this Index with Index No. 291.
2. See Sheets 8 thru 14 for dimensions and areas of reinforcement.

See Section A-A for reinforcement in this area

TYPICAL BOX SECTION (TYPE 2)
DESIGN EARTH COVER 2' OR GREATER

TYPICAL BOX SECTION (TYPE 1)
DESIGN EARTH COVER LESS THAN 2'

STANDARD PRECAST BOX CULVERT WITH 3" CONCRETE COVER
### TABLE 9A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 3' & 4' SPANS

<table>
<thead>
<tr>
<th>SPAN (ft.)</th>
<th>SLAB / WALL THICKNESS (sq. in./ft.)</th>
<th>LENGTH (ft.)</th>
<th>REINFORCEMENT AREAS (Virt. Design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3' x 3'</td>
<td>9 9 9</td>
<td>9</td>
<td>-</td>
</tr>
</tbody>
</table>

**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and Dimension Locations.

### TABLE 9B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 3' & 4' SPANS

<table>
<thead>
<tr>
<th>SPAN (ft.)</th>
<th>SLAB / WALL THICKNESS (sq. in./ft.)</th>
<th>LENGTH (ft.)</th>
<th>REINFORCEMENT AREAS (Virt. Design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3' x 3'</td>
<td>10 10 10</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and Dimension Locations.
<table>
<thead>
<tr>
<th>TABLE 10A - STANDARD PRECAST BOX CULVERT DESIGNS (3&quot; COVER) - 5' &amp; 6' SPANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN x PILE (ft.)</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>5' x 3'</td>
</tr>
<tr>
<td>5' x 4'</td>
</tr>
<tr>
<td>5' x 5'</td>
</tr>
<tr>
<td>5' x 6'</td>
</tr>
<tr>
<td>6' x 3'</td>
</tr>
<tr>
<td>6' x 4'</td>
</tr>
<tr>
<td>6' x 5'</td>
</tr>
<tr>
<td>6' x 6'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 10B - STANDARD PRECAST BOX CULVERT DESIGNS (3&quot; COVER) - 5' &amp; 6' SPANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN x PILE (ft.)</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>5' x 3'</td>
</tr>
<tr>
<td>5' x 4'</td>
</tr>
<tr>
<td>5' x 5'</td>
</tr>
<tr>
<td>5' x 6'</td>
</tr>
<tr>
<td>6' x 3'</td>
</tr>
<tr>
<td>6' x 4'</td>
</tr>
<tr>
<td>6' x 5'</td>
</tr>
<tr>
<td>6' x 6'</td>
</tr>
</tbody>
</table>
TABLE 12A SPAN x RISE
(SJ
(RJ
(ft.)

STANDARD PRECAST BOX CUL VERT DESIGNS (311 COVER) -

SLAB / WALL THICKNESS
DESIGN
TOP
BOT. SIDE HAUNCH EARTH COVER
ABOVE
(TtJ
(HJ
!Tb!
<TwJ
TOP SLAB
((n.J
(in. J
(in. J
(in. J
4

1

8 x 4

1

9

9

9

to
12

9
JO

9.5
10.5

9
9

8 to
12
4

1

8 x 5

1

9

9

9

to
12

9
JO

9.5
10.5

9
9

8 to
12
4

8 x 6
1

1

9

9

9

to
12

9
JO

9.5
10.5

9
9

8 to
12
4

8'x 7'

9

9

9

to
12

9
JO

9.5
10.5

9
9

8 to
12
4

B'x 8'

9

9

9

to
12

9
JO

9.5
10.5

9
9

8 to
12

0.33' -

(2'

2'- (3'

REINFORCEMENT AREAS

(sq. in./ft.J
Asl

0.52
0.52

3'- (5'
5' - JO'
15'

0.48

20

1.00
1.25
1.31
0.51
0.51
0.46
0.51
0.74
0.97
1.20
1.26
0.51
0.51
0.47

1

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5' - JO'
15'

20'
25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5' - JO'
15'
20
25'
30'
0.33' - (2'
2'- <3'
3'- (5'
5' - JO'
15'
20
25'
30'
0.33' - <2'
2'- <3'
3'- (5'
5' - JO'
15'
20 1
25 1
30'
1

1

0.52
0.75

0.52
0.74
0.97
1.18
1.26
0.52
0.52
0.49
0.55

0.77
1.01
1.21
1.31
0.55
0.55
0.53

0.60
0.83
1.08
1.28
1. 41

As2
0.66
0.66
0.49
0.48
0.72
0.98
1.24
1.29
0.69
0.69
0.52
0.51
0.77
1.05
1.33
1.38
0.72
0.72
0.55
0.55
0.83
1.12
1.42
1.46
0.74
0.74
0.57
0.59
0.88
1.19
1.51
1.53
0.77
0.77
0.59
0.63
0.93
1.26
1.59
1.61

TABLE 12B -

B'SPANS

As3

As4

As5

As6

As7

As8

057

0.22

0.24

0.22

0.42

0.52

-

057

0.11
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41
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0.52
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0.72
0.97
1.14
1.21
0.60
0.60
0.56
0.53
0.78
1.05
1.23
1.30
0.64
0.64
0.59
0.58
0.85
1.13
1.32
1.39
0.67
0.67
0.62
0.63
0.91
1.21
1.41
1.47

0.70
0.70
0.64
0.68
0.98
1.29
1.50
1.55

As9

Asl EXT.
LENGTH
(MJ
(in. J

en

0.22

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0.39

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0.11
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V;

SPAN x RISE
(SJ
(RJ
(ft.)

STANDARD PRECAST BOX CUL VERT DESIGNS (311 COVER) -

SLAB / WALL THICKNESS
DESIGN
TOP
BOT. SIDE HAUNCH EARTH COVER
ABOVE
(TtJ
(TwJ
(HJ
!Tb!
TOP SLAB
(in. J
(in.J
(in. J
(in. J
0.33' -

1

8 x 4

1

JO

JO

JO

4

2'- (3'

to

3'- (5'
5'- JO'
15'

10.5

JO

8 to 12
4

1

8 x 5'

JO

JO

JO

to
12

JO

10.5

JO

8 to 12

-

50
50
45
41
41
41
41

4
8'

x 6

1

JO

JO

JO

to

JO

10.5

JO

8 to 12
4

8'x 7'

JO

JO

JO

to

JO

10.5

JO

8 to 12
4

1

8 x 8'

JO

JO

JO

to
12

JO

10.5

JO

8 to 12

As2
0.56
0.56

20

0.76

1

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5'- JO'
15'
20
25'
30'
0.33' - (2'
2'- <3'
3'- <5'
5'- JO'
15'
20
25'
30'
0.33' - <2'
2'- <3'
3'- (5'
5'- JO'
15'
20 1
25 1
30'
1

12

Asl

0.42
0.42

25'
30'
0.33' - (2'
2'- (3'
3'- (5'
5'- JO'
15'

1

12

(sq. in./ft.J

0.38
0.41
0.59
0.78
0.97
1.15
0.40
0.40
0.37
0.41
0.58

20'

12
JO

(2'

B'SPANS

REINFORCEMENT AREAS

0.94
1.JO
0.40
0.40
0.37

0.42
0.58
076
0.94
1.09
0.41
0.41
0.39
0.44
0.61
0.78
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1.11
0.44
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0.65
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0.42
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1.16
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0.81
1.03
1.24

0.60
0.60
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0.68
0.91
1.16
1.40
0.64
0.64
0.51
0.50
0.72
0.96
1.22
1.47

As3
049
0.49
0.46
0.39

057
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0.96
1.JO

0.52
0.52
0.48
0.43

0.62
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1.03
1.24

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0.72
0.94
1.18
1.34

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0.60
0.56
0.55

0.77
1.01
1.26
1.42

As9

Asl EXT.
LENGTH
(MJ
(in. J

As4

As5

As6

0.24
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As7
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As8
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NOTES'
1. See Sheet 2 for Genera! Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.

@

2008 FOOT Design Standards

Last
Revision

Sheet No.

07/01/07 11 of 14

STANDARD PRECAST CONCRETE BOX CULVERTS

Index No.

292


### TABLE 13A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 9' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (H)</th>
<th>SLAB / WALL THICKNESS</th>
<th>REINFORCEMENT AREAS</th>
<th>DIA (M)</th>
<th>44' EFT LENGTH (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9' x 5'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>9' x 6'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
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<td></td>
<td></td>
<td>10</td>
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<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>9' x 7'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

### TABLE 13B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 9' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (H)</th>
<th>SLAB / WALL THICKNESS</th>
<th>REINFORCEMENT AREAS</th>
<th>DIA (M)</th>
<th>44' EFT LENGTH (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9' x 5'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>9' x 6'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>9' x 7'</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
<table>
<thead>
<tr>
<th>No.</th>
<th>11' x 8' 11</th>
<th>11' x 8</th>
<th>11' x 6' 11</th>
<th>15' x 11</th>
<th>20' x 11</th>
<th>25' x 11</th>
<th>30' x 11</th>
<th>35' x 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
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</tbody>
</table>

See General Note 5

Table 14 - Standard Precast Concrete Culvert Designs (Cov. = Cover) - 10 Spans
### Table 18 - Standard Precast Box Culvert Sections (17' - Cover) - 12' Spans

<table>
<thead>
<tr>
<th>Type</th>
<th>Cover</th>
<th>Earth Filling</th>
<th>Extension</th>
<th>Typical Cover</th>
<th>Min.</th>
<th>Max.</th>
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<td>17'</td>
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<td></td>
<td>12'</td>
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<td>2'</td>
<td></td>
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<tr>
<td></td>
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<td>2'</td>
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<td>0.80'</td>
<td>0.15'</td>
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</table>

### Notes:
1. See Sheet 2 for General Notes.
2. See Table 18 for standard reinforcement bending dimensions.
3. See Tables 1 thru 16 for dimensions M, R, S, T, and T.
4. Dimension M, R, and T are variable according to WWR size and location.
5. See Sheet 2 for weld details and reinforcement locations.
6. Reinforcement bending dimensions are out-to-out.

#### Welded Wire Reinforcement Bending Diagram

- **Type 1 Box Section Design Earth Cover LESS THAN 27'**:
  - WWR Piece No. 1
    - 2 (reinforcement per segment)
  - WWR Piece No. 2
    - 2 (reinforcement per segment)
  - WWR Piece No. 3
    - 4 (reinforcement per segment)
  - WWR Piece No. 4
    - 4 (reinforcement per segment)

- **Type 2 Box Section Design Earth Cover 2 OR GREATER**:
  - WWR Piece No. 1
    - 2 (reinforcement per segment)
  - WWR Piece No. 2
    - 2 (reinforcement per segment)
  - WWR Piece No. 3
    - 4 (reinforcement per segment)
  - WWR Piece No. 4
    - 4 (reinforcement per segment)

- **As2** or **As3** option:
  - 2 or 3 (See Sheets 2 or 3)

- **As4** option:
  - 2 or 3 (See Sheets 4 or 5)

- **As5** option:
  - 2 or 3 (See Sheets 6 or 7)

- **As6** option:
  - 2 or 3 (See Sheets 8 or 9)

- **As7** option:
  - 2 or 3 (See Sheets 10 or 11)

- **As8** option:
  - 2 or 3 (See Sheets 12 or 13)

- **As9** option:
  - 2 or 3 (See Sheets 14 or 15)
SAFETY MODIFICATION FOR INLETS IN BOX CULVERTS
## Dimensions and Quantities Per Grate

<table>
<thead>
<tr>
<th>Slope</th>
<th>Pipe Size</th>
<th>Quantity</th>
<th>F</th>
<th>Lbs.</th>
<th>D</th>
<th>R</th>
<th>P</th>
<th>Class 2 Concrete-CY</th>
<th>Steel-Lbs.</th>
<th>Cost SY</th>
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<td>12</td>
<td>101</td>
<td>3</td>
<td>5-1/2</td>
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<td>32</td>
<td>34</td>
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<td>0.75</td>
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<tr>
<td></td>
<td>16</td>
<td>351</td>
<td>5</td>
<td>2-1/2</td>
<td>41</td>
<td>32</td>
<td>34</td>
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## Dimensions and Quantities Per U-Endwall

<table>
<thead>
<tr>
<th>Slope</th>
<th>Pipe Size</th>
<th>G</th>
<th>M</th>
<th>D</th>
<th>R</th>
<th>P</th>
<th>Class 2 Concrete-CY</th>
<th>Steel-Lbs.</th>
<th>Cost SY</th>
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<tr>
<td>(6)</td>
<td>12</td>
<td>3</td>
<td>5-1/2</td>
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<td>34</td>
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<td></td>
<td>16</td>
<td>351</td>
<td>5</td>
<td>2-1/2</td>
<td>41</td>
<td>32</td>
<td>34</td>
<td>3.25</td>
<td>10,000</td>
</tr>
</tbody>
</table>

### General Notes
1. For criteria see "Steel Grating Use Criteria" Index No. 269.
2. Grates shall be ASTM A520, A522 or A588, Grade 50 steel, and galvanized in accordance with Section 962 and 405-3.2 of the Standard Specifications.
3. Channel section C3 x 8.0 may be substituted for the C4 x 5.4 channel.
4. Grates shall be 12" wide with 2" clearance except as noted. Spacing shown are center to center. Lapse is to be 6" minimum. Welded wire fabric is not allowed. Welded wire mesh is to be 6" maximum. All grates are to be picked up and set as noted. Spacing shown is center to center. Lapse should be 6" minimum. Welded wire fabric is not allowed. Welded wire mesh is to be 6" maximum. All grates are to be picked up and set as noted.
5. Anchor Bolt bars shall be included with all anchor bolts. Hoists shall be thoroughly checked prior to installation.
6. Endwall shall be paid underground for under the contract unit price for Class 2 Concrete (Endwall), C225 or Reinforcing Steel (Prestressed or Prestressed). Cost of galvanized bolts and nuts shall be included in the contract unit price for the grate.
7. Sidewalk is to be paid for under the contract unit price for Performance Turf, SY.
Note: For use adjacent to flexible pavement, see diagram right. TYPE B For details on plans.

Gutter shall match the cross slope of the adjacent pavement.

For details depicting usage adjacent to concrete or flexible pavement, see diagram right.

CONCRETE CURB AND GUTTER

CONCRETE CURB

CONCRETE BUMPER GUARD

EXPANSION JOINT BETWEEN GUTTER AND CONCRETE PAVEMENT

GENERAL NOTES

1. For curb, gutter and curb & gutter provide 3'-0" contraction joints at 50' centers (max.).

CONTRACTION JOINT IN CURB AND GUTTER

SHOULDER GUTTER

Surface should be extended within valley gutter and within curb and gutter endings.

CONSTRUCTION

NOTE:

3'-0" Drop in Top of Curb.

EACH 3'-0" Drop in Top of Curb shall be in accordance with Section 300 of the standard specifications.

4. Ends of curbs Types B and D shall transition from full to zero heights in 3'.
**TYPICAL SECTION THRU TRAFFIC SEPARATOR**
(Bridge Deck Shown, Approach Slab Similar)

- For 4'-0" with Bars 4A @ 3 equal spaces (continuous).
- For 6'-0" with Bars 4A @ 5 equal spaces (continuous).
- For 8'-6" with Bars 4A @ 7 equal spaces (continuous).

**LONGITUDINAL SECTION THRU TRAFFIC SEPARATOR AT NOSE**
(Bridge Deck Shown, Approach Slab Similar)

- At the Contractor's option a one piece bar may be substituted for Bars 4B and 4E.

**REINFORCING STEEL OPTION A**

**DETAIL AT EXPANSION JOINTS**
(Strip Seal Shown, Other Armored Joint Types Similar)

**DETAIL AT Poured JOINT WITH BACKER ROD EXPANSION JOINTS**

**BRIDGE INSTALLATIONS - TYPE "E" CURB**

**Note:**
See Structures Plans, Superstructure Sheets for actual dimensions and joint orientation. Treatment of separators on straight bridges shown. For treatment of separators on skewed bridges see Index No. 490.

**TRAFFIC SEPARATORS**
2008 FDOT Design Standards

Sheet No. 07101107 2 of 4

Page No. 302
For 4'-0" width: Bars 4A @ 3 equal spaces (continuous).
For 6'-0" width: Bars 4A @ 5 equal spaces (continuous).
For 8'-6" width: Bars 4A @ 7 equal spaces (continuous).

At the Contractor's option a one piece bar may be substituted for Bars 4B and 4E.

Note:
See Structures Plans, Superstructure Sheets for actual dimensions and joint orientation. Treatment of separators on straight bridges shown. For treatment of separators on skewed bridges see Index No. 490.

Bridge installations - Type "F" Curb
1. Rebar Dimensions are out to out.

2. The 8" vertical dimension shown for Bars 4B and 4D are based on a slab 6.5" thick or greater with a wearing surface. If slab thickness is less than 6.5", decrease this dimension by an amount equal to the wearing surface thickness.

3. Reinforcing Steel Option B:

**Note:** Length of Bars 4B is 2'-4.5" for 4'-0" Separator.
Length of Bars 4C is 4'-4.5" for 6'-0" Separator.
Length of Bars 4C is 6'-11" for 8'-0" Separator.

**Notes: Based on a slab 4'-0" thick or greater without a wearing surface. If a wearing surface is to be provided, increase this dimension by an amount equal to the wearing surface thickness.**

**REINFORCING STEEL NOTATION:**

1. See Notes for dimensions and spacing.
2. Use Welded Wire Reinforcement as required by plans in place of Bars 4A, 4B, and 4E shown in Reinforcing Steel Option A.

**SPICE DETAIL**

*Between WWR 3 x 4 - W5.0 x W6.7 Sections*

**DRAWING JOINT DETAIL**

*For 5' opening or less*

**Dowel Detail**

*Dowels:*
1. Shift Dowel Holes to clear if existing reinforcement is encountered.
2. Provide one adhesive bonding material system in accordance with Sections 416 and 937 of the Specifications.

**BRIDGE INSTALLATIONS - TYPE "E" AND "F" CURBS**

**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

**ALTERNATE REINFORCING STEEL DETAILS (WELDED WIRE REINFORCEMENT)**

**OPTION A:** Use Welded Wire Reinforcement in place of Bars 4A, 4B, and 4E as required by plans in place of Bars 4A, 4B, and 4E shown in the Bending Diagram for Reinforcing Steel Option A.

**OPTION B:** Use Welded Wire Reinforcement in place of Bars 4A, 4B, and 4E shown in Reinforcing Steel Option A.

**Notes:**
- Welded Wire Reinforcement shall conform to ASTM A615.
- Use Welded Wire Reinforcement 3 x 4 W6.7 (Typ.) in Reinforcing Steel Option A.
- Use Welded Wire Reinforcement 3 x 4 W6.7 (Typ.) in Reinforcing Steel Option B.

**CONCRETE:**
- **CONSTANT WIDTH OF SEPARATOR:**
  - **TYPE "E"**
    - 4'-0" Width: 0.018 CY per Ft.
    - 6'-0" Width: 0.021 CY per Ft.
    - 8'-0" Width: 0.024 CY per Ft.
  - **TYPE "F"**
    - 4'-0" Width: 0.150 CY per Ft.
    - 6'-0" Width: 0.174 CY per Ft.
    - 8'-0" Width: 0.204 CY per Ft.

**ESTIMATED TRAFFIC SEPARATOR QUANTITIES**

*All quantities are based on an 8'5" slab.*

**OPTION A:**
- 4'-0" Width: 6.37 Lbs. per Ft.
- 6'-0" Width: 7.00 Lbs. per Ft.
- 8'-0" Width: 8.60 Lbs. per Ft.

**OPTION B:**
- 4'-0" Width: 4.77 Lbs. per Ft.
- 6'-0" Width: 5.37 Lbs. per Ft.
- 8'-0" Width: 6.37 Lbs. per Ft.

**ADHESIVE BONDING MATERIAL SYSTEM:**

*Adhesive bonding material system in accordance with Sections 416 and 937 of the Specifications.*
PROFILE GRADES SHOULD BE ESTABLISHED THAT WILL ALLOW INLETS TO BE LOCATED OUTSIDE THE RETURN WHENEVER PRACTICAL. INLETS SHOULD BE LOCATED TO AVOID CONFLICT WITH PEDESTRIAN MOVEMENT. SPECIAL CARE MUST BE EXERCISED TO PREVENT CONFLICT WITH PUBLIC SIDEWALK CURB RAMPS FOR THE DISABLED. FOR INFORMATION ON PUBLIC SIDEWALK CURB RAMPS REFER TO INDEX NO. 304.

SHOWING LOCATION OF INLETS ON RETURN

TYPICAL RETURN PROFILES
TYPICAL PLACEMENT OF PUBLIC SIDEWALK CURB RAMPS AT CURBED RETURNS

GENERAL NOTES

1. Public sidewalk curb ramps shall be constructed in the public right-of-way for use at curbed returns and in accessible pedestrian routes on arterial streets. Curb transitions with sidewalks and those without sidewalks are to be constructed at all street intersections and at turnouts. Where crosswalk markings are required, ramp runs must fall within the lane widths and configuration vary; must conform to Index No. 515 and 516.

2. The location and orientation of curb ramps shall be as shown in the plans.

3. Curb ramps, running slopes on uncurbed sites shall not be steeper than 1:12 and cross slopes shall be 0.02 or flatter. Transition slopes shall not be steeper than 1:12.

4. When laying existing pavements facilities where existing new development provides a clear space outside the transition, all of the required environment shall be removed to the nearest joint beyond the ramp.

5. Crosswalks in the vicinity of curb ramps shall have detectable warning surfaces.

6. When a curb ramp is constructed within existing curb, curb and gutter and/or sidewalk, the existing curb and gutter shall be reduced to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb and gutter is less than 5'. The existing curb and gutter shall be removed to the nearest joint beyond the curb transitions, 3' from a true plane.

7. Where a curb ramp is constructed within existing sidewalk curbs, curb and gutter, and/or sidewalk, the existing curb and gutter shall be reduced to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb and gutter is less than 5'. The existing curb and gutter shall be removed to the nearest joint beyond the curb transitions, 3' from a true plane. The transition slopes to the ramp; the maximum slope of the transitions shall be 1:12.

8. Public sidewalk curb ramps are to be paid for as follows: Ramps shall be constructed to match existing sidewalk and/or curb transitions and sidewalks. Curbs and gutters shall be removed to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb and gutter is less than 5'. The existing curb and gutter shall be removed to the nearest joint beyond the curb transitions, 3' from a true plane. The transition slopes to the ramp; the maximum slope of the transitions shall be 1:12. Ramps shall be constructed to match existing sidewalk and/or curb transitions and sidewalks. Curbs and gutters shall be removed to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb and gutter is less than 5'. The existing curb and gutter shall be removed to the nearest joint beyond the curb transitions, 3' from a true plane. The transition slopes to the ramp; the maximum slope of the transitions shall be 1:12.

9. Accessibility Criteria for Detectable Warnings:

   a. The area encompassing a ramp shall be complete and uniform in color and texture.
   b. No two adjacent ramps may be interconnected.
   c. There may be no more than 4 non-complying domes in any one square foot of surface.
   d. No two adjacent domes may be non-compliant.
   e. Surface roughness may not exceed 0.027 from a true plane.

10. All sidewalk surfaces, curbs, surfaces, and landings with a cross slope shown in this Index to be 0.02 shall be 0.02 maximum. All ramp surfaces and ramp transition slopes with a slope shown in this Index to be 1:12 shall be 1:12 maximum.
DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS WHERE RAMP AND LANDING DEPTH ARE NOT RESTRICTED BY RIGHT OF WAY
VARIES (9'-1") SHOWN
RAMP VARIABLES
1 2' (5'-11") NSFD.
I
LANDING (NOT REQUIRED TO
EXCEED 8' IN LENGTH)

SECTION THROUGH RAMP RUN AND LANDINGS WITH
UPPER LANDING AT NORMAL SIDEWALK ELEVATION

* Ramp Widths for Curb Ramps CR 15, CR 20, CR 25, CR 30, and CR 40 may be
reduced to 3' min. in restricted conditions when approved by the Engineer.

** Lower landing not required at driveways, parking lots, or other areas with pavement cross-slopes less than 2% (0.02).

DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS WHERE
RAMP AND LANDING DEPTH ARE RESTRICTED BY RIGHT OF WAY
DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS FOR LINEAR PEDESTRIAN TRAFFIC

RAMP AND SIDEWALK CURB OPTIONS

MONOLITHIC CAST CURB

SEPARATELY CAST CURB

BACK OF SIDEWALK CURB OR BUFFER TRANSITION

PLAN

SECTION AA

DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK COMBINED CORNER RAMPS UNDER CONDITIONS OF INFEASIBILITY

Construct Sidewalk Curb In Absence Of Adequate Buffer, Maintenable Surface Contour, Alining Structure, Or When Called For In The Plans Or Standards

2008 FDOT Design Standards

PUBLIC SIDEWALK CURB RAMPS
DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS FOR LINEAR PEDESTRIAN TRAFFIC

Ramp And Sidewalk Curb

PLAN

SECTION AA

DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK COMBINED CORNER RAMPS UNDER CONDITIONS OF INFEASIBILITY

Ramp Widths For Curb Ramps CR 20, CR 21, CR 22, CR 24, and CR 25 may be reduced to 3' min. in Restricted Conditions when approved by the Engineer.

Lower landing not required at driveways, parking lots, or other areas with pavement cross-slopes less than 2% (0.02).

Construct Sidewalk Curb In Absence Of Adequate Buffer; Maintainable Surface Contour, Aligning Structures, Or When Called For In The Plans Or Standards.

BACK OF SIDEWALK CURB OR BUFFER TRANSITION

PUBLIC SIDEWALK CURB RAMPS

2008 FHWA Design Standards

Sheet No. 4 of 6

Index No. 304
Refuge With Maximum Slope Of 0.02 Must Be Provided When Slopes Of 0.05 Or Flatter And 5' In Length Are Not Available On Crosswalks. The Refuge Can Be Constructed At Any Location Within The Crosswalk Or, A 5' x 5' Concrete Landing With Maximum Slope Of 0.02 Can Be Constructed Adjacent To The Crosswalk.

Slopes Shall Intersect At Centerline Of Median On The 0.05 Rate When The Edge Of Pavement Elevations Are Equal. The Slopess May Intersect Off The Centerline For Variable Edge Of Pavement Elevations Or To Accommodate Other Construction In The Median. However, Slopes Shall Not Be Steeper Than 1:12.

SECTION CC

SECTION CC

MEDIAN CROSSWALKS

LANDINGS FOR RAMPS WITHIN PUBLIC RIGHT OF WAY CONSTRUCTED AT LOCATIONS WHERE FUTURE SIDEWALKS ARE PROPOSED, WHERE STABLE SURFACES OTHER THAN SIDEWALKS ARE PART OF A CONTINUOUS PASSAGE OR WHERE A CURB FALLS ALONG THE CIRCULATION PATH TO PEDESTRIAN ROUTES ON ADJACENT SITES
On ramps that are perpendicular with the curb line, the dome pattern shall be in-line with the direction of travel. On ramps intersecting curbs on a radius, the dome pattern shall be in-line with the direction of travel to the extent practicable.

The top width of the dome shall be a minimum of 50% and a maximum of 65% of the base diameter.

PLAN VIEW

All sidewalk curb ramps shall have detectable warning surfaces that extend the full width of the ramp and in the direction of travel 24 inches (610 mm) from the back of curb.
METAL OR PLASTIC CAPS FOR DOWEL BARS

Note: Expansion joints to be spaced as required by codes, or street authorities, and shall be indicated in detail plans.

TRANVERSE CONTRACTION JOINT, VIBRO CAST METHOD

TRANVERSE CONTRACTION JOINT, SAWS METHOD

TRANVERSE JONTS

TRANSVERSE JONTS ARE TO BE SPACED AT A MAXIMUM OF 15'. DOWELS ARE REQUIRED AT ALL TRANSVERSE JOINTS UNLESS OTHERWISE NOTED IN PLANS.

DOVELS / LENGTH 38'

MATERIALS FOR DOWEL BARS

Dowel Bar Layout

Steel Metal Wiper Strip. For Expansion Joints Only

Steel Metal Wiper Strip. For Expansion Joints Only

DOVELL BAR LAYOUT

CONCRETE PAVEMENT JOINTS
**CONCRETE-CONCRETE JOINTS**

- **FOR NEW PROJECTS**
  - PREFORMED ELASTOMERIC COMPRESSION SEAL
  - BACKER ROD BOND BREAKER

- **FOR REHABILITATION PROJECTS**
  - TAPE BOND BREAKER

**CONCRETE-ASPHALT SHOULDER JOINTS**

- **BACKER ROD BOND BREAKER**
- **TAPE BOND BREAKER**

**JOINT SEAL DIMENSIONS**

**BACKER ROD BOND BREAKER (CONCRETE-CONCRETE JOINTS)**

<table>
<thead>
<tr>
<th>JOINT WIDTH</th>
<th>SEALANT BOND THICKNESS</th>
<th>BACKER ROD DIAMETER</th>
<th>MINIMUM JOINT DEPTH</th>
<th>BACKER ROD PLACEMENT DEPTH</th>
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<td>1/12</td>
<td>3/16</td>
<td>1/8</td>
<td>1/8</td>
</tr>
</tbody>
</table>

**CONCRETE PAVEMENT JOINTS**

Note: Dimension w will be shown in the plans or established by the Engineer based on field conditions. Dimension d will be constructed so that the shape factor f has a maximum value of 2.0 and a minimum value of 1.0.

Unless otherwise indicated on the plans the Joint width for new construction will be 1/4". For rehabilitation joints, 1/4 for all other joints.

For rehabilitation projects the Joint width will be shown on the plans or established by the Engineer based on field conditions.
NOTE: After the concrete has set to the extent that the keyway will retain its shape, the hex bolt and plastic insert shall be removed. The remaining portion of the hook bolt assembly shall be installed temporarily prior to placing of concrete in the adjacent lane.

ALTERNATE KEYWAY AND HOOK BOLT

STEEL HOOK BOLT ASSEMBLY

Anchor bolts shall be Grade C in accordance with ASTM A 307. Threaded sleeves shall develop the full strength of the bolt and meet the material and thread requirements of ASTM A 563.

Anchor bolts shall be Grade C in accordance with ASTM A 307. Threaded sleeves shall develop the full strength of the bolt and meet the material and thread requirements of ASTM A 563.

ALTERNATE KEYWAY AND HOOK BOLT

STEEL HOOK BOLT ASSEMBLY

Anchor bolts shall be Grade C in accordance with ASTM A 307. Threaded sleeves shall develop the full strength of the bolt and meet the material and thread requirements of ASTM A 563.

ALTERNATE KEYWAY AND HOOK BOLT

STEEL HOOK BOLT ASSEMBLY

NOTE:
1. Longitudinal joints will not be required for single lane pavement of or less in width. For entrance and exit ramp joint details, see Sheet 6 of 4.

2. Arrangement of longitudinal joints are to be as directed by the Engineer.

3. All manholes, meter boxes and other projections into the pavement shall be boxed-in with 2" preformed expansion joint material.

JOINT ARRANGEMENT

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CONCRETE PAVEMENT JOINTS
Junction layout at entrance and exit ramp terminals

2-THRU LANES WITH SINGLE LANE ENTRANCE RAMP

2-THRU LANES WITH SINGLE LANE EXIT RAMP

3-THRU LANES WITH AUXILIARY LANE AND 2-LANE EXIT RAMP

ENTRANCE TAPER WITH AUXILIARY LANE

EXIT TAPER WITH AUXILIARY LANE

Note: On single lane ramps, longitudinal joint to be constructed along centerline of ramp.
30' i== 15' l  1

Shoulder Pavement

Expansion Joint

Concrete Pavement

Compressed Seal

Subsurf

Sheet Metal Strip

WITH RIGID SHOULDER PAVEMENT

WITH GRASSED SHOULDER OR FLEXIBLE SHOULDER PAVEMENT

Note: Immediately prior to placing the seal, the joint shall be thoroughly cleaned of all foreign material. Immediately after the seal is placed, sheet metal strip shall be bent up against the pavement edge.

The sheet metal strip shall be a minimum of gage steel, 12" wide and shall be galvanized in accordance with ASTM A-526, Coating Designation G90.

DETAIL SHOWING SHEET METAL STRIP

EXPANSION JOINT

OPTIONAL SEALS

CONCRETE PAVEMENT

GENERAL NOTES

1. The centerline of roadway and the centerline of bridge do not necessarily coincide. Prior to the placement of the expansion joint, the centerline of the roadway pavement shall be determined.

2. For information on other types of concrete pavement joints see Index No. 305.

3. Pay quantity for expansion joint is the length of joint to be constructed across the roadway and shoulder pavements, measured at right angles to the centerline of the roadway. Payment for expansion joint shall be full compensation for joint construction, including reinforced concrete subs/abs, sheet metal strip and compression seal, but not including roadway pavement reconstruction associated with joint replacement or reconstruction.

EXPANSION JOINT to be paid for under the contract unit price for Bridge Approach Expansion Joint, LF.
FLEXIBLE PAVEMENT NOTES

Pavement Removal and Replacement

Pavement shall be mechanically removed.

The replacement asphalt shall match the existing structural and friction courses for type and thickness.

The new base materials shall be either of the same type and composition as the materials removed or of equal or greater structural adequacy (See Index No. 506).

BACKFILL

Compacted and Stabilized Fill Option

Backfill material shall be placed in accordance with Section 123 of the Standard Specifications.

In Stage #1, construct compacted fill beneath the base of the pipe, using mechanical tampers suitable for this purpose. This compaction applies to the material placed beneath the base of the pipe and above any bedding.

In Stage #2, construct compacted fill along the sides of the pipe and up to the bottom of the base, with the upper 12 inches being Type B Stabilization. In lieu of Type B Stabilization, the Contractor may employ using optional Base Group 3.

Flexible Fill Option

If compaction cannot be achieved through normal mechanical methods then flexible fill may be used.

Flexible fill is to be placed in accordance with Section 103 of the Specifications, as approved by the Engineer.

Do not allow the utility being installed to float. If a method is provided to prevent flotation from occurring, Stages #1 and #2 can be completed, if approved by the Engineer.

In Stage #1, place flexible fill midway up on both sides of the utility. Allow to harden before placing Stage #2.

In Stage #2, place flexible fill to the bottom of the existing base course.

FLEXIBLE PAVEMENT CUT

TRENCH CUTS AND RESTORATIONS ACROSS ROADWAYS

RIGID PAVEMENT CUT

RIGID PAVEMENT NOTES

Pavement Removal and Replacement

High early strength cement concrete (300 psi) meeting the requirements of Standard Specification 506b shall be used for rigid pavement replacement.

Pavement shall be mechanically removed and replaced to conform with existing pavement joints within 24 hours. (See Index No. 325).

Granular Backfill

Any backfill system that is removed shall be replaced with the same type material.

Any backfill system that is damaged shall be replaced with methods approved by the Engineer. Flowable fill material shall be placed in accordance with the Standard Specifications.

In Stage #1, construct compacted fill beneath the base of the pipe, using mechanical tampers suitable for this purpose. This compaction applies to the material placed beneath the base of the pipe and above any bedding.

In Stage #2, construct compacted fill along the sides of the pipe and up to the bottom of replacement pavement.

Flexible Fill Option

If mechanical compaction cannot be achieved through normal mechanical methods then flexible fill may be used.

Flexible fill is to be placed in accordance with Section 103 of the Specifications, as approved by the Engineer.

Do not allow the utility being installed to float. If a method is provided to prevent flotation from occurring, Stages #1 and #2 can be completed, if approved by the Engineer.

In Stage #1, place flexible fill midway up on both sides of the utility. Allow to harden before placing Stage #2.

In Stage #2, place flexible fill to the bottom of the existing base course.
NOTES FOR UTILITY CONFLICT PIPE

1. These details are for construction field execution to resolve utility conflicts that cannot be remedied by relocation. For conflicts determined during design, use the construction shop drawings for structure details.

2. Concrete used in conflict structures shall be as specified in ASTM CH8: 4000 psi may be used in lieu of Class 2 concrete.

3. Minimum opening for pipe shall be the pipe OD plus 6". Mortar used to seal the pipe into the opening shall be of such mix that shrinkage will not cause leakage into or out of the structure.

4. If the conflict structure is round or there are multiple inlet or outlet pipes, then the wall section should be reviewed for strength.

5. If during the plans design or construction process it is determined that a domestic water supply line must pass through a storm drain structure, it must be shown on the design or construction plans and submitted to the Florida Department of Environmental Protection (FDEP) for review and comment. This index provides accepted methods for addressing conflicts when and where they are reasonably avoided. To be submitted along with the plans shall be a justification describing circumstances and the impracticability of avoidance. If identified, properly justified, and accomplished in accordance with this index, approval is granted. Upon request, the Utility Agency Owner (UAO) must provide support data on the cost of relocation or adjustment to the FDOT for submission to the FDEP.

DESIGNER'S NOTE

"Sump" Conflict Manholes Should Not Be Used Unless the System is Hydraulically Designed to Account For The Head Loss Generated If The Sump Is Completely Blocked.

Allow 2 feet minimum clearance on one side of Utility for maintenance purposes and no less than 1 foot clearance on the other side.

INDEX NO. 307

2006 FDOT Design Standards
MISCELLANEOUS UTILITY DETAILS
PLAN VIEW
FOR TWO OR MORE LANES (TWO LANES SHOWN)

PARTIAL CUTS FOR RING AND COVER ADJUSTMENTS

NOTES
1. No irregular seams are permitted. All seams must be clean sawed.
2. As shown longitudinally but the transverse seams shall extend to the nearest existing joint.

NONTRENCH PAVEMENT CUTS FOR UNDERGROUND UTILITY STRUCTURES IN PAVEMENT
GENERAL NOTES

1. For Repair and Replacement Criteria see Sheet 2 of 2.

2. Full depth repairs consist of removing and replacing at least a portion of the existing slab to the bottom of the concrete.

3. Repair boundaries shall be sawed full-depth with diamond saw blades. On hot days, it may not be possible to make this cut without first making a wide, pressure relief cut within the repair boundaries. A carbide-tipped wheel saw may be used for this purpose, but the wheel saw must not intrude on the adjacent lane, unless the lane is slated for repair. The wheel saw cuts produce a ragged edge that promotes excessive spalling along joints. Hence, if wheel saw cuts are made, diamond saw cuts must be made 18 in. outside the wheel saw cuts. To prevent damage to the base, the wheel saw must not be allowed to penetrate more than 0.5 in. into the base.

4. No additional base or subgrade material shall be added and all loose base or subgrade material not recompactable shall be removed prior to placement of the new concrete slab. The concrete slab shall be placed to the full depth of the material removed. No additional compensation will be allowed for additional concrete required to bring proposed concrete slab up to proposed grade.

5. Removal of the damaged concrete pavement shall be by lifting. Any good concrete pavement which is damaged during removal of damaged areas shall be removed and replaced by the contractor at his expense.

6. If the roadway contract includes grinding, then the slab replacement shall be performed first.

7. During slab replacement operations, fill any saw cut over runs into adjacent slabs with epoxy.
<table>
<thead>
<tr>
<th>DISTRESS PATTERN</th>
<th>SEVERITY/DESCRIPTION</th>
<th>REPAIR METHOD</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRACKING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitudinal</td>
<td>Light: &lt; 1/8&quot; no faulting, spalling &lt; 1/2&quot; wide</td>
<td>None</td>
<td>Figure 0.2</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/8&quot; &lt; width &lt; 1/2&quot; spalling &lt; 3/4&quot;</td>
<td>Clean and Seal</td>
<td>Figure 0.3</td>
</tr>
<tr>
<td></td>
<td>Severe: width &gt; 1/2&quot; spalling &gt; 3/4&quot; faulting &gt; 1/2&quot;</td>
<td>Replace</td>
<td>Figure 0.3</td>
</tr>
<tr>
<td>Transverse</td>
<td>Light: &lt; 1/8&quot; no faulting, spalling &lt; 1/2&quot; wide</td>
<td>None</td>
<td>Figure 0.2</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/8&quot; &lt; width &lt; 1/2&quot; spalling &lt; 3/4&quot;</td>
<td>Clean and Seal</td>
<td>Figure 0.3</td>
</tr>
<tr>
<td></td>
<td>Severe: width &gt; 1/2&quot; spalling &gt; 3/4&quot; faulting &gt; 1/2&quot;</td>
<td>Replace</td>
<td>Figure 0.3, 0.4 and 0.5</td>
</tr>
<tr>
<td>Corner Breaks</td>
<td>Light: &lt; 1/8&quot; no faulting, spalling &lt; 1/2&quot; wide</td>
<td>None</td>
<td>Figure 0.2</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/8&quot; &lt; width &lt; 1/2&quot; spalling &lt; 3/4&quot;</td>
<td>Clean and Seal</td>
<td>Figure 0.3</td>
</tr>
<tr>
<td></td>
<td>Severe: width &gt; 1/2&quot; spalling &gt; 3/4&quot; faulting &gt; 1/2&quot;</td>
<td>Replace</td>
<td>Figure 0.3, 0.4 and 0.5</td>
</tr>
<tr>
<td>Intersecting Random Cracks (Decomposed Slab)</td>
<td>Cracking patterns that divide the slab into three or more segments</td>
<td>Full Depth</td>
<td>Figure 0.3 and 0.4</td>
</tr>
<tr>
<td><strong>JOINT DEFICIENCIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split Nonwheel Path</td>
<td>Light: split width &lt; 1/2&quot;, &lt; 4&quot; slab depth, &lt; 1/8&quot; in length</td>
<td>None</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/2&quot; &lt; split width &lt; 3&quot;, &lt; 4&quot; slab depth, &lt; 1/8&quot; in length</td>
<td>None</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td></td>
<td>Severe: split width &gt; 3&quot; or length &gt; 1/8&quot;</td>
<td>Full Depth</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td>Split Wheel Path</td>
<td>Light: split width &lt; 1/2&quot;, &lt; 4&quot; slab depth, &lt; 1/8&quot; in length</td>
<td>None</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/2&quot; &lt; split width &lt; 3&quot;, &lt; 4&quot; slab depth, &lt; 1/8&quot; in length</td>
<td>None</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td></td>
<td>Severe: split width &gt; 3&quot; or length &gt; 1/8&quot;</td>
<td>Full Depth</td>
<td>Figure 0.4 and 0.5</td>
</tr>
<tr>
<td><strong>SURFACE DETERIORATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pop Outs Nonwheel Path</td>
<td>Light: Small pieces of surface pavement broken loose, normally ranging from 1/4 to 4 in. diameter and 1/2 to 2 in. in depth</td>
<td>None</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td></td>
<td>Severe: Flying debris deemed a traffic hazard</td>
<td>Full Depth</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td>Pop Outs Wheel Path</td>
<td>Light: Small pieces of surface pavement broken loose, normally 3&quot; diameter and 3&quot; in depth</td>
<td>None</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td></td>
<td>Severe: Flying debris deemed a traffic hazard</td>
<td>Full Depth</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td><strong>MISCELLANEOUS DISTRESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulting</td>
<td>Light: Faulting &lt; 1/32&quot;</td>
<td>None</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1/32&quot; &lt; faulting &lt; 1/16&quot;</td>
<td>Grind</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td></td>
<td>Severe: faulting &gt; 1/16&quot;</td>
<td>Grind</td>
<td>Figure 0.4</td>
</tr>
<tr>
<td>Lane To Shoulder Drop-Off</td>
<td>Light: 0 &lt; drop-off &lt; 1&quot;</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Moderate: 1&quot; &lt; drop-off &lt; 3&quot;</td>
<td>Build-Up</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Severe: drop-off &gt; 3&quot;</td>
<td>Build-Up</td>
<td>N/A</td>
</tr>
<tr>
<td>Water Bleeding Or Pumping</td>
<td>Seeping or ejection of water through joints or cracks</td>
<td>Install appropriate drainage, edge drain, permeable</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>subbase, reseal joints, etc.,</td>
<td></td>
</tr>
<tr>
<td>Blowouts</td>
<td>Upward movement of transverse joints or cracks often accompanied by shattering of the concrete</td>
<td>None</td>
<td>Full Depth</td>
</tr>
</tbody>
</table>
NOTES FOR CONCRETE SIDEWALK ON CURBED ROADWAYS

1. Sidewalks shall be constructed in accordance with Section 522 of the FDOT Standard Specifications except for public sidewalk curb ramp runs which shall be finished in accordance with Index No. 304.

2. Bond breaker material can be any impermeable coated or sheet membrane or preformed material having a thickness of not less than 6 mils nor more than 1/8 in.

3. For public sidewalk curb ramps see Index No. 304.

4. Saw cut joints shall be finished in accordance with Index No. 304.

5. Construct sidewalks with 6" thick edges. See Index No. 304.

6. Sidewalk shall be placed for under the contract unit price for Sidewalk Concrete 1" thick, L.S.F.
NOTES FOR CONCRETE SIDEWALKS ON UNCURBED ROADWAYS

1. Sidewalks shall be constructed in accordance with Section 502 of the FHWA Standard Specifications.

2. Sidewalks adjoining driveways 24' and wider, right in-right out approaches, driveways and side roads and streets shall have a detectable warning surface that extends the full width of the sidewalk and 30' (1600 mm) from the edge of driveways and edges of side roads and streets. Detectable warning surfaces shall conform to the requirements described in the General Notes on Index No. 304. For sidewalks continuous through driveways, detectable warning surfaces are not required.

3. For turnouts see Index No. 515.

4. Construct sidewalks with 1' thick edge beam through the limits of any surface mounted Pedestrian/Bicycle Picket Railing or Pipe Guardrail shown in the plans. See Sheet 1 for details.

5. Sidewalk shall be paid for under the contract unit price for Sidewalk Concrete (1' Thick), Sy.

CONCRETE SIDEWALK FOR UNCURBED ROADWAYS

**OPEN JOINTS**

**SAWED JOINTS**

**JINT LEGEND**

A = Expansion Joint (Preformed Joint Filler)
B = Dummy Joint, Tooled
C = Formed Open Joints
D = Saw Cut Joints, 1/2' Deep @ 150 Hour Max. 5' Centers
E = Saw Cut Joints, 1/2' Deep @ 12 Hour Max. 30' Centers
F = Expansion Joint When Run Of Sidewalk Exceeds 30'

Interpolations between locations when called for in the plans or at locations as directed by the Engineer.

When driveway is new construction, reconstruction, or altered, cross slope within this area shall not exceed 0.02. Existing driveways that are not being altered may be left as they are.

DISCONTINUOUS SIDEWALK

CONCRETE SIDEWALK FOR UNCURBED ROADWAYS
1. The illustrations for guardrail applications are standard configurations; adjustments are to be made as required by site-specific conditions to attain optimum design for function, economy, and serviceability.

2. The beginning of guardrail need shall be at the greatest of the upstream distances from the hazard, as determined from Figures I and II, and other application details of this index.

3. One panel (i.e., panel length) equals 2'-6". Guardrail shall be constructed with roll elements 2'-6" in length except where 2'-0" elements are called for by this and other standards. Post spacings shall be 6'-3", except that reduced spacings shall be used for (a) transitions to anchorage at rigid structures such as bridges (See Dehlin and Index No. 400) and transitions to realigning crash cushions, (b) the conditions in Note No. 7 below, (c) special post applications, (d) reduced post spacing required for specific end anchorage assemblies, and, (e) specific specifications called for in the plans.

4. Guardrail mounting height for the W-beam without rubrail and for thrie-beam is 9'-0" to the top of beam, and for W-beam with rubrail 2'-0" to center of beam. Modified thrie-beam shall be mounted at a height of 2'-0" to center of beam. The height is critical and shall be attained in all cases a tolerance of 2" above and 1" below the standard mounting heights is permissible over necessary surface irregularities (e.g., across shoulder gutters, inlets and roadside surface breaks).

5. All guardrail panels, end sections, and special end shoes shall be lapped in the direction of adjacent traffic.

6. Flared end anchorage assemblies providing 4'-0" are the standard end treatments for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach end treatments will be constructed only when restraints prevent construction of flared end anchorage assemblies.

7. Guardrail end anchorage assemblies shall be of the type called for in the plans. If the plans call for end anchorage assembly "flared" and does not identify the specific system to be used, the contractor has the option to construct any FDOT approved thrie-beam end anchorage assembly or other assemblies provided in this Index or identified on the Qualified Products List (QPL), subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.

8. If the plans call for end anchorage assembly "parallel" and does not identify the specific system to be used, the contractor has the option to construct any FDOT approved parallel assembly provided in this Index or identified on the QPL, subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.

9. If the plans call for a specific end anchorage assembly, subassemblies with other end anchorage assemblies will not be permitted unless approved by the Engineer. Approved substitutions will not be eligible for VESC consideration.

10. When an end treatment is attached to guardrail with Pedestrian Safety Treatment, only end treatments and systems with like posts are to be used.

11. Proprietary end anchorage systems must be identified on the drawings if applicable.

12. Single face median guardrail for bridges located on divided roadways shall be constructed the same as outer roadway guardrail under the following conditions:

- All conditions where approach and/or bridge is located outside of opposing roadway clear zone.
- Medians of uniform width that are separated by other transportation media and/or facilities.

13. Medians of uniform or variable widths with independent vertical alignments not suited to normal median guardrail installations.

14. The modified thrie-beam guardrail is a Test Level 3 semi-rigid system and may be used where a Test Level 4 guardrail is required.

15. Steel offset blocks other than modified thrie-beam offset blocks are not permitted for new guardrail construction.

16. Existing steel offset blocks may remain throughout the service life of the existing guardrail. Permissible post and offset block combinations are tabulated on Sheet 15.

17. Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged gusset plates which have been refurbished to condition new shall be installed in accordance with Sections 626 and 624 of the Specifications. No burning of holes will be permitted.

18. For guardrail reflector details see Sheet 15.

19. Any run of guardrail with existing concrete posts that is being reused under a construction or maintenance contract shall be reused using timber or steel posts. Rebel within a run of guardrail with existing concrete posts can be made with either steel, timber, sound salvaged concrete posts; replacement in kind of damaged posts is to be made when like posts are on hand at time of repair.

20. Substitutions between thrie-beam guardrail and concrete barrier wall are not eligible for VESC consideration.

21. On roadways designated for reverse lancing, all downstream ends of guardrail that are not shielded or that are not designed as approach end terminals shall be marked with post-mounted Type 3 Object Markers. Trailing bridge ends and trailing shoulder concrete barrier wall ends shall be marked with Type 3 Object Markers except where there is trailing end guardrail. Object markers to be installed facing reverse lancing traffic. The cost of the object marker shall be included in the cost of the guardrail.

22. The modified thrie-beam guardrail and concrete barrier wall are not eligible for VESC consideration.
Clear Zone Limit Or Horizontal Clearance Limit In Accordance With The Criteria In Volume I Chapters 2, 4 And 25 Of The "Plans Preparation Manual" and Index No. 700.

Beginning Of Length Of Need

X (Length Of Advancement) Ft.

Hazard Free, Traversable Slopes

End Anchorage Assembly (Flare Shown)

Approach End Anchorage

Face Of Guardrail

Edge Of Traffic Lane

Point Of Departure

Length of advancement determined from the diagram and equations above establishes the location of the upstream beginning length of need for guardrail; however, the length of advancement can be no less than that required by other details of this Index. The flared end anchorage with 4 nose offset is shown in the diagram above; however, the diagram applies to other configurations that may occur at the beginning of length of need, such as, other flare designs, upstream returns, and other upstream deflected, tangent and curvilinear conditions.

Equation Variables:

- **D** = Distance in feet from near edge of the near approach traffic lane to either (a) the back of hazard; when the hazard is located inside the clear zone or horizontal clearance or (b) the clear zone or horizontal clearance outer limit, when the hazard extends a or goes beyond the clear zone or horizontal clearance limit. For left side hazards on two-way undivided facilities, D is measured from the inside edge of the near approach traffic lane (see Figure 2).

- **d** = Distance in feet from the near edge of the near approach traffic lane to the face of guardrail at its intersection with the departure line. For left side hazards on two-way undivided facilities, d is measured from the inside edge of the near approach traffic lane (see Figure 2).

For flared and parallel end anchorage assemblies the beginning length of need is to be set at the center of post #3. That is, the departure line must intersect the face of the rail at post #3.

For flared end anchorage assemblies the offset distance “d” will equal the normal guardrail offset measured from the face of the guardrail to the edge of the near approach travel lane plus 1'-2" for 45 mph or less and 1'-8" for greater than 45 mph.

**LENGTH OF ADVANCEMENT - FIGURE 1**

<table>
<thead>
<tr>
<th>Design Speed mph</th>
<th>X (Length Of Advancement) Ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 45</td>
<td>$16 \times (D-d)$</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>$13 \times (D-d)$</td>
</tr>
</tbody>
</table>
Clear Zone Limit Or Horizontal Clearance Limit

Beginning Of Length Of Need
(Facing Approach End Anchorage Assembly)

Length Of Guardrail System (Limit Of Pay For Guardrail)

Left Side Opposite Hand
ONE-WAY TRAFFIC

Approach End Anchorage Assembly
(Type Varies)

Hazard Free, Traverseable Slopes

Point Of Departure (LA)

Face Of Hazard

Clear Zone Limit Or Horizontal Clearance Limit

Beginning Of Length Of Need (LA)

Length Of Guardrail (Limit Of Pay For Guardrail)

Right Approach (RA)

Approach End Anchorage Assembly
(Type Varies)

Hazard Free, Traverseable Slopes

Point Of Departure (RA)

End Treatment

Length Of Need

Length Of Guardrail System (Limit Of Pay For Guardrail)

TWO-LANE TWO-WAY TRAFFIC

For description of the dimensions D, d and X, see Length of Advancement - Figure 1.
For additional shoulder guardrail Information, see Details B and C.

LOCATING TERMINALS ON SHOULDER GUARDRAILS - FIGURE 2
**Division Roadway - Detail B**

<table>
<thead>
<tr>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
<th>Vortex</th>
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</thead>
<tbody>
<tr>
<td>End Anchorage Type II</td>
<td>Flared End Section</td>
<td>(Flare Shown)</td>
<td>1.8 Panels Min.</td>
<td>Hazard</td>
<td>4 ft. Wih.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Guardrail Application for Roadside Hazards**

<table>
<thead>
<tr>
<th>Vortex</th>
<th>Vortex</th>
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<th>Vortex</th>
<th>Vortex</th>
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<th>Vortex</th>
<th>Vortex</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Anchorage Type II</td>
<td>Flared End Section</td>
<td>(Flare Shown)</td>
<td>1.8 Panels Min.</td>
<td>Hazard</td>
<td>4 ft. Wih.</td>
<td></td>
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</tbody>
</table>

**Opposing Traffic - Detail D**

<table>
<thead>
<tr>
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<th>Vortex</th>
<th>Vortex</th>
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<th>Vortex</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Anchorage Type II</td>
<td>Flared End Section</td>
<td>(Flare Shown)</td>
<td>1.8 Panels Min.</td>
<td>Hazard</td>
<td>4 ft. Wih.</td>
<td></td>
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</tr>
</tbody>
</table>

**Guardrail Application for Narrow Median and GORE Hazards**

<table>
<thead>
<tr>
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<th>Vortex</th>
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<th>Vortex</th>
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<th>Vortex</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Anchorage Type II</td>
<td>Flared End Section</td>
<td>(Flare Shown)</td>
<td>1.8 Panels Min.</td>
<td>Hazard</td>
<td>4 ft. Wih.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND
SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL LENGTH OF APPROACH SLAB
GUARDRAIL LENGTHS (FL)

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Projected ADT</th>
<th>ADT (FL)</th>
<th>C.Z. (FL)</th>
<th>Guardslip Length</th>
<th>Shoulder Length</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50</td>
<td>2,500</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>5,000</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td>10,000</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

Lengths are based on median widths and on standard clear zone widths for travel lanes on tangent roadways, and the length of shoulders needed for Travel and shouldral Treatments—shoulder flush, and hazards. Lengths may vary to accommodate for any other specific basis for both standard width and narrow shoulder treatments.
**Guardrail**

**Guardrail**

**Speed Sizing**

See Sheet S1

Opposing Roadway Shoulders

For Determining Crash Cushion Slab Length

<table>
<thead>
<tr>
<th>Panel Width</th>
<th>h/2 Taper Rate</th>
<th>h/5 Taper Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>3.5</td>
<td>6.5</td>
</tr>
<tr>
<td>26</td>
<td>4.5</td>
<td>6.5</td>
</tr>
<tr>
<td>30</td>
<td>5.5</td>
<td>6.5</td>
</tr>
<tr>
<td>36</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>40</td>
<td>7.5</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The lengths shown in this table are based on standard widths for narrow and narrow bridge shoulders. Length requirements for both standard and narrow bridge shoulders and end anchorage or end anchoring requirements shall be determined in a site-specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speed (S2) along the runout from the approach roadways, however, when calculated speeds (S2) are less than 30 mph, crash cushions shall be no less than for 30 mph, and speed diagram left. The number of panels may be reduced when installing a crash cushion more than 2.5' in width, see below.

* Number shown is the minimum number of panels plus a W-3/4 beam transition panel. Single faced guardrail rail has a width of five (5) or more panels.

**Approach Guardrail Treatments for Bridges with Safety Shape Traffic Railing**

**Extending Full Approach Slab Length in Narrow Medians with Flush Shoulders**
### Guardrail Lengths

<table>
<thead>
<tr>
<th>MEDIAN WIDTH</th>
<th>1:10 TAPER RATE</th>
<th>1:5 TAPER RATE</th>
<th>1:10 TAPER RATE</th>
<th>1:5 TAPER RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>PANELS (NO.)</td>
<td>LENGTH (FT.)</td>
<td>PANELS (NO.)</td>
<td>LENGTH (FT.)</td>
</tr>
<tr>
<td>20</td>
<td>0.5</td>
<td>08.25</td>
<td>0.5</td>
<td>08.25</td>
</tr>
<tr>
<td>28</td>
<td>0.5</td>
<td>08.25</td>
<td>0.5</td>
<td>08.25</td>
</tr>
<tr>
<td>30</td>
<td>0.5</td>
<td>08.25</td>
<td>0.5</td>
<td>08.75</td>
</tr>
</tbody>
</table>

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard and narrow bridge shoulders and end anchorage and end shielding requirements shall be determined on a site specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds from the approach roadways; however, when calculated speeds (S) are less than 30 mph crash cushions shall be no less in size than for 30 mph see speed diagram left. The number of panels may be reduced when installing a crash cushion more than 2.5' in width, see "b" below.

*bNumber shown is the minimum number of panels plus a W-3 Half beam transition panel; single faced guardrail must have a length of five (5) or more panels.

---

**Approach Guardrail Treatments for Bridges with Safety Shape Traffic Railing Extending Less Than Full Approach Slab Length in Narrow Medians with Flush Shoulders**

---

**Note:** The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.
LEGEND

1. Edge of traffic lane for simple curve turnouts.
2. Edge of travel lane for taper turnouts.
3. Taper.
4. Permanent return (radius R).
5. Flared end anchorage to be installed except when existing guardrail or intersecting drive or side road adjoins the project.
6. Post for locating flare, proximate to PC or PT:
   - No. 2 post for Radii 25' or less.
   - No. 3 post for Radii >25' and <50'.
   - Between No. 4 and No. 5 posts for Radii greater than 50'.
7. Flared end anchorage assembly.
8. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius R).
9. End anchorage Type II (radial return only).
10. Guardrail installation limited to roadway right of way unless otherwise called for in the plans.

Note: Only 25' and 40' radius panels are to be used for return guardrail on simple turnouts. On skewed turnouts the number of panels used and their arrangement with angle panels will be as shown in the plans or as directed by the Engineer.

GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES

TAPER TURNOUTS

Notes: The guardrail application shown on this sheet are for highways with flush shoulders and no restrictions for constructing flared end anchorage and minimum lengths of guardrail. For highways with flush shoulders and restrictions to constructing flared end anchorage, see General Note No. 6.

Where openings in guardrail are required to ease proximity to bridge traffic rails or ends of concrete barrier walls, and minimum length guardrail with flared end anchorage can not be applied, either controlled release return or energy absorbing terminals are to be applied.
Rubble Protection (Sand-Cement Protection When Specified)

Bridge Traffic Railing Barrier

Limit Of Slope Proceed At Roadway
And Sand Cement Protection At Railroads

Vine (5' Min.)

30' Approach Slab With Bridge Traffic Railing Barrier

BRIDGES OVER STREAMS

BRIDGES OVER STREAMS

BRIDGES OVER RAILROADS

BRIDGES OVER ROADWAYS OR RAILROADS

For Additional Information See Index No. 402

For Additional Guardrail Information See Sheet 12

SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL APPROACH SLAB LENGTH

SKETCH NOTES

1. These sketches are for showing shoulder interface between roadways and bridges where crossings are normal to other roadways, railroads and streams. For site specific applications and details see the plans and the FDOT Structures Design Office "Detailing Manual" and "Design Guidelines".

2. Shoulder treatments shown in these sketches are for locations with shoulder gutter; shoulder hinge location will vary for facilities without shoulder gutter.

SHOULDER INTERFACE BETWEEN ROADWAYS AND BRIDGES
This Standard Post Must Be Timber When Steel Post Used In Guardrail Ahead

See Detail L

Safety pipe rail is required when the back of steel guardrail posts are 45 or less from the near edge of a pedestrian way or bikeway and post bolt treatment is required when the back of timber posts are 4' or less from the near edge of a pedestrian way or bikeway; see 'PEDESTRIAN SAFETY TREATMENTS'.

Curb flare shall follow guardrail flare, see elsewhere in this Index for additional guardrail flare information.

Note: For Proprietary End Treatments See the Qualified Products List.

SECTION CC

SECTION BB

SECTION AA

APPROACH TREATMENT FOR CURB AND GUTTER
Note: For bolt washer requirements on end terminals, see individual end anchorage assembly details. Special bolts having lengths greater than 3\(\frac{1}{2}\) are required. See Table 5.4 of the AASHTO Roadside Design Guide for details.

<table>
<thead>
<tr>
<th>L (in.)</th>
<th>THREAD LENGTH (in.)</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;4&quot;</td>
<td>Full Length</td>
<td>Roll Splice Bolt</td>
</tr>
<tr>
<td>3(\frac{1}{2})</td>
<td>4(\frac{1}{2})</td>
<td>Single or Double Faced Guardrail Bolt</td>
</tr>
<tr>
<td>2(\frac{3}{4})</td>
<td>4(\frac{3}{4})</td>
<td>Single or Double Faced Guardrail</td>
</tr>
</tbody>
</table>

**STEEL WASHER**

**OVAL SHOULDER BUTTON HEAD BOLT**

Note: The round washer is not intended for use under the recess nut for the beam to beam nut splice. The washer is required under the recess nut for connecting the beam to the end block and under the post bolt nut for connecting the beam to the end block. For connecting the beam to end blocks with timber end anchorage bolts in the two bolt head or for securing the beam end plates to the beam end, use a 4\(\frac{1}{2}\) flat or single Faced Guardrail. Special bolts having lengths greater than 3\(\frac{1}{2}\) are required. The washer shall be used on the guardrail face with no more than 3\(\frac{1}{2}\) of the threaded rod projecting beyond the top of the nut. The threaded portion on both ends shall be chamfered to reduce the risk of thread stripping.

**BUFFER END SECTION**

**POST SPACING (Ft.) Measured From Face Of Spur...**

**W-BEAM BACK-UP PLATE**

**MINIMUM OFFSET FOR SINGLE FACED GUARDRAIL (Ft.)**

**HEX BOLTS AND NUTS**
### Notes:

1. The locations shown for special posts mounted on inlets are to be used as guidelines for positioning the posts and for estimating the number of required posts.
2. Special posts and their enclosures mounted on curb inlets shall be in accordance with special steel guardrail posts sheet 9, and paid for under the contract unit price for Special Guardrail Post, EA.

### Variations Shown for the Location of Special Posts

3. Variations shown for the locations of special posts mounted on inlets are established from standard post spacing (6'-3"), wherein an allowance of standard posts from inside 1'-6" and inside of single and double offset blocks or standard posts adjacent to the inlets, generally 60% post overlap is made in concrete and "j" distance for guardrail and 1'-7" for expansion, with offsets. The number of special posts may vary by reducing post spacing and adjusting the height of rail panel(s).

4. Encased guardrail posts shall conform. In addition to standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Posts, EA. Payment shall include cost of foam wrap and foam encasement.

### SPECIAL POST LOCATIONS ON CURB INLETS

#### CURB INLET TYPE 1

- Only Single Special Post Shown
- [Diagram showing single special post]

#### CURB INLET TYPE 2

- Only Single Special Post Shown
- [Diagram showing single special post]

#### CURB INLET TYPE 3

- Only Single Special Post Shown
- [Diagram showing single special post]

#### CURB INLET TYPE 4

- Only Single Special Post Shown
- [Diagram showing single special post]

#### CURB INLET TYPE 5

- Only Single Special Post Shown
- [Diagram showing single special post]

#### CURB INLET TYPE 6

- Only Single Special Post Shown
- [Diagram showing single special post]

### ENCASED GUARDRAIL POST

- Special guardrail posts shall conform with single standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Posts, EA. Payment shall include cost of foam wrap and foam encasement.
**CONCRETE ANCHOR BLOCK OPTION**

**TYPE II NOTES**

1. Unless specified in the plans, the contractor shall supply either the cable anchor option or the concrete anchor block option.

2. Type II end anchorages are approved for all speeds and are intended for use as:
   a. End anchorages for single face free standing guardrail girders.
   b. Approach anchorages for single face free standing guardrail girders when end anchorages are located outside of the clear zone.
   c. Approach anchorages for single face free standing guardrail girders outside of the clear zone.

   Crash cushions shall be provided on or in lieu of Type II end anchorages located outside the clear zone.

3. When concrete end anchorages are specified for use with end anchorages located outside the clear zone, use the necessary hardware to secure them to the concrete anchor block option.

**END ANCHORAGE ASSEMBLY TYPE II**
Soil Plate
24" x 18" x 1"

Bolt
i" Plain
f" Nut With Shelf Angle
Under Long Pavement
24" x 24" x 24" Round Washer

Anchor Plate

Note: Steel tubes and attached soil plate may be installed by:

1. Excavating, backfilling and compacting to provide full passive soil resistance in all surfaces of the tube and soil plate.
2. Driving steel tube and soil plate on a unit with a dummy timber post to prevent damage to backfill post.

END ANCHORAGE ASSEMBLY TYPE MELT

2006 FDOT Design Standards
Sheet 86, Page 3

GUARDRAIL

MODIFIED ECCENTRIC LOADER TERMINAL NOTES

1. The MELT is applicable for display panels up to 45 mph. The MELT is intended for use as an approach and terminal guardrail system. The alignment of the approach shall be to the same general alignment with an effective length of 20', including three standard 6' under posts outside of any standard guardrail, guardrail terminals or other shoulder treatments.

2. This standard drawing is provided by the Florida Department of Transportation solely for use by the Department and its independent contractors, for the planning and design of a roadway project, and associated improvements. The drawings do not include specific information necessary to field identify components parts and materials. The MELT shall be installed in accordance with the distributor’s detailed drawings, procedures and specifications.

3. This standard drawing is sufficient for plan details for the MELT when installed in connection with shoulder guardrail and shall be in accordance with the plans and specifications. This MELT shall be installed in accordance with the distributor’s detailed drawings, procedures and specifications.

4. The first two posts must be short timber beam end posts with steel foundation tubes and soil plates, post Nos. 3 and 4 may be CTFW upright posts and post No. 7 must be a standard timber post.

5. The MELT shall be used in median where horizontal clearance requires the use of a barrier.

6. See the General Notes for installation requirements of metallic components.

7. If the plans call for the MELT at the specific location, substitutions with other end and anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for and anchor plate, the Engineer has the option to construct any MELT approved for the proposed project that meets the specifications for that location. Where a Florida End anchorage is used at the median, any approved substitution with a metallic anchorage will not be eligible for MELT.

8. The MELT shall be paid for under the contract unit price for Guardrail End Anchorage Assembly (Fane), and shall be full compensation for furnishing and installing all components in accordance with the plans, the distributor’s detailed drawings, procedures and specifications and this Index.

WOOD
5/8" x 2"

Note: Assembly furnished with channel turned down for right side application, and turned up for left side application.
1. Controlled release returns are intended for use as (a) in openings in continuous guardrails to provide access to slopes and (b) for standard guardrails. Standard return radii are not bolted (steel only); for standard guardrails, the releases shall be bolted based on an intersection angle of 90°. The return can be accommodated with the guardrail end anchorage assembly type CRT or connected to a standard guardrail as shown or otherwise detailed in the plans. The Guardrail end anchorage assembly type CRT is to be used only for the guided guardrail return with 16' 25' and 32' radii as shown. The assembly is not to be used on any tangent or flatwise return applications. Other types of end anchorage assemblies are not to be used in the controlled release return.

2. The surface immediately behind the control release return shall be sloped not steeper than 1:6 and be maintained free of fixed objects in accordance with the area criteria outlined in the plans below. The area immediately behind the control release return shall have slopes not steeper than 1:6 and be maintained free of fixed objects in accordance with the area criteria outlined in the plans below.

3. The surface immediately behind the control release return shall have a transverse surface of the transverse surface to be based on standard vehicle departure, return radii and preceding tangents. This area is not to be greater than the corresponding 15 and 60 M values described below.

4. The controlled release portion of the controlled release return shall be full section drop bent posts (18.5 or 25.5 panel posts). The surfaces are not to be used between the guardrail beam and the head of the return post bolts of any controlled release terminal (CRT) post or of any Guardrail end anchorage assembly type CRT breakaway guardrail post.

5. The guardrail beam of the B' radius return is to be used only for the guided guardrail return with 16' 25' and 32' radii as shown. The assembly is not to be used on any tangent or flatwise return applications. Other types of end anchorage assemblies are not to be used in the controlled release return.

6. The area immediately behind the control release return shall be sloped not steeper than 1:6 and be maintained free of fixed objects in accordance with the area criteria outlined in the plans below. The area immediately behind the control release return shall have slopes not steeper than 1:6 and be maintained free of fixed objects in accordance with the area criteria outlined in the plans below.

7. The surface immediately behind the control release return shall have a transverse surface of the transverse surface to be based on standard vehicle departure, return radii and preceding tangents. This area is not to be greater than the corresponding 15 and 60 M values described below.

8. The guardrail beam of the B' radius return is to be used only for the guided guardrail return with 16' 25' and 32' radii as shown. The assembly is not to be used on any tangent or flatwise return applications. Other types of end anchorage assemblies are not to be used in the controlled release return.

9. The Guardrail End Anchorage Assembly Type CRT is to be used only for the guided guardrail return with 16', 25', and 32' radii as shown. The assembly is not to be used on any tangent or flatwise return applications. Other types of end anchorage assemblies are not to be used in the controlled release return.

10. The controlled release portion of the controlled release return shall be full section drop bent posts (18.5 or 25.5 panel posts). The surfaces are not to be used between the guardrail beam and the head of the return post bolts of any controlled release terminal (CRT) post or of any Guardrail end anchorage assembly type CRT breakaway guardrail post.

11. The Guardrail End Anchorage Assembly Type CRT is to be used only for the guided guardrail return with 16', 25', and 32' radii as shown. The assembly is not to be used on any tangent or flatwise return applications. Other types of end anchorage assemblies are not to be used in the controlled release return.
Notes:

1. Typical placement shown. May be constructed at other locations as called for in the plans.

2. Rubrail required on median side or ditch side of barrier.

MOUNTING HEIGHT FOR DOUBLE FACED GUARDRAIL ON MEDIAN SHOULDERS (FREeways)
GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES

GUARDRAIL TRANSITION ALIGNMENTS FOR BRIDGE THRIE-BEAM AND VERTICAL FACE TRAFFIC RAILING RETROFIT

PARTIAL PLAN VIEWS

LONGITUDINAL LOCATION OF TRANSITION BLOCKS AND CURB END FLARES WILL VARY WITH SCHEME TYPE

GENERAL NOTES

1. This index provides thrie-beam transition and connection details for approach and guardrail on existing bridges, and standard details for railing and traffic railing retrofits and safety devices on existing bridges. Sheets through 15 apply to bridges with retrofitted traffic railings. Sheet 16 is the railing and guardrail connections. Sheet 24 applies to bridges with safety shaped railing marking.

2. The schemes identified by Arabic numerals in this index are complementary to the bridge traffic railing retrofit details shown in index Nos. 400 through 403. The schemes in this index identified by Roman numerals are complementary to bridge safety shaped traffic railing retrofit schemes shown in index Nos. 404 through 406. The schemes in this index identified by Greek numerals are complementary to bridge safety shaped traffic railing retrofit schemes shown in index Nos. 407 through 409.

3. For guardrail applications and details of related hardware and accessories that are not provided on this index, refer to index Nos. 400 through 409.

NOTES FOR GUARDRAIL TRANSITIONS CONNECTING TO TRAFFIC RAILING RETROFITS ON EXISTING BRIDGES

1. The transition detail shown on this sheet shows the standard post spacing within the typical thrie-beam approach transitions connecting existing bridges with retrofitted traffic railings, and (b) depict the typical alignment of the approach transitions.

2. The curb and gutter flares shown on this sheet is typical of flares that are to be constructed when approach slab edges extend to the beginning of the slab, and where other treatment to curb blunt ends are not in place.

3. The sheet detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

4. Rebar detailing shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars. The assembly shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars. The assembly shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars. The assembly shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars.

5. Adjacent detailing shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars. The assembly shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars. The assembly shall be in accordance with the Specifications, and shall be furnished with the required number of reinforcing bars.

6. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

7. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

8. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

9. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

10. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

11. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

12. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

13. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

14. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

15. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.

16. The transition detail shown on this sheet is specific to all transition applications on this bridge that require one or more steel posts. The typical steel post and base plate assembly shall be fabricated using ASTM A36 or ASTM A572 Grade 50 steel. The assembly shall be hot-dip galvanized in accordance with Section 536 of the Specifications.
Existing Railing Removed
Existing Curb To Remain
See Indexes For Face Of Railing Offset
Front Face Of Existing Backwall & Begin Or End Existing Bridge
Existing Railing Removed Existing Curb To Remain
Special Street Post For Roadway Three-Beam Transitions
Existing Perpendicular Or Angled Wing Post Removed
Transition Block In Absence Of Curb
& Post Bolts
Traffic Railing (Three-Beam Retrofit)

SEE INDEX NO. 471 - SCHEME 1

SEE INDEX NO. 471 - SCHEME 2

SEE INDEX NO. 471 - SCHEME 3

PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
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SEE INDEX NOS. 473 & 476 - SCHEMES 5 & 6
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THRIE-BEAM RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Perpendicular Or Angled Wing Post Removed

Traffic Railing (Vertical Face Retrofit) Constructed

Place First Post 2'

Close Of Wing Wall

Transition Block in Absence Of Curb

Existing Curb - See Indexes For Face Of Rolling Offset

Traffic Railing (Vertical Face Retrofit)

SEE INDEX NO. 481 - SCHEME 1

Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Rolling Removed

Parallel Wing Post Removed,

Traffic Railing (Vertical Face Retrofit)

5' or more in Length Constructed

Transition Block in Absence Of Curb

Existing Approach Slab

Roadway Guardrail Transition

SEE INDEX NO. 481 - SCHEME 2

Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Rolling Removed

Parallel Wing Post Removed,

Traffic Railing (Vertical Face Retrofit)

Less Than 5' in Length Constructed

Transition Block in Absence Of Curb

Existing Approach Slab

Roadway Guardrail Transition

SEE INDEX NO. 481 - SCHEME 2

Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Rolling Removed

Traffic Railing (Vertical Face Retrofit) Constructed

Existing Flared Wing Post Removed,

Traffic Railing (Vertical Face Retrofit) Constructed

SpeciAC Steel Post For Roadway Three-Beam Transition

Existing Curb - See Indexes For Face Of Rolling Offset

Traffic Railing (Vertical Face Retrofit)

SEE INDEX NO. 481 - SCHEME 3

Note:

*21" x 12" Three-Beam Terminal Connector Plate (Back-Up Plate) And 3/8" x 12" Long
HS Hex Bolts And Nuts 15 Req'd. 1 With 25/32" OD Plain Round Washers Under Heads And Nuts

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES
Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Curb - See Indexes For Face Of Railing Offset

Traffic Railing (Vertical Face Retrofit)

SEE INDEX NO. 482 - SCHEME 2

Note:

"2" x 4" x 2" "Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 2" x 11" Long HS Hex Bolts And Nuts (5 Req'd. With 2" OD Plain Rounded Washers Under Heads And Nuts"

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
Front Face Of Existing Backwall & Begin Or End Existing Bridge
Existing Railing Removed
Traffic Railing (Vertical Face Retrofit) Constructed

Existing Curb - See Indexes For Face Of Railing Offset
Existing Parallel Wing Post Removed and Traffic Railing (Vertical Face Retrofit) Constructed

SEE INDEX NO. 483 - SCHEME 2

Front Face Of Existing Backwall & Begin Or End Existing Bridge
Existing Railing Removed
Traffic Railing (Vertical Face Retrofit) Constructed

Existing Curb - See Indexes For Face Of Railing Offset
Existing Parallel Wing Post Removed and Traffic Railing (Vertical Face Retrofit) Constructed

SEE INDEX NO. 483 - SCHEME 2

Traffic Railing (Vertical Face Retrofit) Constructed
Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Railing Removed
Traffic Railing (Vertical Face Retrofit) Constructed

Existing Curb - See Indexes For Face Of Railing Offset
Existing Parallel Wing Post Removed and Traffic Railing (Vertical Face Retrofit) Constructed

SEE INDEX NO. 483 - SCHEME 3

Traffic Railing (Vertical Face Retrofit) Constructed
Front Face Of Existing Backwall & Begin Or End Existing Bridge

Existing Railing Removed
Traffic Railing (Vertical Face Retrofit) Constructed

Existing Curb - See Indexes For Face Of Railing Offset
Existing Parallel Wing Post Removed and Traffic Railing (Vertical Face Retrofit) Constructed

SEE INDEX NO. 483 - SCHEME 3

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

**Note**

- For a 1/4" x 1/2" Thrie-Beam Terminal Connector Plate (Base-Clip Plate) and 1/8" dia. Hex Bolts And Nuts 1/8" Long For Scheme 1 And Length To Fit For Schemes 2 And 3 (5 Req’d) With 1/8" OD Plain Round Washers Under Heads And Nuts
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

SEE INDEX NO. 402 - SCHEMES 2 & 5

PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)
NOTES FOR TRAILING END TRAFFIC RAILING VERTICAL FACE RETROITS

1. Where Guardrail Extensions Are Required Beyond The Trailing End Of Bridges With Traffic Railing Vertical Face Retrofits, Sundrail Connections To The Bridge Railing Will Be By SPECIAL END SHOE For W-Beam Guardrail Extensions And By THRIE-BEAM TERMINAL CONNECTOR For Thrie-Beam Guardrail Extensions.

2. Install W-Beam Special End Shoes and Thrie-Beam Terminal Connectors With Back-Up Plates, And §# BS Hex Washers And Nuts 1/2" Long With C" OD Plain Round Washers Under Heads And Nuts 4 Required For Special End Shoes And 5 Required For Thrie-Beam Terminal Connectors . Back-Up Plates For Special End Shoes Are 1/2" x 1/2" x 1/2" And For Terminal Connector 1/2" x 1/2" x 1/2".

3. Payment For Connecting Trailing End Special End Shoes And Thrie-Beam Terminal Connectors To Traffic Railing Vertical Face Retrofits Will Be Made Under The Contract Unit Price For Guardrail Bridge Anchorage Assembly, EA...
GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES

2006 FDOT Design Standards

GUARDRAIL TRANSITIONS TO EXISTING PRESTRESSED BEAM OR GIRDER BRIDGES

NOTE: When retrofitting truss-beam guardrail to existing wing posts or existing bridge safety shape traffic railing, attachment construction to be paid for under the contract with price for Supplicant Bridge Anchorage, GA...and shall be full compensation for bolt hole construction, terminal socket, terminal socket plate(s) and bolts, nuts and washers.

GUARDRAIL TRANSITION TO EXISTING FLAT SLAB BRIDGES

GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

GUARDRAIL ATTACHED TO EXISTING WING POSTS

GUARDRAIL ATTACHED TO EXISTING WING POSTS

GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR EXISTING FLAT SLAB, PRESTRESSED BEAM AND GIRDER BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR EXISTING FLAT SLAB, PRESTRESSED BEAM AND GIRDER BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

APPROACH POSTS AND SPECIAL OFFSET BLOCKS

Existing Prestressed Beam Or Girder Bridge Wing Post

When Face Panel/Adjustment法兰Offset Add Slope Panel 12" Required - SCHEME I

6'-3" Typical

With 5/8" OD Plain Round Washers Under Heads And Nuts. When Attaching Guardrail To Existing Wing Posts Or Bridge Rail, Care Should Be Exercised To Avoid Damaging Conduits And Their Utilities That May Be Routed Through Wing Posts Or Bridge Rail. When Conduits And Their Utilities Are Encumbered, At Least Five (5) ½" Holes Shall Be Provided In Any Of The Seven Holes Provided In The Truss-Beam Terminal Connector.2

NOTES FOR GUARDRAIL TRANSITIONS TO SAFETY SHAPE TRAFFIC RAILING ON EXISTING BRIDGES

1. When the existing wing post is to be replaced with a bridge traffic railing in accordance with the Structures Manual, the truss-beam guardrail connection shall be in accordance with SCHEME I of Table 402.

SCHEME II

SCHEME III

SCHEME I

GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

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GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES

GUARDRAIL TRANSITIONS TO EXISTING FLAT SLAB BRIDGES
Install New Guardrail Posts & Offset Blocks if called for in Plans or as required to clear Transition Block

Existing Installation of 1987 thru 2000 Roadway and Traffic Design Standards Index 401 Scheme 16 Retrofit

PARTIAL PLAN

Existing Installation of 1987 thru 2000 Roadway and Traffic Design Standards Index 401 Scheme 16 Retrofit

PARTIAL ELEVATION

W-BEAM BRIDGE TRAFFIC RAILING RETROFITS

12'-6" Nested W-Beam Guardrail

Limit of Guardrail (Reset)

6 Sp. @ 1'-6½"

3 Sp. @ 3'-1½"

6'-3" Post Spacing (Typ.)

Construct Transition Block if called for in Plans. See Sheets 2 and 3 for details.

Note:
Do not bolt nested W-Beam to Posts and Offset Blocks at Posts (a), (c) & (e), (Typ.)

TRAILING END ✗

PARTIAL ELEVATION

VERTICAL FACE BRIDGE TRAFFIC RAILING RETROFITS

TRAILING END ✗

2008 FDOT Design Standards
PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH PERPENDICULAR OR ANGLED WING WALLS

PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH FLARED WING WALLS AND PARALLEL INTEGRALLY REINFORCED APPROACH SLAB CURBS (APPROACH SLAB WITH DETACHED CURBS OR SIDEWALK SIMILAR)

PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH PARALLEL WING WALLS AND INTEGRALLY REINFORCED APPROACH SLAB CURBS (APPROACH SLAB WITH DETACHED CURBS OR SIDEWALK SIMILAR)

CROSS REFERENCE
For Transition Block Details, Quantities and reinforcement see Sheet 3.
PLAN VIEW OF TRANSITION BLOCK
(GUARDRAIL NOT SHOWN FOR CLARITY)

ELEVATION OF TRANSITION BLOCK
(GUARDRAIL AND POSTS NOT SHOWN FOR CLARITY)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Class II (Miscellaneous)</td>
<td>CY</td>
<td>0.4</td>
</tr>
<tr>
<td>Reinforcing Steel (Roadway)</td>
<td>LB</td>
<td>61</td>
</tr>
<tr>
<td>Guardrail (Reset)</td>
<td>LF</td>
<td>12.5</td>
</tr>
</tbody>
</table>

CONCRETE: Concrete for Transition Blocks shall be Class II (Miscellaneous).

REINFORCING STEEL: Reinforcing steel shall be ASTM A615, Grade 60.

ANCHOR RODS: Steel Anchor Rods shall be ASTM A36, ASTM A709 Grade 36 or ASTM A615 Grade 60 hot-dip galvanized in accordance with Specification Section 962.

W BEAM GUARDRAIL: Guardrail components and installation shall be in accordance with Design Standards Index 403.

ADHESIVE-BONDED DOWELS: Adhesive Bonding Material Systems for Dowels shall comply with Specification Section 937 and be installed in accordance with Specification Section 416.

Adhesive Bonded Dowels are shown installed in an existing curb or sidewalk integrally reinforced with Approach Slab, Wingwall or Bridge Deck. For installations in existing detached curbs or sidewalks, install dowels in available sound concrete.

PAYMENT: Payment for Guardrail work will be made under Pay Item Guardrail (Reset) (LF). Payment for Transition Block will be made under Pay Items Concrete Class II (Miscellaneous) (CY) and Reinforcing Steel (Roadway) (LB).
Free End Reinforcement

2008 FDOT Design Standards

Sheet No. 07/01/08 2 of 22

Index No. 410

CONCRETE BARRIER WALL
Concrete Median Barrier Wall Transitions at Bridge Piers and Overhead Sign Supports

To Be Piled For An Median Concrete Barrier Wall, LI
(Out To Include Thin Walls, Fill, Cap And Transition)

Concrete Barrier Wall Transition

Concrete Barrier Wall

Concrete Barrier Wall Transition

Concrete Barrier Wall

To Be Piled For An Median Concrete Barrier Wall, LI
(Out To Include Thin Walls, Fill, Cap And Transition)

Concrete Barrier Wall Transition

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Concrete Barrier Wall Transition
To Obtain 2" Clearance

Wall Footing

Conduit From Pull Box

Junction Box/Pull Box

Junction Box Notes:
1. Junction boxes are to be fabricated from steel conforming to ASTM A36 and be hot-dip galvanized after fabrication. All seams shall be continuously welded and ground smooth. A neoprene gasket shall be attached to the box to provide a watertight cover. The cover screws shall be fully galvanized.

2. Remove excess concrete while green and hand form chamfers.

3. Junction box complete and conduit risers are incidental to the construction and cost of the barrier wall; there is to be no separate compensation for the box, risers or installation unless specifically called for in the plans.

4. Junction boxes for use on barrier walls with opaque visual barriers shall have a side access cover. All side access junction boxes shall be oriented...

JUNCTION BOX - ELECTRICAL

LIGHT POLE MOUNTING IN MEDIAN BARRIER WALL
REINFORCED CONCRETE BARRIER WALL (SHOULDER)

**Design Notes:**
- Use of the barrier wall should be limited to special applications such as hazard encroachment into the clear zone where barrier wall extraction, ejection, or impact cannot be tolerated. Example hazards include collision with:
  1. Structure supporting piles, bents and pylons.
  2. Pumping, metering, control or other similar critical stations.
  3. Intolerable vertical drops.
  4. Bridges, structures or monuments.
  5. Rail transit travel way or passenger stations.
  6. Other similar occupancies.

**Payment:**
- Wall to be paid for under the contract unit price for Concrete Barrier Wall (Right-Shoulder), L.F.

**Construction Permissible:**
- Varies

**Plain Concrete Barrier Wall (Shoulder)**

**Reinforcing Steel Modifications**

**Reinforced Concrete Barrier Wall (Shoulder)**
Tri"m When Used With Bar 4A Modified
In "Reinforced Concrete Barrier Wall (Retaining)"

When Used With Bar 4A Modified
In "Reinforced Concrete Barrier Wall (Retaining)"

NOTE: All longitudinal reinforcement #4 bars.
Minimum segment length for this wall is 20 feet.
Wall to be priced per meter of length for Shoulder Concrete Barrier Wall (Rigid- Retaining), LF.

BENDING DIAGRAMS

REINFORCED CONCRETE BARRIER WALL (RETYAINING)
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)

ONE-WAY TRAFFIC (TRAILING END)

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENTS • WITH ADJACENT BICYCLE LANE
Note: Drainage slots shall be located at all low points along the sidewalk, and, unless otherwise shown in the plans, slats shall be spaced at intervals not exceeding 50' in fill sections and 20' in cut sections. Slats shall be located such that only one bar is cut away or deleted in front and rear lines of vertical reinforcement.

SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)

NOTE:

Transition Segments shall be dowelled into the end of the barrier wall in the following manner:

Four 1-inch diameter holes 6" deep on 6" centers shall be drilled into the end of the barrier and Type 1 dowels 6" long set in an Adhesive Bonded Material System. The ends of the dowels extending into the transition segment shall be wrapped with one layer of 15 lb. Type 1 asphalt saturated roofing felt with the ends crimped.

When Construction Joints Are Utilized for Transition Segment Construction, the dowels shall be dowelled to the footing in the following manner:

Five #5 bars 15" long shall be embedded 7" into the footing. The dowels shall be spaced 15" on centers with the first dowel located 2' from the barrier wall. Dowels may be placed within or adjacent to the keyway.

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENT • WITH ADJACENT BICYCLE LANE

RIGHT SIDE SHOWN, LEFT SIDE OPPOSITE HAND

ONE-WAY AND TWO-WAY TRAFFIC (NEAR LANE APPROACH)
**LENGTH OF ADVANCEMENT**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • WITH ADJACENT BICYCLE LANE**

**SECTION TT**

**Equation Variables:**

- \( D \): Distance in feet from near edge of the near approach traffic lane to back of hazard or clear zone width, whichever is lesser. For left side hazards and clear zones on two-way undivided facilities, \( D \) is measured from the inside edge of the near approach traffic lane.
- \( d \): Distance in feet from near edge of the near approach traffic lane to the face of barrier (at offset control point) for left side hazards. For left side hazards on two-way undivided facilities, \( d \) is measured from the inside edge of the nearest opposing traffic lane.

**Design Speed mph**

- \( \geq 45 \)

**Length Of Advancement, Ft. \( X \):**

\[ X = D + d \]

\[ X = 16 (D - d) \]

**Note:** The minimum length of advancement for both near and opposing lane approaches is 40 ft.

**FOR HIGH SIDE**

- Bars 4 or 5 Chrs., 20" Long

**FOR LOW SIDE**

- Bars 4 or 5 Chrs., 20" Long

**BENDING DIAGRAM**

**FOR HIGH SIDE**

- Bars 4 or 5 Chrs., 20" Long

**FOR LOW SIDE**

- Bars 4 or 5 Chrs., 20" Long

**Note:** All longitudinal reinforcement bars. Minimum segment length for this wall is 40 ft. Shall be drilled in the manner described for Transition Segments on Sheet 11. Transverse expansion joints are to be constructed at the juncture of wall transitions and curb and gutter, and at intervals so that spacing will not exceed 100 ft.

For barrier wall inset details see Index No. 209. Inlet extends into bicycle lane 12". Wall to be paid for under the contract unit price per Should barrier Concrete Barrier Wall (Rigid-Curb & Gutter), LF.

Estimated Quantities Per Linear Foot Of Wall:
- Class 2 Concrete: 0.22 C.F.
- Reinforcing Steel: 0.21 lb.

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**Index No. 410**

**Sheet No. 12 of 22**

**CONCRETE BARRIER WALL**
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)

ONE-WAY TRAFFIC (TRAILING END)

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENTS • WITHOUT ADJACENT BICYCLE LANE
WITH OR WITHOUT UTILITY STRIP

NEAT LINE PICTORIAL VIEW

SECTION BB

SECTION AA

NEAT LINE PICTORIAL VIEW

SECTION CC

NOTE:

Expansion slots shall be located at all low points along the sidewalk, and, unless otherwise shown in the plans, shall be spaced at intervals not exceeding 50 feet in fill sections and 20 feet in cut sections. Slots shall be located such that only one bar is cut away or deleted in front and back lines of vertical reinforcement.

SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)

NOTE:

Expansion Joint

Sidewalk (5" STL.)

Utility Strip (Ver) (12")

Barrier Wall

Ver (See Plans)

Expansion Joint

Sidewalk (5" STL.)

Type F Curb & Gutter (12")

Barrier Wall

Ver (See Plans)

Expansion Joint

Sidewalk (5" STL.)

Tactile Surface

Type F Curb & Gutter (12")

Barrier Wall

Ver (See Plans)

One-way and two-way traffic (near lane approach)

Concrete Barrier Wall (Rigid) (Curb & Gutter) • Transition Segment • Without adjacent bicycle lane
**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • WITHOUT ADJACENT BICYCLE LANE**

**LENGTH OF ADVANCEMENT**

\[ D = D_L + D_S \]

- **Design Speed (mph)**
  - 45

- **Length of Advancement, Ft. (X)**
  - 15

**Equation Variables:**
- \( D_L \): Distance in feet from rear edge of near approach traffic lane to back of hazard or clear zone width, whichever is lesser.
- \( D_S \): Distance in feet from near edge of near approach traffic lane to the face of curb or offset control point.
- \( D \): Distance in feet from near edge of near approach traffic lane to the face of curb or offset control point.
- \( d \): Distance in feet from near edge of near approach traffic lane to the face of curb or offset control point.

**NOTES:**
- The minimum length of advancement for both near and opposing lane approaches is 40 ft.

**Estimated Quantities:**
- Class H Concrete: 0.23 C.
- Reinforcing Steel: 19.7 Lbs.

**FOR HIGH SIDE**

- Bars: 5/8" C, 15" Long

**FOR LOW SIDE**

- #4 Bars: 5/8" C, 15" Long

**SECTION QQ**

For barrier wall details see Index No. 410.
HAZARD PENETRATING STEM OF RIGID CONCRETE BARRIER WALLS

BARRIER WALL AT SQUARE PIER

When Back Of Wall Located In Front Of Hazard Face The Fillets Are To Be Adjusted To Maintain Walls Full Bearing Surface Against Hazard.

Examination Joint As Opposite

Concrete Barrier Wall As Approach Treatment Beyond Last Bent
Support Or Pier Where Guardrail Continues, Same As Approach Except On One Way Trailing End Curb Roll Transition.

BARRIER WALL AT ROUND PIER

Concrete Barrier Wall When Span Between Bent Supports Or Pier Columns Exceeds 13'

Concrete Barrier Wall When Guardrail Offset From Bent Or Pier Less Than 3 Feet Or Where Wall Stem Abuts Supports Or Pier Column

REINFORCED CONCRETE BARRIER WALL APPLICATIONS

The details on this sheet are treatments to the F-shape concrete barrier walls depicted on Sheet Nos. 8 through 16, where site conditions impose reduced clearance between above ground hazards and the walls. Bridge bent supports and piers are shown. These treatments are not applicable to hazards that extend parallel lateral support for the walls. See the plans for clients of wall sections applied and other associated wall treatments.
Double Faced Guardrail

1. W-beam elements do not apply to these transition schemes. For barrier wall, refer to median barrier wall details. For truck approaches, see Sheet 2.

2. W-beam elements do not apply to these transition schemes. For barrier wall, see Sheet 2.

3. Section (See Notes)

4. Either steel or timber guardrail post may be used. Timber posts shown.

5. The nested beams shall not be bolted to blocks and posts at posts numbers (11, 13) and 15.

6. On the trailing side of MEDIAN BARRIER WALL, offset blocks may be specified at posts numbers 1, 2, 3, 5 and 6.

7. For additional guardrail information refer to Index No. 410.

GUARDRAIL CONNECTION TO CONCRETE BARRIER WALL APPROACH ENDS

Con yürütme, 2008 Foot Design Standards, Tablo No. 20, Sayfa No. 410

CONCRETE BARRIER WALL
1. Concrete trapezoidal barrier wall is to be either precast or cast-in-place. The wall is designed for zero deflection and shall have a minimum system length of 107'.

2. Where concrete trapezoidal barrier wall height changes from 40' to 60' or from 60' to 80', height change will be uniform for each 10' in height change per 30' or 60'. Steel placement shall meet the dimensional positioning requirements of 40', 60', and 80' high barriers on the trapezoidal panels along the vertical transition, with the vertical steel uniformly spaced and the horizontal steel uniformly spaced throughout.

3. Welded wire fabric (WWF) may be used as an option in the conventional reinforcement for precast or cast-in-place barrier walls with typical construction recommendations shown as placed in horizontal and vertical wall sections. These sections shall be placed in pairs with length, depth and reinforcement as shown in this Index.

4. To obtain proper length, precast segments shall be interconnected in the preferred slabs and grouted into place. Segment length shall be not less than 48'.

5. Preformed slots may be used as an option in the conventional reinforcement for horizontal reinforcement which shall be normal to the roadway and unless otherwise specified in the plans.

6. For reflector barrier marker requirements, see "STANDARD BARRIER WALL DESIGN AND CONSTRUCTION" and the GENERAL NOTES, Sheet 1.

7. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

8. This price will include full payment for transitions, half walls, fill and concrete precast or cast-in-place.

9. To attain system length, precast segments shall be interconnected in the preferred slabs and grouted into place. Segment length shall be not less than 48'.

10. The centerline axis of the barrier shall be vertical except where the roadway is superelevated in which case it shall be normal to the cross slope unless otherwise shown on the plans or directed by the Engineer.

11. The concrete trapezoidal barrier is made in sections length of 28', 36', 42', 48', 54', 60', 72', 84', 36', 42', 48', 54', 60', 72', 84'.

12. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

13. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

14. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

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24. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

25. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

26. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

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31. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

32. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

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45. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

46. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

47. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

48. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

49. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.

50. The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal Aid projects.
NOTES

1. Where nesting is necessary to fit nested beams, the nested surface shall be metalized in accordance with Index No. 400.

2. The nested beams shall not be bolted to the posts and blocks at post numbers (1), (13) and (21).

3. For additional wall details, see Sheet 31.

4. For additional guardrail information refer to Index No. 400.

GUARDRAIL CONNECTION TO TRAPEZOIDAL BARRIER WALL
This Pier Protection Barrier has been structurally evaluated to be equivalent or greater in strength to other safety shape traffic barriers which have been crash tested to NCHRP Report 350, T-3 criteria. This barrier meets the requirements of the 440(T)1 LRRD Bridge Design Specifications for a barrier used for bridge pier protection.

GENERAL NOTES:
1. Concrete shall be Class III or IV unless otherwise called for in the plans. Exposed concrete surfaces shall have a Class 3 surface finish in accordance with Section 521 of the Specifications, unless another finish is called for in the plans. The surfaces shall have a Class 5 applied finishing coating in accordance with Section 400 only when called for in the plans.

2. Construct Pier Protection Barrier continuous without transverse contraction or expansion joints. Construction joints may be spaced greater than or equal to 40'. Provide longitudinal reinforcing steel continuous across construction joints.

3. When the Pier Protection Barrier is installed adjacent to roadway or shoulder pavement, compact the top 12" of the subgrade to at least 100% of the density as defined in the 440(T)1 T-99 specifications.

4. Isolate Barrier Footings, Index 218, from Pier Protection Barriers and Footings with 1" expansion material.

5. On roadways designated for reverse lane marking downstream barrier ends that are not shielded or outside the clear zone can be used in accordance with Section 521 of the Specifications, unless another finish is called for in the plans. The surfaces shall have a Class 5 applied finishing coating in accordance with Section 400 only when called for in the plans.

6. Payment: Pier Protection Barrier and Crash Barriers to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigid-Shoulder 42") (L), or Shoulder Concrete Barrier Wall (Rigid-Shoulder 54") (L, F).

INSTRUCTIONS TO DESIGNER:
As used in this standard, setback distance is as defined by LRFD. See PRM and Index 700 for minimum recoverable terrain and horizontal clearance requirements.

1. Establish the offset from the Pier Protection Barrier to the bridge pier, column or pile bent on project constraints.

2. Determine the appropriate footing configuration(s) for a continuous run of Pier Protection Barrier using the Pier Protection Barrier Footing Layout Schematics. Select the footing configuration(s) based on traffic control needs and locations of piers, pier footings, utilities, drainage structures, etc. as shown. Footing configurations along a continuous run of Pier Protection Barrier may be intermixed as shown.

3. Designate the Pier Protection Barrier height, footing configuration(s) and limiting stations on the Plan-Profiles sheets, e.g.:

   - Begin 42" Pier Protection Barrier with Front Cantilever Footing, Sta. 100+00.00

   - Indicate Crash Wall locations when required and lengths on the Plan-Profiles sheets. Designate Crash Walls (when required) to match height of adjacent Pier Protection Barrier.

   - In absence of continuous concrete barrier, determine guardrail requirements in accordance with Indexes 400 and 410.

   - Show Cross Sections as required to locate Pier Protection Barriers, Crash Walls (when required) and footings to bridge piers, columns or footings, drainage structures, utilities, etc.

   - Prepare Traffic Control Plans to accommodate Pier Protection Barriers, Crash Walls (when required) and footing construction.

   - Include length(s) of Crash Walls (measured along front face) in length of Pier Protection Barrier for payment.

   - Although intended for shielding bridge piers, the Pier Protection Barrier can be used on a project specific basis to shield other critical roadside objects when deemed necessary or appropriate.
Setback Limit

Bock
Of Pier
or Bent
Type 3 Object Marker When
Required (See Index
400,
General Note No. 21
---~
Pier Protection Barrier

DETAIL 'A'

(LEFT SIDE OPPOSITE HAND)

ONE-WAY TRAFFIC

Pier Protection Barrier
Barrier Gutter Line
 Х Edge Of Traffic Line

Guardrail Transition, See Index 400, Sheet 20

NOTE:

Length of Advancement determined from the diagrams and equations shown establishes the location of
the upstream beginning length of need for a Pier Protection Barrier, however, the Length of
Advancement for the combination of Pier Protection Barrier and required guardrail can be no less
than that required by other details of Index 400.

Equation Variables:

D = Distance in feet from the near edge of the near approach traffic lane to either (a) the back of
pier, when the pier is located inside the Setback Distance or (b) the Setback Distance, when the
pier extends to or goes beyond the Setback Distance. For left side piers on two-way undivided
facilities, D is measured from the inside edge of the near approach traffic lane.

d = Distance in feet from the near edge of the near approach traffic lane to the
Pier Protection Barrier gutter line at its intersection with the departure line or the face of guardrail at its
intersection with the departure line. For left side hazards on two-way undivided facilities, d is
measured from the inside edge of the near approach traffic lane.

<table>
<thead>
<tr>
<th>Design Speed mph</th>
<th>X (Length Of Advancement) Ft.</th>
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<tbody>
<tr>
<td>45</td>
<td>16 (D-d)</td>
</tr>
<tr>
<td>50</td>
<td>(D-d)</td>
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</table>

NOTE:

See Index 400 for Clear Zone and Horizontal Clearance

Length of Advancement Diagrams.

PPB - Pier Protection Barrier

LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

2008 FDOT Design Standards

PIER PROTECTION BARRIER
LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION
ONE-WAY TRAFFIC

DETAIL 'B'
(Guardrail not shown for clarity)

LEFT APPROACH (LA)

42" or 54" Pier Protection Barrier with Crash Walls - 50' Min.

TWO-LANE TWO-WAY TRAFFIC

LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH CRASH WALL AND GUARDRAIL CONTINUATION

NOTES:
See Index 400 for Clear Zone and Horizontal Clearance.
Length of Advancement Diagrams.
PPB = Pier Protection Barrier

See Notes on Sheet 2.
Setback

Type 3 Object Marker When Required (See Index 400, General Note No. 51)

Beginning Of Length Of Need (LA)

Barrier with Crash Walls - 50' Min.

42° or 54° Pier Protection Barrier with Crash Walls - 50' Min.

32' Concrete Barrier Wall, See Index 410

42° or 54° Pier Protection Barrier with Crash Walls - 50' Min.

32' Concrete Barrier Wall, See Index 410

32' Concrete Barrier Wall, See Index 400

NOTES:
See Index 400 for Clear Zone and Horizontal Clearance.
Length of Advancement Diagrams.
PPB = Pier Protection Barrier

See Notes on Sheet 2.

LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH CRASH WALL AND CONCRETE BARRIER WALL CONTINUATION
FLARED END TREATMENT - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

END TREATMENT - PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION
END TRANSITION AND TAPERED TOE DETAILS - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

PARTIAL ELEVATION - 54" PPB DETAIL

ELEVATION - BARRIER END TRANSITION - 42" PPB (shown): 54" PPB (similar) (Guardrail and back leg of Stirrups not shown for clarity)

END TRANSITION DETAILS - PIER PROTECTION BARRIER WITH GUARDRAIL OR CONCRETE BARRIER WALL CONTINUATION

ESTIMATED 42" PPR QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT QUANTITY</th>
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<tbody>
<tr>
<td>Concrete</td>
<td>CY/LF 0.141</td>
</tr>
<tr>
<td>Reinforcing Steel (w/out Bars 5V)</td>
<td>LB/LF 33.10</td>
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ESTIMATED 54" PPR QUANTITIES

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<th>ITEM</th>
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<tbody>
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<td>Concrete</td>
<td>CY/LF 0.172</td>
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<tr>
<td>Reinforcing Steel (w/out Bars 5V)</td>
<td>LB/LF 48.74</td>
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NOTE: PPB: Pier Protection Barrier.
BILL OF REINFORCING STEEL

<table>
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<th>LENGTH</th>
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<td>5</td>
<td>7'-6&quot;</td>
</tr>
<tr>
<td>P</td>
<td>5</td>
<td>6'-7&quot;</td>
</tr>
<tr>
<td>S</td>
<td>8</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>42&quot; P&amp;B T1 &amp; T2</td>
<td>6</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>54&quot; P&amp;B T1 &amp; T2</td>
<td>6</td>
<td>21'-0&quot;</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>9'-2&quot;</td>
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</table>

REINFORCING STEEL NOTES:
1. All dimensions in the bending diagrams are out to out.
2. Bars 8S may be continuous or spliced at the construction joints. Lap splices for Bars 8S shall be a minimum of 4'-0".
3. The Contractor may utilize Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A597.

NOTE: PPB = Pier Protection Barrier

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

TRANSITION BAR 5P & 5R
To Be Field Cut (2 required per Railing End Transition)

Vary Field Cut from 7" to 1'-0" to maintain a 2'-0" min. lap.

Field Cut & Discard

Stirrup Bar 5P

Stirrup Bar 5V

End Stirrup Bar 5V
To Be Field Cut
(Two required per Barrier End Transition w/ Tapered Toe)

STIRRUP BAR 5P

STIRRUP BAR 5V

1'-0" to 2'-0" Field Cut

45°

SECTION D-D

TYPICAL SECTION THRU
42" PIER PROTECTION BARRIER

SECTION D-D

TYPICAL SECTION THRU
54" PIER PROTECTION BARRIER

END VIEW E-E
(BARRIER DETAILS)

BARRIER DETAILS

END VIEW F-F
(without Tapered Toe)
Field bend and shift Bars 5A & 5B in Footings as shown (Typ.).

Field bend Bars 5B in Crash Wall Footing to lap 2'-0 min. with Bars 5B in Barrier Footing (Typ.).

Barrier Footing (type varies)

Field bend Bars 5B in Crash Wall to extend 2'-0 min. into PPB (Typ.).

Barrier Gutter Line

Field trim Bars 5C & 5D in Crash Wall & bend Bars 5B locally as required to maintain cover (Typ.).

Barrier Protection Barrier

Concrete Barrier Wall Continuation shown, Guardrail Continuation similar

ANSI CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
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<tbody>
<tr>
<td>B</td>
<td>5</td>
<td>As Reqd.</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>0'-0''</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>11'-0''</td>
</tr>
</tbody>
</table>

REINFORCING STEEL NOTES:
1. All dimensions in the bending diagrams are out to out.
2. Lap splices for Bars 5B shall be a minimum of 2'-0''.
3. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A 497.

CONCRETE REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are out to out.
2. Lap splices for Bars 5B shall be a minimum of 2'-0''.
3. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A 497.

CONCRETE FOOTING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Footing)</td>
<td>CY/LF</td>
<td>0.260</td>
</tr>
<tr>
<td>Concrete (42'' Crash Wall)</td>
<td>CY/LF</td>
<td>0.589</td>
</tr>
<tr>
<td>Concrete (54'' Crash Wall)</td>
<td>CY/LF</td>
<td>0.500</td>
</tr>
<tr>
<td>Reinforcing Steel (42'' Crash Wall)</td>
<td>LB/LF</td>
<td>66.06</td>
</tr>
<tr>
<td>Reinforcing Steel (54'' Crash Wall)</td>
<td>LB/LF</td>
<td>70.23</td>
</tr>
</tbody>
</table>

NOTES:
1. Provide 3'' lip when optional construction joint is used.
2. See Sheet 5 for Barrier Details and Sheet 9 for Barrier Footing details.

REFER TO:
- Section H-H
- Plan View
- Elevations
- Details

CRASH WALL & FOOTING DETAILS

2008 FDOT Design Standards

PIER PROTECTION BARRIER

NOTE: PPB = Pier Protection Barrier
GENERAL NOTES

1. The 'Portable Temporary Low Profile Barrier For Roadside Safety' is a proprietary design by the University of Florida. Any infringement on the rights of the designer shall be the sole responsibility of the user.

2. This standard drawing (Index No. 412) is provided by the Florida Department of Transportation solely for use by the Department and its assignees. The purpose for this standard drawing is to indicate the approval of use of the barrier on the State Highway System; to provide sufficient pictorials for identifying the barrier units; and, to provide general installation geometry for the barrier.

3. Only those barrier units cast by producers licensed by the University of Florida will be allowed for installation on the State Highway System in Florida. Barrier wall units shall conform to Section 521 of the Standard Specification and shall be produced in Department approved plants with quality control plans for precasting concrete barrier walls. Each barrier wall unit shall be permanently marked with an identification mark that is traceable to the manufacturer, the producing precast concrete plant and the date of production. This permanent identification mark will serve as certification that the unit has been manufactured in accordance with University of Florida drawings and specifications, and the approved quality control program.

4. The low profile barrier is to be installed only with hardware and accessories furnished by the licensed barrier producer. Units shall be used for no purpose other than as interconnected segments in a run of barrier. Low profile barrier wall units shall be installed so as to be in firm contact with adjoining units. Nuts on tensioning rods shall be installed snug tight.

5. The low profile barrier is applicable for design speeds of 45 mph or less.

6. Tubular markers shall be installed along the run of barrier at the ends and at 50’ centers on tangents and 25’ centers on curves. The markers shall be fixed to the top of the barrier by an adhesive or other method approved by the engineer. Approach end units shall be marked with a Type I object marker. The cost of the tubular markers and Type I object marker shall be included in the cost of the low profile barrier.

7. Information regarding licensing, shop drawings, specifications, quality control and certification of compliance can be obtained from the University of Florida, Office of Technology Licensing. Inquiries should be addressed to: Office of Technology Licensing, P.O. Box 115500, Gainesville, Florida, 32611-5500, Telephone: 352-392-8929, Fax: 352-392-6600, Reference UF#-11052.

8. The 'Portable Temporary Low Profile Barrier For Roadside Safety' shall be paid for under the contract unit price for Barrier Wall (Temporary) Low Profile Concrete, LF, and will be full compensation for furnishing, installing, maintaining and removing the barrier walls.

BACKSIDE AND END PICTORIAL VIEWS

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY
PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

PLAN VIEWS OF CONNECTIONS

CONCAVE CONNECTION

FLAT FACE FEMALE END

BEVELED FACE MALE END

PARALLEL CONNECTION

END VIEWS

DEFLECTION SPACE AT DROPOFFS

PLAN VIEW OF APPROACH END OFFSET

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY
CONVEX CURVATURE

See Inset A

TRAFFIC SIDE

Inset A

CONCAVE CURVATURE

MAXIMUM CURVATURE • MINIMUM RADIUS

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

Inset B

See Inset B

LOW PROFILE BARRIER
Approach Traffic ➔

Work Area

Edge Of Traveled Way

Work Area

Approach Traffic ➔

Work Area

Edge Of Traveled Way

Driveway Width (w)

Approach Traffic ➔

Work Area

Edge Of Traveled Way

Driveway Width (w)

Approach Traffic ➔

Work Area

Edge Of Traveled Way

Driveway Width (w)

LEGEND

BARRIER OPENINGS AT DRIVEWAYS

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

* Trailing End Flares Are Not Required When Barrier Located Outside The Clear Zone Of Opposing Traffic

Type I Object Marker To Be Installed When Trailing End Flare Falls Within The Clear Zone Of Opposing Traffic

LOW PROFILE BARRIER
Approach Traffic

Edge Of Traveled Way

45'

Approach Traffic

Edge Of Traveled Way

60'

LEGEND

Type I Object Marker

Tailing End Flares Are Not Required When Barrier Located Outside The Clear Zone Of Opposing Traffic

Type I Object Marker To Be Installed When Tailing End Flare Falls Within The Clear Zone Of Opposing Traffic

* BARRIER OPENINGS AT DRIVEWAYS

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

LOW PROFILE BARRIER

Last Revision 07/01/05
Sheet No. 5 of 5
Index No. 412
The Type K Temporary Concrete Barrier System has been crash tested to NCHRP Report 350 TL-3 criteria or structurally evaluated to meet the requirements of NCHRP Report 350 TL-3 criteria for the installation configurations as shown utilizing the types, sizes, lengths, shapes, strengths and grades of the fabrication and installation materials as shown.

In order to maintain crashworthiness of the system, do not substitute different grades, sizes, shapes or types of reinforcing steel for those shown for constructing Type K Barrier Units. Also, do not substitute different type, size, length or material grade anchor bolts, nuts, washers, adhesives, connector pins, stakes, keeper pins, or guardrail components for installing Type K Barrier Units.

**FABRICATION NOTES:**

**FABRICATOR PREQUALIFICATION:** The Barrier Units shall be made in a prestressed concrete plant that meets the requirements of Specification Section 450 or in a precast plant meeting the requirements of Specification Section 6-8.

**CONCRETE:** Concrete shall be Class IV in accordance with Specification Section 346. Specification Sections 346-10.2 through 346-10.4 are not applicable. Barrier Units represented by concrete acceptance strength tests which fail below 5000 psi will be rejected.

**REINFORCING STEEL:** All reinforcing steel shall be ASTM A 615, Grade 60 except for Bars 601, 602 and 603. Bars 601, 602 and 603 shall be ASTM A 706 except that a 27/4 diameter pin must be used for the 180 degree bend test. After fabrication, all or part of Bars 60 shall be hot dip galvanized in accordance with Specification Section 962 or coated with a cold galvanizing compound in accordance with Specification Section 971. The minimum amount of galvanizing or coating is shown in the Bending Diagrams. At the Fabricator's option, the entire length of Bars 60 may be galvanized or coated. Install Bars 60 within 1/8" of the plan dimensions. Correct placement of Bars 60 is critical for proper fit up and performance of individual Barrier Units.

**LIFTING SLEEVE ASSEMBLY:** Inclusion of the Lifting Sleeve Assemblies is optional. Steel for Pipe Sleeve shall be in accordance with ASTM A 53. Hot-dip galvanize the Lifting Sleeve Assemblies after their fabrication in accordance with the Specifications.

**SURFACE FINISH:** Construct Barrier Units in accordance with Specification Sections 400 and 521. Finish the top and sides of the Barrier Units to a dense uniform surface by floating in lieu of the General Surface Finish. Use stationary metal forms or stationary timber forms with a form liner.

**MARKING:** Permanently mark the top left end of each Barrier Unit by the use of an embedded and anchored metallic plate with letters and figures a minimum of 0.5" tall. Ink stamps are not allowed. Permanently mark with the following information:
- Type K
- Fabricator’s name or symbol
- Date of manufacture (day, month and year)

**HANDLING:** At no time shall the Barrier Units be lifted or moved by use of Bars 60 that extend from the ends of the units. Approximate weight of one unit equals 2.7 tons.

**ALTERNATE DESIGN:** Manufacturers seeking approval of proprietary concrete barrier systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the barrier system is crash tested to NCHRP Report 350 Test Level 3 criteria, is accepted by FHWA for use as a temporary concrete barrier in the configurations shown herein, is a minimum of 2'-8" tall, has transitions and connections comparable to the standard design and has permanent deflections due to TL-3 crash test impacts not to exceed 3'-9" in freestanding configuration, 3.5" in bolted down configuration and 2'-0" in stake down configuration.
The above quantities are for one Barrier Unit.

Cross References:
For Section A-A, Section B-B and Section C-C see Sheet 3.
**Conventional Reinforcing Steel Details**

**No. 4 Bar Over Drain Slots (Conventional Steel)**

- **Configuration One**
  - Place No. 5 Bars (2'-3" long) in bottom of Welded Wire Reinforcement cage as shown.
  - D 17.2 spacing shall match spacings for Bars 4A shown in Elevation View, Sheet 2. Field trim D 17.2's to clear drain slots by 2".

- **Configuration Two**
  - Place No. 5 Bars (2'-3" long) in bottom of Welded Wire Reinforcement cage as shown.
  - D 19.7 spacing shall match spacings for Bars 4A shown in Elevation View, Sheet 2. Field trim D 19.7's to clear drain slots by 2".

**Bill of Reinforcing Steel**

<table>
<thead>
<tr>
<th>Mark</th>
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<th>Number</th>
<th>Length</th>
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<tbody>
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<td>A1</td>
<td>4</td>
<td>10</td>
<td>6'-1&quot;</td>
</tr>
<tr>
<td>A2</td>
<td>4</td>
<td>2</td>
<td>5'-5&quot;</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>5</td>
<td>12'-3&quot; (Straight)</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>6</td>
<td>3'-1&quot;</td>
</tr>
<tr>
<td>D1</td>
<td>6</td>
<td>2</td>
<td>6'-4&quot;</td>
</tr>
<tr>
<td>D2</td>
<td>6</td>
<td>2</td>
<td>7'-6&quot;</td>
</tr>
<tr>
<td>D3</td>
<td>6</td>
<td>2</td>
<td>8'-6&quot;</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>4</td>
<td>2'-0&quot;</td>
</tr>
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</table>

**Notes:**

- Place 2 = No. 5 Bars (2'-3" long) in bottom of Welded Wire Reinforcement cage as shown.
- D 17.2 spacing shall match spacings for Bars 4A shown in Elevation View, Sheet 2. Field trim D 17.2's to clear drain slots by 2".
NOTE FOR ALL INSTALLATIONS:

LIMITATION OF USE: This Temporary Concrete Barrier System is intended for work zone traffic control and other temporary applications. It shall not be used for permanent traffic railing construction unless specifically permitted by the Plans. Except as shown for the Black Piled Roadway Installations, the Barrier Units must be installed on a flexible pavement (asphalt) or rigid pavement (concrete) surface as shown with a cross slope of ±2% or flatter. Except as shown for transition installations, Type K Barrier Units are not intended to be bolted down or staked down in locations where they can be impacted from the back side.

HANDLING: At no time shall the Barrier Units be lifted or moved by use of Bars 60 that extend from the ends of the units. Approximate weight of one unit equals 2.7 tons.

SURFACE PREPARATION: Except as shown for the Black Piled Roadway Installations, remove debris, loose dirt and sand from the pavement, bridge deck or asphalt pad surface within the barrier footprint just prior to placement of the Barrier Units.

CONNECTION PIN ASSEMBLY: Steel for Connection Pin and Top Plate assemblies shall be in accordance with ASTM A36 or ASTM A307 Grade B. Nondestructive testing of welds shall not be required. At the Contractor’s option, a 5/8” diameter hole may be provided at the bottom of the Connection Pin, as shown for the Vandal-Resistance bolt. Connection Pin Installation: Initially set Barrier Units by using a 1 3/4” wooden block between ends of adjacent units. Install Connection Pin between adjacent Barrier Units as shown, then pull newly placed Barrier Unit away from adjacent Barrier Unit to remove slack between Connection Pin and Bars 60 (as shown on Sheet 5). Barrier Units shall not be used unconnected.

DETAIL OF CONNECTION BETWEEN BARRIER UNITS

INSTALLATIONS ON CURVED ALIGMENTS: The details presented in these Standards are shown for installations on tangent alignments. Details for horizontally curved alignments are similar.

TRANSITIONS: Transitions are required for freestanding, bolted down, staked down and back filled Type K Barrier Installations, see Sheet 8 for transition requirements and details. Transitions are also required between installations of Type K Barrier and other types of temporary barrier, see Index No. 410 for transition requirements and details. Splices and transitions are required between installations of Type K Barrier and permanent Bridge or roadway traffic barriers, see Sheets 8 through 13 for transition requirements and details.

PAVEMENT: Barrier Units for work zone traffic control and other temporary applications shall be paid for under the contract unit price for Barrier Wall (Temporary) [Type K], L.F. Any relocation of the Barrier Units required for the project shall be paid for under the contract unit price for Barrier Wall (Temporary) [Relocate] (Type K), L.F. Type C Steady-Burn Lights shall be paid for under the contract unit price for Lights (Type C, Steady-Burn), L.D. The Contractor shall furnish Barrier Units except when the Plans stipulate the availability of Department-owned units. Regardless of unit source the Contractor shall furnish all hardware and shall be responsible for anchoring, installation, replacement and removal. Unless otherwise noted on the Plans, the Barrier Units shall become the property of the Contractor and shall be removed from the site prior to acceptance of the completed project.

NOTES FOR THREE-BEAM GUARDRAIL, SPLICE INSTALLATIONS:

THREE-BEAM GUARDRAIL: Provide Thrie-Beam Guardrail splices in accordance with 440470 W 180, Type II (Zinc coated) as follows:

- Two panels per splice (One panel of each side of Class B, 1/2” Gauge), or
- Four panels per splice (Two nested panels per side of Class A, 1/2” Gauge)

Guardrail length shall be 26-46’. Provide and install all other associated metallic guardrail components (Terminal Connectors, Guardrail Bolts, Mid-Beam Plates, etc.) in accordance with Index No. 400.

INSTALL GUARDRAIL ANCHOR BOLTS at each end of each splice in any of the standard seven anchor bolt holes in the Thrie-Beam Terminal Connector.

GUARDRAIL OFFSET BLOCKS: Provide and install all offset blocks as shown and required in order to prevent bending or kinking of Thrie-Beam Guardrail panels.

CONCRETE FILLING TAPED THREAT RAILING TUES: Provide concrete for filling tapered toes of Traffic Railings as shown meeting the material requirements of Specification Section 346, any Class, or a commercially available prebagged concrete mix (3000 psi minimum compressive strength). Sampling, testing, evaluation and certification of the concrete in accordance with Specification Section 346 is not required. Saturate with water the surfaces upon and against which the concrete will be placed prior to placing concrete. Place and finish concrete using forms or by hand methods to the general configurations shown to provide a smooth transition between the Type K Barrier and the adjacent traffic railing. A low slump is desirable if placing and finishing concrete by hand methods. Cure the concrete fill by application of a curing compound, or by covering with a wet top or burlap for a minimum of 24 hours. Completely remove the concrete fill upon relocation or removal of the Type K Temporary Concrete Barrier.
NOTES FOR BOLTED DOWN GOWN LIMITATION OF USE:
ANCHOR BOLTS, NUTS
ADHESIVE-BONDING MATERIAL
ADJACENT
Omit one (1) Anchor Bolt within a single Barrier by the use of Adhesive-Bonded Anchor Bolts. Do not drill into or otherwise damage the tops of supporting beams or remaining Section 416-6, install six (6) Adhesive-Bonded Anchor Bolts in the demonstration Barrier Engineer. Remove the demonstration Barrier Plate
Nuts
Index No. 415. Installations. For the number and positions of Anchor Install of the Barrier accordance with Specification Section 926. If a
Deck (top girders, bridge deck expansion joints or drains. Install Anchor Bolts and Nuts so that the maximum extension beyond the
transversely post-tensioned, solid or voided concrete slab units. Anchor
Bolts shall
be in accordance with ASTM A 563 or ASTM A 194. Flat Washers shall be in accordance with ASTM F 436 and Plate Washers shall be in accordance with ASTM A 36 or ASTM A 709 Grade 36.

Install three (3) Anchor Bolts per Barrier Unit on the traffic side of the Barrier Units as shown, except for Transition Installations. For the number and positions of Anchor Bolts required in Transition Installations see Sections 8 and 9 and Index No. 415. Drilling through deck reinforcing steel to install Anchor Bolts is permitted. Unless otherwise shown in the Plans, all Anchor Bolts shall be installed by through bolting (where geometrically possible) or by the use of Adhesive-Bonded Anchor Bolts. Do not drill or otherwise damage the tops of supporting beams or girders, bridge deck expansion joints or drains. Install Anchor Bolts and Nuts so that the maximum extension beyond the face of the Barrier Units is 1½". Snug tighten the Nuts on the Anchor Bolts. For through bolted installations, snug tighten the double nuts on the underside of the deck against each other to minimize the potential for loosening.

Unit one (1) Anchor Bolt within a single Barrier Unit if a conflict exists between the Anchor Bolt location and a bridge deck expansion joint or drain. The adjacent Barrier Units must each be installed with the standard three (3) Anchor Bolts.

Unit one (1) Anchor Bolt within a single Barrier Unit as shown in the Treatment at Bridge Deck Expansion Joint Schematic if the Barrier Unit straddles a bridge deck expansion joint. The adjacent Barrier Units must each be installed with the standard three (3) Anchor Bolts.

ADHESIVE-BONDING MATERIAL: Adhesive Bonding Material Systems for Anchor Bolts shall be Type HS+W in accordance with Specification Section 416. Prior to installation of the Barrier Units in the Plan location(s), install a demonstration Barrier Unit using the proposed production installation method, at a location approved by the Engineer. It is the responsibility of the production test requirements of Specification Section 416-6, install (6) Adhesive-Bonded Anchor Bolts in the demonstration Barrier Unit and test each Anchor Bolt with a 25,850 pound tensile proof load. Install load test additional demonstration Barrier Units when requested by the Engineer. Remove the demonstration Barrier Unit prior to testing the Anchor Bolts. The test Anchor Bolts after testing as directed by the Engineer.

REMOVAL OF ANCHOR BOLTS: Upon removal or relocation of Barrier Units, remove all Anchor Bolts and completely fill the remaining holes in bridge decks, approach slabs and roadway rigid pavements that are to remain with Magnesium Ammonium Phosphate Concrete in accordance with Specification Section 810 or an Epoxy Resin Compound, Types 1 or 2, in accordance with Specification Section 826. If a flexible pavement overlay is present and is to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.

THROUGH BOLTED ANCHOR INSTALLATION ON BRIDGE DECK

SUPPLEMENTAL BOTTOM PLATE WASHER DETAIL

BOTTOM PLATE WASHER DETAIL

TOP PLATE WASHER DETAIL

BARREL UNIT

BARREL UNIT

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TREATMENT AT BRIDGE DECK EXPANSION JOINT SCHEMATIC

# To accommodate movement at Expansion Joint, set Barrier Units with 3½" gap at locations shown.

BOLTED DOWN BRIDGE, APPROACH SLAB, ROADWAY AND TRANSITION INSTALLATIONS

NOTE: FOR BOLTED DOWN BRIDGE, APPROACH SLAB, ROADWAY AND TRANSITION INSTALLATIONS!

LIMITATION OF USE: This installation technique can only be used on rigid pavement and concrete bridge decks as shown. Barrier Units shall not be bolted down on bridge superstructures that contain post-tensioned tendons within the concrete deck (top flange at concrete box girders) or on bridge superstructures consisting of longitudinally prestressed, transversely post-tensioned, solid or voided concrete slab units. Anchor Bolts must not be installed on both sides of the Barrier Units. Do not bolt down Barrier Units across bridge finger or modular expansion joints.

ANCHOR BOLTS, NUTS AND WASHERS: Adhesive-Bonded Anchor Bolts shall be fully threaded rods in accordance with ASTM F 1554 Grade 36. Anchor Bolts for through bolting shall be in accordance with ASTM F 1077 or ASTM F 1554 Grade 36. Nuts shall be in accordance with ASTM A 563 or ASTM A 194. Flat Washers shall be in accordance with ASTM F 436 and Plate Washers shall be in accordance with ASTM A 36 or ASTM A 709 Grade 36.

Install three (3) Anchor Bolts per Barrier Unit on the traffic side of the Barrier Units as shown, except for Transition Installations. For the number and positions of Anchor Bolts required in Transition Installations see Sections 8 and 9 and Index No. 415. Drilling through deck reinforcing steel to install Anchor Bolts is permitted. Unless otherwise shown in the Plans, all Anchor Bolts shall be installed by through bolting (where geometrically possible) or by the use of Adhesive-Bonded Anchor Bolts. Do not drill or otherwise damage the tops of supporting beams or girders, bridge deck expansion joints or drains. Install Anchor Bolts and Nuts so that the maximum extension beyond the face of the Barrier Units is 1½". Snug tighten the Nuts on the Anchor Bolts. For through bolted installations, snug tighten the double nuts on the underside of the deck against each other to minimize the potential for loosening.

Unit one (1) Anchor Bolt within a single Barrier Unit if a conflict exists between the Anchor Bolt location and a bridge deck expansion joint or drain. The adjacent Barrier Units must each be installed with the standard three (3) Anchor Bolts.

Unit one (1) Anchor Bolt within a single Barrier Unit as shown in the Treatment at Bridge Deck Expansion Joint Schematic if the Barrier Unit straddles a bridge deck expansion joint. The adjacent Barrier Units must each be installed with the standard three (3) Anchor Bolts.

ADHESIVE-BONDING MATERIAL: Adhesive Bonding Material Systems for Anchor Bolts shall be Type HS+W in accordance with Specification Section 416. Prior to installation of the Barrier Units in the Plan location(s), install a demonstration Barrier Unit using the proposed production installation method, at a location approved by the Engineer. It is the responsibility of the production test requirements of Specification Section 416-6, install (6) Adhesive-Bonded Anchor Bolts in the demonstration Barrier Unit and test each Anchor Bolt with a 25,850 pound tensile proof load. Install load test additional demonstration Barrier Units when requested by the Engineer. Remove the demonstration Barrier Unit prior to testing the Anchor Bolts. The test Anchor Bolts after testing as directed by the Engineer.

REMOVAL OF ANCHOR BOLTS: Upon removal or relocation of Barrier Units, remove all Anchor Bolts and completely fill the remaining holes in bridge decks, approach slabs and roadway rigid pavements that are to remain with Magnesium Ammonium Phosphate Concrete in accordance with Specification Section 810 or an Epoxy Resin Compound, Types 1 or 2, in accordance with Specification Section 826. If a flexible pavement overlay is present and is to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.
UNSTALLATION ADJACENT REMOVAL OF KEEPER PINS: Upon removal or relocation of Barrier Units, completely remove all Keeper Pins and completely remove/ relocate all Stake assemblies in accordance with ASTM A 36 or ASTM A 709 Grade 36. All welds shall be in accordance with the American Welding Society Structural Welding Code (Steel) AWS D1.1 (current edition). Weld metal shall be E60XX or E70XX. Nondestructive testing of welds is not required.

INSTALLATION: Prior to installation of Stake assemblies, verify the locations of all adjacent buried utilities, drainage structures, pipes, etc. It conflicts between Stake locations and buried elements exist, a maximum of two (2) Stakes within a single Barrier Unit may be omitted if the adjacent Barrier Units are installed with the standard three (3) Stakes.

REMOVAL OF STAKES: Upon removal or relocation of Barrier Units, completely remove all Stake assemblies and index No. 415. Stake assemblies are to be removed by hand or diamond tool. Stake assembly removal is to be made for the purpose shown in Accommodation Sections 709 and 930. Prior to Stake assembly removal, the Stake assembly shall be completely removed from the Asphalt Pad. Stake removal is to be made to the maximum of two (2) Stakes on the traffic side of the Barrier Units as shown, except for Transition Installations where the number and positions of stakes required is to be made in accordance with Transition Installations see Sheets 8 and 9. Do not drill into or otherwise damage bridge deck expansion joints or drains.

FREESTANDING BRIDGE or APPROACH SLAB INSTALLATIONS

TYPICAL SECTION (BRIDGE DECK SHOWN, APPROACH SLAB SIMILAR)
NOTE FOR FREE STANDING BRIDGE OR APPROACH SLAB MEDIAN INSTALLATION:

KEEPER PINS: Keeper Pins shall be ⅝" diameter, smooth steel bar in accordance with ASTM A 36 or ASTM A 709 Grade 36, as directed by the Engineer. Each Keeper Pin per Barrier Unit shall be installed as shown. Alternate Keeper Pin locations from side to side of Barrier Units along the length of the installation. Do not drill into or otherwise damage bridge deck expansion joints or drain pipes.

REMOVAL OF KEEPER PINS: Upon removal or relocation of Barrier Units, remove all Keeper Pins and completely fill the remaining holes in bridge decks and approach slabs that are to remain with Magnesium Ammonium Phosphate Concrete in accordance with Specification Section 930 or with an Epoxy Resin Compound, Type I or Q, in accordance with Specification Section 926. If a flexible pavement overlay is present and is to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.

FREESTANDING ROADWAY MEDIAN INSTALLATION

TYPICAL SECTION

NOTES FOR FREE STANDING ROADWAY MEDIAN INSTALLATION:

LIMITATION OF USE: This installation technique can only be used on flexible or rigid pavement or on an Asphalt Pad as shown.

ASPHALT PAD: Where existing pavement is not present, construct the Asphalt Pad using Miscellaneous Asphalt Pavement in accordance with Specification Section 339 with the exception that the use of a pre-emergent herbicide is required. No separate payment will be made for the Asphalt Pad.

REMOVAL OF KEEPER PINS: Upon removal or relocation of Barrier Units, remove all Keeper Pins and completely fill the remaining holes in bridge decks and approach slabs that are to remain with Magnesium Ammonium Phosphate Concrete in accordance with Specification Section 930 or with an Epoxy Resin Compound, Type I or Q, in accordance with Specification Section 926. If a flexible pavement overlay is present and is to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.
PARTIAL PLAN VIEW AT MEDIAN TRAFFIC RAILING

32" F Shape Traffic Railing (shown), 32" New Jersey Shape and 42" F Shape Traffic Railings and 8' or 14' Traffic Railing / Sound Barriers (similar)

Align Top of Type K Barrier Unit with Traffic Railing at its end

Anchor Bolts or Stakes

PARTIAL PLAN VIEW

PARTIAL ELEVATION VIEW - FLORIDA CORRAL TRAFFIC RAILING

42" Vertical Shape Traffic Railing (shown)

PARTIAL ELEVATION VIEW - VERTICAL SHAPE TRAFFIC RAILINGS

Approach Transition Splice Detail for Florida Corral and Vertical Shape Traffic Railings

PARTIAL ELEVATION VIEW
Freestanding Type K Barrier Units shown Bolted or Staked Units similar. See Plans for specific requirements.

32" F Shape Traffic Railing (shown); 32" New Jersey Shape and 42" F Shape Traffic Railings and 8' or 14' Traffic Railing / Sound Barriers (similar).

Align Top of Type K Barrier Unit with Traffic Railing at its end

Fill tapered toe if present (shown hatched) with concrete, see Note on Sheet 4

Partial Plan View

Cross References:
See Sheet 13 for Section A-A, Section B-B and Section C-C.
**APPROACH TRANSITION FROM FREESTANDING PROPRIETARY TEMPORARY BARRIERS TO BOLTED OR STAKED DOWN TYPE K TEMPORARY CONCRETE BARRIERS**

**LEGEND:**

- Dot indicates number and position of Bolts or Stakes

**NOTE:** Where Barrier is located within Clear Zone of opposing traffic, Approach Transition is required.

**TRAILING END TRANSITION FROM BOLTED OR STAKED DOWN TYPE K TEMPORARY CONCRETE BARRIERS TO FREESTANDING PROPRIETARY TEMPORARY BARRIERS**

**APPROACH AND TRAILING END TRANSITIONS FROM FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS TO FREESTANDING PROPRIETARY TEMPORARY BARRIERS**

**TYPE K-PROPRIETARY TEMPORARY CONCRETE BARRIER TRANSITIONS**
APPENDIX Transition Sections from Freestanding to Back Filled Temporary Concrete Barriers

LEGEND:

NOTE

Where Barrier is located within Clear Zone of opposing traffic, Approach Transition is required.

APPROACH TRANSITION FROM FREESTANDING PROPRIETARY TEMPORARY BARRIERS TO BACK FILLED TYPE K TEMPORARY CONCRETE BARRIERS

TRAILING END TRANSITION FROM BACK FILLED TYPE K TEMPORARY CONCRETE BARRIERS TO FREESTANDING PROPRIETARY BARRIERS

MEDIAN APPROACH AND TRAILING END TRANSITIONS FROM FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS TO FREESTANDING PROPRIETARY TEMPORARY BARRIERS

TYPE K–PROPRIETARY TEMPORARY CONCRETE BARRIER TRANSITIONS
TEMPORARY CONCRETE BARRIER

**NOTICE**

THE TEMPORARY CONCRETE BARRIER WALL UNIT SHOWN ON THIS INDEX THAT WAS PRODUCED PRIOR TO OCTOBER 1, 2002, AND THAT IS IN GOOD CONDITION CAN BE USED ON STATE HIGHWAY PROJECTS THROUGH SEPTEMBER 30, EXC. TEMPORARY CONCRETE BARRIER WALL UNITS PRODUCED ON AND AFTER OCTOBER 1, 2002 FOR USE ON STATE HIGHWAY PROJECTS MUST MEET THE CRITERIA AND MUST BE INCLUDED ON THE QUALIFIED PRODUCTS LIST. IF AND WHEN APPROVED FOR USE ON STATE HIGHWAY PROJECTS, THE UNIT DESIGN WILL BE POSTED ON THE ROADWAY DESIGN WEB SITE.

**NOTE:** These deflection space requirements also apply to approved options identified in General Note L.

**GENERAL NOTES**

1. Temporary Concrete Barrier walls on roadways may be any of the following:
   a. The FDOT Type K Temporary Concrete Barrier Wall Design Standard Index 414.
   b. The FDOT 455 Temporary Concrete Barrier wall unit shown on Sheet 4 of this Index. If manufactured prior to October 1, 2002, it is good condition, and herrated in accordance with this Index, units may be either F-Shape or New Jersey Shape. The FDOT 455 unit shown in this Index is the design permitted in Index No. 455 in prior editions of the Design Standards. See "NOTICE" below. These units produced after October 1, 2002 cannot be used, complete fabrication details are omitted in this edition of the Design Standards.
   c. Temporary concrete barrier walls meeting NCHRP 350 Test Level 3 criteria and included in the Qualified Products List. Units may be either F-Shape or New Jersey Shape unless otherwise noted in the plans.

   For temporary concrete barrier walls on bridges see Design Standard Index No. 444.

2. The FDOT 455 units with the optional end connections shown in this Index may be interconnected within a run of wall. However, interconnecting units with different shaped (F-Shape, New Jersey Shope) Type K End Units is not permitted. See Sheets 8 through 10 for required treatment for continuation of row of barrier with different shapes or dissimilar connectors.

3. Alignment, length of work, anchorage and end treatment shall be in accordance with this index.

4. Wall units shall not be used for permanent barrier wall construction regardless of unit length, unless specifically permitted by the plans.

5. If the plans specify Barrier Wall (Temporary) Type K, substitution with other barrier types is not permitted.

6. If the plans specify temporary concrete barrier wall, substitution with water filled barriers is not permitted.

7. Type C Steady-Burn Lights are to be mounted on top of temporary concrete barrier walls that are used as barriers along traveled ways in work zones. The lights are to be spaced at 500-feet centers in transverse or 1250-feet centers on tangent roadways. For additional information refer to Index 610.

8. Wall units used for work zone traffic control and other temporary applications shall be paid for under the contract unit price for Barrier Wall Temporary. For Type C Steady-Burn Lights shall be paid for under the contract unit price for Lights, Temporary, Barrier Wall Mount Type C, Steady-Burn 1, LF.

**DEFLECTION SPACE REQUIREMENTS**

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<th>Deflection Space</th>
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<tr>
<td>45 mph or Less</td>
<td>2&quot;</td>
</tr>
<tr>
<td>50 mph or Greater</td>
<td>4&quot;</td>
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<table>
<thead>
<tr>
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<th>Offset To Travelway</th>
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<tbody>
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<td>0&quot; min. 0&quot; preferred</td>
</tr>
<tr>
<td>50 mph or Greater</td>
<td>0&quot;</td>
</tr>
</tbody>
</table>

Note: These deflection space requirements also apply to approved options identified in General Note L.
The approach departure line location is determined by the line intersected with the back of the hazard or the area to be shielded, however the intersected offset distance is not to be beyond the clear zone limit. The trailing departure line is determined by the line intersected with the front of the downstream end of the hazard or the area to be shielded.

The length of barrier wall need is the distance from the approach departure line intersected with the upstream toe of the temporary concrete barrier wall to the trailing departure line intersected with the downstream toe of the temporary concrete barrier wall.

Where temporary concrete barrier wall end units are not anchored, two and one-half (2½) wall units (min.) are required beyond the length of barrier need for wall end anchorage. Temporary concrete barrier wall end units shall be located at or outside the clear zone or shielded by other structures, earth embedment or a crash cushion.

Proprietary redirective crash cushions designed for use with temporary concrete barriers have the beginning length of need and departure line intersected point indicated on the respective SPII drawing for each proprietary crash cushion. Where redirective crash cushions are located, on the departure line by their length of need reference point, the wall upstream and unit must be aligned with the crash cushion and wall's end unit secured with the anchor plates shown on Sheet 4 of this index. See Sheets 5 through 8 for configurations requiring end unit anchorage.

The wall offset from the near traffic lane, wall flare rate and wall flare length are to be in conformance with the alignment called for in the plans and the alignments called for by Department Design Standards specified in the plans. In absence of either plan requirement, the offset shall be as determined by the Engineer, and, unless other flare rates are approved by the Engineer the flare rates to be applied are 1/15 for speeds up to 45 mph and 1/30 for speeds 45 mph or faster for speeds up to 70 mph, see Index No. 518 for other flare rates on freeway facilities.

The surface cross slope approaching the barrier wall and continuing across the required deflection space shall not exceed a rate of 1\% on horizontal.

ALIGNMENT AND LENGTH OF NEED

TEMPORARY CONCRETE BARRIER
OPTIONAL END TREATMENTS FOR WALL UNITS

END OF UNIT

TOP VIEW

END VIEW

SIDE VIEW

ROUND BAR CONNECTOR

WIRE ROPE CONNECTOR

OPTIONAL PINS

STEEL CONNECTING PIN

INSERTING FOOT SNAKE PIN

ASSEMBLED UNIT

REMOVING FOOT SNAKE PIN

CONNECTING PIN ASSEMBLY

FDOT SNAKE PIN

TEMPORARY CONCRETE BARRIER
NOTES FOR WALL END SHELTERING

1. Redirective crash cushions are the principal (standard) devices to be used for sheltering approach ends of temporary concrete barrier walls. Except where the plans designate a particular type of redirective crash cushion for a specific location, the contractor has the option to construct either the REACT 550, QualiGuard, TRACC, or TAU-2 crash cushions subject to the uses and limitations described on their respective drawings on the Qualified Products List. The barrier wall end unit must be anchored to a paved surface using anchor plates in accordance with "Anchor Plate Notes" and the details on this sheet.

2. Temporary redirective crash cushions shall be installed in accordance with the manufacturer's specifications and recommendations. Temporary crash cushions can be either new or functionally sound used devices. Performance of intended function is the only condition for acceptance, whether the crash cushion is new, used, refurbished, purchased, leased, rented, or shared between projects, or made up of mixed new and used components.

3. Inertial crash cushions are not optional systems for locations designated for redirective crash cushions by the plans; can not be substituted for redirective crash cushions, and are not eligible for VECG consideration.

4. A yellow post mounted Type I Object Marker shall be centered 3' in front of the nose of all temporary crash cushions. Mounting hardware shall be in accordance with Index Nos. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the crash cushion.

5. Optional temporary redirective crash cushions are to be paid for per location under the contract unit price for Vehicular Impact Attenuator (Temporary) / Redirective Option I, 10.

ANCHOR PLATE REQUIREMENTS FOR BARRIER WALL END UNITS ABUTTING CRASH CUSHIONS

ANCHOR PLATE NOTES
1. For temporary barrier wall end units requiring anchor plates, see sheets 5 through 8.

2. The temporary concrete barrier wall anchor plates depicted above is a proprietary design by Energy Absorption Systems, Inc. Other temporary anchored plates can be substituted when wall rigidity is assured by any of the following:
   a) Proven by acceptable crash test of redirective crash cushions, or
   b) Meet anchorage prescribed in "A Guide To Standardized Highway Barrier Hardware", or
   c) Crash cushion manufacturer's engineered design, or
   d) Approved shop drawings on a case by case basis.

3. The cost for anchoring the wall segment will be included in the cost for the adjoining redirective crash cushion.
Barrier Wall End Unit Anchorage

BARRIER WALL END UNIT ANCHORAGE
Edge Of Traffic Lane

Crash Cushion

3 Units

4 Units

4 Units

45 MPH OR LESS

Edge Of Traffic Lane

Crash Cushion

3 Units

4 Units

6 Units

45 MPH OR LESS

50 MPH OR GREATER

Anchor Plates Required Front Only On Unit Absorbing Crash Cushion (See Sheet 4).

SHOULDER BARRIER ON UNDIVIDED FACILITIES

SHOULDER BARRIER ON DIVIDED FACILITIES

Edge Of Traffic Lane

Crash Cushion

3 Units

6 Units

3 Units

INTERIOR MEDIAN BARRIER

CONTINUATION OF RUNS OF BARRIER WITH DISSIMILAR CONNECTORS

NOTE:

Schemes on this sheet based on 12' units.
See Sheet Nos. 7 & 8 for bridge applications with barrier type K.

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Index No. 415

TEMPORARY CONCRETE BARRIER
**Legend:**
- Dot indicates number of bolt anchors or stakes
- Anchor plates required front side only on unit abutting crash cushion (See Sheet 4).
- Overlap reference line

**Approach Shoulder Barrier on Undivided Facilities**

**Approach Shoulder Barrier on Divided Facilities**

**Interior Median Barrier**

**Continuation of Barrier • From Other Type Barriers to Barrier Type K**

**Barrier Type K on Bridges and Approach Slabs**
Barrier Type K

• Edge Of Traffic Lane

45 MPH OR LESS

50 MPH OR GREATER

DEPARTURE (TRAILING) SHOULDER BARRIER ON DIVIDED FACILITIES

Note:
See Sheet No. 7 For Approach Shoulder Applications.
See Sheet No. 7 For Interior Median Applications.

CONTINUATION OF BARRIER • FROM BARRIER TYPE K TO OTHER TYPE BARRIERS

BARRIER TYPE K ON BRIDGES AND APPROACH SLABS

LEGEND

Dot Indicates Number Of Bolt Anchors Or Stakes

2008 FDOT Design Standards

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Sheet No. 415

TEMPORARY CONCRETE BARRIER
UNIDIRECTIONAL - SEPARATED TRAFFIC

BI DIRECTIONAL - SEPARATED TRAFFIC

Wall End Treatment When Shielded by a QuadGuard Crash Cushion

Wall End Treatment When Shielded by a TRACC Crash Cushion

SHIELDING WALL ENDS WITH RE DIRECTION C LASH CUSHIONS (REDIRECTION OPTION)
(CONTINUATION ON SHEET 10)

NOTES

1. For alignment and length of need see Sheets 2 and 5 through 8.
2. Anchor plates required only on units abutting crash cushions.
3. For crash cushion details see drawings posted on the Qualified Products List at "SM Vehicles Impact Attenuators".
UNIDIRECTIONAL - SEPARATED TRAFFIC

BIDIRECTIONAL - SEPARATED TRAFFIC

SHOULDER - RIGHT OR LEFT (RIGHT SIDE SHOWN)

WALL END TREATMENT WHEN SHIELDED BY TAU II CRASH CUSHION

NOTES

1. For alignment and length of need see Sheets 2 and 3 through 5.
2. Anchor plates required only on units sheilded crash cushions.
3. For crash cushion details see drawings posted on the Qualified Products List.

SHIELDING WALL ENDS WITH REDIRECTIVE CRASH CUSHIONS (REDIRECTIVE OPTION)
NOTES FOR TEMPORARY GATING CRASH CUSHIONS

1. The crash cushion arrays shown on this index can be used on the State Highway System only when all of the following conditions are met:
   (a) Use is limited to shielding temporary concrete barrier wall approach ends.
   (b) Use is limited only when a temporary gating crash cushion or inertial crash cushion is specifically called for in the plans.
   (c) Use is limited to installations that will not exceed 30 calendar days in duration, unless otherwise called for in the plans.

2. Inertial crash cushions are gating type crash cushions and a clear runout area behind the array must be provided. The arrays shown can be used for outer roadway applications, exclusive of gore areas, and for median applications where the median width is sufficient to provide clear zone width between the back side module and the near edge of the approaching traffic.

3. Inertial crash cushion modules shall be installed in accordance with the manufacturer's specifications and recommendations, and can be constructed of either new or functionally sound used modules.

4. Anchorage of barrier wall end segment is not required.

5. A yellow post mounted Type I Object Marker shall be centered 3' in front of the nose of all crash cushion arrays. Mounting hardware shall be in accordance with Index No. 415.

6. Temporary gating crash cushion systems listed on the Department's Qualified Products List (QPL) may be substituted for the crash cushion arrays shown in this index.

7. Temporary crash cushions (gating) are to be paid for per array, under the contract unit price for Vehicular Impact Aftermath/Crash Cushion (Gating) (Temporary), #13.
This railing has been structurally evaluated to be equivalent or greater in strength to other safety shape railings which have been crash tested to NCHRP Report 350 TL-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes.

MARKERS:反射性标志图案应被置于交通扶手的顶部。在桥面宽度小于100 ft.时，一个标志应被置于每处桥面的顶部。在桥面宽度超过100 ft.或在一个桥面上只安装一个标志时，应在此标志上安装一个标志。标志应被安装在佛罗里达州交通部的要求位置。安装标志应包括在合同价格中。

ELEVATION OF BRIDGE DECK AND APPROACH SLAB SHOWING RAILING ON RETAINING WALL

TRAFFIC RAILING NOTES

NAME DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be shown on the Traffic Railing as to be seen on the driver’s right side when approaching the bridge. The Date shall be shown on the driver’s left side when approaching the bridge. The Date shall be shown on the Bridge Number on the existing railing, use both the existing date and the year of the widening. Black plastic letters shall be seen on the driver’s right side when approaching the bridge. The Date shall be shown on the Driver’s left side when approaching the bridge. The Date shall be shown on the Bridge Number in white or yellow color (white or yellow) shall be used, as approved by the Engineer, in lieu of the black plastic letters and figures 3″ in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by 1/8″ V-Grooves. V-Grooves shall be formed by perforated letters and figures.

ELEVATION OF BRIDGE DECK AND APPROACH SLAB SHOWING RAILING ON RETAINING WALL

TRAFFIC RAILING NOTES

REFLECTIVE RAILING MARKER SPACING

Distance from Perpendicular to Face of Railing Spacing (Ft.)
4 ft. or less 40
4 ft. or more 60

CROSS REFERENCE: For Section A-A, B-B and C-C. For Section A-A, view B-B and C-C. For Section C-C, see Sheet 3.
TYPICAL SECTION THRU TRAFFIC RAILING
(Section thru Bridge Deck shown, Section thru Approach Slab and Retaining Walls similar)

NOTE:
- Rotate Bars 5V in Railing End Transition to maintain cover. Begin placing Railing Bars 5P and 5V on Approach Slab at the barrier end and proceed toward Begin or End Bridge to ensure placement of guardrail bolt holes.
- It required adjustments to the bar spacing for Bars 5P and 5V shall be made immediately adjacent to Begin or End Bridge.

INSTRUCTIONS TO DESIGNER:
- For Bridge Decks up to a maximum thickness of 9", the two Bars 5S placed in the Bridge Deck may substitute for the longitudinal deck steel located within the limits of Bars 5V, provided that the total area of longitudinal deck steel beneath the railing, as required by calculation, is not reduced. Show these bars on the Structures Plans, Superstructure Sheets with the deck steel.
- For locations of Section 4-4 and View B-B see Sheet 1.

2006 FDOT Design Standards
Traffic Railing - (32" F Shape)
At the option of the Contractor Welded Wire Reinforcement (WWR) may be utilized in lieu of all Bars 5V. Option 2 and 5V. Welded Wire Reinforcement shall conform to ASTM A497. Welded Wire Reinforcement at Railing End Transition shall be field bent inward as required (Pieces 1 & 2) to maintain cover. The vertical wires (0.307") in Piece 1 shall be cut as shown and the gutter side portion bent inward as required to allow placement.

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are out to out.
2. The 9° and the 2°-4° vertical dimensions shown for Bar 5V are based on a bridge deck without a raised sidewalk. If a raised sidewalk is to be provided, increase these dimensions to achieve a 6" minimum embedment into the bridge deck. See Structures Plans, Sections Conventional Reinforcing Steel Bending Diagrams.
3. The reinforcement for the railing on a retaining wall shall be the same as detailed above for a 9° deck with 5A = 50° = 90°.
4. Air reinforcing steel at the open joints shall have a 2" minimum cover.
5. Bars 5V may be continuous or spliced at the construction joints. Bar splices for Bars 5V shall have a minimum of 2°-4°.

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>5</td>
<td>5'-7&quot;</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>46' Read</td>
</tr>
</tbody>
</table>

Length as Required

Welded Wire Reinforcement (WWR) may be utilized in lieu of all Bars 5V. The vertical wires (0.307") in Piece 1 shall be cut as shown and the gutter side portion bent inward as required to allow placement.

DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT

EQUIPMENT LIST AND FIGURES

ESTIMATED TRAFFIC RAILING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
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</thead>
<tbody>
<tr>
<td>Concrete</td>
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<tr>
<td>Reinforcing Steel</td>
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<td>27.12</td>
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</table>

(The above quantities are based on a 2° deck cross slope railing on low side of deck.)
TRAFFIC RAILING NOTES

TRAFFIC RAILING (Reinforcing Steel not shown for clarity)

PLAN (Reinforcing Steel not shown for clarity)

- Approach Slab
- Bridge Deck
- Joint (see Notes)
- Intermediate Open Joint (see Notes)
- V-Groove in both faces and top of Traffic Railing (Equally spaced between open joints)
- Deck Joint (see Notes)
- Approach Slab
- Transition on Approach Slab shown, (When called for in Plans)
- Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)

ELEVATION

- V-Groove in both faces and top of Traffic Railing (Equally spaced between open joints)
- Joint (see Notes)
- Approach Slab
- Bridge Deck
- Approach Slab
- Transition on Approach Slab shown, (When called for in Plans)
- Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)

REFLECTIVE RAILING MARKER SPACING

- Distance: Edge of Travel (Lanes) to Face of Railing
- Spacing (Ft.)
  - ≤ 4' 40'
  - 4' to 8' 80'
  - > Max 8' None Required

CROSS REFERENCE

- For Section A-A, View B-B and Detail B see Sheet 2.
- For Detail B see Sheet 3.

CROSS REFERENCE

- For Section A-A, View B-B and Detail B see Sheet 2.
- For Detail B see Sheet 3.

TRAFFIC RAILING NOTES

- This railing has been structurally evaluated to be equivalent or greater in strength to other safety shazleirgs which have been crash tested to NCHRP Report 350 TL-4 criteria.

CONCRETE AND REINFORCING STEEL

- See Structures Plans, General Notes, Guardrail. For Guardrail connection details see Index No. 406

5" SUPERELEVATED BRIDGES

- At the option of the Contractor the Traffic Railing on super-elevated bridges may be constructed perpendicular to the roadway surface.

REFLECTIVE RAILING MARKERS

- Reflective Railing Markers shall conform to Section 993 of the Specifications. Install markers 6" below the top of the Traffic Railing at the spacings shown in the table above. Reflective color (white or yellow) shall conform to the color of the near edgeline.

- Joint(s): See Plans, Superstructure, Approach Slab and Retaining Walls Sheets for actual dimensions and joint orientation. Open Railing joints at Deck Expansion Joint locations shall match the dimensions of the Deck Joint. For treatment of railings on skewed bridges see Index No. 490. Deck Joint at Begin Bridge or End Bridge shown, Deck Joint at 8" or Intermediate Bent similar. Provide 5" Intermediate Open Joint(s)

  - (1) Substructure supports where superstructure slab is continuous.
  - (2) Midspan where span length exceeds 90 ft.
  - (3) Midspan where span length exceeds 180 ft.

- Approach Slab
- (Typical except as noted below)

- Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)

- Approach Slab (Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab Similar)

- Approach Slab
- (Typical except as noted below)

- Approach Slab
- (Typical except as noted below)
SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
(SECTION THRU BRIDGE DECK SHOWN - SECTION THRU APPROACH SLAB SIMILAR)

INSTRUCTIONS TO DESIGNER:

For Bridge Decks up to a maximum thickness of 9", the three Bars 5S placed on the deck may substitute for the longitudinal deck steel located within the limits of Bars 5W provided that the total area of longitudinal deck steel beneath the railing, as required by calculation, is not reduced. Show these bars on the Structures Plans, Superstructure Sheets and Roadway Plans.

All Bars 5R, 5S, and 5W as shown are included in the Estimated Traffic Railing Quantities. Do not include Bars 5R, 5S and 5W in the reinforcing bar lists and estimated quantities for supporting bridge decks or approach slabs.

NOTE:
Begin placing Railing Bars 5R and 5W on Approach Slab at the beginning of the section and proceed toward Begin or End Bridge to ensure placement of guardrail bolts. If required, adjustments to the bar spacing for Bars 5R and 5W should be made immediately adjacent to Begin or End Bridge Spans and rotate Bars 5R and 5W as required to maintain cover in Railing End Transition.

Start Railing End Transition and Guardrail if Index (See Structures Plans, Plan and Elevation Sheet and Roadway Plans. If Railing End Transition is omitted, extend Typical Section to the end of Approach Slab and space Bars 5R and 5W at 1'-0" (Typ.)

DETAIL "A"

PLAN - Railing End Transition
(Showing Bars 5W and 5S)

PLAN - Railing End Transition
(Showing Bars 5R and 5S)
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

ROADWAY CROSS-SLOPE

- On Slope
- At Crown

<table>
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<tr>
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<th>LENGTH</th>
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<tr>
<td>R</td>
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<td>0'-0&quot;</td>
</tr>
<tr>
<td>S</td>
<td>5</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>W</td>
<td>5</td>
<td>5'-0&quot;</td>
</tr>
</tbody>
</table>

$4$ and $8$ shall be 90° if Contractor elects to place railing perpendicular to the deck, and approach slabs.

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are cut to cut.
2. All reinforcing steel at the open joints shall have a 2" minimum cover.
3. Bars 55 may be continuous or spliced at the construction joints. Bar splices for Bars 55 shall be a minimum of 2'-0".
4. At the Contractor's option, Bars 5W may be fabricated as a two piece bar with a 1'-2" lap splice of the bottom legs.

DETAIL "B" - SECTION AT INTERMEDIATE OPEN JINT

NOTE: At Intermediate Open Joints, plug the lower 3" portion of the open joint by filling it with mortar in accordance with Section 400 of the Specifications.

ESTIMATED TRAFFIC RAILING QUANTITIES

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<tr>
<th>ITEM</th>
<th>UNIT</th>
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<tr>
<td>Reinforcing Steel</td>
<td>LB/LF</td>
<td>23.29</td>
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(The above quantities are based on a crowned roadway, with a 2% cross slope.)
REFLECTIVE RAILING MARKERS

Reflective Railing Markers shall conform to Section 993 of the Specifications.

CONCRETE

This railing has been structurally evaluated to be equivalent or greater in strength to other safety shape railings which have been crash tested to NCHRP Report 350 TL-4 Criteria.

REFLECTIVE RAILING MARKER SPACING

| Distance to | Width of Bridge
<table>
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<th></th>
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<tbody>
<tr>
<td>Edge of Traffic Lane</td>
<td>Spacing (ft.)</td>
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<tr>
<td>4'-8&quot;</td>
<td>80'</td>
</tr>
<tr>
<td>&gt; than 8'</td>
<td>None Required</td>
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TRAFFIC RAILING NOTES

This railing has been structurally evaluated to be equivalent or greater in strength to other safety shape railings which have been crash tested to NCHRP Report 350 TL-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans, General Notes.

MARKERS: Elevation Markers shall be placed on top of the Traffic Railing at the end bents. On bridges longer than 100 ft. one marker shall be placed at each end of the bridge. On bridges 100 ft. or less one marker shall be placed at one end of the bridge only. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor. The cost of installing the markers shall be included in the Contract Unit Price for the Traffic Railing.

RAISING ON RETAINING WALLS: If the Traffic Railing is to be provided on a retaining wall, the railing section within the same span as shown on Index No. 422, Sheet 2. All other details such as the guardrail transition attachment, the maximum spacing of the 3/4" open joint and 1/2" V-Groove shall apply.

NAME, DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing so as to be seen on the driver's right side when approaching the bridge. The Date shall be placed on the driver's left side. In the event that the Date shall be the same as shown on Index No. 422, Sheet 2. At ends of approach slabs when adjacent to Retaining Walls, Black plastic letters and figure 3/4" in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by 1/2" V-Grooves. V-Grooves shall be formed by perforated letters and figures.

TRAFFIC RAILING - (42° VERTICAL SHAPE)
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

<table>
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<td>5</td>
<td>As Req'd.</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>10'-8&quot;</td>
</tr>
<tr>
<td>X</td>
<td>5</td>
<td>6'-9&quot;</td>
</tr>
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</table>

Length as Required

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are out to out.
2. The 4'-6" vertical dimension shown for Bars 5T and 5X is based on a bridge deck with a 6" thick x 6" wide raised sidewalk at low side of deck, 22° deck cross slope and a counter 22° raised sidewalk cross slope. If the raised sidewalk thickness, width or cross slope vary from the above amounts, adjust this dimension accordingly to achieve a 6" minimum embedment into the bridge deck. See Structures Plans, Superstructure and Approach Slab Sheets.
3. The reinforcement for the railing on a retaining wall shall be the same as detailed above with a "90°.
4. All reinforcing steel at the open joints shall have a 3" minimum cover.
5. Bars 5S may be continuous or spliced at the construction joints. Bar splices for bars 5S shall be a minimum of 2'-2".
6. The Contractor may utilize Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A497.

DETAIL "A" - SECTION AT INTERMEDIATE OPEN JOINT
NOTE: An Intermediate Open Joint, the lower 3" portion of the open joint shall be plugged with mortar in accordance with Section 400 of the Specifications.

SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

ESTIMATED TRAFFIC RAILING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
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<td>30.68</td>
</tr>
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</table>

(The above quantities are based on a 6" thick x 6" wide raised sidewalk at low side of deck, 22° deck cross slope and counter 22° sidewalk cross slope)
NOTES

- Omit Roiling End Taper and Guardrail Bolt holes. If required, adjustments to the bar spacing for Bars 5T and 5X on Approach End Slab at the roiling and proceed toward Begin or End Bridge to ensure placement of guardrail post holes. If required adjustments to the bar spacing for Bars 5T and 5X shall be made immediately adjacent to Begin or End Bridge. Shift and rotate Bars 5T and 5X on Approach Slab in end taper section as required to maintain cover.

SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
SECTION THRU BRIDGE DECK SHOWN

NOTES

- Bars 55 (Typ.)

- Bars 5T & 5X

- Alternating at 6'

- 2 X 3" (Steel in Deck (Rotate to maintain cover))

RAILING END DETAIL
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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<tr>
<td>T</td>
<td>5</td>
<td>9-0&quot;</td>
</tr>
<tr>
<td>X</td>
<td>5</td>
<td>5-40&quot;</td>
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</table>

ROADWAY CROSS-SLOPE

<table>
<thead>
<tr>
<th>04</th>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
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<tbody>
<tr>
<td>0' to 2'x</td>
<td>90°</td>
<td>90°</td>
</tr>
<tr>
<td>2' to 6'x</td>
<td>87°</td>
<td>83°</td>
</tr>
<tr>
<td>6' to 10'x</td>
<td>84°</td>
<td>96°</td>
</tr>
</tbody>
</table>

STIRRUP BAR 5T

STIRRUP BAR 5X

REINFORCING STEEL NOTES:

1. All bar dimensions in the bending diagrams are out to out.
2. The 3'-87/4" vertical dimensions shown for Bars 5T and 5X are based on a bridge deck with a 6" thick x 6' wide raised sidewalk at low side of deck, 2% deck cross slope and a counter 2% raised sidewalk cross slope. If the raised sidewalk thickness, width or cross slopes vary from the above amounts, adjust these vertical dimensions accordingly to achieve a 6" minimum embedment into the bridge deck.
3. The reinforcement for the railing on a Retaining Wall shall be the same as detailed with 04 = 90°.
4. All reinforcing steel at the open joints shall have a 2" minimum cover.
5. Bars 5S may be continuous or spliced at the construction joints. Bar splices for Bars 5S shall be a minimum of 2'-2".
6. The Contractor may utilize Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A497.

DETAIL "A" - SECTION AT INTERMEDIATE OPEN JOINT

NOTE:

At Intermediate Open Joints, the lower 3" portion of the open joint shall be plugged by filling it with mortar in accordance with Section 400 of the Specifications.

SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

<p>| ESTIMATED TRAFFIC RAILING QUANTITIES |</p>
<table>
<thead>
<tr>
<th>ITEM</th>
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(The above quantities are based on a 6" thick x 6' wide raised sidewalk at low side of deck, 2% deck cross slope and counter 2% sidewalk cross slope.)
PLAN OF RAILING ON BRIDGE DECK (WITHOUT SIDEWALK SHOWN, WITH SIDEWALK SIMILAR) (APPROACH SLAB WITHOUT GUARDRAIL, WITH OR WITHOUT SIDEWALK SIMILAR)

TRAFFIC RAILING NOTES

This railing has been structurally evaluated to be equivalent or greater in strength to other railings which have been crash tested to NCHRP Report 350 TL-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes.

AGGREGATE LIMITATION: The aggregate used in the concrete mix shall be a #67 aggregate.

MARKERS: Elevation markers shall be placed on top of the Traffic Railing at the end bents. On bridges longer than 100 ft., one marker shall be placed at one end of the bridge only. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor. The cost of installing the markers shall be included in the Contract Unit Price for the Traffic Railing.

GUARDRAIL: For Guardrail connection details see Index No. 400.

SUPERELEVATED BRIDGES: If the option of the Contractor to install Traffic Railing on super-elevated bridges may be constructed perpendicular to the roadway surface. The cost of any modifications will be at the Contractor's expense.

ELEVATION OF SIDE FACE OF RAILING (BRIDGE DECK SHOWN, APPROACH SLAB WITHOUT GUARDRAIL, OR ADJACENT TO ROADWAY BARRIER SIMILAR)

TRAFFIC RAILING - (CORRUGATED SHAPE)
Plan of Railing with Guardrail on Approach Slab Without Sidewalk (Approach Slab with Adjacent Sidewalk Similar)

Reinforcing Steel Not Shown for Clarity

**Begin placing Railing Bars 7P1 or 7P2 and 4V on Approach Slab at the barrier end and proceed toward Begin or End Bridge to ensure placement of guardrailbolt holes.** If required, adjustments to the bar spacing for Bars 7P1 or 7P2 and 4V shall be made immediately adjacent to Begin or End Bridge.

**NOTE:**
- Bars 7P1 or 7P2 (HF) Bars 4V (FF) (Typ.)
- Bars 7P1 or 7P2 (HF) Bars 4V (FF) (Typ.)

For details and reinforcement of Typical End Section, Typical Interior Section and Posts with or without curbs see "Elevation of Inside Face of Railing" Sheet 1.

**Elevation of Inside Face of Railing with Guardrail on Approach Slabs 40'-0" or Less Along Gutter (Without Curb Shown, with Curb Similar)**

Approach Slabs greater than 40'-0" (Measured Along Gutter Line)

**SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES**

**NOTES:**
- NF means Near Face.
- FF means Far Face.
- Cross References: For Sections see Sheets 3 and 4. For Quantities and Quantity Breakdown see Sheet 5.
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB
(END POST SHOWN; INTERIOR POST SIMILAR)
(Bars R, S and T not shown for clarity)

NOTES:
1) Shift deck and approach slab transverse reinforcement minimal to allow placement of Bars 7PJ & 4V.
2) For decks to 85"-0" place Bars 7PJ & 4V with the bottom mat of reinforcement as shown in Section A-A. For decks and slabs thicker than 85"-0" place Bars 7PJ and 4V with 6" embedment. At skewed joints, place Bars 7PJ and 4V with 5" embedment.

CROSS REFERENCES:
For Locations of Sections see Sheets 1 and 2.
For Quantities and Rebar Details see Sheet 5.
Asphalt Overlay

Future Overlay (see Note 3) (see Note 3) (see Section 4-A)

SECTION A-A (WITH CURB SHOWN, WITHOUT CURB SIMILAR)

TYPICAL SECTIONS THRU RAILING ON BRIDGE DECK WITH SIDEWALK (SHOWN)
(RAILING ON APPROACH SLAB SIMILAR)

SECTION B-B

TYPICAL SECTIONS THRU RAILING ON BRIDGE DECK WITH SIDEWALK (SHOWN)
(RAILING ON APPROACH SLAB SIMILAR)

SECTION C-C

END VIEW D-D

TYPICAL SECTIONS THRU RAILING END SECTION ON APPROACH SLAB WITH SIDEWALK AND GUARDRAIL
(APPROACH SLAB (FLEXIBLE PAVEMENT APPROACHES) SHOWN, APPROACH SLAB (RIGID PAVEMENT APPROACHES) SIMILAR)

RAILING ADJACENT TO SIDEWALK NOTES:
1) End Post detailed above. Interior Post and Approach Slab End Section similar.
2) For decks to 80" wide place Bars T91 and T92 and 4V with the bottom mat of reinforcement as shown in Section 4-A. For decks and slabs thicker than 80" place Bars T91 and T92 and 4V with 6" embedment.
3) Alternate Bars T91 and T92 at each post. At each post 5" embedment, at Intermediate Post 6" required, at Intermediate Post 6" required.
4) Reverse direction of every other Bar 4V to match direction of Bars T91 and T92.
5) Shift deck and approach slab transverse reinforcement minimum to allow placement of Bars T91 & 4V.

CROSS REFERENCES:
For Locations of Sections see Sheets 1 and 2. For Quantities and Rbar Details see Sheet 5.
1. The reinforcement for the railing on a CORRAL Bar shall be as detailed above for a 6' deck with $\theta = 90^\circ$, unless otherwise noted. If bottom horizontal legs of Bars 7P2, 7P3 and 4V1 prohibit placement, Bars 7P4 and 4V2 may be substituted for Bars 7P1, 7P3 and 4V1 as shown.

2. Reinforcing steel at the open joints shall have a 2" minimum cover unless otherwise noted.

3. At construction joints Bars 6RJ, 5R2, and 4R3 may be continuous or spliced. Where bars are spliced provide a 2'-6" min. lap length for Bars 6RJ, a 2'-0" min. lap length for Bars 5R2 and a 1'-0" min. lap length for Bars 4R3.

4. The skew angle for Bars 7P3 may vary from joint to joint and side to side, see Structures Plans, Superstructure Sheets for details.

5. The skew angle for Bars 7P3 may vary from joint to joint and side to side, see Structures Plans, Superstructure Sheets for details.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONCRETE QUANTITY (CY)</th>
<th>REBAR QUANTITY (LB)</th>
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<tbody>
<tr>
<td>Typical 10'-0&quot; Section w/Curb</td>
<td>1.11</td>
<td>428</td>
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<tr>
<td>Typical 10'-0&quot; Section w/o Curb</td>
<td>1.03</td>
<td>428</td>
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<tr>
<td>Approach Slab with Guardrail/End Section</td>
<td>0.14</td>
<td>44 (per LF)</td>
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</table>

Bar 7P4 ***
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB
- 0 DEGREE SKEW ANGLE

1. Alternate Bars 7PJ with Bars 4VJ and reverse direction of every other Bar 4VJ as detailed above to facilitate placement of concrete.
2. Shift deck transverse reinforcement minimally to allow placement of Bars 7PJ and 4VJ.

PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK
- 0 DEGREE SKEW ANGLE

1. Alternate Bars 7PJ with Bars 4VJ and reverse direction of every other Bar 4VJ as detailed above to facilitate placement of concrete.
2. Shift deck transverse reinforcement minimally to allow placement of Bars 7PJ and 4VJ.

NOTES:
1. RailS expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
2. Bars 4VJ (not shown) shall be placed perpendicular or radial to the gutter.
3. Bridge Deck and Approach Slab without Guardrail, Attached (shown). End Post & Approach Slab End Section - Place Bars 7PJ & 4VJ in acute corners of intersection of deck joint and gutter line. Place Bars 7PJ & 4VJ in acute corners of intersection of deck joint and gutter line as required. Interior Post - use bars 7PJ and 4VJ placed with bottom half of reinforcement. Shift deck or slab reinforcement minimally to allow proper placement of Bars 7PJ and 4VJ and to facilitate placement of concrete.
4. Rotate vertical Bars 7PJ & 4VJ to match bridge deck reinforcement. Shift deck or slab reinforcement to allow proper placement of Bars 7PJ & 4VJ and to facilitate placement of concrete.
5. Bars 7PJ & 4VJ in the Approach Slab may be rotated to match Approach Slab reinforcement or placed perpendicular or radial to the gutter.

GENERAL NOTES:
1. Deck Expansion Joint at begin or end bridge shown. Deck Expansion Joints at 5' Plan or Intermediate Rents are similar.
2. Partial Plan Views shown are intended as guides only. See Structures Plans, Superstructure and Approach Slab Sheets for skew angles, joint orientation, dimensions and details.
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK — SKEW ANGLE GREATER THAN 15 DEGREES

NOTES:
1. Installing railings at deck expansion joints shall follow the deck joint for allowance of joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radial to this line. See Structures Plans, Superstructure, and Access Slab Sheets for details.
2. Bars 4SJ (not shown) shall be placed perpendicular or radial to the gutter.
3. Edge of Approach Slab adjacent to the roadway shall follow end of railing. Bars TP at end of the railing shall be field cut and shifted to maintain clearance. See details above. Also, see sheet for similar details.
4. Intermediate Post shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement of Bors TP & 4VJ.
5. Intermediate Post and reinforcement detailed above. Railing Interior Post reinforcement similar.

PARTIAL PLAN VIEW AT BEGIN OR END APPROACH SLAB WITH SIDEWALK AND RAILING WITH GUARDRAIL ATTACHED — SKEW ANGLE GREATER THAN 15 DEGREES SHOWN, 15 DEGREES OR LESS SIMILAR

NOTES:
1. Installing railings at deck expansion joints shall follow the deck joint for allowance of joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radial to this line. See Structures Plans, Superstructure, and Access Slab Sheets for details.
2. Bars 4SJ (not shown) shall be placed perpendicular or radial to the gutter.
3. Deck transverse reinforcement may be shifted minimally to allow proper placement of Bors TP & 4VJ. Please see details above. Approach Slab reinforcement may be shifted if conflicts occur.
4. Intermediate Post shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement of Bors TP & 4VJ.
5. Interim Post shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement of Bors TP & 4VJ.
6. Use Bars 7PJ with reverse direction of Bars 4VJ where skew restricts use of Bars 7PJ & 4VJ.
7. Use Bars 7PJ with reverse direction of Bars 4VJ where skew restricts use of Bars 7PJ & 4VJ.
8. Interim Post shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement of Bors TP & 4VJ. It required, adjustments to the bar spacing for Bors TP & 4VJ shall be made immediately adjacent to Begin or End Bridge.
This railing has been structurally evaluated to be equivalent or greater in strength to other safety shape railings which have been crash tested to NCHRP Report 350 TL-5 criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans, General Notes.

MARKERS: Elevation Markers shall be placed on top of the Traffic Railing at the end of the bridge. On bridges longer than 100 ft, one marker shall be placed at each end of the bridge. On bridges 100 ft or less, one marker shall be placed at one end of the bridge only. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor. The cost of installing the markers shall be included in the Contract Unit Price for the Traffic Railing so as to be seen on the driver’s right side when approaching the bridge. The Date shall be placed on the driver’s left side when approaching the bridge. The Date shall be the year the bridge is completed. For a widening when the existing railing is removed, use both the existing date and the year of the widening. Black plastic letters and figures formed by V-Grooves shall be formed by preferred letters and figures.

GUIDE RAILS: For Guardrail connection details, see Index No. 409.

RAILINGS ON RETAINING WALLS: If the Traffic Railing is to be provided on a retaining wall, the railing section within the same on Sheet 3. All other details such as the guardrail transition attachment, the maximum spacing of the 3/4″ open joints and 5/8″ V-groove shall apply.

TRAFFIC RAILING NOTES


NAME, DATE, AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing so as to be seen on the driver’s right side when approaching the bridge. The Date shall be placed on the driver’s left side when approaching the bridge. The Date shall be the year the bridge is completed. For a widening when the existing railing is removed, use both the existing date and the year of the widening. Black plastic letters and figures formed by V-Grooves shall be formed by preferred letters and figures.


For treatment of Railings on skewed bridges see Index No. 490. Deck Joint at Begin or End Bridge Shown. Deck Joint on 1 Plan or Intermediate Plan Similar.

Provide 3/4″ Intermediate Open Joints shall be provided as:

1. Substructure supports where superstructure slab is continuous.
2. Midspan where span length exceeds 90 ft.
3. Interim locations equally spaced between midspan and substructure supports where span length exceeds 180 ft.
4. At ends of approach slabs when adjacent to retaining walls and at expansion joints on retaining wall juncture sides.
PLAN – Railing End Transition
(Showing Bars 5V, 8S1, 5S2 and 8T2)

Note:
Bars 8T2 and 8S1 (Bottom) as required
Bars 5P @ 8” sp. (max.)
Bars 5V @ 8” sp. (max.)
Bars 5V @ 6’-0” (Top Transition)

DETAIL “A”

* Where railings of adjacent bridges are to be built back to back, the outside vertical face of the railing and deck may coincide along a plane centered 1-1/2” from each gutter line. A bond breaker will be required. See Structures Plans, Superstructure Sheets for details.

ELEVATION – RAILING END TRANSITION
(Guardrail end back leg of Stirrups not shown for clarity)

VIEW C-C

TYPICAL SECTION THRU TRAFFIC RAILING
(SECTION THRU BRIDGE DECK SHOWN – SECTION THRU APPROACH SLAB SIMILAR)

SECTION A-A

VIEW B-B

(SECTION THRU APPROACH SLAB SHOWN – SECTION THRU RETAINING WALLS SIMILAR)
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

**BILL OF REINFORCING STEEL**

<table>
<thead>
<tr>
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<th>SIZE</th>
<th>LENGTH</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>5</td>
<td>7'-5&quot;</td>
</tr>
<tr>
<td>S1</td>
<td>8</td>
<td>46 Reqs.</td>
</tr>
<tr>
<td>S2</td>
<td>5</td>
<td>46 Reqs.</td>
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<tr>
<td>T1 &amp; T2</td>
<td>8</td>
<td>13'-0&quot;</td>
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<tr>
<td>V</td>
<td>5</td>
<td>6'-2&quot;</td>
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**ROADWAY CROSS-SLOPE**

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<thead>
<tr>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
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<tbody>
<tr>
<td>0° to 2°</td>
<td>90° 90° 90° 90°</td>
</tr>
<tr>
<td>2° to 6°</td>
<td>93° 87° 87° 93°</td>
</tr>
<tr>
<td>6° to 10°</td>
<td>96° 84° 84° 96°</td>
</tr>
</tbody>
</table>

- S4 and S8 shall be 90°. If Contractor elects to place railing perpendicular to the deck.
- Length as Required

**BARS BS1 & SS2**

**TRANSITION BARS BT1 & BT2**

(2 of each required per Railing End Transition)

- Very Field Cut from 7" to 1'-0" to maintain a 3'-0" min. lap.

**STIRRUP BAR 5P**

To Be Field Cut (10 of each required per Railing End Transition)

**STIRRUP BAR 5V**

To Be Field Cut (One required per Railing End Transition)

**END STIRRUP BAR 5V**

- Portion of Bar 5V to be used
- Field Cut & Discard

**DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT**

*Note:*
- All dimensions in the bending diagrams are out to out.
- The reinforcement for the railing on a retaining wall shall be the same as detailed above for a 10' deck with S2 = 80 = 90°.
- All reinforcing steel at the open joints shall have a 2" minimum lap.
- Bars BS1 may be continuous or spliced at the construction joints. Lap splices for Bars BS1 and SS2 shall be a minimum of 4'-0" and 2'-0", respectively.
- The Contractor may utilize Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A497.

**SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES**

**ESTIMATED TRAFFIC RAILING QUANTITIES**

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<tr>
<td>Reinforcing</td>
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*Note:*
- The estimated railing quantities are based on a 2'/deck cross slope railing on low side of deck.
**LIMIT OF PAYMENT**

For Concrete Barrier Wall

- Permanent Concrete Foundatron
- Threaded Joists

**BEGINNING OF LENGTH OF NEED**

- Departure Line (Typ.)
  - LSF for Speeds 55
  - LSF for Speeds 45

**DESIGN NOTES - CONCRETE BARRIER WALL APPLICATION**

1. Design length is the length from the beginning of length of need to the end of the crash cushion.
2. Determine length of need for barrier as detailed on Index 400.
3. Establish the end of barrier based on design length of shortest Crash Cushion option for given design speed.
4. Determine adequate space is available for construction of all options for given design speed. If adequate space is not available, options must be limited to those that will fit. Tabulate selected options in the plans by location and design speed.

**GENERAL NOTES FOR OPTIONAL CRASH CUSHIONS**

1. Crash Cushions for which the optional item may be used are limited to the systems identified on this Index. The Contractor may only use the options identified in the plans.
2. This Index is applicable for permanent installations that shield the ends of Concrete Barrier Walls or Guardrails only.
3. For Crash Cushion details, see drawings posted on Qualified Products List (QPL) web page.
4. For other Crash Cushion applications, see the approved QPL drawings.
5. Crash Cushions shall be assembled and installed in accordance with the manufacturer's specifications and any limiting conditions noted on the approved QPL drawings.
6. Transition Panels may be required from Concrete Barrier to Crash Cushions subject to reverse direction hits; see the Crash Cushion drawings posted on the QPL for details. Transitions are required between the Crash Cushion and guardrail and vary in length depending on the Crash Cushion used; see the Crash Cushion drawings for details.
7. Optional Crash Cushions will be paid for under the contract unit price for Vehicular Impact Attenuator/Crash Cushion (optional I EA), and shall be full compensation for furnishing and installing all components in accordance with the plans, the manufacturer's detail drawings, procedures and specifications, the drawings posted on the QPL, and this Index.

**CONCRETE BARRIER WALL APPLICATION**

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<td>26.98</td>
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**NOTE:**
Total length of Crash Cushion for the TAU I units is based on use of the Compact Backstop. When the PCB Backstop is used, these lengths are reduced by 1.61 ft.
DESIGN NOTES - GUARDRAIL APPLICATION

1. Design length is the length from the beginning of length of need to the end of the transition section.

2. Determine length of need for barrier as detailed on Index 400.

3. Establish the end of the guardrail based on the design length of the shortest Crash Cushion option for given design speed.

4. Determine that adequate space is available for construction of all options for given design speed. If adequate space is not available, options must be limited to those that will fit. Tabulate selected options in the plans by location and design speed.
The opaque visual barrier is intended to function as a visual screen, and is not intended to resist vehicle impact loads or to restrain, contain, or resist vehicles or cargo. The barrier is designed to withstand core wind loading and strikes by light debris and, designed to resist to occasional strikes by vehicles or cargo, and to contain captured segments of the screen when yielding to such strikes.

2. When the opaque visual barrier is constructed on an existing barrier wall, dowels shall be 1'-6" in length, embedded 2" into the barrier wall and set with an approved chemical grout. Embedment holes shall be 2" diameter, drilled to a depth 2" below the top of the dowel unless greater depth is required to accept manufactured grout caps.

When the opaque visual barrier is constructed in conjunction with precast concrete barrier walls, dowels may be set as described above, in either the drilled or preformed holes, or placed when the barrier wall is cast. For dowels that are placed when the wall is cast, the dowels shall be 2'-2" in length and embedded to a depth of 2".

When longitudinal reinforcing bars are encountered in the stem of existing barrier, shift the dowels to clear, estimating the 3/8" Cover Minimum to the face of the Opaque Visual Barrier.

3. For both double and single faced concrete barrier walls the opaque visual barrier is to be located in the center of the top of the wall.

4. In lieu of the reinforcement shown, the Contractor may substitute welded wire fabric equal to or better than that shown, when approved by the Engineer. Details shall be submitted with requests for substitution.

5. The Contractor may construct contiguous precast concrete panels in lieu of the cast-in-place opaque visual barrier when approved by the Engineer. Details shall be submitted with requests for substitution.

6. The Opaque Visual Barrier is constructed atop the approach side barrier wall, unless differential profiles, or otherwise, lateral transitions or end overlaps for adjoining opaque visual barriers or traffic control devices are called for in the plans.

7. Payment for opaque visual barriers shall be made upon completion of the Opaque Visual Barrier, in accordance with Section 1010 of the Standard Specification, unless another finish is called for in the plans. The surfaces shall have a Class 1 Applied Finish Coating in accordance with Section 450 only when called for in the plans.

8. Payment for opaque visual barriers shall be full compensation for concrete, reinforcement, dowels, finishing, placement, installing, cleaning, testing, and all incidental thereto, and shall be paid for under the contract unit price for Opaque Visual Barrier (Concrete 1-2'-3" Height).
TRAFFIC RAILING NOTES

This Traffic Railing Retrofit has been structurally evaluated to be equivalent or greater in strength to a design which has been successfully crash tested in accordance with NCHRP Report 350, TL-4 criteria.

CONCRETE: Concrete for Transition Blocks and Curbs shall be Class II (Bridge Deck).

REINFORCING STEEL: Reinforcing steel shall be ASTM A416, Grade 60.

THRIE-BEAM GUARDRAIL: Steel Thrie Beam Elements shall meet the requirements for Class B (1/4 Gauge) Guardrail of AASHTO M-180, Type II (125° coated). The minimum panel length for Thrie-Beam Elements shall be 15'-0". Field drilled holes for Post connections shall be 3/4" by 2"/16" slotted holes.

GUARDRAIL: Bolts, nuts and washers shall be in accordance with AASHTO M630.

THREE-Beam GUARDRAIL: Steel Thrie Beam Elements shall meet the requirements for Class B (1/4 Gauge) Guardrail of AASHTO M-180, Type II (125° coated). The minimum panel length for Thrie-Beam Elements shall be 15'-0". Field drilled holes for Post connections shall be 3/4" by 2"/16" slotted holes.

GUARDRAIL: Bolts, nuts and washers shall be in accordance with AASHTO M630.

POSTS AND BASE PLATES: Posts and Base Plates shall be in accordance with ASTM A456 or ASTM A795, Grade 36.

ANCHOR BOLTS, NUTS AND WASHERS: Adhesive-Bonded Anchors and Anchor Bolts shall be fully threaded rods in accordance with ASTM F1554, Grade 105 or ASTM A490, Grade 50. At the Contractor’s option, Anchor Bolts for through bolting may be in accordance with ASTM A490. All nuts shall be single self-locking hex nuts and in accordance with ASTM A456 or ASTM A494. Plate Washers shall be in accordance with ASTM F436 and Plate Washers (for long slotted holes only) shall be in accordance with ASTM A494 or ASTM A795, Grade 36. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and the exposed trimmed ends of anchors shall be coated with a galvanizing compound in accordance with the Specifications.

PLATE: Pedestrian Safety Pipes, Transition Blocks and Curbs, Bridge Name Plates shall include the information required.

COATINGS: All Nuts, Bolts, Anchors, Washers, Guardian Posts, Anchor Plates and Base Plates shall be hot-dip galvanized in accordance with the Specifications. Guardian Post Assemblies shall be hot-dip galvanized after fabrication.

ADHESIVE-BONDED ANCHORS AND WASHERS: Adhesive Bonding Material Systems for Anchors and Dowels shall comply with Specification Section 837 and be installed in accordance with Specification Section 416.

BRIDGES ON CURVED ALIGNMENTS: The details presented in these Standards are shown for bridges on tangent alignments. Details for bridges on horizontally curved alignments are similar.

POST SPACING: Posts shall be located along the length of the bridge at typical 6'-0" or 2'-0" intervals. Use the Modified Post Spacing at Intermediate Deck Joints Details as required to clear deck joints. Establish post spacing along the bridge as outlined in the Specifications. The variable post spacing located near the beginning and end of the bridge may be utilized to optimize the typical post spacing. Variable lengths of guardrail overlap are also permitted to optimize the typical post spacing. Symmetry of post spacing is not necessary.

ELEVATION MARKERS: Elevation Markers shall be placed on the top surface of the end bents as directed by the Engineer when portions of the existing traffic railing carrying existing elevation markers are removed. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall conform to Section 993 of the Specifications. Install markers in the upper groove of the Thrie-Beam Guardrail at the spooling shown in the tables below. Reflective color (white or yellow) shall conform to the color of the near edge line.

PEDESTRIAN SAFETY PIPE RAIL: Pedestrian Safety Pipe Rails required when called for in the Plans. See Index No. 450 for details.

BRIDGE NAME PLATE: If a portion of the existing Traffic Railings is to be removed that carries the bridge name, number and or date, or if the installation of the Traffic Railing (Thrie-Beam Retrofit) will obscure the bridge name number and or date, then a Bridge Name Plate shall be furnished and installed on an adjacent, separate guardrail post as directed by the Engineer. The Bridge Name Plate shall include the information on the existing Traffic Railing that has been removed or obscured, e.g., Bridge Number, Bridge Name or Date. The Bridge Name Plate shall be approximately 1/4" thick aluminum plate in accordance with Specification Section 700. The Bridge Name Plate shall be white background, with 3" tall black letters, 1/2" black border and sized appropriately to contain the information required.

PAYMENT: Payment will be made under Metal Traffic Railing (Thrie-Beam Retrofit) which shall include all materials and labor required to fabricate and install the barrier and lapped guardrail where necessary to maintain post spacing. The Pedestrian Safety Pipe Rail, Transition Blocks and Curbs, Bridge Name Plate, Reflective Railing Markers and the installation of Elevation Markers, where required, will not be paid for directly but shall be considered as incidental work.

REFLECTIVE RAILING MARKER SPACING

Distance =

\begin{tabular}{|c|c|}
\hline
Edge of Travel Lane & Spacing (Ft.) \\
\hline
< 4' & 40' \\
4' to 8' & 80' \\
> than 8' & None Required \\
\hline
\end{tabular}
PARTIAL ELEVATION OF INSIDE FACE OF RAILING
MODIFIED POST SPACING AT INTERMEDIATE DECK JOINTS DETAIL FOR INDEX NOS. 471, 475 & 476

POST SPACING measured to Edge of Post

------------

THREE-BEAM EXPANSION SECTION

PARTIAL PLAN
INTERMEDIATE JOINT SKEW DETAIL
NOTES:
1. On approach end provide Index No. 402 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be removed off 1" below existing concrete and grouted over.

CROSS REFERENCES:
For Section A-A see Sheet 2.
For Traffic Railing Notes and Details see Index No. 470.
NOTES
1. The 1'-2" Vertical dimension shown for bar 4D is based on a curb height of 9". If curb height is less or more than 9", decrease or increase this dimension by an amount equal to the difference in curb height.
2. The 1'-2" vertical dimension shown for bar 4D is based on a curb height of 9". If curb height is less or more than 9", decrease or increase this dimension by an amount equal to the difference in curb height.

TYPICAL SECTION A-A
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

TYPICAL SECTION B-B
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB

BILL OF REINFORCING STEEL

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</tr>
<tr>
<td>D</td>
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</tr>
<tr>
<td>L</td>
<td>4</td>
<td>1'-2&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. All bar dimensions are out to out.
2. The 1'-2" vertical dimension shown for bar 4D is based on a curb height of 9". If curb height is less or more than 9", decrease or increase this dimension by an amount equal to the difference in curb height.

BAR BENDING DIAGRAMS

Dowel Bar 4D

(Standard 180° Hook)

Dowel Bar 4L

TYPICAL SECTION THRU EXISTING TRAFFIC RAILING SHOWING LIMITS OF REMOVAL
(BRIDGE DECK SHOWN, WING WALL SIMILAR)

CROSS REFERENCES:
For location of Section A-A see Sheets 1, 3 & 4.
For location of Section B-B see Sheets 3 & 4.
For Application of Dim. A see Post Dimension Table on Index 470, Sheet 3.
SCHEME 1 NOTES:
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

SCHEME 2 NOTES:
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
1. Provide Cast-In-Place Curb as shown. Shape and height of Transition Block and Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field cut and bend Bars 4A and rotate Dowel/Bars 4B within Curb and Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. A single 3/4" x 8" Adhesive-Bonded Anchor may be omitted as shown when 2" clear cover cannot be provided.

Depth of shaded portion extending off Approach Slab shall not exceed 1'-0" Min.
NOTES:

1. On approach end provide Index No. 402 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.

2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.

3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burnished off 1" below existing concrete and grouted over.

PARTIAL PLAN OF RAILING

6'-3" spacing (Typ. except as noted along Bridge, see Note 2)

1'-6" Min. for non skewed joints. For treatment of skewed Intermediate Deck Joints see Skew Detail Index No. 470, Sheet 2 (Typ.).

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Existing Traffic Railing not shown for clarity)

TYPICAL TREATMENT OF RAILING ALONG BRIDGE

CROSS REFERENCES:
For Section A-A see Sheet 2.
For Traffic Railing Notes and Details see Index No. 470.
**NOTE**

**MARK SIZE LENGTH**

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**TYPICAL SECTION THRU RAILING ON BRIDGE DECK**

**BILL OF REINFORCING STEEL**

**BAR BENDING DIAGRAMS**

**VIEW C-C**

**SECTION B-B**

**TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB (SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)**

**SECTION A-A**

**TYPICAL SECTION THRU RAILING ON BRIDGE DECK**

**DETAIL "A"**

**CROSS REFERENCES:**

For location of Section A-A see Sheets 1, 3 and 4.
For location of Section B-B see Sheet 4.
For location of View C-C see Sheet 3.
For application of Dim. 4 see Post Dimension Table on Index 470, Sheet 3.

**TRAFFIC RAILING - (THREE-BEAM RETROFIT)**

**WIDE STRONG CURB TYPE 1**

**2008 FDOT Design Standards**

**Sheet No.** 2 of 4

**Index No.** 472
Bridge Deck

Existing Bridge

Transition Block (as shown) or Field bend Dowel Bars 4L within Transition Block as required to maintain SCHEME 1

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WALLS

SCHEME 1 NOTES:

Schematic Notes:

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALKS LESS THAN 6" THICK

SCHEME 2 NOTES:

Schematic Notes:

1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with Fielded Approach Slab Curb.

2. Field bend 4X4 Dowel Bars 40 and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
NOTES:
1. On approach end provide Index No. 402 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

Cross References:
For Section A-A see Sheet 2.
For Traffic Railing Notes and Details see Index No. 470.
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

BILL OF REINFORCING STEEL

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BAR BENDING DIAGRAMS

1'-1/2" / 2'-0" DOWEL BAR 4D

3'-8" / 4'-6" DOWEL BAR 4L

NOTE: All dimensions are cut to cut.

VIEW C-C

DETAIL "A"

CROSS REFERENCES:
- For location of Section 4-A see Sheet 1, 3 and 4.
- For location of Section B-B see Sheet 3.
- For location of View C-C see Sheet 3.
- For Traffic Railing Notes and Details see Index No. 470.
- For application of Dim. 4 see Post Dimension Table on Index 470, Sheet 3.

TRAFFIC RAILING - (THRIE-BEAM RETROFIT)
WIDE STRONG CURB TYPE 2

2004 FDOT Design Standards

Revision: 07/30/07

2 of 4
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2” top and side clearance and 3” bottom clearance.

**SCHEME 1**

**SCHEME 1 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2” top and side clearance and 3” bottom clearance.

**PARTIAL PLAN OF RAILING**

(Rail Post Spacing as measured)

- Post Bolts
- Traffic Railing
- Asphalt Overlay when present
- Transition Block
- Existing Bridge Deck
- Existing Curb

**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

(Established Wing Post and Traffic Railing not shown for clarity)

**SCHEME 2**

**SCHEME 2 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with Flared Approach Slab Curb.

2. Field bend or hit Dowel Bars 40 and Bars 4M within Transition Block as required to maintain 2” top and side clearance and 3” bottom clearance.

**TRAFFIC RAILING - (THRIE-BEAM RETROFIT)**

**WIDE STRONG CURBS TYPE 2**
NOTES:
1. On approach end provide Index No. 402 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

TYPICAL TREATMENT OF RAILING ALONG BRIDGE
SECTION A-A
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

BILL OF REINFORCING STEEL

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BAR BENDING DIAGRAM

NOTE: All bar dimensions are out to out.

TYPICAL SECTION THRU EXISTING TRAFFIC RAILING SHOWING LIMITS OF REMOVAL (BRIDGE DECK SHOWN, WING WALL SIMILAR)

SECTION B-B (SCHEME 2)
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB

OFFSET Block(s) as required

THREE-BEAM GUARDRAIL

2 - 3/8" x 8" Adhesive-Bonded Anchors with Heavy Hex Nuts and Washers set in drilled holes (1/2" Min. Depth)

OFFSET Block(s) as required

THREE-BEAM GUARDRAIL

2 - 3/8" x 8" Adhesive-Bonded Anchors with Heavy Hex Nuts and Washers set in drilled holes (1/2" Min. Depth)

SHIM with washers around Anchor Bolts and Anchors as required to maintain tolerance.

OFFSET may vary ± 1" for Adhesive-Bonded Anchors to clear existing curb reinforcing and provide minimum edge clearance. Offset shall be consistent along length of bridge.

CROSS REFERENCES:
For location of Section A-A see Sheet 1 and 3.
For location of Section B-B see Sheet 3.
For application of Dim. A see Post Dimension Table on Index 470, Sheet 3.
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb. See Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend DowelBars 4L within Transition Block as required to maintain 2” top and side clearance and 3” bottom clearance.
NOTES:
1. On approach and provide Index No. 462 (as shown) or other site specific treatment, see Roadway Plans.
   For treatment of railing and see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

PARTIAL PLAN OF RAILING

3-3½" spacing (Typ. except as noted along Bridge, see Note 2)

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Existing Traffic Railing not shown for clarity)

Typical Treatment of Railing Along Bridge

Cross References:
For Section A-A see Sheet 2.
For Traffic Railing Notes and Details see Index No. 470.
Asphalt Overlay when present (Varies)  

**NOTE**

MARK SIZE LENGTH

D 4 3'-7"  
L 4 4'-1"  
M 4 3'-8"

**DOWEL BAR 4D**

**DOWEL BAR 4L**

**BAR 4M**

NOTE: All bar dimensions are out to out.

**SECTION A-A**

**TYPICAL SECTION THRU RAILING ON BRIDGE DECK**

**BILL OF REINFORCING STEEL**

**BAR BENDING DIAGRAMS**

- 1'-4"  
- 3"  
- 4D  
- 4L  
- 4M

**SECTION A-A**

**TYPICAL SECTION THRU RAILING ON BRIDGE DECK**

- 1'-4"  
- 3"  
- 4D  
- 4L  
- 4M

**SECTION B-B**

**TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB**

(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

**ILLUSTRATION:**

- 2'-0"  
- 3'-8"

**VIEW C-C**

**DETAIL "A"**

**CROSS REFERENCES:**

- For location of Section A-A see Sheet 1.
- For location of Section B-B see Sheet 2.
- For location of View C-C see Sheet 3.
- For application of Dim. A see Index on Sheet 4.
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Scheme 2.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
 existing Existing Curb

Existing Traffic Railing (See Note 2) Intermediate Deck Joint Existing Bridge Capping

Intermediate Deck Joint

Guardrail/Post Assembly (Typ.) Gutter Line

Existing Bridge Deck

Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

PARTIAL PLAN OF RAILING

$ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

3'-6" spacing (Typ. except as noted along Bridge, see Note 2)

2" Min. for non skewed joints, For treatment of skewed Intermediate Deck Joints (See Sie Details Index No. 470, Sheet 2) (Typ.)

Intermediate Deck Joint

Guardrail/Post Assembly (Typ.) $ Post Bolts (See Note 2)

Intermediate Deck Joint

$ Post Bolts

Intermediate Deck Joint

$ Post Bolts

2'/6" Spacing unless otherwise specified (Variation)

Top of Existing Curb

Existing Bridge Deck

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

(Traffic Railing not shown for clarity)

TYPICAL TREATMENT OF RAILING ALONG BRIDGE

NOTES:

1. On approach end provide Index No. 402 (as shown) or other site specific treatment, see Roadway Plans.

For treatment of railing and see Roadway Plans.

2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index No. 470, Sheet 2, as required.

3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

CROSS REFERENCES:

For Section A-A see Sheet 2

For Traffic Railing Notes and Details see Index No. 470.
**SECTION A-A**

**TYPICAL SECTION THRU RAILING ON BRIDGE DECK**

**BILL OF REINFORCING STEEL**

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**BAR BENDING DIAGRAMS**

- **Dowel Bar 4D**
  - 1'-8''
  - 2'-05''

- **Dowel Bar 4L**
  - 3'-8''

**NOTE:** All bar dimensions are out to out.

**SECTION B-B**

**TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB**

**DETAILED "A"**

**CROSS REFERENCES:**

- For location of Section A-A see Sheet 1, 3 and 4.
- For location of Section B-B see Sheet 4.
- For location of Section C-C see Sheet 3.
- For application of Schemes 3, 4 & 5 of Schemes 5 and 6 shown, Schemes 3 and 4 similar.
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS

SCHEME 1

RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALK LESS THAN 6" THICK

SCHEME 2

NOTES:
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curbs.

2. Field bend or Kit Dowel Bars 4L and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
## REFLECTIVE RAILING NOTES

This Traffic Railing Retrofit has been structurally evaluated to be equivalent or greater in strength to a design which has been successfully crash tested previously and approved for a NCMA Report 350 Test Level 4 rating.

**CONCRETE:** Concrete for the Traffic Railing (Vertical Face Retrofit) and replacement curb sections shall be Class IV. Concrete for Transition Blocks shall be Class II (Bridge Deck).

**REINFORCING STEEL:** Reinforcing steel shall be ASTM A416, Grade 60, except Expansion Dowel Bar B which shall be ASTM A36 smooth round bar hot-dip galvanized in accordance with the Specifications.

**EXPANSION SLEEVE ASSEMBLY:** Pipe sleeve shall be ASTM D2241 PVC pipe, SDR115. End Cap shall be ASTM D2466 PVC socket fitting, Schedule 40. End of Sleeve assembly at railing open joint shall be sealed with silicone to prevent concrete intrusion during railing casting. A compressible expanded polystyrene plug is required in the opposite end of the assembly for correct dowel positioning during railing casting. Correct dowel positioning is required in order to provide for thermal movement of the deck.

**ADHESIVE-BONDED ANCHORS AND DOWELS:** Adhesive Bonding Material Systems for Anchors and Dowels shall comply with Specification Section 937 and be installed in accordance with Specification Section 416.

**SURFACE CONCRETE:** Blocks shall be Class II (Bridge Deck). Markers shall be seen on the driver’s right side when approaching the bridge. The Date shall be the year the bridge was constructed. Letters and figures may be placed on the Traffic Railing at the spacings shown in the table below. Reflector color shall be yellow or orange.

**TOP OF EXISTING CURB:** The Curb Increment shall be placed on the Traffic Railing when portions of the existing traffic railing carrying existing elevation markers are removed. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor.

**ELEVATION MARKERS:** Elevator Markers shall be placed on the top surface of the ends of the bridge as directed by the Engineer when portions of the existing traffic railing carrying existing elevation markers are removed. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor.

**FILLER:** Unless otherwise shown in the Plans, place a Class 5 Applied Finish Coating on the top and sides of the Traffic Railing (Vertical Face Retrofit).

**REFLECTIVE RAILING MARKERS:** Reflective Markers shall conform to Section 993 of the Specifications. Lettering Details for bridges on horizontally curved alignments are similar.

**NAME AND BRIDGE NUMBER:** The Name and Number shall be placed on the Traffic Railing to be seen on the driver’s right side when approaching the bridge. The Date shall be the year when the bridge was constructed. Letters and figures may be placed on the Traffic Railing at the spacings shown in the table below. Reflector color shall be yellow or orange.

**PARKING:** Parking shall be made under Traffic Railing (Vertical Face Retrofit) which shall include all materials and labor required to construct the railing. The Transition Blocks and Curb, Reflective Railing Markers and installation of Elevation Markers, where required, will not be paid for directly but shall be considered as incidental work.

## ESTIMATED TRAFFIC RAILING QUANTITIES

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1. All dimensions in the bending diagrams are cut out to cut.
2. The reinforcement for the traffic railing on a retaining wall shall be the same as detailed for a bridge deck.
3. The reinforcement for the Vertical Face Retrofit Railing shall have a 2" minimum cover.
4. Bars 55 may be continuous or spliced at the construction joints. Bar splices for Bars 55 shall have a minimum of 2'-0".
5. Expansion Dowel/Bars B shall be ASTM A36 smooth round bar and hot-dip galvanized in accordance with the Specifications.

Notes:
- **Bars 4L, 4M & 4N**
- **Bars 4C** (12 required per open joint)

**OPEN JOINT EXPANSION DOWEL DETAIL**
(Railing Reinforcing Not Shown For Clarity)

**Note:**
- Dowel Installation Notes:
  1. Shift dowels to clear if the existing reinforcement is encountered.
  2. See individual Standards Index Nos. 481 thru 483 for required embedment length of Bars 60, 4L, or 4M.

**PARTIAL PLAN OF RAILING (SKEW ANGLE $\theta$ LESS THAN 70°)**
(Skewed Deck Joint at Beginning or End Bridge Shown, Skewed Deck Joint at Intermediate Pier or Bent Similar)

**SKEW DETAIL**

**2006 FDOT Design Standards**

**TRAFFIC RAILING - (VERTICAL FACE RETROFIT)**

**GENERAL NOTES & DETAILS**
NOTES:
1. On approach and provide a Roadway Guardrail Transition, Index No. 402 as shown or other site specific treatment. See Roadway Plans for limiting station of Roadway Guardrail Transition or other site specific treatment. If limiting station of Roadway Guardrail Transition is on the bridge, which Three Beam Terminal Connection to railing as shown above. If limiting station of Roadway Guardrail Transition is along the Wing Wall, see Schemes 2 or 3, Index No. 481. Sheet 2 and 3. On skewed bridges, if the skew along the deck joint extends across the width of the railing, the 2-5/8" minimum dimension shall apply to both the front and back face of the railing. For treatment of trailing and see Roadway Plans.

2. Field cut Bars 55 and Dowel/Bars 6D to maintain clearance within Vertical Face Retrofit Railing.

3. Areas where existing structure has been removed that are not engaged in new concrete shall match adjoining areas and shall be finished flat by grouting or priming as required. Exposed existing reinforcing steel that is not engaged in new concrete shall be burned off 1" below existing concrete and grouted over.

- Expansion Dowel Assembly, Bars 4C not required at end of railing for Scheme 1
- Expansion Dowel & Bars 4C not required at end of railing for Scheme 1
- Expansion Dowel & Bars 4C not required at end of railing for Scheme 1
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PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

TYPICAL TREATMENT OF RAILING ALONG BRIDGE

TYPICAL SECTION THRU RAILING ON CURB WITH CORBELS

TYPICAL SECTION THRU RAILING SHOWING LIMITS OF REMOVAL (BRIDGE DECK SHOWN, WING WALL SIMILAR)

TYPICAL SECTION THRU RAILING ON FULL DEPTH CURB (BRIDGE SHOWN, WING WALL SIMILAR)
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Railing End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

**SCHEME 1 NOTES:**

**SCHEME 1:** Railing End Treatment for Perpendicular or Angled Wing Walls

**NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Railing End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
SCHEME 3 NOTE:
1. See roadway plans for limiting station of roadway guardrail transition or other site-specific treatment. If limiting station of roadway guardrail transition is along the wing wall, attach three-beam terminal connector to railing as shown above. If limiting station of roadway guardrail transition is on the bridge, see sheet 1.

PARTIAL PLAN OF RAILING

- Front face of box wall, begin or end bridge & match line (See sheet 1)
- Parallel portion of vertical face retrofit railing (if present) (See note 1)
- Limiting station of transition (varies 1'-6" min.)
- End of roadway guardrail transition (See note 1 below & note 1, sheet 1)

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

(Railing reinforcing and expansion dowel assemblies not shown for clarity)

SCHEME 3
RAILING END TREATMENT FOR FLARED WING WALLS
NOTES
1. Field cut Bars 55 and Dowel/Bars 6D as noted for skewed deck joints.
2. Areas where existing structure has been removed that are not encased in new concrete shallmatch adjoining areas and shall be finished flush by grouting or grinding as required. Exposed existing reinforcing steel that is not encased in new concrete shall be burned off 1" below existing concrete and grouted over.

TYPICAL TREATMENT OF RAILING ALONG BRIDGE

TYPICAL SECTION THRU RAILING ALONG PROPOSED APPROACH SLAB
SHOWING LIMITS OF REMOVAL
(SCHEMES 4 AND 5 ONLY)

TYPICAL SECTION THRU EXISTING APPROACH SLAB AND END BENT WING WALL
SHOWING LIMITS OF REMOVAL
(SCHEMES 2 AND 3 ONLY)

For General Notes, Estimated Quantities, Dowel Details, Expansion Dowel Details, Reinforcing Steel Notes & Bending Diagrams see Index No. 480.
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Rail End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. If a Special Steel Guardrail Post is required for attachment to the top of a sloping Wing Wall, saw cut and remove a wedge shaped portion of the sloping Wing Wall as required to provide a level surface for post installation.

**SCHEME 1 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Rail End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. If a Special Steel Guardrail Post is required for attachment to the top of a sloping Wing Wall, saw cut and remove a wedge shaped portion of the sloping Wing Wall as required to provide a level surface for post installation.
PARTIAL PLAN OF RAILING

1. Dowel Bars 6D may be cast cut to clear Backwall in conjunction with the new section of curb as shown or they may be installed in drilled holes in the new section of curb using an Adhesive Bonding Material System with a 7/8" minimum embedding.

2. Dowel Bars 4N may be installed on a maximum 1'-0" Spacing (Front Face only) in conjunction with the new section of curb as shown or they may be installed in drilled holes in the new section of curb using an Adhesive Bonding Material System with a 1-1/2" minimum embedding.

3. At the Contractor's option, if limiting station of Roadway Guardrail Transition is along the Wing Wall, attach Three-Beam Terminal Connector to railing as shown above.

SCHEME 4 NOTES:

1. See Roadway Plans for limiting station of Roadway Guardrail Transition or other site specific treatment. If limiting station of Roadway Guardrail Transition is along the Wing Wall, attach Three-Beam Terminal Connector to railing as shown above. If limiting station of Roadway Guardrail Transition is on the bridge, see Sheet 1.

2. Dowel Bars 4N may be installed on a maximum angle of 45° to the cut edge of the Approach Slab as shown to facilitate drilling of holes and installation of bars.

3. If the Contractor's option, along the length of the Approach Slab curb that is to be replaced, Dowel Bars 6D may be cast in with the new section of curb as shown or they may be installed in drilled holes in the new section of curb using an Adhesive Bonding Material System with a 1-1/2" minimum embedding.

4. See Roadway Guardrail Transition (See Note 1 & Sheet 1).
Parapet of Existing Flared Wing Wall may or may not exist (length varies).

Retrofit Railing
Bars 4C (Type)
Expansion Dowel Sleeve Assembly
Bars 6D cut to clear Backwall

Final Riding Surface
Bars 4A @ 3'-0" Max. (Field Bend as required to maintain clearance) (Typ.)
Transition Block (See Note 3) Below & Note L 1 Sheet L
Asphalt Overlay when present (Various)

Partial Plan of Railing

Limiting Station of Transition

Asphalt Overlay when present (Various)

Partial Elevation of Inside Face of Railing

(SCHEME 5 SHOWN, SCHEME 5 SIMILAR)

SCHEME 5 NOTES:
1. See Roadway Plans for limiting station of Roadway Guardrail Transition or other site specific treatment. If limiting station of Roadway Guardrail Transition is the Wing Wall, attach Thrie-Beam Terminal Connector to railing as shown above. If limiting station of Roadway Guardrail Transition is on the bridge, see Sheet 1.
2. Dowel Bars 4N may be installed on a maximum angle of 45° to the cut edge of the Approach Slab as shown to facilitate drilling of holes and installation of bars.
3. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend beyond end of existing End Bent Wing Wall, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Railing End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.
4. Field bend Dowel Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
5. At the Contractor's option, along the length of the Approach Slab curb that is to be replaced, Dowel Bars 6D may be cast in with the new section of curb as shown or they may be installed in drilled holes in the new section of curb using an Adhesive Bonding Material System with a 1'-0" minimum embedment.

Curb heights vary from 5' min. to 10' max. Match height and shape of existing curb on bridge.

2' Clear

3' Min. Embedment

Existing Wing Post (Type Various)

Existing Railed Wing Wall

Existing Parallel Wing Wall

Bars 4P @ 9' Max. (Field Bend as required to maintain clearance) (Typ.)

Transition Block (See Note 3)

Asphalt Overlay

Final Riding Surface

Existing Approach Slab

Transition Block

SCHEME 5

Railing End Treatment for Parallel Curbs

TRAFFIC RAILING - (VERTICAL FACE RETROFIT) WIDE CURB
**Notes:**

1. On approach and provide a roadway guardrail transition, Index No. 402 (as shown) or other site-specific treatment. See roadway plans for limiting station of roadway guardrail transition or other site-specific treatment. If limiting station of roadway guardrail transition is on the bridge, attach Thrie-Beam Terminal Connector to railing as shown above. If limiting station of roadway guardrail transition is along the wing wall, see Schemes 2 or 3, Sheets 2 & 3. On skewed bridges, if the skew allows the deck joint to extend through the width of the railing, the 2'-6" minimum dimension shall apply to both the front and back face of the railing. For treatment of railing and see roadway plans.

2. Field cut bars 5S and dowel bars 60 to maintain clearance within vertical face retrofit railing.

3. Areas where existing structure has been removed that are not encased in new concrete shall match adjoining areas and shall be finished flat by grinding or marring as required. Exposed existing reinforcing steel that is not encased in new concrete shall be burned off 1" below existing concrete and grouted over.

**Partial Elevations of Inside Face of Railing**

(expansion dowel assemblies and bars 4C not shown for clarity)

**Typical Treatment of Railing Along Bridge**

**Typical Section Thru Existing Traffic Railing Showing Limits of Removal**

(Bridge Deck Shown, Wing Wall Similar)

**Cross Reference:**

For General Notes, Estimated Quantities, Dowel Details, Expansion Dowel Details, Rebar Details, Bond Breaker Notes & Bending Diagrams, see Index No. 480.
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Railing End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. If a Special Steel Guardrail Post is required for attachment to the top of a sloping Wing Wall, saw cut and remove a wedge shaped portion of the sloping Wing Wall as required to provide a level surface for post installation.

PARTIAL ELEVATION OF INSIDE FACE OF GUARDRAIL

SCHEME 1
RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS

SCHEME 1 NOTES:
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Railing End Transition and Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. If a Special Steel Guardrail Post is required for attachment to the top of a sloping Wing Wall, saw cut and remove a wedge shaped portion of the sloping Wing Wall as required to provide a level surface for post installation.

TRAFFIC RAILING - (VERTICAL FACE RETROFIT)
INTERMEDIATE CURB
SCHEME 3 NOTE:
1. See roadway Plans for limiting Station of roadway guardrail Transition or other site specific treatment. If limiting Station of roadway guardrail Transition is along the Wing wall, attach Three-Beam Terminal Connector to railing as shown above. If limiting Station of roadway guardrail Transition is on the bridge, see Sheet 1.

PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Railing reinforcing and Expansion Dowel Assemblies not shown for clarity)

SCHEME 3
RAILING END TREATMENT FOR FLARED WING WALLS
NOTES:
1) Concrete Parapet reinforcement is not affected by skew angle, see Index No. 820 for details.
2) Parapet expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure Sheets for details.
3) Traffic Railings reinforcement vertical Bars 5V & SF may be shifted up to 0.1° (Max.) and rotated up to 10 degrees as required to allow proper placement. Bars 5V adjacent to expansion joints shall be field adjusted to maintain clearance and spacing. Extra bars 5V will be required. Bars 5V bottom horizontal portion shall be cut so as to maintain maximum bottom horizontal length of bar to each verticall edge being placed. Remainder of bar shall be discarded. Cut Bars 5V may be rotated to maintain clearance.
4) Railings ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint in the face of parapet shall be turned perpendicular or radial to this line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
5) Intermediate Open Joint in Railing or Parapet Bars 5V Field cut (see Note 3).
6) Approach Slab View shown are intended as guides only. See Structures Plans, Superstructure and Approach Slab Sheets for locations.
7) At Begin or End Approach Slab at the railing ends 3" gutter side or back face of railing as required to provide a base for casting of the railing.
8) At Begin or End Approach Slab at the railing ends 3" gutter side or back face of railing as required to provide a base for casting of the railing.
9) Traffic Railing reinforcement is not affected by skew angle, see Index No. 820 for details.

GENERAL NOTES:
1) Work this Sheet with Traffic Railing, Pedestrian/Bicycle Railing, and Approach Slab Indexes as applicable.
2) Deck Expansion Joint at Begin or End Bridge shown, Deck Expansion Joints at Pier or Intermediate Bents are similar.
3) Partial Plan Views shown are intended as guides only. See Structures Plans, Superstructure and Approach Slab Sheets for skew angles, joint orientation, dimensions and details.
4) Railings on Raised Sidewalk shall be treated similar to the Partial Plan View of Bridge Deck with Traffic Railing Index No. 420 details shown in the upper right corner of this sheet.
5) Welded Wire Fabric is used in lieu of conventional reinforcement placement of the WWF vertical elements shall be similar to those shown above. Clipping of horizontal elements to facilitate placement shall be minimized where possible.
NOTES:
1) Median Traffic Railing reinforcement vertical bars SW may be shifted up to 1/" (Max.)
and rotated up to 10 degrees as required to allow proper placement.
2) Transition Shrink Bars SW shall be used as required at railing ends adjacent to expansion joints
to facilitate placement of bars in acute corners. Place Transition Bars SW in a fan pattern to
maintain spacing. Rotate bars in 10° (Max.) increments as required.
3) Median Traffic Railing ends at deck expansion joints shall follow the deck joint with allowance for joint
movement. See Structures Plans, Superstructure and Approach Slab Sheets for details.
4) 3/4" Intermediate Open Joints and 1/2" V-Grooves in railing shall be placed perpendicular or radial to the
edge of the median railing. See Structures Plans, Superstructure and Approach Slab Sheets for locations.
5) At begin or end approach slab extend slab at the median railing ends 3/" (open side) as shown
to provide a base for casting of the railing.
6) Begin placing Railing Bars SW on Approach Slab at the railing end and proceed toward Begin or End
Bridge to ensure placement of guardrail bolt holes. If required, adjustments to the bar spacing for Bars SW and
SW shall be made immediately adjacent to Begin or End Bridge.

GENERAL NOTES:
1) Work this sheet with Median Traffic Railing and Traffic Separator and Approach Slab
Indexes as applicable.
2) Deck Expansion Joint at begin or end bridge shown. Deck Expansion Joints at E Pier or
Intermediate Bents are similar.
3) Partial Plan Views shown are intended as guides only. See Structures Plans, Superstructure
and Approach Slab Sheets for skew angles, joint orientation, dimensions and details.
4) If Welded Wire Fabric is used in lieu of conventional reinforcement placement of the WWF
vertical elements shall be similar to those shown above. Clipping of horizontal elements to facilitate
placement shall be minimized where possible.

2008 FOOT Design Standards
SKEW DETAILS FOR TRAFFIC RAILINGS,
PARAPETS AND TRAFFIC SEPARATORS
2 of 2
REMOVAL OF ORGANIC MATERIAL

GENERAL NOTES

1. All details shown in this Index for removal of organic and plastic materials shall be followed unless otherwise shown on the plans.

2. Utilization of accreted materials shall be in accordance with Index No. 505.

3. Where organic or plastic material is undercut, bottom line shall be made of suitable material in accordance with Index No. 505, unless otherwise shown on the plans.

4. The term "Plastic Material" used in this Index in conjunction with removal of organic and soil is defined under soil classifications for Plastic (P) and High Plastic (PH) on Index No. 505.

5. The term "Organic Material" as used on this Index is defined as any soil which has an average organic content greater than five (5.0) percent, or an individual organic content test result which exceeds seven (7.0) percent. Organic material shall be removed as shown on this Index and the area unhindered otherwise by the District Geotechnical Engineer.

Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum. Tests shall be performed in accordance with AASHTO T 267 on the portion of a sample passing the No. 4 sieve.

6. The normal depth of side cutts shall be 3.5 feet below the shoulder point except in special cases.

7. In municipal areas, where underdrain is to be constructed beneath the proposed pavement, the grade of the underdrain filter material shall conform to FDOT specifications. Where grades on underdrain pipe shall be O/S.

8. See Index No. 506 for miscellaneous soft earth details.

REMOVAL OF ORGANIC AND PLASTIC MATERIAL

DESIGN NOTES

1. At locations where organic material or other soft soil deposits persist to such depth that removal is impractical, the stabilization of a geosynthetic foundation over these soils should be considered. The Engineer or Contractor should request guidance from the District Geotechnical Engineer on making a geosynthetic foundation design in accordance with Index No. 502 when pursuing geosynthetic alternatives.

2. The designer shall take into consideration the possibility of roadway widening to the outside, and where widening is anticipated or in the vicinity of a collector roadway, the limits of removal of organic and plastic materials necessary to accommodate anticipated widening.
HALF SECTION

NOTES: Refer to roadway cross sections to determine whether minimum or preferable removal is used.

Where frequency of median breaks indicates that it is impractical to leave plastic material in the median, the designer may elect to indicate total removal of this material.

If, during construction, it becomes apparent that it is impractical to leave plastic material in the median, total removal of this material shall be approved by the Engineer.

REMOVAL OF PLASTIC MATERIAL AND LOCATION OF UNDERDRAIN IN URBAN CONSTRUCTION

REMOVAL OF ORGANIC AND PLASTIC MATERIAL
GENERAL NOTES

1. All designs shall meet the requirements shown on this sheet and the contract documents.

2. $T_d = \frac{T_{60}}{R_{60}, R_{90}, R_{10}, C, F}$

3. Intermediate reinforcement shall be ruled out parallel to slope face.

GEOSYNTHETIC REINFORCED SOIL SLOPES
REINFORCED EMBANKMENT

GEOSYNTHETIC REINFORCED FOUNDATIONS CONSTRUCTED ON SOFT SOILS

- Maximum vertical spacing between reinforcement layers is 36 inches.
- Minimum vertical spacing between reinforcement layers is 6 inches.
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<th>REQUIRED TEST METHOD</th>
<th>MIRAFI GEOLON HP 370</th>
<th>MIRAFI GEOLON HP 370</th>
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**APPROVED GEOSYNTHETIC PRODUCTS (WOVEN GEODRIB)**

**APPLICATION AND PROPERTIES**

2006 FDOT Design Standards

GEOSYNTHETIC REINFORCED SOILS
### Table of Woven Geotextile Values

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<tr>
<th>PROPERTY</th>
<th>REQUIRED TEST METHOD</th>
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<th>MRRAFI Exxon</th>
<th>MRRAFI GEOLON HS 2400</th>
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**Approved Application Usage:**

1. Strengthened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
4. Reinforced Embankment
5. Construction Expedition

### Approved Geosynthetic Products (Woven Geogrid)

**Application and Properties**

**Geosynthetic Reinforced Soils**

2008 FDOT Design Standards

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<th>MARAFI MG 5XT (Matrex 30)</th>
<th>MARAFI MG 7XT</th>
<th>MARAFI MG 8XT (Matrex 60)</th>
<th>MARAFI MG 10XT (Matrex 90)</th>
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Approved Application Usage:
1. Steepened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
4. Reinforced Embankment
5. Construction Equivalent
* Minimum 3 Overlap
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**Approved Application Usage**

1. Steepened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
4. Reinforced Embankment
5. Construction Expedient

**Minimum 3" Overlap**
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<th>RAUGRID 3/3</th>
<th>RAUGRID 4/2</th>
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<th>RAUGRID 8/3</th>
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Approved Application Usage:
1. Steepened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
4. Reinforced Embankment
5. Construction Expedition
6. Minimum 3’ Overlap

APPROVED GEOSYNTHETIC PRODUCTS (WOVEN GEOGRID)
APPLICATION AND PROPERTIES
<table>
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<th>REQUIRED TEST METHOD</th>
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<th>TENSAR BX 4200</th>
<th>TENSAR BX 1100</th>
<th>TENSAR BX 1200</th>
<th>TENSAR BX 1220</th>
<th>TENSAR BX 1500</th>
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Approved Application Usage:
1. Steepened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Both Steepened Slopes & Reinforcement of Foundations over Soft Soils
4. Reinforced Embankment
5. Construction Expedient

Approved Geosynthetic Products
(EXTRUDED GEOGRID)
APPLICATION AND PROPERTIES
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**APPROVED GEOSYNTHETIC PRODUCTS**

**EXTRUDED GEOGRID**

**APPLICATION AND PROPERTIES**
**DIVIDED ROADSWAYS**

**UNDIVIDED ROADWAY**

**FLEXIBLE PAVEMENT**

**GENERAL NOTES**

1. roadway dimensions are representative. Subgrade dimensions and control lines are standard. The distances shown on this Index do not represent the details shown in the plans or on Index Nos. 500 or 506.

2. Plastic (P) soils may be placed above the existing water level (at the time of construction) to within 4 feet of the proposed grade. It should be placed immediately to the lower portion of the embankment for some distance along the project rather than full depth for short distances.

3. High Plastic (H) soils excavated within the project limits may be used in embankment construction as indicated on this Index. High Plastic soils are not to be used for embankment construction when obtained from outside the project limits.

4. Select (S) soils having an average organic content of more than two and one-half (2.5) percent, or having an AASHTO test value which exceeds four (4) percent, shall not be used in the subgrade portion of the roadbed.

Select (S), Plastic (P), or High Plastic (H) soils having an average organic content of more than five (5) percent, or an organic content individual test result which exceeds seven (7) percent, shall not be used in the portion of embankment inside the control line, unless written authorization is obtained from the District Environmental Engineer. These soils may be used for embankment construction outside the control line, unless restricted by the plans or otherwise specified in the plans, provided they are compacted sufficiently to provide a drivable surface for operational vehicles as approved by the Engineer.

5. Highly organic soils, composed entirely of partially decomposed organic material, often dark brown or black in color with an odor of decay, and sometimes fibrous, shall be designated as muck. Further, any material or material containing more than twenty (20) percent organic material may be designated as Muck (M). Highly organic soils shall not be used within the embankment or embankment portion of the roadway with the exception of muck used as a supplement to construct a finish soil layer as described in Section 821 of the FDOT Standard Specifications.

**DESIGN NOTES**

1. The designer shall take into consideration the conditions existing at the site, and the relationship of the subgrade to the subgrade of the future widening or construction line. For utilization of High Plastic (H) soils, and/or soils classified as organic material to the embankment.

2. The designer shall take into consideration the position of the drainage swales in the portion of the roadway along which Plastic (P) soils, High Plastic (H) soils, or soils classified as organic material would be allowed. The designer shall limit the use of Plastic (P) soils, High Plastic (H) soils, or soils classified as organic material to locations that will not deflect the infiltration of stormwater from the swales.

**SYMBOLS**

- S: Select
- P: Plastic
- H: High Plastic
- M: Muck

**CLASSIFICATION (AASHTO M 95)**


**NOTES**

- For cut sections this dimension may be reduced to 4", see Index No. 503.
- For minor collectors and local facilities this dimension may be reduced to 4".
RIGID PAVEMENT - TREATED PERMEABLE BASE OPTION

DESIGN NOTE

1. Concrete pavement is to be placed over 4" of Asphalt Treated Permeable Base (ATPB) or Cement Treated Permeable Base (CTPB) as identified in the plans. This will be placed on an aggregate separator layer using Type SP. This will be placed on a working platform using 4" of Type B Stabilization.

UNDIVIDED ROADWAY

SYMBOL
S
P
H
W

CLASSIFICATION (AASHTO M 65)
A-2, A-2-6, A-2-7
A-5 OR A-7 (ALL WITH LL > 50)
A-8

Classification listed left to right in order of preference.

See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

- Certain types of A-2-4 material are likely to contain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. These may be used in the subgrade portion of the roadway when approved by the District Materials Engineer. A-2-4 material placed below the existing water level must be nonplastic and contain less than 0.5% passing the No. 200 U.S. Standard sieve.

- For cut sections this dimension may be reduced to 24", see Index No. 505.

For other contractors and local facilities this dimension may be reduced to 18".
**UNDIVIDED ROADWAY**

### SYMBOLS USED

- **S**: Select
- **P**: Special Selected
- **H**: High Plastic
- **M**: Muck

### CLASSIFICATION (AASHTO M 98)

- **S**: Select
- **P**: Special Selected
- **H**: High Plastic
- **M**: Muck

### REQUIREMENTS

- **S**: A-2-4 **
- **P**: S +, P +
- **H**: H +
- **M**: M +

### Notes

- **S** classification is preferred.
- **P** classification is used for special applications.
- **H** classification is used for high-plastic soils.
- **M** classification is used for muck materials.

### RIGID PAVEMENT - SPECIAL SELECT SOIL OPTION

- SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

### EMBANKMENT UTILIZATION

- See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

### Additional Information

- When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer.
- This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 12% passing the No. 200 U.S. Standard sieve.
- Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the existing water level existing at the time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 15% passing the No. 200 U.S. Standard sieve.
- 3" of #57 or #85 Coarse Aggregate mixed into Top 6".
**NOTES**

1. All material in the shaded area is excess base to be removed.
2. The cost for removal of excess base material shall be included in the contract unit price for base.
3. Payment for base shall be calculated using normal width.

**REMOVAL OF EXCESS BASE MATERIAL**

---

**MEDIAN STABILIZING DETAILS**

**NOTES**

1. When the median has curb or curb and gutter, stabilize 4" back of curb.
2. When the median has shoulder with no curb or curb and gutter, stabilize to normal shoulder width.
3. See the details above for stabilizing requirements at crossroads.
4. Stabilize entire area under all paved traffic islands.
5. Stabilize full width under all traffic separators.
6. Select material as defined in Index No. 503. For minor collectors and local facilities the depth of selected material thickness may be reduced from 24" to 18".

**MEDIAN STABILIZING DETAILS**
### GENERAL NOTES

1. Maximum rate of superelevation for urban highways and high speed urban streets shall be 0.05.

2. Superelevation shall be obtained by rotating the plane successively about the point of the structure where the plane has obtained a slope equal to that required by the chart. Should the rotation reverse the entire section further superelevation shall be required, the remaining rotation of the plane shall be about the high side of the inside travel lane.

3. When positive superelevation is required, the slope of the gutter on the high side shall be a continuation of the slope of the superelevated pavement.

4. In construction, short vertical curves shall be placed at all angular profile breaks within the limits of the superelevation transition.

5. The variable superelevation transition length (LT) shall have a minimum value of 50 feet for design speeds under 40 MPH and 75 feet for design speeds of 40 MPH or greater.

6. Roadway sections having lane arrangements different from those shown, but composed of a series of planes, shall be superelevated in a similar manner.

7. For superelevation of urban streets, see the FDOT Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways. For superelevation of curves on rural highways, urban freeways, and high speed urban highways, see Index No. 510.

### SUPERELEVATION RATES (e) FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

#### e\textsubscript{max} = 0.05

#### SUPERELEVATION FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS
SUPERELEVATION TRANSITION SECTIONS
FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS
Note: The sections and profiles shown are examples of superelevation transitions. Similar schemes should be used for roadways having other sections.

EXAMPLE SUPERELEVATION SECTIONS AND PROFILES
FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS
## General Use Optional Base Groups and Structural Numbers

### GENERAL NOTES

1. On new construction and complete reconstruction projects where an entirely new base is to be built, the design engineer may specify just the Base Group and any of the unrestricted General Use Optional Bases shown in that base group may be used. Note, however, that some thick granular bases are limited to widening which prevents their general use.

2. Where base options are specified in the plans, only those options may be bid and used.

3. The designer may require the use of a single base option, for instance Type B-12.5 in a high water condition. This will still be bid as Optional Base.

* For granular subbase, the construction of both the subbase and Type B-12.5 will be paid for under the contract unit price for Optional Base. Granular subbases include Lime Rock, Cemented Coquina, Shell Rock, Bank Run Shell and Graded Aggregate Base at LBR 100. The base thickness shown is Type B-12.5. All subbase thicknesses are 4".

** B To be used for widening only, three feet or less.

△ Based on minimum practical thicknesses.

□ Restricted to nonlimited access shoulder base construction.

### Base Thickness and Option Codes

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<tr>
<th>Base Group</th>
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<th>Base Group Pay Line Number</th>
<th>Structural Number (Per, In.)</th>
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<td>701</td>
<td>(0.18)</td>
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<tr>
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<td>702</td>
<td>(0.18)</td>
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<td>8</td>
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<td>708</td>
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### GENERAL USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS

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**Note:**

- For granular subbase, the construction of both the subbase and Type B-12.5 will be paid for under the contract unit price for Optional Base. Granular subbases include Lime Rock, Cemented Coquina, Shell Rock, Bank Run Shell and Graded Aggregate Base at LBR 100. The base thickness shown is Type B-12.5. All subbase thicknesses are 4".

- B To be used for widening only, three feet or less.

- △ Based on minimum practical thicknesses.

- □ Restricted to nonlimited access shoulder base construction.
## Base Thickness and Option Codes

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<tr>
<td>8</td>
<td>1.65-1.75</td>
<td>708</td>
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</tbody>
</table>

**Note:**

- These base materials may be used on 90FT projects when approved in writing by the District Materials Engineer and shown in the plans.
- * Based on Minimum Practical Thickness

**Limited Use Optional Base Groups and Structural Numbers**
DIVISIONAL SETBACK CONNECTION ELEMENT FLARE (Drop Curb J F

Small Street or road intersection design, with possible auxiliary lanes and channelization, should be considered for more than 2 lanes in the turnout.

DESIGN "2-Way" refers to a "2-Way" connection with one "2-Way" movement and one "2-Way" movement for the connection.

When more than 2 lanes in the turnout connection are required, the 26 retention will be increased to relieve interference between entering and exiting traffic which adversely affects traffic flow. These cases require documented site specific study and design.

NOTE: In lieu of flares as approved by the Department.

DESIGN NOTES: "1-Way" connections will be designed to effectively alleviate pedestrian movement.

GENERAL NOTES

1. For definitions and descriptions of access connection "Categories" and access "Classification" of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, "State Access Connection Permits Administrative Process" and Rules Chapter 14-31, "State Highway System Access Management Classification System And Standards."

2. For this Index the term "turnout" applies to that portion of a roadway, street or road and their appurtenant islands, accessways, service lanes, parking facades, drainage pipes and structures, crosswalks, sidewalks, turnouts, medians, signage, pavement making, required channelization, maintenance of traffic or other means of access or to centred access facilities. The turnout requirements set forth in this Index do not provide complete intersection design, construction or maintenance requirements.

3. The location, positioning, spacing and number of connections and median openings shall be in accordance with FDOT Rule Chapter 14-96.

4. On Department construction projects all turnouts not shown on the plans are to be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.

5. Turnouts shall have sufficient length and size for all vehicles stopping, backing, maneuvering, stopping and parking to be carried out safely beyond the right of way line. Except for vehicle stopping to enter the highway, the turnout area and driveway within the right of way shall be used only for moving vehicles entering or leaving the highway.

6. Connections with expected daily traffic over 4000 vpd are to be constructed as intersecting streets or roads. The design requirements of this Index and that of the local government shall be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

7. For connections with expected daily traffic less than 4000 vpd, the Department will determine if a drop curb or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this Index and that of the local government shall be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

8. Connections that are intended to be accommodated either multi-unit vehicle or single unit vehicle turning 30° in length, returns with 50 feet are to be used, unless otherwise specified for in the plans or otherwise stipulated in permits. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii are to be increased and auxiliary lanes, islands, barriers, separators and/or islands constructed as determined by the Department to be necessary for safe turning movements.

9. Any connection requiring or having a specified median opening with left turn storage and served directly by that opening shall have radial returns.

10. For new connections and for connections on all new construction and reconstruction projects, pavement materials and thicknesses shall meet the requirements applicable to either that detailed for "Urban Important Turnouts", or, that described in "Table 515-1" for connections with radial returns and/or islanded sections.

11. The responsibility for the cost of construction or alteration to an access connection shall be in accordance with FDOT Rule Chapter 14-96.

SUMMARY OF GEOMETRIC REQUIREMENTS FOR TURNOUTS

For additional information Refer to FDOT Rule Chapters 14-96 and 14-31.

For definitions and descriptions of access connection "Categories" and access "Classification" of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, "State Access Connection Permits Administrative Process" and Rules Chapter 14-31, "State Highway System Access Management Classification System And Standards."
DRIVEWAY SECTIONS ON CURBED FACILITIES WITH SIDEWALK

GENERAL APPLICATIONS

MARGINAL APPLICATIONS ON LOW SIDE OF FULLY SUPERELEVATED ROADWAY (REFER TO MODIFICATIONS ON SHEET 4)

ADVERSE APPLICATIONS (REFER TO MODIFICATIONS ON SHEET 4)

* See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS' on Sheet 2.

A may be reduced to 3' with 3' minimum when approved by the Engineer. Depth less than 3' allowable only under findings of infeasibility.

SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

2008 FDOT Design Standards
MODIFICATIONS OF 'ADVERSE' AND 'MARGINAL' APPLICATIONS

SIDEWALK ADJACENT TO CURB
SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE
SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

ADVERSE* AND MARGINAL* SECTIONS MODIFIED TO ACHIEVE GENERAL* APPLICATION

ADVERSE* SECTIONS MODIFIED TO ACHIEVE MARGINAL* APPLICATION

* See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS' On Sheet 2.
A May Be Reduced To 3' Min. In Restricted Conditions When Approved By The Engineer. Depth Less Than 3' Allowable Only Under Findings Of Infeasibility.

MODIFICATIONS TO ADVERSE AND MARGINAL SECTIONS

2008 PUDT Design Standards
LIMITS OF CLEARING AND GRUBBING, STABILIZING AND BASE AT INTERSECTIONS

MATERIAL TYPES AND THICKNESSES IN DRIVING AREAS FOR RURAL AND URBAN CONNECTIONS

<table>
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<tr>
<th>Course</th>
<th>Material Type</th>
<th>Thickness (In)</th>
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<td>Structural</td>
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<tr>
<td>Connection</td>
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<tr>
<td>Roadway</td>
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</table>

**NOTES**

1. The paving shall be structurally designed to meet the essential traffic loads and should not be less than that shown above unless identified as a modified pavement as follows: See CMBLRRABLE PAVEMENT MATERIALS/N U. S. T. S. For paving between adjacent paved and untreated soils see U.S. T. S.

2. The pavement on grades in excess of 6% shall be designed as Flexible pavement. The Department may require a minimum thickness of 6" for flexible pavement. The Department may require a minimum thickness of 6" for flexible pavement.

3. The thickness of the base and subbase shall be determined by the Department.

4. Structural and surfacing materials shall be designed by the Department.

5. All signing required under the State highway code, including horizontal and vertical alignments and signing for placement of all signs and signal installations on the State highway system shall be designed by the Department.

6. The Department may require other pavement widths where local conditions warrant.

### RURAL TURNOUT CONSTRUCTION

**LIMITS OF CLEARING AND GRUBBING**

- Length of Clearing and Grubbing:
  - Access Basis: No Basis
  - Other Basis: 4' Outside Basis
  - Access Basis: 4' Outside Basis
  - Other Basis: 4' Outside Basis

**BASES**

- 5' Min. For Residential Connections
- 6' Min. For Commercial Connections

**CURB**

- 6' Min. For Residential Connections
- 6' Min. For Commercial Connections

**Pavement**

- 6' Min. For Residential Connections
- 6' Min. For Commercial Connections

**LIMITS OF CONSTRUCTION AND MAINTENANCE FOR RURAL CONNECTIONS**

**TURNOUTS**

- 6' Min. For Residential Connections
- 6' Min. For Commercial Connections

**NOTES**

1. Auxiliary drainages and stormwater systems shall be designed by the Department.

2. Departmental approval of structural elements shall exceed 5' from the street line or limits of paved surfaces, and extend to include any necessary curbs and gutters.

3. The magnitude and location of drainage facilities within the right-of-way shall be designed and maintained in accordance with the drainage facility requirements of the Design Specifications.

4. The Department shall be responsible for the maintenance of drainage facilities within the right-of-way.
URBAN TURNOUT PROFILES

When restoring or reconstructing existing commercial turnout connections on new construction and reconstruction projects, the maximum 10% commercial grade may be exceeded provided this does not create any adverse roadway operational or safety impacts. This shall be approved by the District Design Engineer and be supported by documented site specific findings.

RURAL TURNOUT PROFILES

G - Grade (%) = Algebraic Difference in Grades (%) / L - Transition [See Tabulated Lengths];

- > 14% - Straight Or Rounded Transition Required

STORMWATER RUNOFF AND PROFILE OPTION NOTES

1. Turnouts shall neither cause water to flow on or across the roadway pavement, nor cause water ponding or erosion within the State right of way. In all cases, the length of the profile shall be selected to direct stormwater runoff to the roadside ditch, if one exists. Flow o other appropriate runoff control devices shall be constructed when runoff volumes are sufficient to cause erosion or the downstream stormwater runoff on urban turnouts.

2. The Option 1 profile is intended for locations where runoff volumes are relatively large. The Option 2 profile is intended for locations where runoff volumes are relatively small and/or where there is no roadside ditch.

RECOMMENDED TURNOUT PROFILE

TRANSITION LENGTHS (L) (FT.)

ROADWAY PAVEMENT SLOPES AND SLOPES OF ABUTTING MURAL TURNOUT SURFACES (G)

SUPERELEVATION SECTIONS

TURNOUT PROFILES
**TURNOUT CONSTRUCTION**

**SECTION AA WITH WIDENING**

**TURNOUT CONSTRUCTION**

**SECTION AA**

---

**RESURFACING EXISTING TURNOUT**

**SECTION AA**

---

**PAVEMENT STRUCTURE FOR 5' DEEP TURNOUTS**

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<tr>
<th>Drive Width (Ft.)</th>
<th>Intersection Type</th>
<th>Structural Course Material</th>
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<td>Skewed</td>
<td>Optional Base (See Index No. 54)</td>
<td>0.25&quot;</td>
</tr>
</tbody>
</table>

**Notes:**

1. Turnout structural course to be the same material as roadway leveling or structure course. Structural course not required if asphalt base course and its thickness increased to match edge of roadway pavement.
2. Any Department approved pavement structure equivalence may be used at the discretion of the Engineer.
3. Additional structural strength may be required if heavy truck loads are anticipated.

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**GENERAL NOTES**

1. Turnouts are to be constructed or resurfaced for low volume (single family, duplex, farm etc.) residential connections as directed by the Engineer.
2. Turnout construction is not required for low volume residential connections where roadway shoulders are paved.
3. Connections outside the 5' limit are to be constructed as directed by the Engineer.
4. The contract unit price for Turnout Construction includes the cost for excavation and base.
5. Payment for structural course is to be included in roadway resurfacing pay items.
6. Payment for feathering friction course is to be included in the unit price for Asphaltic Concrete Friction Courses placed on the roadway. Feathered areas will not be included in measured quantities. Feathering is not required for FC-5 Friction course.
RAISED RUMBLE STRIPS

GENERAL NOTES FOR RAISED RUMBLE STRIPS

1. Raised rumble strips shall be constructed on all paved shoulders approaching structures, where the structure shoulder width is less than the usable shoulder width of the approach roadway. Raised rumble strip sets at intersections shall be constructed only when specified in the plans.

2. Raised rumble strips are to be constructed in accordance with Section 547 of the Specifications.

3. When any portion of a curve falls within the limit of rumble strips shown in these details, additional rumble strip sets spaced at 200' centers shall be constructed throughout the remainder of the approach curve.

4. Raised rumble strips shall be paid for per set under the contract unit price for Rumble Strip Sets, PS. Such price and payment shall be full compensation for all work and materials required without adjustment due to width of pavement receiving the strips or length of strips.

PLAN INTERSECTIONS

INSET A

INSET B

INSET A

INSET B

PLAN * ONE-WAY

PLAN * TWO-WAY

STRUCTURES WITH LESS THAN FULL WIDTH SHOULDERS

1. Raised rumble strip sets shall be constructed on all paved shoulders approaching structures, where the structure shoulder width is less than the usable shoulder width of the approach roadway. Raised rumble strip sets at intersections shall be constructed only when specified in the plans.

2. Raised rumble strips are to be constructed in accordance with Section 547 of the Specifications.

3. When any portion of a curve falls within the limit of rumble strips shown in these details, additional rumble strip sets spaced at 200' centers shall be constructed throughout the remainder of the approach curve.

4. Raised rumble strips shall be paid for per set under the contract unit price for Rumble Strip Sets, PS. Such price and payment shall be full compensation for all work and materials required without adjustment due to width of pavement receiving the strips or length of strips.

PLAN INTERSECTIONS

INSET A

INSET B

PLAN * ONE-WAY

PLAN * TWO-WAY

STRUCTURES WITH LESS THAN FULL WIDTH SHOULDERS

1. Raised rumble strip sets shall be constructed on all paved shoulders approaching structures, where the structure shoulder width is less than the usable shoulder width of the approach roadway. Raised rumble strip sets at intersections shall be constructed only when specified in the plans.

2. Raised rumble strips are to be constructed in accordance with Section 547 of the Specifications.

3. When any portion of a curve falls within the limit of rumble strips shown in these details, additional rumble strip sets spaced at 200' centers shall be constructed throughout the remainder of the approach curve.

4. Raised rumble strips shall be paid for per set under the contract unit price for Rumble Strip Sets, PS. Such price and payment shall be full compensation for all work and materials required without adjustment due to width of pavement receiving the strips or length of strips.

PLAN INTERSECTIONS

RAISED RUMBLE STRIPS
SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT

HALF PLAN
LIMITED ACCESS FACILITIES

SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT

ISOMETRIC - TRANSVERSE CUT

ISOMETRIC - LONGITUDINAL CUT

LOCATION ALONG SHOULDER (FLEXIBLE PAVEMENT)

SHOULDER GROUND-IN RUMBLE STRIPS

GENERAL NOTES FOR SHOULDER GROUND-IN RUMBLE STRIPS

1. Ground-in rumble strips shall be constructed on limited access facilities.
2. The skip array is the standard array. The continuous array shall be constructed in advance of bridge ends for a distance of 5000', or back to the gore recovery area for existing interchange bridges, and constructed at other specific locations as called for in the plans.
3. Ground-in rumble strips are to be constructed in accordance with Section 346 of the Specifications.
4. When friction course extends more than 6" beyond the edge of the travel lane, the extended friction course shall be bladed off back to the 8' line, prior to rumble strip grinding.
5. Both arrays shall be paid for under the contract unit price for Rumble Strips (Ground-In). Such price and payment shall be full compensation for all work and materials required.

DESIGN NOTE

1. The rumble strips described on this sheet are intended for use on flexible pavement shoulders. When constructing ground-in rumble strips on existing rigid concrete shoulders, no rumble strips shall be located closer than 6" from any pavement joint. When specifying ground-in rumble strips on existing rigid shoulders their location and array shall be detailed in the plans.
2. Other methods and types of applications shall not be used unless approved in writing by the State roadway Design Engineer. Approval will be considered only with sufficient documented justification for deviation from this standard.
RIGID PAVEMENT WITH FLEXIBLE PAVEMENT SHOULDER

See INSET A

RIGID PAVEMENT WITH RIGID PAVEMENT SHOULDER

See INSET A

ISOMETRIC - LONGITUDINAL CUT (RIGID PAVEMENT)

INSET A
1. Gravity wall design is based on the soil criteria which covers the majority of soils found in Florida. Classification = Cohesive (Fine Sand), Friction Angle = 30 degrees. Min. Unit Weight of Backfill = 120 psf/cu. ft. Presumptive Allowable Bearing Pressure = 0.50 psf for slopes equal to or flatter than 1:2, 1.50 psf for slopes steeper than 1:2. Corrected SPT Blow Count for foundation = 35 blows/ft. Coverage value within the range of depth from the base of wall to 2.0 feet below top of wall. Max. Seasonal High Water Table (SHWT) is one foot below the horizontal ground surface at the toe of the wall, except as noted.

2. In cases where the designer considers the slope at the specific location to be of lesser strength, an analysis is required to verify that sliding, bearing, overturning and stability requirements are satisfied.

3. Overall stability of the wall should be assessed when the backfill slope exceeds 1:2 (vert. : horiz.) or the seasonal high water table (SHWT) is less than 2 ft. below the ground surface.

4. Stability of the slope above the top of the gravity wall should be analyzed for slopes steeper than 1:2 (vert. : horiz.) with a minimum Factor of Safety = 1.3.

5. For Scheme 1 or Scheme 2, when a roadside barrier is required above the wall (guardrail) barrier wall, etc.) the deflection space required for the barrier must be considered. Locate the barrier so that there is no conflict between guardrail posts or barrier footing and the gravity wall backfill reinforcement. This may result in an offset greater than the minimum offset for the live load.

**ESTIMATED QUANTITIES FOR WALL**

<table>
<thead>
<tr>
<th>HEIGHT (FT.)</th>
<th>CLASS 1 CONCRETE (CY)</th>
<th>REINFORCING STEEL (LB.)</th>
<th>WEED HOLES (SPACED REG.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1' 0&quot; Min. to SHW</td>
<td>1.08</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td>2' 0&quot; Min. to SHW</td>
<td>1.04</td>
<td>0.02</td>
<td>0.09</td>
</tr>
<tr>
<td>3' 0&quot; Min. to SHW</td>
<td>0.22</td>
<td>0.03</td>
<td>0.29</td>
</tr>
<tr>
<td>4' 0&quot; Min. to SHW</td>
<td>0.32</td>
<td>0.04</td>
<td>0.43</td>
</tr>
</tbody>
</table>

**ESTIMATED QUANTITIES NOTES:**

For Scheme 3 Junction Slab and Traffic Railing see the referenced Design Standards for estimated quantities.

**DESIGN NOTES:**

1. Gravity walls constructed as extensions of reinforced concrete retaining walls except when proprietary designs, shall have the same face texture and finish as the reinforced concrete retaining wall.

2. Concrete for Gravity Wall shall be Class I (Nonstructural) per Section 347. Concrete for Scheme 3 Junction Slab and Traffic Railing shall be Class II per Section 346 unless otherwise specified in the plans.

3. Reinforcing steel shall be ASTM A515, Grade 40 or 60 provided at the max. spacings shown. ASTM A495 Smooth or ASTM A499 Deformed Welded Wire Fabric (WWF) may be substituted on an equal basis. Do not increase bar/wire spacing for Grade 60 reinforcing steel.

4. When required, for joints over reclaimed/bicycle railings see the plans, Index No. 850, 860 as appropriate. For adjacent Type B, see Index No. 852.

5. Joint seal to be two layers of 3/8" smooth roofing paper or Type O-5 geotextile fabric in accordance with Index No. 199. Map all contact surfaces at concrete and roofing paper or geotextile fabric with cut-back asphalt. Stop stop paper or geotextile fabric 11" below top of wall.

6. Provide a continuous 11" clean gravel or crushed rock drain for wall heights 3 ft. and higher. Wrap drainage layer as shown, with Type O-3 geotextile fabric in accordance with Index No. 199. Provide 6"x6" galvanized mesh with 4" openings, at the inside end and at the PVC Drain Pipe. Provide 2" PVC Drain Pipe (Schedule 40) at 10 ft. max. spacing. Allow Joint Seal to be two layers of 3/8" clear or joint seal.

7. Cost of reinforcing steel, face texture, finish, joint seal, drain pipes, drainage layer, galvanized mesh and geotextile fabric to be included in the Contract Unit Price for Class I Concrete (Retaining Walls) CY. Cost of concrete for Junction Slab in Scheme 3, to be included in Contract Unit Price for Class II Concrete (Retaining Walls). Adjacent traffic railings, bicycle railings or fences to be paid for separately.
Pedestrian Railing (Picket railing shown, other railings similar)

**STAIR TREAD AND RISER DETAILS**

1. The greatest clear height within the flight of steps shall not exceed the smallest by more than 3/4.
2. The greatest tread depth within the flight of steps shall not exceed the smallest by more than 3/4.

**ELEVATION**

- **E1:** 0' - 0"
- **E2:** 0' - 0"
- **E3:** 0' - 0"
- **E4:** 0' - 0"

**NOTES:** Provide a maximum of 12 risers between landings.

1. Do not use this Index for suspended (structural) steps or stairways.
2. Construct steps in accordance with Section 522 of the FOOT Standard Specifications.
4. Reinforcing Steel: Grade 60, ASTM A615.
5. Tread Finish: Broom, finish parallel to steps unless otherwise shown in Plans.
6. Pedestrian Railing: See Index Nos. 850, 860, 870, 880 or Project Specific Design.
7. Cost of concrete steps, landings, and cheekwalls shall be paid for under the contract unit price for Class I Concrete (Miscellaneous), CY. Cost of reinforcing steel shall be paid for under the contract unit price for Reinforcing Steel (Miscellaneous), LB.

**PLAN AT JUNCTION OF STEPS & LANDING**

(Bottom Landing shown, Top Landing similar)

**SECTION A-A**

- 9" Picket Railing
- 5'-0" Guardrail
- 5'-0" Cheekwall
- 2'-0" Min. Cover

**SECTION B-B**

- 6'-9" Picket Railing
- 5'-0" Guardrail
- 5'-0" Cheekwall
- 2'-0" Min. Cover

**SECTION C-C**

- 6'-9" Picket Railing
- 5'-0" Guardrail
- 5'-0" Cheekwall
- 2'-0" Min. Cover

**ALIGN RAILINGS**

- Handrail (Typ.)
- Landing
- Pedestrian Railing (Typ.)
- Cheekwall

**PLAN AT JUNCTION OF STEPS & LANDING**

(Bottom Landing shown, Top Landing similar)
PCC Pavement or Flexible Pavement

Shoulder Line

4' Shoulder Pavement

2 LANS

Shoulder Pavement

Edge Of Bem

Pavment Type As Ramp Port.
Shoulder Gutter (See General Note No. 4)

DETAIL A

TWO THRU LANES

Shoulder Gutter (See General Note No. 4)

INSET

Shoulder Line

2' Shoulder Pavement

Wdth Corrresponds To Case II
Traffic Condition "C"

Ramp Width Case II
Traffic Condition "C"

INSET

Slope Varies

Shoulder Gutter (See General Note No. 4)

SECTION AA

Width Corresponds To Case II
Traffic Condition "B"

Ramp Width Case II
Traffic Condition "C"

INSET

Shoulder Line

2' Shoulder Pavement

Wdth Corrresponds To Case II
Traffic Condition "B"

Ramp Width Case II
Traffic Condition "C"

INSET

Section 525

FLEXIBLE PAVEMENT THICKNESS TRANSITION

EXIT TERMINALS

SINGLE - LANE RAMPS

RAMP TERMINALS
GENERAL NOTES

1. Taper-Type exit and entrance terminals as detailed shall not be used on ramps for which a speed of 50 MPH or greater cannot be maintained. For such ramps, parallel deceleration and acceleration lanes shall be used in place of ramps with lengths set according to AASHTO.

2. (a.) PCC Pavement Projects: Where shoulder pavement adjacent to shoulder gutter is less than 6' wide, it shall be identical to the adjacent roadway pavement beginning with the transverse joint nearest the point of 6' width.

(b) Flexible Pavement Projects: Where shoulder pavement used in combination with shoulder gutter is less than 6' uniform width, it shall be identical to the adjacent roadway pavement.

3. For concrete pavement joint details and layouts at entrance and exit ramp terminals see Index No. 305.

4. Shoulder gutter applications will be determined by drainage design.
THREE THRU LINES - APPROACH AUXILIARY LANE

EXIT TERMINALS

TWO-LANE RAMPS
ACCELERATION LANE WITH SHOULDER GUTTER

DECELERATION LANE WITH SHOULDER GUTTER

SHOULDER TREATMENT
AT SPEED CHANGE LANES AT FREEWAY RAMP TERMINALS

FREEWAY RAMP TERMINALS
Standard cross road entrance terminals. To be used when roadway alignment is tangent and no bridges are located within the merging lane.

Parallel cross road entrance terminals. Recommended when a bridge is located within the merging lane.

Standard cross road exit terminal. To be used when roadway alignment is tangent.

Parallel cross road exit terminals. Recommended when exit is partially hidden over the crest of vertical curve or when turning roadway speed is less than 60% of the thru roadway speed, or for the combinations of horizontal alignment shown elsewhere on this sheet.

UNIVERSAL ENTRANCES

UNS/GNAZED ENTRANCES

UNS/GNAZED EXITS

NOTE: Ramp terminals on curves should be avoided when possible.
4-LANE WITH TWO-WAY LEFT-TURN LANES

4-LANE UNDIVIDED FLARED - SYMMETRICAL

INTERSECTION TURNS AND STORAGE

Notes:
- For locations with unrelocatable control points, minimum taper rates for lane drop (L_d) will be 1:60.
- For pavement markings refer to Index No. 0346.
FLARED & PAINTED LEFT TURNS FOR 2-LANE 2-WAY ROADWAYS
4-LANE DIVIDED TO 4-LANE UNDIVIDED

4-LANE DIVIDED TO 2-LANE UNDIVIDED

4-LANE UNDIVIDED TO 2-LANE UNDIVIDED

LANE DIVERGENCE AND CONVERGENCE FOR CENTERED ROADWAYS
CONNECTING FLARE WITH PAVED SHOULDERS TO EXISTING ROADWAY WITHOUT PAVED SHOULDERS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING SYMMETRICAL FLARE WITHOUT PAVED SHOULDERS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING ASYMMETRICAL FLARE WITHOUT PAVED SHOULDERS

CONNECTING SIMILAR WIDTH PAVEMENTS

CONNECTING DIFFERENT WIDTH PAVEMENTS

FLARED - PAVED SHOULDERS

PAVED SHOULDER TREATMENT AT TRANSITIONS AND CONNECTIONS

S = Design speed (mph)
NOTES FOR SHEETS 5 THRU 8

1. The transition details as represented on sheets 5 thru 8 are intended as guidelines only. The transition lengths, curve data, nose radii and offsets are valid only for tangent alignment, design speeds ≤45 mph, the median widths and lane widths shown.

2. Approach lane departures (≤5°) are suitable for design speeds up to 60 mph. Interior curves (≤1°) are suitable for normal crown for design speeds up to 50 mph. Merging curves (≤2°) will require superelevation.

3. The geometrics of these schemes are associated with the standard subsectional spacing for sideroads, but in any case will require modification to accommodate sideroad location, multilane and/or divided sideroads, oblique sideroads, crossover widths, storage and speed change lane requirements, and, other related features.

LEFT ROADWAY CENTERED ON APPROACH ROADWAY

TWO LANE TO FOUR LANE TRANSITION
LEFT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION

L = WS for speeds ≤ 45 mph
L = WD for speeds > 40 mph

Where:
W = Width of lateral transition in feet.
S = Design speed.
RIGHT ROADWAY CENTERED ON APPROACH ROADWAY
TWO LANE TO FOUR LANE TRANSITION

L=WS for speeds >45 mph
L=WS/2 for speeds ≤40 mph

Where:
W=Width of lateral transition in feet,
S=Design speed.
**22' MEDIAN**

**40' MEDIAN**

**64' MEDIAN**

RIGHT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION

L = \( \frac{W}{5} \) for speeds ≤ 45 mph

L = \( \frac{W}{10} \) for speeds > 40 mph

Where:

W = Width of lateral transition in feet.

S = Design speed.

2008 FDOT Design Standards

ROADWAY TRANSITIONS
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer tackler merging and for minimum clearance between trucks exiting opposing movement. The depleted design only applies where roads and streets intersect at 90° to the mainline and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

Returns Depicted:
Three Centered Compound Curves For All Returns Depicted
40'-47-312/Postu, 8' And B Offsets
Simple Curves With Tapers Not Shown
40° Radius, 1/2, and (B Tapers With
2' And 8 Offsets Tested (Practical Fit))

SWEPT PATH LEGEND:
WB 40
SU

40' MEDIAN • 4-LANE DIVIDED • PARALLEL TURN BAY • 2001 AASHTO SU & WB-40 (WB-12)
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside turning. The depicted design only applies where roads and streets intersect at 90° to the mainline. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 WB-50 tractor-semitrailer.

RETURNS:

Returns Depicted:

- Simple Curve With Tapers For Returns Nos. 1, 2 & 4 (Best Configuration):
  - 70' Radii
  - 2'/5 And 6'/2 Tapers
- Three Centered Compound Curves For Return No. 3:
  - 100'-150'-200' Radii, 2' And 15' Offsets

40' MEDIAN • 4-LANE DIVIDED • PARALLEL TURN BAY • 2001 AASHTO WB-50 (WB-15)
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for separation clearance between tracks making opposing movements. The depicted design only applies where roads and streets intersect at 90° to the median and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

RETURN NO. 1
RETURN NO. 2
RETURN NO. 3
RETURN NO. 4

QUADRANT NO S. 1 & 2 VACANT

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking. The depicted design only applies where roads and streets intersect at 90° to the median. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.
**FLOOR**

- 6" Reinforced Concrete Slab w/WFP 6 x 6 x 4 w/C4
- 1'-6" x 1'-6" Drop Footing At Slab Perimeter & Interior Piers.
- Harden & Broom Finish Slab Surface.

**STRUCTURE**

- Posts: 8 x 8 FT
- Beams: 4 x 6 FT
- Framing: 4x PT As Described.
- Misc Members: As and Ex As Described.

**ROOF**

- 3" x 6" T&G Wood Decking.
- 50' Asphalt Impregnated Fiberglass Felt Underlayment.
- Standing Seam Metal Roof (24 Ga Steel Or 0.030 Alum. w/Kynar 500 Finlsh.
- Sheathing, Sealing And Roofing Shall Be Designed To Withstand 130 mph Wind Load.

**BUILDING CODE**

CONCRETE
Concrete: FDOT Class III
Reinforcing Bars: ASTM A6/A615, Grade 400
Welded Wire Fabric: ASTM A-185
Vapor Barrier: Black 6-mil Polyethylene

STEEL
Galvanized Steel Plates: Steel Plates ASTM A446 with 60 Gm Zinc Coating
Galvanized Fasteners: High-Strength Bolts and Nuts, ASTM A325 with 80 Gm Zinc Coating
Galvanized Shapes After Fabrication, Make Field Paintings To Galvanizing With High Zinc Dust Content Primer, Complying With SSPC-Prime-80

WOOD
Comply With American Institute For Timber Construction, "Standard For Heavy Timber Construction"
For Solid Wood Decking, Comply With ATC 30, Standard For Tongue And Groove Heavy Timber Standard"
Species: Douglas Fir, Hem-fir, Or Southern Pine, At Fabricator's Option
Preservative Treatment: Pressure Treated Wood With Waterborne Solution For Above Ground Use, Complying With AMCA C2
Wood Decking: Field STUD Dealing At 30° Centers For Lateral Spiking To Adjacent Units. Spikes To Be 20d Galvanized Common

PICNIC TABLES
Plastic Tables And Benches Shall Be 6 x 6 x Heavy Galvanized Pipe Frames And Recycled Plastic Wood Seats And Table Tops. All Tables Shall Be Of Wood Thru Design Suitable For Exterior Locations. Tables At Accessible Pavilions Shall Meet The Requirements Of The Americans With Disabilities Act (ADA) Accessibility Guidelines

PICNIC PAVILIONS
GENERAL NOTES

5. Mailboxes shall be located on the right-hand side of the roadway in the direction of the delivery route, except on one-way roads and streets where they may be placed on the left-hand side.

6. Mailboxes shall be light sheet metal or plastic construction, in traditional style only, and
only in size I as prescribed by the Domestic Mail Manual of the U.S. Postal Service.
Mailbox production standards, lists of approved manufacturers and suppliers of mailboxes,
design approval and guidance may be obtained by writing to the Rural Delivery Division,
Delivery Service Department, Operations Group, USPS Headquarters, Washington, DC,
20260.

7. No more than two mailboxes may be mounted on a support structure unless the support structure and mailbox arrangements have been shown to be safe by crash testing in accordance with NCHRP Report 350 and listed on the Department's Qualified Products List (GPL).

8. Lightweight newspaper receptacles may be mounted below the mailbox on the side of the support post in conformance with the USPS Domestic Mail Manual. The mail patron shall be responsible for newspaper receptacle installation and maintenance.

9. Wood and steel support posts for both single and double mailbox mountings shall be embedded no more than 24" into the ground.

Concrete, block, brick, stone, or other rigid foundation structure or encasement,
either above or below the shoulder groundline, will not be permitted for mailboxes on
rural highways. On urban roads and streets where mailbox support posts are set
within rigid pavement back of curb, the support posts shall be separated from the
pavement by a minimum of 1" of expansion material.

Support posts shall not be fitted nor installed with surface mount base plates.

10. At driveways entrances mailboxes shall be placed on the far side of the driveway
in the direction of the delivery route.

At intersecting roads mailboxes shall be located 100' or more from the centerline of the
intersecting road on the far side. In the direction of the delivery route, with
the distance increased to 200' when the route volume exceeds 400 vehicles per day.

11. Wood support posts shall be in conformance with the material and dimensional
requirements of Section 952 and the treatment requirements of Section 955 of
the Standard Specifications.

Steel support posts shall have an external finish equal to or better than two coats of
weather resistant, air dried or baked, paint or enamel. Surface(s) shall be cleaned of
any loose scale prior to finishing. The Postal Service prefers that posts be painted
white, but other colors may be used when approved by the Engineer. When galvanized
posts are used painting is not required.

Mounting brackets, plates, shelves and accessory hardware surface finishes
are to be suited to support post finish.

12. Mailboxes shall be paid for under the contract unit price for Mailboxes, Each.
Payment shall be limited to one mailbox per patron address whether the mailbox is
new, reused, salvaged, reset or relocated. Payment shall be per mailbox regardless
of the number of mailboxes per support or grouping arrangement.

The above compensation shall include any work and cost incurred by the contractor
for removal and disposal of existing mailboxes.

There shall be no payment participation for NDCBU furnishing, assembly, installation,
resetting or relocation.
Symmetrical About E

One Row Of 1" x 8" Long Drills In 10" Centers
(In Center Of Slab)

Width Varies - See Section Below

PLAN

SECTION AA
Note: Class I concrete is to be used unless otherwise noted in plans or special provisions.

REINFORCED CONCRETE
TYPE A

GENERAL NOTES
1. Tractor crossing shall be paid for under the contract unit price for Tractor Crossing, EA.

TRACTOR CROSSINGS

A Sufficient number of mats will be used as to extend a minimum of four feet (4') beyond roadway shoulders.

PLAN

SECTION BB
Note: Tractor crossing to be constructed to match pavement cross slope.

TREATED TIMBER
TYPE B

TRACTOR PASSAGE

GENERAL NOTES
2008 FDOT Design Standards

Last Revision
Sheet No.
1 of 1

Index No.
535
**INSTALLATION**

NOTES:

1. Elevation of the top of each length of marker pipe shall be determined as soon as it is installed and also immediately before the next length of marker pipe is added.

2. Settlement plate locations shall be flagged and protected from construction vehicles and equipment. If settlement plates are disturbed, they shall be replaced in kind.

3. Oakum used to construct seal should not have a mesh covering (plastic or other synthetic material).

4. The settlement plates shall be paid for under the contract unit price for Settlement Plate Assembly, #540.
**General Notes:**

1. All dimensions 6" and less are exaggerated for illustrative purposes only.

2. Plant containers shall be removed prior to planting. If plants are not container grown, remove a minimum of the top 1/3 of burlap, fabric, or wire mesh. Never lift or handle the tree by the trunk.

3. The uppermost root on all trees shall be covered by less than 1" of soil. Use hand tools to carefully remove all excess soil. The top of the rootball shall be at least 2" above finish grade and per plumb to the horizon. If planting pit is too deep, remove the tree and firmly pack additional soil in the bottom of the planting pit to raise the rootball. After positioning the tree in the planting pit, slice through rootball with 3 or 4 vertical slices (top to bottom) equally distributed around the tree.

4. Backfill shall be loose existing soil. Remove rocks, sticks, or other deleterious material greater than 1" in any direction prior to backfilling. Water and tamp to remove air pockets. If existing soils contain excessive sand, clay, or other material not conducive to proper plant growth, contact Engineer prior to planting.

5. Soil rings shall be constructed of existing soil at the outer edge of the planting pit, with a height of 3" and gently sloping sides. Do not pile soil on top of rootball.

6. Mulch shall be a 3" deep layer placed to the edge of the rootball, around the base of shrubs, or solidly around groundcover. Never pile mulch against the tree trunk.

7. Straps shall be minimum 1" wide nylon or polypropylene. All wood stakes or anchors shall be located beyond the edge of soil ring and located below finished grade, unless otherwise specified.

8. Sidewalls may be hurricane cut. All other sides must have trunks filled with biodegradable twine. Pole trunks shall have no burn marks, sars, or sanding.

9. All dimensions provided for hardwood are nominal.

10. When a permanent, subsurface, or drip irrigation system is provided, a soil ring is not required. Water to edge of planting pit.

11. Alternate tree bracing and guying systems approved by the Engineer may be used in lieu of the tree bracing and guying methods detailed on the index. Alternate tree protection systems approved by the Engineer may be used in lieu of the tree protection systems detailed on the index.

12. Remove aboveground guying systems at the end of the establishment period.
GENERAL NOTES

1. Details apply to both rural and urban intersections under stop sign control or flashing beacon control. For full signal controlled intersections see Design Note No 4.

2. Sight distance (d) applies to normal and skewed intersections (intersecting angles between 90° and 120°), and where vertical and/or horizontal curves are present. Sight distance (d) is measured along the major roadway from the center of the entrance lane of the minor roadway to the center of the near approach lane (right or left) of the major roadway. Distances dL and dR are measured from the centerline of the entrance lane of the minor roadway to a point on the near roadway. Distance d is measured from the centerline of the entrance lane of the minor roadway to a point on the median clear zone limit or horizontal clearance limit for the far side roadway of the major roadway.

3. a. The limits of clear sight define a corridor throughout which a clear sight window must be preserved. See WINDOW DETAIL, Sheet 6.

b. Clear sight must be provided between vehicles at intersection stop locations, and vehicles on the major roadway within dimension 'd'.

c. Since observations are made in both directions along the line of sight, the reference datum between roadways is relocated or eliminated plantings.

4. Barrier systems within intersection sight corridors, where penetration into the sight window might

5. Restrictive planting area. Drivers of vehicles on the intersecting roadway

6. Trees:

<table>
<thead>
<tr>
<th>Description</th>
<th>Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td>(Inches)</td>
<td></td>
</tr>
<tr>
<td>Minimum Spacing (c, 10 of Track)</td>
<td>22</td>
</tr>
<tr>
<td>(Feet)</td>
<td></td>
</tr>
</tbody>
</table>
| Sight distance based on the Passenger Vehicle is suitable for most intersections.
Where substantial volumes of heavy vehicles enter the major road, such as from ramp terminals with stop control or roadways serving truck terminals, the use of tabulated values for SV Vehicles or Combination Vehicles should be considered.

7. Where curvature, superelevation, adverse split profiles or other conditions preclude the use of standard tree sizes and spacing, proof of view and shadowing restraints must be documented and the size and location of trees in medians detailed in the plans.

SIGHT DISTANCE AT INTERSECTIONS

1. The information shown on this index is intended solely for the purpose of clear sight development and maintenance at intersecting highways, roads and streets, and is not intended to be used to establish roadway and roadside safety except as related to clear sight corridors. An analysis of sight distance shall be documented for all intersections.

2. Details are based on the AASHTO "Policy On Geometric Design Of Highways And Streets," 2000, CHAPTER 9, INTERSECTION SIGHT DISTANCES, CASES B and F, and Department practices for channelized median openings (left turns from major roadways).

3. The minimum driver eye setback of 14.5' from the edge of the traveled way may be adjusted on any intersection leg only when justified by a documented, site specific field study of vehicle stopping position and driver eye position.

4. For SIGNALIZED INTERSECTIONS sight distances should be developed based on AASHTO "Case D" intersections With Traffic Signal Control. At signalized intersections, the first vehicle stopped on each approach should be visible to the driver of the first vehicle stopped on each of the other approaches. Left-turning vehicles should have sufficient sight distance to select gaps in opposing traffic and complete left turns. Apart from these sight conditions, there are generally no other approach or departure sight triangles needed for signalized intersections. However, if the traffic signal is to be placed on two-way flashing operation (i.e., flashing yellow on the major-road approaches and flashing red on the minor-road approaches) under off-peak or nighttime conditions, then the appropriate departure sight triangles for Case B, both to the left and to the right, should be provided for the minor-road approaches. In addition, if right turns on a red signal are to be permitted from any approach, then the appropriate departure sight triangles to the left for Case B2 should be permitted to accommodate right turns from that approach.

5. Trees can be used with lawn, pavers, pavement, gravel, bark or wood chips basal covers or other Department approved material. The clear sight window must be in conformance with the WINDOW DETAIL modified to attain the height requirements listed in "Ground Covers" above. Tree size and spacing shall conform to the following tabular values:

6. Minimum Spacing (c, 10 of Track)
PICTORIAL
2 LANE UNDIVIDED

Legend:
- Areas Free of Sight Obstructions

NOTE: See Sheet 6 for intersecting roadway origin of clear sight and quadrant corner clips.
SIGHT DISTANCES ($d_1$) AND RELATED DISTANCES ($d_2$, $d_3$, $d_4$ & $d_{OL}$) (FEET)

4 LANE DIVIDED ROADWAY

**PASSENGER VEHICLE (P)**

**SINGLE-UNIT TRUCK (SU)**

**INTERMEDIATE SEMI-TRAILERS (WB-40 & WB-50)**

**NOTES FOR 4-LANE DIVIDED ROADWAY**

1. See Sheet 6 for origin of clear sight line on the minor road.

2. Values shown in the tables are the governing (controlling) sight distances calculated based on "AASHTO Case B - Intersection with Stop Control on the Minor Road."

**LEGEND**

- Areas Free Of Sight Obstructions
- Areas Limited To Ground Cover
- Areas With Obscuring Barriers

**INSET A**

Where the median is sufficiently wide for the design vehicle to pause in the median (vehicle length plus 6' with) the clear line of sight to the right ($d_1$) is measured from the vehicle pause location, i.e., not from the crossroad stop position. Distances $d_2$ & $d_3$ do not apply.

**INSET B**

SIGHT DISTANCE AT INTERSECTIONS
SIGHT DISTANCES \((d), (d_v)\) & \((d_s)\) AND RELATED DISTANCES \((d_l, d_m, d_e & d_{vl})\) (FEET)

6 LANE DIVIDED
Minor Road Under Stop Control

The Traveled Way is the portion of the roadway for the movement of vehicles, exclusive of shoulders and marked bicycle lanes.

Note: Lines for 'Limit of Clear Sight' are opposite hand when major road near lane traffic moving left (e.g., one-way left).

The intent of this standard is to provide a window with vertical limits of not less than 5' above and 6' below the sight line datum, and horizontal limits defined by the limits of clear sight.

The values in the table were established by the method referenced in Design Note 2, and are applicable to urban, predominantly curbed roadways with design speeds of 45 mph or less and meeting the restricted conditions defined in Index No. 700. For horizontal clearance (HC) of six feet (6'), the values for \( d_2 \) may be determined by the equation \( d_2 = \frac{d_1}{6} + 9.1\). For roadways with nonrestricted conditions, \( d_1 \) should be based on the geometry for the left turn storage and on clear zone widths (see Index No. 700).

Areas Free Of Sight Obstructions

LEGEND

Channelized Directional Median Openings

Sight Distance at Intersections
Crossing Shoulder Pavement Exception Area Occupied by Crossing Surfacing Material in:
(a) To Shoulder Line for Outside Shoulders Less Than 4 Feet.
(b) To Shoulder Line For Outside Shoulders 4 Feet or More (irrespective of Aspersion Shoulder Pavement Width).
(c) 4 Feet for Wagon Shoulders.

WHERE THE EXISTING SHOULDER IS NONCONFORMING FOR THE FACILITY, THE SHOULDER WIDTH SHOULD BE ENLARGED TO ACCOMMODATE CROSSING SHOULDER PAVEMENT.

ROADWAYS WITH FLUSH SHOULDERS

SECTION VIEW

TYPICAL CROSSING MATERIAL REPLACEMENT AT RR CROSSINGS

CROSSING SURFACES

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Concrete</td>
</tr>
<tr>
<td>R</td>
<td>Rubber</td>
</tr>
<tr>
<td>RA</td>
<td>Rubber/Agg.</td>
</tr>
</tbody>
</table>

VERTICAL ROADWAY ALIGNMENT THROUGH A RAILROAD CROSSING

General Notes
1. The Railroad Company will furnish and install all track bed (ballast), crossties, rails, crossing surface panels and accessory components. All pavement materials, including that through the crossing, will be furnished and installed by the Department or its Contractors unless negotiated otherwise.
2. When a railroad grade crossing is located within the limits of a highway construction project, a transition pavement must be maintained at the approaches of the crossing to reduce vehicular impacts to the crossing. The transition pavement will be maintained at the approaches of the crossing to reduce vehicular impacts to the crossing. The transition pavement will be maintained as appropriate to protect the crossing from low clearance vehicles and vehicular impacts until the construction project is completed and the final highway surface is constructed.
3. The General Contractor will erect traffic control devices at the site of the crossing in accordance with the signed, approved drawings and specifications.
4. The General Contractor shall include on the plans and specifications, or as an addendum to the above, the railroad crossing design information, which shall include:
   a. Photographs and other visual aids to clearly show the location of all components.
   b. As-built drawings of the existing crossing.
   c. All proposed changes to the existing crossing.
   d. A list of all materials and equipment to be furnished by the contractor, including the manufacturer's name, model number, and any other pertinent information.
5. The General Contractor shall submit the approved engineering drawings to the appropriate engineering office for review and approval. The approved engineering drawings shall be used as the basis for the construction of the railroad crossing.
6. All plans and specifications must be submitted in accordance with the requirements of the District Office.

To prevent low-clearance vehicles from becoming caught on the tracks, the crossing surface should be at the same plane as the top of the rails for a distance of 2 feet outside the rails. The surface of the highway should also be at least 3 inches higher or lower than the top of the nearest rail or a point 5 feet from rail unless track super-elevation makes a difference that is appropriate. Vertical curves should be used to traverse from the highway grade to a level plane at the elevation of the rails. Rails that are super-elevated, or a roadway approach section that is at least 6 feet wide, may necessitate a site-specific analysis for rail presence.
OVERHEAD WORK

Work is only allowed over a traffic lane when one of the following options is used:

OPTION 1 (OVERHEAD WORK USING A MODIFIED LANE CLOSURE)

Work using a modified lane closure is allowed if:

a. Construction work is within 2 feet of the edge of travelway with a width of 4 feet or less.
b. Traffic control devices are placed directly under the work area.
c. Traffic control devices are placed in advance of the vehicle/vehicle/equipment on lanes using a lane closure of less than 0.5 lane.
d. Aerial lift equipment in the work area has a high-intensity, rotating, flashing, oscillating, or strobe lights operating.
e. Aerial lift equipment is placed directly below the work area.
f. Traffic control devices are placed in advance of the vehicle/equipment/equipment lane using a lane closure of less than 0.5 lane.
g. Volume or complexity of the roadway may dictate additional devices, signs, flagmen and/or a traffic control officer.

OPTION 2 (OVERHEAD WORK ABOVE AN OPEN TRAFFIC LANE)

Work above an open traffic lane is allowed if all of the following conditions are met:

a. Work operations are not on a utility pole, light pole, signal pole, or their attachments.
b. Work operations are 60 minutes or less.
c. Speed limit is 45 mph or less.
d. No encroachment by any part of the work activities and equipment on an area bounded by 2 feet outside the edge of travelway and 18 feet high.
e. Aerial lift equipment in the work area has a high-intensity, rotating, flashing, oscillating, or strobe lights operating.
f. Volume or complexity of the roadway may dictate additional devices, signs, flagmen and/or a traffic control officer.
g. Adequate precautions are taken to prevent parts, tools, equipment and other objects from falling into open lanes or traffic.
h. Other Governmental Agencies, Rail facilities, or Codes may require a greater clearance. The greater clearance required prevails as the rule.

OPTION 3 (OVERHEAD WORK ADJACENT TO AN OPEN TRAFFIC LANE)

Workhead adjacent to an open traffic lane is allowed if all of the following conditions are met:

a. Work operations are on a utility pole, light pole, signal pole, or their attachments.
b. Work operations are 1 day or less.
c. Speed limit is 45 mph or less.
d. No encroachment by any part of the work activities and equipment on an area bounded by 2 feet outside the edge of travelway and 18 feet high.
e. Aerial lift equipment in the work area has a high-intensity, rotating, flashing, oscillating, or strobe lights operating.
f. Volume or complexity of the roadway may dictate additional devices, signs, flagmen and/or a traffic control officer.
g. Adequate precautions are taken to prevent parts, tools, equipment and other objects from falling into open lanes or traffic.
h. Other Governmental Agencies, Rail facilities, or Codes may require a greater clearance. The greater clearance required prevails as the rule.

OPTION 4 (OVERHEAD WORK USING A STANDARD LANE CLOSURE)

The lane directly below the overhead work is closed in accordance with the appropriate standard index drawing or detailed in the plans.

SIGHT DISTANCE

Tapers: Transition tapers should be obvious to drivers. If restricted sight distance is a problem (e.g., a sharp vertical or horizontal curve), the taper should begin well in advance of the view obstruction. The beginning of tapers should not be hidden behind curbs.

Intersections: Traffic control devices at intersections must provide sufficient sight distance for the road user to perceive potential conflicts and to traverse the intersection safely.

ABOVE GROUND HAZARD

Above ground hazards (as defined) are to be considered work areas during working hours and treated with appropriate work zone traffic control procedures. During nonworking hours, all objects, materials and equipment that constitute an above ground hazard must be moved outside the travelway and clear zone or be shielded by a barrier or crash cushion.

For above ground hazards within a work zone the clear zone required should be based on the regulatory speed posted during construction.

CLEAR ZONE WIDTHS FOR WORK ZONES

The term ‘clear zone’ describes the unobstructed relatively flat area, impacted by construction, extending outward from the edge of the travel lane. The table below gives clear zone widths in work zones for medians and roadside conditions other than for road side canals where roadside canals are present, clear zone widths are to conform with the distances as canals as described in Volume 2, Chapter 6, Section 4.2 and Exhibit 4-A and 4-B of The Plans Manual

<table>
<thead>
<tr>
<th>WORK ZONE SPEED</th>
<th>WIDTHS</th>
<th>WORK ZONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35</td>
<td>60</td>
<td>(&quot;)</td>
</tr>
<tr>
<td>35-40</td>
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<tr>
<td>45-50</td>
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<td>60</td>
<td>45-50</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>45-50</td>
</tr>
</tbody>
</table>

SUPERELEVATION

Horizontal curves constructed in conjunction with work zone traffic control should have the required superelevation applied to the design radius. Under conditions where normal cross slope controls curvature, the minimum radius that can be applied are listed in the table below.

<table>
<thead>
<tr>
<th>MINIMUM RADII FOR NORMAL CROSS SLOPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>MPH</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>100</td>
</tr>
</tbody>
</table>

General information for traffic control through work zones.
**OVERWEIGHT/OVERSIZE VEHICLES**

Restrictions to Lane Widths, Heights or Load Capacity can greatly impact the movement of over dimensioned loads. The Contractor shall notify the Engineer who in turn shall notify the State Permits Office, phone no. (850) 410-5777, at least seven calendar days in advance of implementing a maintenance of traffic plan which will impact the flow of overweight/oversized vehicles. Information provided shall include location, type of restriction (height, width or weight) and restriction time frames. When the roadway is restored to normal service the State Permits Office shall be notified immediately.

**LANE WIDTHS**

Lane widths of through roadways should be maintained through work zone travel ways wherever practical. The minimum widths for work zone travel lanes shall be as follows: 11' for interstate with at least one 12' lane provided in each direction, unless formally expected by the Federal Highway Administration, 11' for freeways; and 10' for all other facilities.

**LENGTH OF LANE CLOSURES**

Lane closures shall not exceed 2 miles in total length (taper, buffer space and work space) in any given direction on the Interstate or on state highways with a posted speed of 55 MPH or greater.

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**TYPICAL PLACEMENT OF TEMPORARY RAISED RUMBLE STRIPS**

**GENERAL NOTES**

1. Temporary raised rumble strip sets shall be placed in advance of each flagging station when called for in the plans.

2. Temporary raised rumble strip sets are used to supplement a series of advanced warning signs and shall be installed and removed when the signs are installed and removed.

3. Remove the temporary raised rumble strips prior to removing the advance warning signs.
HIGH-VISIBILITY SAFETY APPAREL

All high-visibility safety apparel shall meet the requirements of the International Safety Equipment Association (ISEA) and the American National Standards Institute (ANSI) for High-Visibility Safety Apparel*, and labeled as ANSI/ISEA 107-2004. The apparel material color shall be either fluorescent orange-red or fluorescent yellow-green as defined by the standard. The retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. Class 3 apparel may be substituted for Class 2 apparel. Replace apparel that is not visible at 1,000 feet.

WORKERS: All workers within the right-of-way shall wear ANSI/ISEA Class 2 apparel. Workers operating machinery or equipment in which loose clothing could become entangled during operation shall wear fitted high-visibility safety apparel. Workers inside the bucket of a bucket truck are not required to wear high-visibility safety apparel.

UTILITIES: When other industry apparel safety standards require utility workers to wear apparel that is inconsistent with operation, replace apparel that is not visible at 1000 feet.

FLAGGERS: For daytime activities, Flaggers shall wear high-visibility safety apparel and equipment. Where floggers are used, a FLAGGER symbol or legend sign must be placed below the construction warning sign for which the reduced speed conditions exist. All workers visible within the work zone regulatory speeds are removed, the regulatory speed existing prior to construction will automatically go back into effect unless new speed limit signing is provided for in the plans. On projects with interspersed work activities, speed reductions should be located in proximity to those activities which merit a reduced speed, and not “blanketed” for the entire project. At the departure of such activities, the normal highway speed should be posted to give the motorist notice that normal speed can be resumed.

If the existing regulatory speed is to be used, consideration should be given to supplementing the existing regulatory speeds with the following signs: For projects where the reduced speed conditions exist for greater than 1 mile in rural areas, a sign to the effect “Reduced Speed” shall be placed in the right or left hand lane. For projects located on interstate highways or on rural or urban interstate, additional regulatory speed signs are to be placed at no more than 1 mile intervals. Engineering judgement should be used in placement of the additional signs. Loading these signs beyond ramp entrances and beyond major intersections are examples of improper placement. When urban conditions (non-interstate), additional speed signs are to be placed at a maximum of 1,000 feet apart.

When field conditions warrant speed reductions different from those shown in the TCP, the contractor may submit to the project engineer an engineering judgment. The speed shall be established to route vehicles safely through the work zone as close as to normal highway speed as possible. The regulatory speed shall not be reduced more than 10 mph below the posted speed and never below the minimum statutory speed for the class of facility. When a speed reduction greater than 10 mph is imposed, the reduction is to be done in 10 mph per 5000 increments.

Temporary regulatory speed signs shall be removed as soon as the conditions requiring the reduced speeds no longer exist. Class 3 apparel may be substituted for Class 2 apparel. When other industry apparel safety standars require the reduced speed conditions exist, the regulatory speed shall be automatically removed when the equipment is removed from the work zone.

In general, the regulatory speed should be established to route vehicles safely through the work zone as close as to normal highway speed as possible. The regulatory speed should not be reduced more than 10 mph below the posted speed and never below the minimum statutory speed for the class of facility. When a speed reduction greater than 10 mph is imposed, the reduction is to be done in 10 mph per 5000 increments.

Traffic Control Plans (TCPs) for all projects must include specific regulatory speeds for each phase of work. This can either be the posted speed or a reduced speed. The speed shall be noted in the TCPs. This includes indicating the existing speed if no reduction is to be made. Regulatory speeds are to be uniformly established through each phase.

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SIGN PLACEMENT
Post-mounted signs installed at the side of the road shall be mounted at a height of at least 7 feet measured from the bottom of the sign to a point a line extended from the near edge of the pavement. Signs mounted on barricades, or other portable supports shall be no less than 1 foot above the traveled way.

SIGN MATERIALS
Mesh signs may be used only for Daylight Operations as noted in the standards. Type B Lights and Orange Flags are not required except for survey work zones.

Vinyl signs may be used for Day or Night Operations not to exceed 1 day except as noted in the standards. Type B Lights and Orange Flags are not required except for survey work zones.

INTERSECTING ROAD SIGNING
Signing for the control of traffic entering and leaving work zones by way of intersecting highways, roads and streets shall be adequate to make drivers aware of work zone conditions. Under no condition will intersecting leg signing be less than a ROADSIGN INTERSECTION as noted in the standards. Type B Lights and Orange Mesh signs may be used only for Daylight Operations not to exceed roads and streets shall be adequate to make drivers WORK AHEAD sign.

except for survey work zones.

ADJOINING AND/OR OVERLAPPING WORK ZONE SIGNING
Adjoining work zones may not have sufficient spacing for standard placement of signs and other traffic control devices in their advance warning areas or in some cases other areas within their traffic control zones. Where such restraints or conflicts occur or are likely to occur, one of the following methods will be employed to avoid conflicts and prevent conditions that could lead to misunderstanding on the part of the traveling public as to the intended travel way by the traffic control procedure applied:

(A) For selected projects the engineer in responsible charge of project design will resolve anticipated work zone conflicts during the development of the project traffic control plan. This may entail revision of plans on preceding projects and coordination of plans on concurrent projects.

(B) Unanticipated conflicts arising between adjoining in progress highway construction projects will be resolved by the Resident Engineer for projects under his responsibility, and, by the District Construction Engineer for in progress projects under adjoining responsibilities.

(C) The District Maintenance Engineer will resolve anticipated and occurring conflicts within scheduled maintenance operations.

(D) The Unit Maintenance Engineer will resolve conflicts that occur within maintenance areas, including maintenance works, between maintenance operations, and, between unit controlled maintenance works and highway construction projects.

SIGN COVERING AND INTERRUPTION WORK STOPPAGE SIGNING
Existing signs that conflict with temporary work zone signing shall be removed or covered as approved by the Engineer. Traffic control signs that require covers when no work is being performed in a work area shall be fully covered with a durable opaque sheet material.

Plastic film and woven fabric including burlap will not be permitted. Covers, hinged panels and intermittent work stoppage shields and plaques are incidental to work operation signs and are not to be paid for separately.

SIGNING FOR DETOURS, LANE SHIFTS AND DIVERSIONS
Detours should be signed clearly over their entire length so that motorists can easily determine how to return to the original roadway. The reverse curve (W-4) warning sign should be used for the advanced warning for a lane shift.. A diversion should be signed as a lane shift..

EXTENDED DISTANCE ADVANCE WARNING SIGN
Advance Warning Signs shall be used at extended distance of one-half mile or more where limited sight distance or the nature of the obstruction may require a motorist to bring their vehicle to a stop. Extended distance Advanced Warning Signs may be required on any type roadway, but particularly be considered on multilane divided highways where vehicle speed is generally in the higher range (45 MPH or more).

UTILITY WORK AHEAD SIGN
The UTILITY WORK AHEAD (W-1) sign may be used as an alternate to the ROAD WORK AHEAD or the ROAD WORK XX FT (W-2) sign for utility operations on or adjacent to a highway.

LENGTH OF ROAD WORK SIGN
The length of road work sign (G20-1) bearing the legend ROAD WORK NEXT XX FT is required for all projects of more than 2 miles in length. The number of miles entered should be rounded up to the nearest mile. The sign shall be located at begin construction points.

SPREADING FINES DOUBLED WHEN WORKERS PRESENT SIGN
The SPREADING FINES DOUBLED WHEN WORKERS PRESENT sign should be installed on all projects, but may be omitted where the work operation is less than 1 day. The sign should be 500 feet beyond the ROAD WORK AHEAD sign or midway to the next sign, whichever is less.

GROOVED PAVEMENT AHEAD SIGN
The GROOVED PAVEMENT AHEAD sign is required 500 feet in advance of a milled or grooved surface open to traffic.

END ROAD WORK SIGN
The END ROAD WORK sign (G20-2A) should be installed on all projects, but may be omitted where the work operation is less than 1 day. The sign should be placed approximately 500 feet beyond the end of a construction or maintenance project unless other distance is called for in the plans. When other Construction or Maintenance Operations occur within 500 feet of this sign, the sign should be omitted and signing coordinated in accordance with Index No. 630, ADJOINING AND/OR OVERLAPPING WORK ZONE SIGNING.
GENERAL NOTES:
1. All signs shall be post-mounted when work operations exceed one day except as noted in the standards.

TEMPORARY SIGN SUPPORT NOTES:
1. Signs mounted on temporary supports or barricades, and barricade/sign combination shall be fabricated in accordance with NCHRP 350 requirements and included on the Qualified Products List (QPL).

POST MOUNTED SIGN NOTES:
1. Use only approved systems listed on the Department's Qualified Products List (Manufacturers seeking QPL approval will see Index 11860).
2. Provide 3 lb/ft Steel U Channel Posts with a minimum section modulus of 0.43 in² for 60 ksi, or a minimum section modulus of 0.37 in² for 70 ksi steel.
3. Provide 4 lb/ft Steel U Channel Posts with a minimum section modulus of 0.56 in² for 60 ksi, or a minimum section modulus of 0.47 in² for 70 ksi steel.
4. Steel U Channel Posts shall meet the material requirements of Specification 703, with the exception that galvanization is not required.
5. Sign attachment bolts, washers, nuts and spacers shall conform with ASTM A307 or A-36.
6. For diamond warning signs with supplemental plaque (up to 3 H² in area), use 4 lb/ft posts for up to 10 ft Clear Height measure to the bottom of diamond warning signs.
7. Install 4 lb/ft Steel U Channel Posts with approved breakaway splice in accordance with the manufacturer's details shown on the QPL.
8. The contractor may install 3 lb/ft Steel U Channel Posts with approved breakaway splice in accordance with the manufacturer's details shown on the QPL.
9. Install all posts plumb.
10. The contractor shall set the posts in preformed holes to the specified depth with suitable backfill stored securely on all sides, or filled with flowable fill bagged concrete. The cost of the flowable fill or bagged concrete shall be included in the cost of sign. At the contractor's option, 3 lb/ft post and any base post may be driven. (See Typical Foundation Details).

SIGN ATTACHMENT DETAIL

TYPICAL FOUNDATION DETAIL
See QPL for post, splice and connection details. No bolts installed closer than 1" to cutting edge.

WORK ZONE SIGN SUPPORTS

POST AND FOUNDATION TABLE FOR WORK ZONE SIGNS

<table>
<thead>
<tr>
<th>SIGN SHAPE</th>
<th>SIGN SIZE</th>
<th>NUMBER OF STEEL U CHANNEL POSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octagon</td>
<td>60X60</td>
<td>2</td>
</tr>
<tr>
<td>Triangle</td>
<td>48X48</td>
<td>2</td>
</tr>
<tr>
<td>Rectangle</td>
<td>12X12</td>
<td>2</td>
</tr>
<tr>
<td>Square</td>
<td>24X24</td>
<td>2</td>
</tr>
<tr>
<td>Circle</td>
<td>24X24</td>
<td>2</td>
</tr>
</tbody>
</table>

Note For Table:
1. Use 3 lb/ft posts for Clear Height up to 10’ and 4 lb/ft posts for Clear Height up to 12’.
2. Minimum foundation depth is 4.5 feet for 3 lb/ft posts and 5 feet for 4 lb/ft posts.
Notes:
1. The size of diamond shaped Temporary Traffic Control (TTC) warning signs shall be a minimum of 48" x 48".
2. Fluorescent orange shall be used for all orange colored work zone signs.
3. When standard orange Flags or Flashing warning lights are used in conjunction with signs, they shall not block the sign face.
4. The sign shields, symbols and messages contained on this sheet are provided for ready reference to those signs used in the development of traffic control plans. For additional signs and sign detail information refer to the STANDARD HIGHWAY SIGNS MANUAL as specified in the MUTCD. Special signs for traffic control plans will be approved by the State Traffic Plans Engineer.
   The sign codes shown on this sheet are for the purpose of identifying cell names found in the Traffic Control Cell Library (TCCLib). The STANDARD HIGHWAY SIGNS MANUAL should be referenced for the official sign codes for use in the development of traffic control plans. See Index No. 1055 for MUT sign details.

COLOR CODES

Legend and/or Symbol/Background

- Orange (Reflectorized)
- Red (Reflectorized)
- Black (Non-Reflectorized)
- Yellow (Reflectorized)
- White (Reflectorized)
- Green (Reflectorized)

COMMONLY USED WARNING AND REGULATORY SIGNS IN WORK ZONES

2008 MUTCD Design Standards

GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES

Index No. 1055 for MUT sign details.
MANHOLES/CROSSWALKS/JOINTS

Manholes extending 18 in. or more above the travel lane and crosswalks having an uneven surface greater than 2 inches shall have a temporary asphalt apron constructed as shown in the diagram below.

All transverse joints that have a difference in elevation of 1 in. or more shall have a temporary asphalt apron as shown in the diagram below.

Manhole or other above ground obstruction

Asphalt Apron

Temporary Surface

The apron is to be removed prior to constructing the next lift of asphalt. The cost of the temporary asphalt shall be included in the contract unit price for Maintenance of Traffic, LS.

CHANNELIZING AND DEVICES

Channelizing and devices for work zone traffic control shall be as prescribed in Part II of the MUTCD, subject to any revisions provided in the contract documents.

Primary work zone traffic control devices are listed on the Department's Qualified Product List.

MANHOLE/CROSSWALKS/JOINTS

Manholes extending 18 in. or more above the travel lane and crosswalks having an uneven surface greater than 2 inches shall have a temporary asphalt apron constructed as shown in the diagram below.

All transverse joints that have a difference in elevation of 1 in. or more shall have a temporary asphalt apron as shown in the diagram below.

TRUCK-MOUNTED ATTENUATORS

Truck-mounted attenuators (TMA) can be used for moving operations and short-term stationary operations. For moving operations, see Index Nos. 607 and 608. For short-term, stationary operations, see Part XII of the MUTCD.

REMOVING PAVEMENT MARKINGS

Existing pavement markings that conflict with temporary work zone delineation shall be removed by any method approved by the Engineer, where operations exceed one daylight period; however, painting over existing pavement markings will not be permitted. Full pavement width orifices of either a structural or friction course are a positive means to achieve obliteration.

SIGNS

Existing traffic signal operations that require modification in order to carry out work zone traffic control shall be included in the CTPD and be approved by the District Traffic Operations Engineer.

Maintain all existing activated or traffic responsive mode signal operations for main and side street movements for the duration of the Contract and require restoration of any loss of detection within 12 hours. The contractor shall select only detection technology listed on the Department's Approved Products List (APL) and approved by the Engineer to restore detection capabilities. The plans should identify the intersections where Temporary Traffic Detection is required.

WARNING LIGHTS

Warning lights shall be in accordance with Section 6F-78 of the MUTCD except for the application limitations stipulated below:

Flashing
Type A Low Intensity Flashing Warning Lights are to be mounted on barricades, drums, vertical panels or advance warning signs (except as noted below) and are intended to continually warn drivers that they are approaching or proceeding in a hazardous area. Flashing lights shall be used to delineate the intended path of travel, and not placed with spacings that will form a continuous line to the drivers eye. Type A lights will be used to mark obstructions that are located ahead of or in the intended travel way. Type A lights shall be used in conjunction with the first advance warning sign or the second such sign when used.

For post-mounted signs, Type B High Intensity Flashing Warning Lights shall be mounted on the first advanced warning sign and on the first and second advanced warning signs where two or more signs are used, this applies to all approaches to any work zone. The sign shall be mounted on the channel post or on the upper edge of the sign nearest the traffic.

Steady-Burn
Type C Steady-Burn Lights are to be mounted on barricades, drums, concrete barrier walls or vertical panels and used in combination with those devices to delineate the travel way on lane closures, lane changes, lane divergence curves and other similar conditions. Steady-burn lights are intended to be placed in a line to delineate the traveled way through and around obstructions in the transition, buffer, work and termination areas of the traffic control zone. Their intended purpose is not for warning drivers that they are approaching or proceeding through a hazardous area.

STANDARD ORANGE FLAG

For post-mounted signs, a standard orange flag 18 in. x 18 in. shall be mounted on the first advanced warning sign and on the first and second advanced warning sign where two or more signs are used, this applies to all approaches to any work zone. The flag shall be mounted on the channel post or on the upper edge of the sign furthest from traffic.

PORTABLE CHANGEABLE (VARIABLE) MESSAGE SIGNS (PCMS)

The PCMS can be used for:

1. Supplement standard signing in construction or maintenance work zones.
2. Reinforce static advance warning messages.
3. Provide motorists with updated guidance information.

PCMS should be placed approx. 500 to 600 feet in advance of the work zone conflicts or 1.5 to 2 miles in advance of complex traffic control schemes which require new and/or unusual traffic maneuvers.

If PCMS are to be used at night, the intensity of the Flashers shall be reduced during darkness when lower intensities are desirable.

For additional information refer to the FDOT Plans Preparation Manual, Volume II, Chapter 10.

ADVANCE WARNING ARROW PANELS

An arrow panel in the arrow or chevron mode shall be used only for stationary or moving lane closures on multilane roadways.

For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily closing one lane on a two-lane, two-way roadway, an arrow panel shall be used only in the caution mode.

A single arrow panel shall not be used to merge traffic laterally more than one lane. When arrow panels are used to close multiple lanes, a single panel shall be used at the merging point for each closed lane.

When Advance Warning Arrow Panels are used at night, the intensity of the flashers shall be reduced during darkness when lower intensities are desirable.
DROP-OFF CONDITION NOTES

1. A drop-off is defined as a drop in elevation, parallel to the adjacent travel lanes, greater than 3" with slopes (A:B) steeper than 1:4. When drop-offs occur within the clear zone due to construction or maintenance activities, protection devices are required. See chart.

2. Distance X is to be the maximum practical under project conditions.

3. Distance from the travel lane to the barrier or warning device should be maximum practical for project conditions.

4. Any drop-off condition that is created and restored within the same work period will not be subject to the use of barriers; however, warning devices will be required.

5. When permanent curb heights are ≥6", no warning device will be required. For curb heights < 6", see chart.

DROP-OFF NOTES

1. These conditions and treatments can be applied only in work areas that fall within a properly signed work zone.

2. The following are defined as acceptable warning devices:
   a. Vertical panel
   b. Type I or Type II barricades
   c. Drum
   d. Cone (where allowed)
   e. Tubular marker (where allowed)

3. Where a barrier is specified, any of the types below may be used in accordance with the applicable index:

   Index No. Description
   400 Temporary guardrail and end anchorage
   412 Temporary low profile barrier
   414 Type K temporary concrete barrier
   415 Temporary concrete barrier

   For temporary water filled barriers see the QPL.

4. Warning device spacing shall be as shown in Table I.

5. Shoulder treatment may be used in lieu of barrier. Warning devices are required.

6. Daily inspections shall be conducted to assure that no erosion, excessive slopes, rutting, or other adverse conditions exist. Any deficiencies shall be repaired immediately.

7. For shoulder treatment in lieu of a barrier is not eligible for VECP consideration.

TRAVEL LANE TREATMENT FOR MILLING OR RESURFACING

1. This treatment applies to resurfacing or milling operations between adjacent travel lanes. Whenever there is a difference in elevation between adjacent travel lanes, the WB-11 sign with "UNEVEN LANES" is required at intervals of 1 mile maximum.

2. Treatment allowed only when D is ≥3" or less. If the slope is steeper than 1:4 (not to be steeper than 1:4), the HH-I and W11-I-04 signs shall be used as a supplement to the WB-11. This condition should never exceed 3 miles in length.

Table I

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Max. Distance between Devices (ft.)</th>
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</thead>
<tbody>
<tr>
<td>25</td>
<td>25 25 50 25 50 25 50</td>
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<tr>
<td>30 to 45</td>
<td>25 25 50 30 50 50</td>
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<tr>
<td>50 to 70</td>
<td>25 25 50 50 100</td>
</tr>
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DROP-OFF PROTECTION REQUIREMENTS

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<th>X (ft)</th>
<th>D (in.)</th>
<th>Device Required</th>
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</thead>
<tbody>
<tr>
<td>0-12</td>
<td>&gt;3</td>
<td>Barrier</td>
</tr>
<tr>
<td>0-CZ</td>
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<td>Barrier</td>
</tr>
<tr>
<td>0-CZ</td>
<td>&gt;5</td>
<td>Barrier</td>
</tr>
</tbody>
</table>

For Clear Zone widths, see Index No. 600 sheet 2.

SHOULDER TREATMENT
1. Sign height shall be 7' minimum. Sign offset from edge of travel way should be between 6' and 10' and relatively consistent through the project phase.

2. Signs should show specific business names. Logos may be provided by business owners. BUSINESS ENTRANCE sign in accordance with Index 17355 may be used when approved by the Engineer.

3. Place one business sign for each driveway entrance affected. When several businesses share a common driveway entrance, place one sign per common driveway entrance.

4. Channelizing devices should be placed at a reduced spacing on each side of the driveway entrance as to not to interfere with providing sight distances for the driveway user.

**PLACEMENT OF BUSINESS ENTRANCE SIGNS AND CHANNELIZING DEVICES AT BUSINESS ENTRANCE**

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1. The tubular marker is to be made of a flexible material or have a flexible joint at the base such that it will not cause damage to vehicles upon impact and will return to its original shape after being struck by a 5000 lb. vehicle at a velocity of 75 ft./sec.

2. The tubular marker shall be orange with two white retroreflective bands.

3. The tubular marker may be attached by bituminous adhesive or other methods approved by the Engineer.

4. Retroreflective materials shall have a smooth sealed outer surface which will display the same approximate color day and night.

5. 12" openings for drainage will be constructed in the separator island every 25' in areas with grades of 1% or less or every 50' in areas with grades over 1% as directed by the Engineer.

6. Two-Way Traffic signs shall be repeated every 6 miles in each direction, throughout the limits where the temporary traffic separator is used.

7. The Contractor has the option of using temporary traffic separators and tubular type warning devices from the qualified products list in Index of the temporary asphalt separator and tubular warning device detailed on this sheet.

8. Temporary traffic separator shall be paid for under the contract unit price for Maintenance of Traffic, LS, and will include all materials and work necessary to construct, maintain, and remove the temporary traffic separator. Any damage to existing pavement caused by the removal of temporary traffic separator shall be satisfactorily repaired and the cost of such repairs are to be included in the cost of Maintenance of Traffic, LS.

**TEMPORARY ASPHALT SEPARATOR**
1. Only approved traffic control devices included on the Qualified Products List (QPL) may be used.

2. The FDOT approval number shall be engraved on the device at a convenient and readily visible location. Where engraving is not practical a water-resistant type label may be used.

3. The details shown on this sheet are for the following purposes: (a) For ease of identification and (b) To provide information that supplements or supersedes that provided by the MUTCD.

4. The Type III Barricade shall have a unit length of 6'-0" only. When barricades of greater lengths are required those lengths shall be in multiples of the 6'-0" unit. Signs used in conjunction with Type III Barricades may be mounted on or above the barricade. These signs should not cover more than 50 percent of the top two rails or 33 percent of the total area of the three rails.

5. During hours of darkness, warning lights shall be used on drums, vertical panels, Type I, Type II, and direction indicator barricades in accordance with "Warning Lights" in Index No. 600.

6. Ballast shall not be placed on top rails or any striped rails or higher than 13" above the driving surface.

7. The direction indicator barricade may be used in tapers and transitions where specific directional guidance to drivers is necessary. If used, direction indicator barricades shall be used in series to direct the driver through the transition and into the intended travel lane.

8. The splicing of sheeting is not permitted on either channelizing devices or MOT signs.

9. For rails less than 3'-0" long, 4" stripes shall be used.

10. Cones shall
   a. Be used only in active work zones where workers are present.
   b. Not exceed 2 miles in length of use at any one time.
   c. Be reflectorized as per the MUTCD with Department approved reflective collars when used at night.

IDENTIFICATIONS - CHANNELIZING AND LIGHTING DEVICES
I. Paint or removable tape are the required work zone markings and shall be placed in accordance with the plans and specifications. If these work zone markings can not be placed due to weather restrictions identified in the appropriate specification, temporary substitution of RPM's for work zone markings will be allowed until the weather conditions permit the placement of appropriate work zone markings. Temporary substitution of RPM's for work zone markings will be allowed for equipment malfunction, placement of the appropriate work zone markings shall be made within 3 days, or sooner if possible. When RPM's are used as a temporary substitution for work zone markings the following shall apply:

a) Lane widths identified in the plans must be maintained. Placement of RPM's should consider where work zone markings will be placed as soon as conditions allow. If the RPM's can not be placed so that the lane width is maintained after the placement of the work zone markings, the conflicting RPM's must be removed.

b) The color of the RPM body and the reflective face shall conform to the color of the marking for which they substitute.

c) In work zones, CLASS A, B, or D RPM's may be used to form lane lines, edge lines and temporary gore areas as a temporary substitute for paint or removable tape at the spacing shown above. Where the RPM's will be used for five (5) days or less, CLASS E RPM's may be used.

NOTES FOR REFLECTIVE PAVEMENT MARKERS

1. The color of the raised pavement marker under both day and night conditions shall conform to the color of the marking for which they serve as a positioning guide, or for which they supplement or substitute.

2. To provide contrast on concrete pavement, or light asphalt, the five (5) white RPM's shall be followed by five (5) black RPM's. The spacing between RPM's shall be 2'-0". Black RPM's will not be required for contrast with yellow RPM's.

3. RPM's used to supplement lane lines are to be paid for as Reflective Pavement Marker (Temporary), EA. RPM's used as a temporary substitute for paint or removable tape due to weather restrictions are to be paid for as Reflective Pavement Marker (Temporary), EA. RPM's used as a temporary substitute for paint or removable tape due to equipment malfunction are to be placed at the Contractor's expense.

PLACEMENT OF PAVEMENT MARKINGS

1. RPM's shall be installed as a supplement to:
   a) All lane lines.
   b) Edge lines or transition & approach areas.
   c) Edge lines of gore areas.

2. The color of the raised pavement marker under both day and night conditions shall conform to the color of the marking for which they serve as a positioning guide, or for which they supplement or substitute.

RPM CLASS

A. Permanent Application in Nontraffic Areas Or Can Be Used in Work Zone Applications For Traffic And Nontraffic Areas.

B. Permanent Application In Traffic And Nontraffic Areas Or Can Be Used in Work Zone Applications For Traffic And Nontraffic Areas.

C. Work Zone Application Only For Traffic And Nontraffic Areas.

D. Temporary Work Zone Application Only Not Exceeding Five (5) Continuous Days, For Traffic And Nontraffic Areas.
GENERAL NOTES

1. If the work operation (excluding establishing and terminating the work area) requires that two or more work vehicles cross the offset zone in any one hour, traffic control will be in conformance with Index No. 602.

2. No special signing is required.

3. When a side road intersects the highway within the work area, additional TTC devices shall be placed in accordance with other applicable TCZ indexes.

4. When construction activities encroach on a sidewalk refer to Index No. 660.

5. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE BEHIND AN EXISTING BARRIER, MORE THAN 2' BEHIND THE CURB, OR 15' OR MORE FROM THE EDGE OF TRAVEL WAY.
### SYMBOLS
- **Work Area**
- **Sign With 18" x 18" (Mn.) Orange Flag And Type B Light**
- **Channelizing Device (See Index No. 600)**
- **Work Zone Sign**
- **Lane Identification + Direction of Traffic**

### GENERAL NOTES
1. When four or more work vehicles enter the through traffic lanes in a one-hour period or less (excluding establishing and terminating the work area), the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs, see Index No. 603.
2. WORKERS sign to be removed or fully covered when no work is being performed.
3. SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign only on the side where the shoulder work is being performed.
4. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TTC indexes.
5. For general TCZ requirements and additional information, refer to Index No. 600.

### DURATION NOTES
1. Signs and channelizing devices may be omitted if all of the following conditions are met:
   - **a)** Work operations are 60 minutes or less.
   - **b)** Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

### CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 15' BUT NOT CLOSER THAN 2' TO THE EDGE OF TRAVEL WAY.
### DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Spacing (ft.)</th>
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<tbody>
<tr>
<td>25 or less</td>
<td>200</td>
</tr>
<tr>
<td>30</td>
<td>250</td>
</tr>
<tr>
<td>40 or greater</td>
<td>300</td>
</tr>
</tbody>
</table>

* The ROAD WORK 1 MILE sign may be used as an alternate to the ROAD WORK AHEAD sign.

** END ROAD WORK **

### TABLE I DEVICE SPACING

<table>
<thead>
<tr>
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</thead>
<tbody>
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<td>Speed (mph)</td>
</tr>
<tr>
<td>25 to 45</td>
</tr>
<tr>
<td>50 to 70</td>
</tr>
</tbody>
</table>

### GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.
2. Additional one-way control may be effected by the following means:
   (1) Flag-carrying vehicle; (2) Official vehicle; (3) Pilot vehicles; (4) Traffic signals.
3. The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.
4. When flaggers are the sole means of one-way control, the flaggers shall be in sight of each other or in direct communication at all times.
5. The two channelizing devices directly in front of the work area and the one channelizing device directly at the end of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
6. For general TCZ requirements and additional information, refer to Index No. 600.

### DURATION NOTES

1. ROAD WORK AHEAD and the BE PREPARED TO STOP signs may be omitted if all of the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Speed limit is 45 mph or less.
   c) No sight obstructions to vehicles approaching the work area for a distance equal to the buffer space.
   d) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e) Volume and complexity of the roadway has been considered.

### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENTRAP THE AREA BETWEEN THE CENTERLINE AND A LINE 2' OUTSIDE THE EDGE OF TRAVEL WAY.
Notice: The Florida Department of Transportation has received approval from FHWA to experiment with the use of the automated flagger assistance devices (AFAD). AFADs shall only be used when called for in the plans that include the appropriate pay item and developmental specification or approved by the State Roadway Design Office.

DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Spacing (ft)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>45</td>
<td>300 500 500 175</td>
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<tr>
<td>50</td>
<td>500 500 500 250</td>
</tr>
<tr>
<td>55 or greater</td>
<td>1000 1000 1000 250</td>
</tr>
</tbody>
</table>

* (See Sheet 1 Notes)  
** (See Sheet 1 Notes)

STOP/SLOW AFAD

METHOD 1 - 2 AFAD's

Channelizing Devices Optional on §
If Used, See Table 1 - Device Spacing - Tangent
Buffer Space See Table

Device Spacing - Tangent
See Table 1

DEVICE SPACING - TAPER
See Table 1

RED/YELLOW AFAD

METHOD 2 - 1 AFAD AND A FLAGGER

AUTOMATED FLAGGER ASSISTANCE DEVICES (AFAD)

1. When used at nighttime, the AFAD flagging station shall be illuminated.

2. When the AFAD is not in use, it shall be moved outside the clear zone or be shielded by a barrier or crash cushion and the signs associated with the AFAD shall be removed or covered.

3. Duration Notes shown on sheet 1 do not apply when AFAD are used.
**SYMBOLS**

- Work Area
- Sign With 18" x 18" x 18" (1 Min.)
- Orange Flag And Type B Light
- Type I Or Type II Barriooe Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Flagger
- Stop Bar
- Lane Identification + Direction of Traffic

**GENERAL NOTES**

1. The FLAGGER legend sign may be substituted for the symbol sign.
2. When vehicles in a parking zone block the line of sight to TCZ signs, the signs shall be post mounted and located in accordance with Index No. 2730.
3. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.
4. Flaggers shall be located where they can control more than one direction of traffic.
5. Maximum spacing between channelizing devices shall be not greater than 20'.
6. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
7. For general TCZ requirements and additional information, refer to Index No. 600.

**DURATION NOTES**

1. ROAD WORK AHEAD AND END ROAD WORK sign may be omitted if all of the following conditions are met:
   a. Work operations are 60 minutes or less.
   b. Speed is 45 mph or less.
   c. No sight obstructions to vehicles approaching the work area for a distance equal to A plus B.
   d. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e. Volume and complexity of the roadway has been considered.

<table>
<thead>
<tr>
<th>CONDITIONS</th>
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<tbody>
<tr>
<td>WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF A PORTION OF ONE OR MORE TRAFFIC LANES IN AN INTERSECTION.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISTANCE BETWEEN SIGNS</th>
<th>Speed</th>
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<td>600 ft</td>
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<tr>
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<td>200 ft</td>
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</tbody>
</table>

**INDEX**

- Index No. 600
- Index No. 604

**TWO-LANE TWO-WAY, WORK IN INTERSECTION**
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREAS LESS THAN 200' DOWNSTREAM FROM AN INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES.

---

**SYMBOLS**

- **Work Area**
- **Sign With 18" x 18" (Min.) Orange Flag And Type B Light**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)**
- **Flagger**
- **Work Zone Sign**
- **Road Work Ahead**

**GENERAL NOTES**

1. Work operations shall be confined to one travel lane, leaving the opposing travel lane open to traffic.

2. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 6532.

3. If work area is confined to an outside auxiliary lane, the work area shall be barricaded and the FLAGGER signs replaced by ROAD WORK AHEAD signs. Flaggers are not required.

4. Flaggers shall be in sight of each other or in direct communication at all times.

5. The FLAGGER legend sign may be substituted for the symbol sign.

6. The maximum spacing between devices shall be no greater than 25'.

7. For general TCZ requirements and additional information, refer to Index No. 650.

8. The two channelizing devices directly in front and directly at the end of the work area is occupied only by a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights.
I. Work operations shall be confined to one traffic lane, except for haul road crossings, leaving the opposite lane open to traffic.

2. The installation and timing of signals shall be approved by the District Traffic Operations Engineer prior to signals being placed in operation.

Where sight distance to the signal is limited, the signals may be mounted on span wire at the discretion of the Engineer. The maximum distance between portable traffic signals (receiver/controllers) shall be 0.25 mile; however, in no case shall the distance exceed the maximum distance at which the remote operator (transmitter) can positively and safely operate both portable signals.

3. Flaggers to supplement the signal operator/flagger shall be used when needed to assure safe movements between traffic and operating equipment, as determined by the Engineer.

4. When needed, an additional warning sign may be installed in advance of the TCZ AHEAD sign. The distance between successive signs shall be 500'.

5. The SIGNAL AHEAD legend sign may be substituted for the symbol sign.

6. SIGNAL AHEAD and EQUIPMENT CROSSING AHEAD signs are to be removed or fully covered when no work is being performed and the highway is open to two-way traffic. Type III Barricades shall be in place to block haul road access when the haul road is not in operation and a flagger/signal operator is not on duty, except when the haul road is an existing properly marked road.

7. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.

8. For general TCZ requirements and additional information, refer to Index No. 600.

9. Span wire signals are to be used only in work zones with workers present, where the contractor can monitor signal operation and maintain traffic with flaggers in the event of a power failure.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCROACH ON ONE LANE OR MOMENTARILY ENCROACH ON BOTH LANES OF A TWO-LANE TWO-WAY ROADWAY AND TRAFFIC SIGNALS ARE NEEDED.
MOMENTARY ROADWAY CLOSURE • HAUL ROUTE CROSSING
The distance between the advance warning sign and the work location should not exceed 5 miles.

**GENERAL NOTES**

1. Where work activities within 2' of the edge of travel way are incidental (i.e., Mowing, Litter Removal), the Engineer may delete requirements for signs and the advance warning vehicle provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.

2. If an arrow panel is used, the caution mode shall be used.

3. Shadow and Advance Warning Vehicle shall display rotating/strobe lights.

4. For general TCZ requirements and additional information, refer to Index No. 600.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE AN INTERMITTENT OR CONTINUOUS MOVING OPERATION.
Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

**GENERAL NOTES**

1. For speed sign applications, see Index No. 600.

2. When the tangent distance (T) exceeds 600', spacing between cones or tubular markers may be increased to 50' or spacing between Type I or Type II barricades, vertical panels or drums may be increased to 100' within limits of the tangent, or post mounted delineators at 50' centers may be substituted for the barricades, vertical panels or drums.

3. On the existing pavement, all existing markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for marking a new centerline and edge line.

4. Where the tangent distance (T) exceeds 600' and no passing or stopping sight distance restrictions exist, the yellow reflectorized markings used to indicate the centerline of the traveled way may be replaced with yellow reflectorized markings in a broken pattern. For raised pavement marker application see Index No. 600 and Index No. 17352.

5. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.

6. If temporary structures are required on the diversion, traffic control will be in accordance with Index No. 650.

7. For general TCZ requirements and additional information, refer to Index Nos. 600 and 17352.

8. If posted speed for Work Zone is 45 mph or less, use "ROAD WORK 2 MILE" and space accordingly.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF BOTH LANES AND A TEMPORARY DIVERSION IS CONSTRUCTED.
GENERAL NOTES

1. If the work operation (excluding establishing and terminating the work area), requires that two or more work vehicles cross the offset zone in any one hour, traffic control will be in accordance with Index No. 612.

2. No special signing is required.

3. This Index also applies when work is being performed on a multilane undivided highway.

4. This Index also applies to work performed in the median behind an existing barrier or more than 15' from the edge of travel way, both roadways. Work performed in the median behind curb and gutter shall be in accordance with Index No. 612.

5. When a side road intersects the highway within the work area, additional traffic control devices shall be placed in accordance with other applicable TCZ indexes.

6. When construction activities encroach on a sidewalk, refer to Index No. 650.

7. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE BEHIND AN EXISTING BARRIER, MORE THAN 2' BEHIND THE CURB, OR IS OR MORE FROM THE EDGE OF TRAVEL WAY.
GENERAL NOTES
1. If the work operation encroaches on the through traffic lanes or when four or more work vehicles enter the through traffic lanes in a one hour period (excluding establishing and terminating the work area), a flagger shall be provided and a FLAGGER sign shall be substituted for the WORKERS sign. The flagger shall be positioned at the point of vehicle entry or departure from the work area.

2. This TCZ plan also applies to work performed in the median more than 2' but less than 15' from the edge of travel way.

3. When work is being performed on a multilane undivided roadway the signs normally mounted in the median (as shown) shall be omitted.

4. WORKERS signs to be removed or fully covered when no work is being performed.

5. SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign.

6. When a side road intersects the highway within the TCC zone, additional TCC devices shall be placed in accordance with other applicable TCC Indexes.

7. For general TCC requirements and additional information, refer to Index No. 600.

DURATION NOTES
1. Signs and channelizing devices may be omitted if all of the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 15' BUT NOT CLOSER THAN 2' TO THE EDGE OF TRAVEL WAY.

SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign.

When a side road intersects the highway within the TCC zone, additional TCC devices shall be placed in accordance with other applicable TCC Indexes.

For general TCC requirements and additional information, refer to Index No. 600.
**GENERAL NOTES**

1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.
2. On divided highways the median signs as shown are to be omitted.
3. When work is performed in the median lane on divided highways, the channelizing device plan is inverted and lanes closed and lane ends signs substituted for the right lane closed and lane signs.
4. When work on divided highways occurs across the centerline do not encroach on both median lanes, the inverted plan is applied to the approach of both roadways.
5. When work operations are 60 minutes or less, the entire plan is applied to the approach of both roadways.
6. The ROAD WORK 1 MILE sign may be used as an alternate to the ROAD WORK AHEAD sign and the ROAD WORK 1 MILE sign may be used as an alternate to the ROAD WORK AHEAD sign or midway between signs whichever is less.
7. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TTC lanes.

**DURATION NOTES**

1. Temporary white edge line may be omitted for work operations less than 3 days.
2. Signs, arrow panel and buffer space may be omitted if the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Speed limit is 45 mph or less.
   c) No sight obstructions to vehicles approaching the work area for a distance equal to the buffer space and taper length combined.
   d) Vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
   e) Volume and complexity of the roadway is considered.

**SYMBOLS**

- **Work Area**
- **Orange Flag And Type B Light**
- **Channelizing Device (See Index No. 600)**
- **Type I Type II Or Type III Barricade (Or VerticalPanelDrum) (With Flashing Light)**
- **Work Zone Sign**
- **Advance Warning Arrow Panel**

**DISTANCE BETWEEN SIGNS**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Max Distance Between Devices (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 45</td>
<td>25 30 30 30 30 30 25 25 25</td>
</tr>
<tr>
<td>45 to 70</td>
<td>25 30 30 30 30 30 25 25 25</td>
</tr>
</tbody>
</table>

**Table I**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Buffer Space (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buffer Space</td>
</tr>
<tr>
<td>30 to 45</td>
<td>25 30 30 30 30 30 30</td>
</tr>
<tr>
<td>45 to 70</td>
<td>25 30 30 30 30 30 30</td>
</tr>
</tbody>
</table>

**Table II**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Buffer Space (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 45</td>
<td>25 30 30 30 30 30 30</td>
</tr>
<tr>
<td>45 to 70</td>
<td>25 30 30 30 30 30 30</td>
</tr>
</tbody>
</table>

**CONDITIONS**

Where any vehicle, equipment, workers or their activities encroach on the lane adjacent to either shoulder and the area 2 outside the edge of travel way.

**MULTILANE, WORK WITHIN THE TRAVEL WAY**

**MEDIAN OR OUTSIDE LANE**

---

*Note: The image contains a detailed diagram with various symbols and annotations related to traffic control and work zone signs. The text provides guidelines and specifications for traffic control devices, work zone configurations, and speed limits.*
SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

EVEN PAVEMENT

UNEVEN PAVEMENT

INTERMITTENT WORK STOPPAGE - LANE REOPENED TO TRAFFIC

MULTILANE, WORK WITHIN THE TRAVEL WAY

MEDIAN OR OUTSIDE LANE
**EXISTING POSTED WORK ZONE SPEED**

<table>
<thead>
<tr>
<th>MPH</th>
<th>MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>45</td>
<td>35</td>
</tr>
</tbody>
</table>

**PROPOSED WORK ZONE SPEED**

<table>
<thead>
<tr>
<th>MPH</th>
<th>MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>45</td>
<td>35</td>
</tr>
</tbody>
</table>

**REMARKS**
The 'Proposed Work Zone Speeds' are recommended speeds for the traffic control plan defined below, where the Engineer deems other speeds are appropriate, the applicable speeds are to be shown on the plans.

---

**CONDITION NOTES**

1. The RIGHT LANE CLOSED and lane reduction signs are to be removed or fully covered when no work is being performed and the center lane is opened to traffic.

2. For work performed in the median or outside lane, refer to Index No. 613.

3. When the lane closure exceeds a continuous 24 hour period, all existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement marking used for marking new edge lines and centerline.

---

**GENERAL NOTES**

1. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ indexes.

2. For general TCZ requirements and additional information, refer to Index No. 600.

---

**DURATION NOTES**

1. Temporary pavement markings may be omitted for work operations less than 3 days.

---

**SYMBOLS**

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic

---

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON ANY PORTION OF A CENTER LANE OF A MULTILANE HIGHWAY, AND TWO DRIVING LANES ARE MAINTAINED ON THE TRAVEL WAY.
CONDITION NOTES

1. See General Notes, Sheet 1 of 2.

2. Length of time that traffic is using shoulder should be minimized. For example, remove lane closure and lane shift at night (unless performing night work) if practical.

3. In the RIGHT LANE CLOSED, lane reduction and reverse curve signs are to be removed or fully covered when no work is being performed and the travel way is open to traffic.

4. When the lane closure exceeds a continuous 24 hour period, all existing pavement markings in the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for marking new edge lines and centerlines.

5. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON ANY PORTION OF A MULTILANE HIGHWAY, AND TWO DRIVING LANES ARE MAINTAINED, AND THE OUTSIDE SHOULDER PAVEMENT IS TEMPORARILY USED AS A TRAVEL LANE.
**SYMBOLES**
- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Channelizing Device (See Index No. 600)
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- Work Zone Sign
- Stop Bar
- Advance Warning Arrow Panel
- Lane Identification = Direction of Traffic

**GENERAL NOTES**
1. The WORKERS legend sign may be substituted for the symbol sign.
2. When vehicles in a parking zone block the line of sight to TCZ signs, the signs shall be post mounted and located in accordance with Index No. 6302.
3. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.
4. Dual signs are required for divided roadways.
5. Maximum spacing between barricades, vertical panels, cones, salver markers and drums shall not be greater than 100.
6. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
7. For general TCZ requirements and additional information, refer to Index No. 660.

---

**DURATION NOTES**
1. Signs and arrow panel may be omitted if all of the following conditions are met:
   a. Work operations are 60 minutes or less.
   b. Speed is 45 mph or less.
   c. No sight obstructions to vehicles approaching the work area for a distance equal to twice the taper length.
   d. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e. Volume and complexity of the roadway has been considered.

---

**CONDITIONS**
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF AT LEAST ONE MEDIAN TRAFFIC LANE.

---

**Table II**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Merge (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 mph or less</td>
<td>600, 750, 900</td>
</tr>
<tr>
<td>45 mph</td>
<td>350, 350, 350</td>
</tr>
</tbody>
</table>

For lateral transitions other than 180, use formula for L shown in the notes column. Where:
- L = Length of taper in feet
- W = Width of lateral transition in feet
- S = Posted speed limit (mph)

---

**SIGNALIZED**
GENERAL NOTES

1. Work operations shall be confined to either one lane, or lane combinations as follows:
   (a) Outside travel lane;
   (b) Outside auxiliary lane;
   (c) Inside travel lane;
   (d) Inside auxiliary lane;
   (e) Inside travel lane and adjoining auxiliary lane.

   * See Sheet 3 of 3

   If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT (LEFT) LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs, and the merge symbol signs eliminated.

2. When vehicles in a parking zone block the line of sight to TCZ signs, the signs shall be post mounted and located in accordance with Index No. 17.302.

3. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.

4. Signs are required on the median side for divided highways.

5. The two channelizing devices directly in front and directly at the end of the work area may be omitted provided vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

6. For general TCZ requirements and additional information, refer to Index No. 600.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.)
- Orange Flag And Type B Light
- Work Zone Sign
- Advance Warning Arrow Panel
- Type I Or Type II Barricade Or Vertical Panel (With Flashing Light At Night Only)
- Type III Barricade
- Channelizing Device (See Index No. 600)
- Lane Identification + Direction of Traffic

DURATION NOTES

i. Signs and arrow panel may be omitted if all of the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Speed limit is 45 mph or less.
   c) No sight obstructions to vehicles approaching the work area for a distance equal to twice the taper length.
   d) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e) Volume and complexity of the roadway has been considered.
RIGHT LANE CLOSED ON FAR SIDE OF MINOR SIDESTREET

RIGHT LANE CLOSED ON FAR SIDE OF INTERSECTION WITH SIGNIFICANT RIGHT TURNING MOVEMENTS

1. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right turning movements, then the right lane may be restricted to right turns only as shown in this detail.

2. For intersection approaches reduced to a single lane, left turning movements may be prohibited to maintain capacity for through vehicular traffic.
LEFT LANE CLOSED ON FAR SIDE OF INTERSECTION TURNING MOVEMENTS ALLOWED

1. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant right turning movements, then the left lane may be reopened as a turn bay for left turns only as shown in this detail.
**SYMBOLS**

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- **Advance Warning Arrow Panel**
- **Lane Identification + Direction of Traffic**

**GENERAL NOTES**

1. Work operations shall be confined to one center travel lane, leaving the adjacent travel lanes open to traffic.
2. The merging taper shall direct vehicular traffic into either the right or left lane, but not both.
3. When vehicles in a parking zone block the line of sight to TCZ signs, the signs shall be post mounted and located in accordance with Index No. 47302.
4. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.
5. For general TCZ requirements and additional information, refer to Index No. 600.

**DURATION NOTES**

i. Signs and buffer space may be omitted if all of the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Speed limit is 45 mph or less.
   c) No sight obstructions to vehicles approaching the work area for a distance equal to the buffer space and the taper length combined.
   d) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e) Volume and complexity of the roadway has been considered.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE CENTER LANE NEAR AN INTERSECTION.
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**GENERAL NOTES**

1. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.
2. Signs are required on the median side for divided highways.
3. The two channelizing devices directly in front and directly at the end of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
4. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 25'. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 12' up to 25 MPH; 20' for 30-40 MPH; 25' for 45 MPH.
5. For general TLC2 requirements and additional information, refer to Index No. 660.

**Table 2**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Notes (Merge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>30</td>
<td>180</td>
</tr>
<tr>
<td>35</td>
<td>245</td>
</tr>
<tr>
<td>40</td>
<td>320</td>
</tr>
<tr>
<td>45</td>
<td>540 (W)</td>
</tr>
</tbody>
</table>

For lateral transitions other than 12', use formula for L shown in the notes column. Where:

L = Length of taper in feet
W = Width of lateral transition in feet
S = Posted speed limit (mph)

**Symbols**

- **D** Work Area
- **STOP** Sign with 18" x 18" (Min.) Orange Flag and Type B Light
- **B** Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)
- **B** Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- **W** Work Zone Sign
- **P** Advance Warning Arrow Panel
- **S** Stop Bar
- **L** Lane Identification • Direction of Traffic

**MULTILANE, WORK NEAR INTERSECTION**

**TWO LANES CLOSED - 45 MPH OR LESS**
The distance between the advance warning sign and the work location should not exceed 5 miles.

**GENERAL NOTES**

1. These illustrations are representative of general conditions.
2. The intensity of light and position of panels shall be as specified in Index No. 600.
3. Vehicle-mounted signs shall be mounted with the bottom of the sign at a minimum height of 48 inches above the pavement. Sign legends shall be covered or turned from view when work is not in progress.
4. If the work vehicle speed exceeds the minimum legal speed limit on limited access facilities and one half the posted speed limit on other facilities, the engineer in charge may delete requirements for shadow vehicle and attenuators.
   - The work vehicle will be required to have an advance warning sign.
5. Where work activities within 2' of the edge of the travel way are incidental (i.e., mowing, litter removal), the engineer may delete requirements for signs and the advance warning vehicle provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.
6. Shadow and Advance Warning Vehicle shall display rotating/strobe lights.
7. For general TCZ requirements and additional information, refer to Index No. 600.

**SYMBOLS**

- **Work Vehicle With Rotating/Strobe Lights**
- **Shadow (S) Or Advance Warning (AW) Vehicle with Advance Warning Arrow Panel and Sign Message**
- **Truck Mounted Attenuator (TMA)**
- **Lane Identification And Direction Of Traffic**

**CONDITIONS**

**MOVING OPERATION**

**MULTILANE, MOBILE OPERATIONS**

**WORK ON SHOULDER, WORK WITHIN THE TRAVEL WAY**
SYMBOLS

- **Work Area**
- **Sign With 18" x 18" (Min.)**
- **Orange Flag And Type B Light**
- **Type I Or Type II Barricade Or Vertical Panel**
  
  (Orange Markers May Be Used During Daylight Only, Cones May Be Used - See Index No. 600)
- **Work Zone Sign**
- **Advance Warning Arrow Panel**
- **Lane Identification + Direction of Traffic**

GENERAL NOTES

1. TWO-WAY TRAFFIC signs shall be repeated every 1 mile in each direction, throughout the tangent distance (T).

2. \( W = \frac{S - 45}{40} \) for speeds \( \geq 45 \text{ mph} \)

3. Where the tangent distance (T) exceeds 250', spacing between Type I or II barricades or vertical panels or drums may be increased to 100' within the limits of the tangent, or post mounted delineators at 50' centers may be substituted for barricades, vertical panels or drums.

4. All existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for making new edge lines.

5. Where side roads, cross roads or interchanges intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TTC indexes.

6. For general TTC requirements and additional information, refer to Index No. 620.

SCHEME APPLICATIONS

**Scheme 1**: Restricted Construction Limits.
**Scheme 2**: Unrestricted Construction Limits And Light To Moderate Traffic.
**Scheme 3**: Unrestricted Construction Limits And Moderate To Heavy Traffic.

**Where**: Construction Limits Are The Outward Beginning Or Ending Of Lane Reductions.

**Where**: Unless A Specific Scheme Is Called For In The Plans, Scheme Selection Shall Be At The Contractor's Option And As Approved By The Engineer.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF ONE ROADWAY AND THE OPPOSING ROADWAY IS CONVERTED TO TEMPORARY TWO-WAY TRAVEL BY WAY OF CROSSOVERS.
SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Channelizing Device (See Index No. 600)
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic

GENERAL NOTES
1. TWO-WAY TRAFFIC signs shall be repeated every 2 mi in each direction, through the tangent distance (T).
2. When paved shoulders having a width of 8 ft. or more are closed, channelizing devices shall be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the travel way. See Index No. 612 for shoulder taper formulas.
3. Where the tangent distance (T) exceeds 500', spacing between cones or tubular markers may be increased to 500' or spacing between Type I or Type II barricades or vertical panels or drums may be increased to 100' within the limits of the tangent.
4. This index does not apply when work is being performed in the middle lanes of a six or more lane highway. Special maintenance of traffic details will be required.
5. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ indexes.
6. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF THE LANES IN ONE DIRECTION AND A DIVERSION IS PROVIDED BY UTILIZING ONE LANE OF THE OPPOSING TRAFFIC LANES.
**SYMBOLS**

- **Work Area**
- **Stop Sign**
- **Advance Warning Arrow Panel**
- **Lane Identification + Direction of Traffic**
- **Road Work**
- **200' (Min.)**
- **200'**
- **200'**
- **200'**
- **200'**
- **200' (Min.)**
- **Less Than**
- **More Than 200'**
- **Reduced Device Spacing Run**
- **See Duration Note**

**GENERAL NOTES**

1. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 600.
2. Dual signs are required for divided roadways.
3. Channelizing devices are to be spaced with Type I or Type II barricades or vertical panels or drums at 50 centers in tangent sections and 15' centers where reduced device spacing runs are identified in the drawing.
4. For general TCZ requirements and additional information, refer to Index No. 600.

**DURATION NOTE**

1. Removable reflectorized pavement markings shall be used when closure time exceeds one daylight period.

**CONDITIONS**

**Where any vehicle, equipment, workers or their activities encroach on the pavement requiring the closure of traffic lanes in one direction and the use of one opposing traffic lane to maintain two-way traffic, for work area less than 200' from intersection, for a period of more than 60 minutes.**
When Other Construction Or Maintenance Operations Occur Within 1 Mile, Signs Are To Be Coordinated In Accordance With Index No. 600.

General Notes:

1. Work operations shall be confined to two way left turn lane, leaving the adjacent lanes open to traffic.

2. Advance Warning Vehicle will have an Advanced Warning Arrow Panel in the Warning Mode.

3. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TTC Indexes.

4. For general TCZ requirements and additional information, refer to Index No. 600.

Symbols:

- **Work Area**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)**
- **Work Zone Sign**
- **Advance Warning Vehicle Equipped With Advance Warning Arrow Panel And Truck Mounted Attenuator**
- **Sign With 18" x 18" (Min.) Orange Flag And Type B Light**

Conditions:

Where any vehicle, equipment, workers or their activities are being conducted in the two way left turn lane.

2008 FHWA Design Standards

TWO-WAY LEFT TURN LANE CLOSURE
**CASE I**

**GENERAL NOTES**

1. This Index does not apply to limited access facilities.

2. When crossovers do not exist, the contractor will construct temporary crossovers in accordance with Index No. 631.

3. \( L \) = Length of taper in feet
   
   - \( W_S \) for speeds 25-45 mph
   
   - \( S_P \) for speeds 40 mph

   Where:
   
   - \( W \) = Width of lateral transition in feet.
   - \( S \) = Posted speed limit (mph).

4. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 25'. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 15' up to 25 MPH; 30' for 30-40 MPH; 50' for 45 MPH or greater.

Spacing for devices parallel to the travel lanes shall be 25' centers for cones or tubular markers and 50' for Type I or Type II barricades or vertical panels or drums.

5. For Case I, Condition A, when the median width is too narrow for trucks to make turns into Lane 1, the advance warning arrow panel shall be moved ahead to a crossover in advance of the paving lane taper. Project advance warning signals (not shown) shall be located in advance of the relocated sign No. 3.

6. For Case II, Conditions A & B, when the median width is too narrow for trucks to make turns into Lane 2, the advance warning arrow panel shall be moved ahead to a crossover in advance of the "RIGHT LANE CLOSED" MILE Sign. Project advance warning signals (not shown) shall be located in advance of the relocated sign No. 3.

**SYMBOLS**

- Work Area
- Traffic Transition Area Upstream From Crossover
- "Lane Identification + Direction of Traffic"
- "Lane Number"
- "Approach Of The Work Vehicle"
- "Panel"
- "Temporary Crossovers in accordance with Index No. 631"
When the paving train is in lane (1) the U-turning vehicle shall cautiously turn into lane (2) and proceed in lane (2) to the front of the train.

**CONDITION B**

When the paving train is in lane (2), the U-turning vehicle shall turn into lane (1), cautiously merge into lane (1) and proceed to the front of the paving train.

**CONDITION A & B**

The advance warning arrow panel is required. Under no circumstances will the traffic transition be located within the limits of the crossover.

**TRAFFIC TRANSITION AREA DOWNSTREAM FROM CROSSOVER**

**CASE II**

Notes: See Sheet 1 of 2 for General Notes.
TEMPORARY CROSSOVER FOR MEDIAN WIDTHS ≥ 75'

GENERAL NOTES

1. Temporary median crossovers shall be within the project limits and shall not be used for transporting materials to or from any other project. The acceleration-deceleration surfaces shall be paved. RAP material is acceptable for crossing surfacing.

2. Temporary median crossovers shall be located only in areas having adequate sight distance. On limited access facilities temporary median crossovers shall not be located within 1.5 miles of interchanges nor within 2000 ft. of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.

3. For paving train operations at permanent crossovers, see Index No. 630.

4. All traffic control devices are to be removed when crossover will not be in use for one hour or longer.

5. Trailer mounted advance warning panel may be used in lieu of advance warning vehicle.

6. When a crossover is no longer needed, all temporary construction shall be immediately removed and the area restored to its original condition.

7. Cost of construction, maintenance, removal and restoration work related to temporary crossovers shall be included in the contract unit price for Maintenance of Traffic.

8. Temporary crossovers on limited access right of way and use of this Index are prohibited unless specifically permitted in the Contract Plans or Special Provisions. When permitted in the Contract Plans or Special Provisions and prior to construction of any temporary crossover, the Contractor must submit, in writing, a request identifying specific locations for approval by the Engineer.

SYMBOLS

- Work Zone Sign
- Lane Identification - Direction of Traffic

LENGTH OF ACCESS LANES (Ft.)

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<th>D_2</th>
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</tr>
<tr>
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<td>925'</td>
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PLAN

SECTION AA

SECTION BB

Lane Identification - Direction of Traffic
SYMBOLS

- Work Area, Hazard Or Work Phase
  (Any Pattern Within A Boundary)
- Work Zone Sign
- Cone Or Tubular Marker
- Advance Warning Vehicle
- Lane Identification + Direction of Traffic

LENGTH OF ACCESS LANES (FT.)

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<td>3 to 4% Downgrade</td>
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NOTE

1. A lane closure analysis will be required to determine the times of day that this crossover can be in operation.

TEMPORARY CROSSOVER FOR MEDIAN WIDTHS FROM 50' TO < 75'

Maximum Spacing Between Cones And Tubular Markers Shall Be 25'

$L$ (Min.) = WS

$S$ = Existing Posted Speed (MPH)
The ROAD WORK I MILE sign may be used as an alternate to the ROAD WORK AHEAD sign.

** BE PREPARED TO STOP sign may be omitted for speeds of 45 MPH or less.

GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.

2. Additional one-way control may be effected by the following means:
   (1) Flag-carrying vehicle;
   (2) Official vehicle;
   (3) Pilot vehicles;
   (4) Traffic signals.

When flaggers are the sole means of one-way control, the flaggers shall be in sight of each other or in direct communication at all times.

3. The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.

4. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ indexes.

5. The two channelizing devices directly in front of the work area and the one channelizing device directly at the end of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.

6. Discontinuance of extended buffer space will not occur until the queue length plus 300' is reached.

7. If the queuing of vehicles across active rail tracks cannot be avoided, an unformed traffic control officer or flagger shall be provided at the high-speed rail crossing to prevent vehicles from stopping within the high-speed rail crossing, even if automatic warning devices are in place.

8. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 2' OUTSIDE THE EDGE OF TRAVEL WAY THAT REQUIRES A LANE CLOSURE IN THE VICINITY OF A RAILROAD CROSSING.

DURATION NOTE

1. ROAD WORK AHEAD and the BE PREPARED TO STOP signs may be omitted if all of the following conditions are met:
   a) Work operations are 60 minutes or less.
   b) Speed limit is 45 mph or less.
   c) No sight obstructions to vehicles approaching the work area for a distance equal to the buffer space.
   d) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e) Volume and complexity of the roadway has been considered.
   f) No queuing of vehicles across rail tracks.
Lane Identification

SPEEDING
WHEN WORKERS
DOUBLED PRESENT

Or Sign With
Flog And Type B Light

Type I
Type II
Type III

Barricade (With Flashing Light)

Cones May Be Used
(Tubular Markers May Be Used During Daylight Work Zone Sign

Drum (With Steady Burning Light At Night

When Other Construction Or
Maintenance Operations Occur
Within 2 Mile, Signs To Be Limited And Signing To Be Coordinated In
Accordance With Index No. 600.

PHASE III

1. Remove temporary marking from the existing pavement and temporary shoulder
pavement. Mark pavement, install warning devices and resign as shown. Traffic
must be controlled in accordance with Index No. 607. For lane width requirements
see Index No. 600.

2. Route through traffic to newly constructed roadway.

3. Resurface or reconstruct existing pavement including required shoulder
pavement and friction course.

PHASE IV

1. Reroute through traffic as shown in Phase II. Signing to be as shown in Phase II.

2. Construct friction courses over pavement constructed in Phases I and II.

GENERAL NOTES

1. Existing signs and pavement markings that conflict with
clearance of construction signing and marking shall be obliterated
or removed.

2. Lane widths for maintenance of two-way traffic should
desirably be equal to lane widths of the existing facility,
but lanes shall be not less than 10' in width. When one-lane
one-way operations are necessary, a minimum width of 12'
shall be maintained and traffic controlled in accordance
with Index Nos. 603 and 607. Minimum width for the
temporary shoulders is 6'.

3. Within the lateral transitions, the maximum spacing
between Type I or Type II barricades or vertical panels or
drums shall be based on the speed limit as follows: 10' up
to 25 MPH; 30'-40' MPH for 45 MPH or greater.

The maximum spacing between warning devices used for
definition between the travelway and construction area
is 50' for Type I or Type II barricades or vertical panels
or drums.

4. Warning devices shall be in conformance with 'Specifications
For Work Zones', see Index No. 600.

5. For speed sign applications, see 'Regulatory Speed In
Work Zones' Index No. 650.

6. For reflectorized raised pavement marker applications,
see 'Pavement Markers' Index No. 630 and Index No. 17135.

7. Additional barricades, signing lighting or other traffic
controls shall be provided for limited work areas in
accordance with other applicable TCZ Indexes.

8. When a side road intersects the highway within the TTC
zone, additional TCZ devices shall be placed in accordance
with other applicable TCZ Indexes.

9. Provisions approved by the Engineer shall be made for the
removal of storm water from the roadway(s) during construction.

10. For general TCZ requirements and additional information,
refer to Index No. 600.
SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

required for Projects > 2 Miles

SYMBOLS

- Sign With 18" x 18" (Min.)
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light at Night Only)
- Type III Barricade (With Flashing Lights)
- Work Zone Sign
- Stop Bar
- Lane Identification = Direction of Traffic

PHASE I

1. Maintain two-lane two-way traffic along existing facility. Install construction signing.

2. Remark existing pavement to facilitate temporary pavement construction. For lane width requirements see Index No. 600.

3. Construct temporary pavement of sufficient width to accommodate two-lane two-way traffic on the temporary pavement and a portion of the existing pavement during Phase I roadway construction. When two-lane two-way traffic can not be maintained during temporary pavement construction one-lane operations shall be maintained in accordance with Index No. 605. Channelizing devices shall be in conformance with "Drop-Offs in Work Zones" of Index No. 600.

4. Mark the pavement in accordance with the Phase I diagram. Reroute through traffic to the temporary pavement and a portion of the existing pavement. For lane width requirements see Index No. 600.

5. Construct two lanes of the proposed roadway, excluding the friction course. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with. Index Nos. 604, 605 and 625. Barricading shall be in conformance with "Drop-Offs in Work Zones", Index No. 600. When work extends through an intersection, temporarily reroute the cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets, in accordance with Index Nos. 604, 605 and 625.

LEGEND

See Sheet 3 for General Notes

2008 FOOT Design Standards

CONVERTING TWO LANES TO FOUR LANES
DIVIDED, URBAN
When Other Construction Or Maintenance Operations Occur Within 1 Mile, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

End Road Work

speeding fines DOUBLED WHEN WORKERS PRESENT

Phase II

1. Sign and mark Phase I pavement in accordance with the Phase II diagram. For lane width requirements see Index No. 600.

2. Reroute through traffic to Phase I pavement.

3. Complete all Phase II construction, including the friction course. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with Index Nos. 604, 605, and 615. Channelizing devices shall be in conformance with ‘Drop-Offs in Work Zones’ of Index No. 600. When work extends through an intersection, temporarily reroute cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets, in accordance with Index Nos. 604, 605, and 615.

LEGEND

See Sheet 3 for General Notes.
PHASE III

1. Sign mark Phase II pavement in accordance with the Phase III diagram.
2. Reroute through traffic to Phase II pavement.
3. Construct friction course over Phase I pavement. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with Index Nos. 604, 605 or 615. When work extends through an intersection, temporarily reroute cross traffic to other cross streets. When rerouting is not possible provide one-lane access (minimum) for two-lane two-way cross streets and one-lane across (minimum) each direction for four-lane two-way cross streets.

GENERAL NOTES

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 600.
2. Lane widths for maintenance of two-way traffic should desirably be equal to lane widths of the existing facility, but lanes shall not be less than 10' in width. When one-lane one-way operations are necessary, a minimum width of 12' should be maintained and traffic controlled in accordance with Index Nos. 604, 605 or 615.
3. At signalized intersections, signals shall be directed or relocated as required to the center of relocated lanes.
4. For reflectorized raised pavement marker application, see Index Nos. 600 and 17352.
5. Additional barricades, signing, lighting or other traffic controls for limited work areas shall be provided in accordance with other applicable TCZ Indexes as conditions warrant in each phase.
6. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
7. For general TCZ requirements and additional information, refer to Index No. 600.

LEGEND

- Phase I Construction
- Phase II Construction
- Phase III Construction

SYMBOLS

- Sign With 24" x 24" (Min.) Orange Flag And Type II Light
- Type I Or Type II Barricade Or Vertical Panel
- Work Zone Sign
- Stop Bar
- Lane Identification + Direction of Traffic

CONVERTING TWO LANES TO FOUR LANES DIVIDED, URBAN
Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

**Phase I**
1. Maintain two-lane two-way traffic over existing facility.
2. Construct temporary structure, approaches, guardrail, and install crash cushions if center truss is constructed.
3. The signing shown in the Phase I diagram is required whenever equipment workers or their activities are within 15' of the existing pavement edge.

**Phase II**
1. Resign and mark as shown in Phase II plan.
2. Reroute traffic to diversion and maintain two-way traffic on diversion, install Type III barricades.
3. Construct proposed structure and reconstruct or resurface existing approaches.

**Phase III** (See Sheet 2 of 2)

**General Notes** (See Sheet 2 of 2)

**Symbols**
- **Sign with 18" x 18" (Min.)**
- **Orange Flag and Type B Light**
- **Type I or Type II Barricade or Vertical Panel**
- **Type III Barricade (With Steady Burning Light At Night Only)**
- **Work Zone Sign**

**Legend**
- Phase I
- Phase II

**2008 FDOT Design Standards**

**Two-Lane Two-Way, Rural Structure Replacement**

**Last Revision**
Sheet No. 07/01/05 1/2

**Index No.**
650
PHASE III

1. Reroute traffic to final alignment and maintain two-way traffic.
2. Remove all temporary construction items.

GENERAL NOTES

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 600.
2. For speed sign applications, see Index No. 600.
3. For lane width requirements see Index No. 600. When one-way one-lane operations are necessary, a minimum width of 12' shall be maintained and traffic controlled in accordance with Index Nos. 603, 606 or 607. Minimum width for the diversion shoulders is 6'.
4. Method of attaching temporary guardrail to the diversion structure to be approved by the Engineer. Cost of temporary guardrail systems, including end anchorage assemblies, transitions and attachment to temporary structures, are to be included in the contract unit price for Guardrail (Temporary).
5. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
6. Only temporary crash cushions approved by the Department shall be used unless specified devices called for in the plans.
7. Where the temporary structure is not required, the diversion may be constructed in accordance with Index No. 608, unless otherwise stipulated in the plans.
8. For reflective raised pavement marker application, see Index Nos. 600 and 11352.
9. For general TCZ requirements and additional information, refer to Index No. 620.
When Other Construction Or Maintenance Operations Occur Within 1 Mile, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 605.

**Symbols**

- **Work Area**
  - Sign: White 18" x 18" (Min.)
  - Orange Rod And Type B Light

- **Type I Or Type II Barricade Or Vertical Panel**
  - Drum (With Steady Burning Light At Night Only)

- **Work Zone Sign**
  - Lane Identification + Direction of Traffic

**General Notes**

1. *Posted speed limit (mph).*
2. While the lateral transitions, the maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 15' up to 25 MPH; 30' for 30-40 MPH; 50' for 45 MPH or greater. Barricades, vertical panels, and drums shall not be intermixed in lateral transitions.
3. For speed sign applications, see ‘Regulatory Speed In Work Zones’ Index No. 605.
4. All existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and new pavement markings used for marking edge lines and lane lines.
5. When side roads, cross roads or interchanges within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.
6. For general TCZ requirements and additional information, refer to Index No. 605.

**Conditions**

Where any vehicle equipment, workers or their activities require the closure of one roadway and the opposing roadway is converted to temporary two-way travel, by way of crossovers.
When other construction or maintenance operations occur within 1 mile, signals to be coordinated in accordance with Index No. 600.

Barricade Placement

For Signing

See Sheet 1

CURVILINEAR ALIGNMENT CROSSOVER

When other construction or maintenance operations occur within 1 mile, signals to be coordinated in accordance with Index No. 600.

CURVE END

APPRACh END

TRAILING END

See Sheet 1 for Signing and Barricade Placement

NOTE: Diversions with speeds of 50 mph or greater are considered high speed facilities; curvature and superelevation criteria for open highway conditions apply.
CORNER SIDEWALK CLOSURE
WITH TEMPORARY CROSSWALKS

GENERAL NOTES

1. Only the signs controlling pedestrian flows are shown. Other work zone signs will be needed to control traffic on the streets.

2. For spacing of traffic control devices and general TIZ requirements refer to Index No. 600. Maximum spacing between barricades, vertical panels, drums or tubular markers shall not be greater than 25'.

3. Street lighting should be considered.

4. For nighttime closures use Type A flashing warning lights on barricades supporting signs and closing sidewalks. Use Type C steady-burn lights on channelizing devices separating the work area from vehicular traffic.

5. Pedestrian traffic signal display controlling closed crosswalks shall be covered or deactivated.

6. Post-Mounted Signs located near or adjacent to a sidewalk shall have a 7' minimum clearance from the bottom of sign to the sidewalk.

7. When construction activities involve sidewalks on both sides of the street, efforts should be made to stage the construction so that both sidewalks are not out of service at the same time.

8. In the event that sidewalks on both sides of the street are closed, pedestrians shall be guided around the construction zone.

9. Temporary walkways shall be a minimum of 4' wide with a maximum 0.02 cross slope and a maximum 0.05 running slope between ramps. Temporary walkways less than 5' in width shall provide for a 5' x 5' passing space at intervals not to exceed 200'. Temporary ramps shall meet the requirements for curb ramps specified in Index No. 304, General Notes 1 through 7.

10. Temporary walkways and temporary crosswalk markings shall be removed with reopening of the sidewalk, unless otherwise noted in the plans. All work and materials associated with constructing temporary curb ramps and temporary crosswalk markings, removal and disposal of temporary curb ramps and temporary crosswalk markings, and restoration to original condition shall be paid for as Maintenance at Traffic, Lump Sum.

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE SIDEWALK FOR A PERIOD OF MORE THAN 60 MINUTES.

PEDESTRIAN CONTROL FOR CLOSURE OF SIDEWALKS

SYMBOLS

- Work Area
- Type I or Type II Barricade Or Vertical Panel
- Drums (With Steady Burning Light At Night Only)
- (Prevail Against Side Movement Or Stoplight Only)
- (May Be Used - See Index No. 600)
- Work Zone Sign
- Required Locations For Either Temporary Or Permanent Curb Ramps.
- Lane Identification + Direction of Traffic
1. Access openings across limited access right of way and use of this Index are prohibited unless specifically permitted in the Contract Plans or Special Provisions. When permitted in the Contract Plans or Special Provisions and prior to construction of any opening, the Contractor must submit, in writing, a request identifying specific locations for approval by the Engineer.

2. No more than two (2) access openings will be allowed on each project.

3. Access openings shall be located only in areas having adequate sight distance and shall not be located within 1.5 miles of interchanges nor within 2000 ft. of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.

4. Access openings shall not be constructed directly opposite temporary median crossovers nor within 2000 ft. of temporary median crossovers.

5. Access openings shallWithin the project limits and shall not be used for transporting materials to or from any other project. The acceleration-deceleration surfaces shall be paved. RAP material is acceptable for driveway surfacing.

6. Any Motorist Aid Call Boxes affected by the temporary access openings shall be relocated outside the limits of access lanes and remain in use during construction. Upon removal of access lanes, call boxes shall be returned to their previous location. Temporary relocation and restoration of call boxes shall be at the contractor's expense.

7. Access openings in the limited access fence shall have gates which are to be locked during nonwork hours or periods when the access is not in active use.

8. The contractor shall take all precautions necessary to insure against entrance by livestock or unauthorized persons or vehicles.

9. The contractor shall not vary from the plan detail without approval of the Engineer.

10. Gates shall be removed and access opening locations shall be restored to preconstruction condition immediately upon completion of activities utilizing the materials being transported through the openings whether or not the project is completed.

11. Failure to comply with any provision of the access opening plan shall be cause for term/noting use of all openings. Upon notification by the Engineer, the contractor shall cease hauling and begin restoration of affected areas. Under this condition expenses of removal, restoration and of additional hauling distances shall be borne by the contractor.

12. No guardrail or barrier wall will be removed for access openings.

13. Construction and removal of the access and restoring the area to preconstruction condition shall be included in the cost of Maintenance Of Traffic, LS.

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<th>Grade</th>
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<tr>
<td>3 to 4% Downgrade</td>
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</table>

**Symbols**
- D: Work Zone Sign

**General Notes**
- **PLAN**
  - Double 18' White Stripes
  - Full Length of Access Lanes
- **Existing Lane**
  - Existing Shoulder Pavement
  - Existing Shoulder Flare
  - Side Drain Pipe Use Mitered End Sections
  - 'r' With Clear Zone (Index No. 275)
- **Temporary Site Posts**
  - Fence Gate Type A (Double 12' / 24' Opening)
- **Access Opening**
  - Existing Travel Lanes
- **Existing Shoulder**
  - Widening
  - Existing Pavement
  - Existing Pavement
- **Section AA**
  - Double 18' Shoulder
  - Existing Shoulder

**Symbols**
- D: Work Zone Sign
Typical PCMS Display

With speed reduction:
Message 1: WORKERS PRESENT AHEAD
Message 2: SPEED REDUCED NEXT 3 MILES

Without speed reduction:
Message 1: NEXT 3 MILES

SYMBOLS

\[ \text{Work Area} \]

\[ \text{Sign With IB"x IB" (Min.) Orange Flag And Type B Light} \]

\[ \text{Channelizing Device (See Index No. 600)} \]

\[ \text{Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)} \]

\[ \text{Work Zone Sign} \]

\[ \text{Advance Warning Arrow Panel} \]

\[ \text{Lane Identification + Direction of Traffic} \]

\[ \text{(1) PCWS = Portable Changeable Variable Message Sign} \]

\[ \text{(2) PRS = Portable Regulatory Sign - Speed Limit When Flashing} \]

\[ \text{(2) RSN = Radar Speed Display Unit} \]

GENERAL NOTES

1. At lane closures where workers are present, reduce the posted speed limit (speed limit that existed prior to construction) by 10 MPH using the Portable Regulatory Sign (PRS), but not less than 55 MPH or to a speed warranted by geometric condition, whichever is lower. Taper lengths, buffer space and device spacing shall be selected using the posted speed, not the reduced speed.

2. All Arrow Panels, Portable Changeable Message Signs, Portable Regulatory Signs and Radar Speed Display Trailers, shall be turned off and moved outside the clear zone or be shielded by a barrier or crash cushion when not in use.

3. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.

4. When work is performed in the median lane on divided highways, the barricading plan is inverted and lane reduction signs substituted for the right lane closed and lane reduction signs.

5. When work is being performed on a multi-lane undivided roadway, the signs and traffic control devices normally placed in the median (as shown) shall be omitted.

6. When speed shoulders having a width of 6 ft. or more are closed, channelizing devices shall be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the travel way. See Index No. 602 for shoulder taper formulas.

7. For general TCZ requirements and additional information, refer to Index No. 600.

Table I

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CONDITIONS

The MAS shall be used if all of the following conditions exist:

- Multi-lane Facility
- Posted speed limit is 55 MPH or greater
- Work activity requires a lane closure for more than 5 days (consecutive or not)
- Workers are present

Revision 07/01/07

Table II

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TABLE A
MINIMUM RECOVERABLE TERRAIN (11)

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TABLE B
RESTRICTING CONDITIONS

1. The facility is an urban facility.
2. The facility's design speed is 45 mph or lower.
3. The facility is predominantly a curbed facility.
4. The distance from the face of curb to the R/W line is less than the value obtained in STEP 2.

STEP 1
Obtain the design speed.

STEP 2
Select the minimum recoverable terrain from Table A based on lane type and design speed.

STEP 3
Does the facility meet ALL the restricting conditions in Table B?

Yes

STEP 4A
Select the horizontal clearance requirement from the restricted column of Table C based on the object, obstruction, or condition.

STEP 4B
Select the horizontal clearance requirement from the nonrestricted column of Table C based on the object, obstruction, or condition.

END

Clear Zone is the relatively flat undisturbed area that is to be provided for safe use by errant vehicles, and must be wide enough so that the sum of all the recoverable terrain within is equal to or greater than the value obtained in STEP 2. Recoverable terrain provided beyond nonrecoverable terrain must be a minimum of 20 feet. Areas beyond nonrecoverable and hazardous terrain cannot be used as recoverable or nonrecoverable terrain.

Recoverable terrain includes all surfaces along the roadway other than travel lanes, auxiliary lanes, and ramps.

For the purpose of establishing clear areas and horizontal clearance requirements, roadside terrain is defined as recoverable, nonrecoverable, non-traversable, and hazardous as follows:

Recoverable when it is safely traversable and on a slope that is lv:4h or flatter.

Nonrecoverable when it is safely traversable and on a slope that is steeper than lv:4h but not steeper than lv:3h.

Nontraversable when it is not safely traversable or on a slope that is steeper than lv:3h.

Hazardous when a slope is steeper than lv:3h and deeper than 6 feet as shown in Figure 2.

Horizontal Clearance Requirements are shown in Table C and are the required offsets to an object from a specified point on the roadway.

ROADSIDE TERRAIN
FIGURE I

2008 FDOT Design Standards
Sheet No. 1 of 2

ROADSIDE OFFSETS
### TABLE C

<table>
<thead>
<tr>
<th>Item No.</th>
<th>OBJECTS, OBSTRUCTIONS OR CONDITIONS</th>
<th>HORIZONTAL CLEARANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Restricted</td>
</tr>
<tr>
<td>1</td>
<td>Above ground fixed hazards: All movable objects, obstructions or conditions other than those listed below that exceed 4 inches in height and pose a hazard to errant vehicles and vehicle occupants.</td>
<td>Locate as close to the Right Of Way as practical and not less than 4 feet from face of curb.</td>
</tr>
<tr>
<td>2</td>
<td>All FOOT approved guardrails, crash cushions, permanent or temporary concrete barriers, and guardrail end terminals.</td>
<td>Locate as shown in the Design Standards.</td>
</tr>
<tr>
<td>3</td>
<td>Drop-off hazards: Any point along the roadway slope steeper than 1 in 30 that is deeper than 6 feet below the hinge point. See Figure 2.</td>
<td>Locate the point that is 6 feet below the hinge point or less than 20 feet from the traveled way.</td>
</tr>
<tr>
<td>4</td>
<td>Wares not shown in Design Standard 532.</td>
<td>Not to be used.</td>
</tr>
<tr>
<td>5</td>
<td>Warehouses shown in Design Standard 532.</td>
<td>Locate in accordance with Design Standard 532.</td>
</tr>
<tr>
<td>6</td>
<td>Trees expected to become greater than 4 inches in diameter measured 6 inches above the ground. Outside roadways: Locate no less than 4 feet from face of curb. In accordance with Design Standard 546. Inside roadways: Locate no less than 6 feet from the edge of travel areas and in accordance with Design Standard 546.</td>
<td>Locate outside the clear zone as close to the Right Of Way as practical and in accordance with Design Standard 546.</td>
</tr>
<tr>
<td>7</td>
<td>Trees not expected to become greater than 4 inches in diameter measured 6 inches above the ground. Locate in accordance with Design Standard 546.</td>
<td>Locate in accordance with Design Standard 546.</td>
</tr>
<tr>
<td>8</td>
<td>Cables behind guardrail. Locate no less than 5 feet from the back of the guardrail post.</td>
<td>Locate no less than 5 feet from the back of the guardrail post.</td>
</tr>
<tr>
<td>9</td>
<td>Cables without guardrail. Locate as close to the Right Of Way as practical and not less than 40 feet from the traveled way. Design standards of 50 mph and greater: Locate as close to the Right Of Way as practical and not less than 60 feet from the traveled way. Design standards of less than 50 mph: Locate as close to the Right Of Way as practical and not less than 50 feet from the traveled way.</td>
<td>Design standards of 50 mph and greater: Locate as close to the Right Of Way as practical and not less than 60 feet from the traveled way.</td>
</tr>
<tr>
<td>10</td>
<td>Culvert with wall, endwall, retaining walls and filled sections less than 6 feet deep.</td>
<td>Locate no less than 4 feet from face of curb.</td>
</tr>
<tr>
<td>11</td>
<td>Culvert with wall, endwall, retaining walls and filled sections 6 feet or greater in depth.</td>
<td>Treat as drop-off hazards, See item No. 3.</td>
</tr>
<tr>
<td>12</td>
<td>Wires and electrodes. Locate as shown in Design Standards S72 and S73.</td>
<td>Locate as shown in Design Standards S72 and S73.</td>
</tr>
<tr>
<td>13</td>
<td>Frangible sign supports. Locate no less than 4 feet from face of curb and in accordance with Design Standard D530.</td>
<td>Locate outside the clear zone.</td>
</tr>
<tr>
<td>14</td>
<td>Overhead sign supports and other nonfrangible signs. Locate no less than 4 feet from face of curb.</td>
<td>Locate outside the clear zone.</td>
</tr>
<tr>
<td>15</td>
<td>Signal controller cabinets, signal poles, traffic poles and mast arms. Locate no less than 4 feet from face of curb and not in medians.</td>
<td>Locate outside the clear zone and not in medians.</td>
</tr>
<tr>
<td>16</td>
<td>Conventional lighting (frangible and nonfrangible). Locate no less than 4 feet from face of curb and not in medians.</td>
<td>Locate outside the clear zone.</td>
</tr>
<tr>
<td>17</td>
<td>Highway lighting. Not applicable.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>18</td>
<td>Bridge piers and abutments: Above ground vertical structures. Locate no less than 5 feet from edge of travel lane.</td>
<td>Locate outside the clear zone.</td>
</tr>
<tr>
<td>19</td>
<td>Fire hydrants: With base no higher than 4 inches above the ground. Locate no less than 2 feet from face of curb.</td>
<td>Locate outside the clear zone as close to the Right Of Way as practical.</td>
</tr>
<tr>
<td>20</td>
<td>Utility installations: All above ground fixed objects. Locate as close as possible to the Right Of Way as practical and not less than 4 feet from face of curb and not in medians.</td>
<td>Locate outside the clear zone as close to the Right Of Way as practical and not less than 4 feet from face of curb and not in medians.</td>
</tr>
</tbody>
</table>

### GENERAL NOTES

1. When sidewalks are present, an unobstructed sidewalk width of at least 4 feet must be provided.

2. When site-specific conditions prohibit meeting the horizontal clearance requirements, the requirements in these manuals can only be reduced when a Design Variation or Design Exception has been approved in accordance with Chapter 23 of the Plans Preparation Manual, Volume 1 or Exception has been approved in accordance with Chapter 13 of the Utility Accommodation Manual.

---

![Diagram](image-url)
Approach Slab

Expansion Or Chemical Concrete Anchor Eyebolt Or Studs And Eyenuts. Embedment 2:1 Min. 3 Req'd.

This Post To Be Located Approx. In Line With End Beam. Set Post At Edge Of Slope Pavement.

Vertices, As Directed By The Engineer.

Proposed Fence

ELEVATION

FENCING TERMINALS AT BRIDGE ENDS

PLAN

LA R/W Line

Shoulder Line

Tie Of Slope

Proposed Fence

ELEVATION

FENCING TERMINALS AT BRIDGE ENDS

PLAN

LA R/W Line

Shoulder Line

Tie Of Slope

Proposed Fence

FENCE LOCATION
LA R/W along the crossroad will extend a minimum 300' beyond the end of the acceleration or deceleration taper, with the taper most remote from the project establishing the end. If there is no taper, the radius point of the ramp return will be used with the above criteria.

For interchange quadrants having no ramp the LA R/W will extend along the crossroad to a point opposite the limit of LA R/W established by the ramp taper or radius point as noted above.

APPLIES TO BRIDGE OVER CROSSROAD AND CROSSROAD OVER FREEWAY / BRIDGE OVER CROSSROAD SHOWN

FENCING TERMINALS AT RURAL INTERCHANGES

Retaining Wall

6” Where Fencing Begins

LA R/W Line

PLAN

Fence

FENCING TERMINALS AT RURAL INTERCHANGES

Gound Line

FENCING TERMINALS AT RETAINING WALLS

FENCE LOCATION
i. This fence to be provided generally in rural areas. For supplemental information see Section 550 of the FDOT Specifications.

2. Fabric shall be woven wire, either galvanized steel, meeting the requirements of ASTM A690, 9-Fram, Design Number D6-05-9, with Class 3 zinc coating, or aluminum coated steel, meeting the requirements of ASTM A554, 9-Fram, Design Number D6-05-9, with a minimum coating weight of 175 oz./ft.

3. Fence shall be insulated with wire sides to provide privacy except on horizontal surfaces greater than 3 feet.

4. Posts may be either timber, steel, recycled plastic or concrete. Unless a specific post material is called for in the plans, the Contractor may select to use either a single material or a combination of timber, steel, recycled plastic, or concrete materials. Line posts of one material may be used with corner, pull, or end posts of other material. The arrangements of all optional materials will be coordinated between corner and end post assemblies. Within individual corner and end post assemblies only one optional material will be permitted.

5. Timber posts shall meet the material requirements of Specification Section 594. Timber line posts are to be minimum 4 inches diameter. Timber corner post, pull, and end posts are to be a minimum 5 inches diameter. Timber posts shall not be less than 1/2 inches thick. At approaches, corner, and pull posts, steel every line wire. All line wire shall be galvanized at the point of contact with the post and posts shall be painted with the points in separate groups.

6. Steel posts and braces shall be standard steel posts, galvanized at the rate of 2 oz./ft², together with necessary hardware and wire clips and meeting the following requirements:
   a. Line posts 9 long, 2-3/4” diameter, standard size, hot forming, 1-3/8” length, and with a minimum of two 1-1/4” diameter round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.
   b. Pull posts 9 long, 2-3/4” diameter, standard size, hot forming, round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.
   c. Pull posts 9 long, 2-3/4” diameter, standard size, hot forming, round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.
   d. Pull posts 9 long, 2-3/4” diameter, standard size, hot forming, round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.
   e. Pull posts 9 long, 2-3/4” diameter, standard size, hot forming, round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.

7. Fabric shall be woven wire, either galvanized steel, meeting the requirements of ASTM A690, 9-Fram, Design Number D6-05-9, with Class 3 zinc coating, or aluminum coated steel, meeting the requirements of ASTM A554, 9-Fram, Design Number D6-05-9, with a minimum coating weight of 175 oz./ft.

8. Posts shall be set by digging and tamp with a minimum of two 1-1/4” diameter round or square hole through the post at the top and in the center of the post. The hole shall be at least 1-1/2” in diameter.

9. Post pull, corner, and end post assemblies shall be cut from concrete. Lengths of post to be as indicated for timber posts.

10. Aluminum post, brace and necessary framing hardware shall not be used unless the plans specifically detail their location or the engineer specifically approves such incorporation in fence design or repairs. Aluminum trimmed gates are permitted as described in General Notes.
BRACE AND POST  
BRACE TO BRACE ON LINE  
BRACE TO BRACE AT CORNER  

FASTENER FOR CONCRETE POST AND BRACES

POST NO. 7  
GAGE GALV.  
UEFA/STRAP, 1-1/2" WIDE

4" I  
I  
#  
4" I  
I  
#  

FASTENER FOR TIMBER POST AND BRACE

PRESTRESSED POST

Length As Required

Prestressed Cable Centered  
All Edges

PRESTRESSED BRACE

Length As Required

Prestressed Cable Centered  
All Edges

PRECAST POST

Length As Required

No. 3 Bars (4 Req’d.)

PRECAST BRACE

Length As Required

No. 3 Bars (2 Req’d.)

CORNER POSTS END AND PULL POSTS

Each horizontal wire to be wrapped around corner, end and pull posts and fastened with wire. See General Notes 5 and 7.  
Corner posts illustrated. These methods also apply to steel and concrete post illustrations.

SPLICES
GENERAL NOTES

D. Chain link fabric options 1/2" mesh with barbed wire and barbed slope top and bottom for all options except as described in Notes No. 9.

(1) AASHTO M60 Type 1 - Zinc-Coated Steel, No. 8 gage (coated wire diameter), coated at the rate of 1.8 oz./ft. 2.

(2) AASHTO M60 Type 2 - Aluminum Coated Steel, No. 8 gage coated wire diameter, coated at the rate of 0.40 oz./ft. 2.

(3) AASHTO M60 Type 12 - Polystyrene (PS) Coated Steel, No. 8 gage coated wire diameter, coated at the rate of 0.40 oz./ft. 2.

E. Tension wire options:

(1) Steel - Wire No. 8 gage zinc coated at the rate of 1.2 oz./ft. 2.

(2) Aluminum alloy coated steel wire with 0.40 oz./ft. 2 longer conforming to the requirements of ASTM B61, Aaluminum 5055, temp. grade, or Alcoa Aluminum 5055 temp. grade.

(3) Aluminum alloy coated steel wire No. 8 gage coated at the rate of 0.40 oz./ft. 2.

F. Top and bottom wire options:

(1) Steel - Wire No. 8 gage zinc coated at the rate of 0.40 oz./ft. 2.

(2) Aluminum alloy wire with a diameter of 0.40 oz./ft. 2 longer conforming to the requirements of ASTM B61, Aaluminum 5055, temp. grade, or Alcoa Aluminum 5055 temp. grade.

(3) Aluminum alloy coated steel wire No. 8 gage coated at the rate of 0.40 oz./ft. 2.

6. Unless a specific material is specified in the plan the Contractor may use either a single type of material or a combination of materials from the following methods:

(a) One or more different types of wire materials, e.g., a combination of aluminum coated steel wire with an alloy coated steel wire.

(b) A combination of wire materials with different diameters, e.g., a combination of No. 8 gage and No. 12 gage wire.

7. Line installers shall be permitted between corner posts and/or end posts, unless otherwise specified in the contract plans.

8. For Condruction purposes corner post assemblies shall consist of one corner post, two brace posts, two brace rods, and all necessary fittings and hardware as detailed above.

9. Post assemblies shall consist of one post, one brace, one brace rod, and all necessary fittings and hardware as detailed above.

10. All posts, tension wires, chain link fabric, the wire, Class 2 concrete, and all miscellaneous fittings and hardware are included in the cost for fencing.

DESIGN NOTE

This Index strictly defining that is furnished with data link fabric type B in design and with specific ground clearance. For fencing of different height or installation details, the fence shall be fully detailed in the Contract plans.

TYPE II VINYL COATED FABRIC

AASHTO M60 Table 4 Required As Follows

<table>
<thead>
<tr>
<th>Specific Diameter</th>
<th>Minimum Weight</th>
<th>Flattened Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>0.40 oz./ft. 2</td>
<td>2.75&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>0.75 oz./ft. 2</td>
<td>3.50&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1.00 oz./ft. 2</td>
<td>4.25&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1.25 oz./ft. 2</td>
<td>5.00&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>1.50 oz./ft. 2</td>
<td>5.75&quot;</td>
</tr>
<tr>
<td>14&quot;</td>
<td>1.75 oz./ft. 2</td>
<td>6.50&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>2.00 oz./ft. 2</td>
<td>7.25&quot;</td>
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<tr>
<td>18&quot;</td>
<td>2.25 oz./ft. 2</td>
<td>8.00&quot;</td>
</tr>
<tr>
<td>20&quot;</td>
<td>2.50 oz./ft. 2</td>
<td>8.75&quot;</td>
</tr>
<tr>
<td>22&quot;</td>
<td>2.75 oz./ft. 2</td>
<td>9.50&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>3.00 oz./ft. 2</td>
<td>10.25&quot;</td>
</tr>
</tbody>
</table>

H. All post and corner post assemblies shall be cut to 2" length and/or size for posts of the opening. Gates shall be permitted at breaks in vertical members of the fence. Gates shall be permitted between corner posts and/or end posts.

I. For fencing of different height or installation details, the fence shall be fully detailed in the Contract plans.

2008 FOOT Design Standards

FENCE TYPE B
### STANDARD WALL

- **Galv. Wt. Per. Ft.**: ±5%
- **Yield PSI (Min.)**: 45,000

### THINWALL

- **Galv. Wt. Per. Ft.**: ±5%
- **Yield PSI (Min.)**: 45,000

### OPTIONAL "C" LINE POST

- **STEEL**
  - **Area (Sq. In.)**: 794
  - **Weight (Lb./Ft.)**: 0.776
  - **Surface Area (SF/Ft.)**: 0.776
  - **Tensile Strength (Min. PSI)**: 80,000
  - **Yielding Point (Min. PSI)**: 48,000

- **ALUMINUM**
  - **Area (Sq. In.)**: 794
  - **Weight (Lb./Ft.)**: 0.776
  - **Surface Area (SF/Ft.)**: 0.776
  - **Tensile Strength (Min. PSI)**: 80,000
  - **Yielding Point (Min. PSI)**: 48,000

### OPTIONAL 1/2" x 1/8" H-BEAM LINE POST

- **Dimensions Same As Adjacent Side**

### FENCE POSITION AT LOCATIONS WITHOUT FRONTAGE ROADS

(REFER TO DETAIL PLANS FOR FENCE POSITION AT LOCATIONS WITH FRONTAGE ROADS)

### Optional 808 Foot Design Standards

- **Fence Type B**

### BASE PLATE AND ANCHOR NOTES:

1. Base plates identified for line, pull, end and corner posts and shall be considered an integral part of the respective posts for basis of payment.
2. Post to be plumbed by ground drive under base plate.
3. Anchors (Galvanized Steel):

### Barb Wire Attachment

- **Steel**: ASTM A36 G10 Material
- **Aluminum**: Alloy 6061-T6

- **Dots Hole For Anchors, Nuts and Washers**: L (Feared)
- **Fence And Wall**

### FENCE MOUNTING ON CONCRETE ENDWALL AND RETAINING WALLS

- **TWO ANCHOR OPTION**
- **FOUR ANCHOR OPTION**
FENCING NOTES

FENCE INSTALLATION:
- Install posts plumb (within a tolerance of \( \pm \frac{1}{2}^\circ \)). Use shim plates as required to achieve plumb. The required quantity and thickness of shim plates will be determined in the field. Install chain link fence in accordance with ASTM F 567 as applicable.

TRAFFIC RAILING BARRIER DETAILS:
- See Superstructure Sheets for Traffic Railing Barrier details.

CONCRETE PARAPET DETAILS:
- See Index No. 200 - Pedestrian/Bicycle Railing for Concrete Parapet details. Provide fencing in lieu of aluminum bullet railing as shown on Index No. 820.

UNITS OF FENCING:
- Limits of fencing are from begin of approach slab to Begin Bridge to end of approach slab to End Bridge, unless otherwise shown in the plans.

PAYMENT:
- Payment will be made under Fencing, Type R. Payment includes posts, horizontals and expanson rails, brace rails and bands, rail ends, combination rail ends, boulevard clamps, chain link fabric, tension wire, tee, hog rings, tension bars and bands, post and loop caps, pipe clamps, base plates, anchor rods, bolts, nuts, washers, shim plates, spacers, neoprene gaskets, miscellaneous fence fittings and hardware and all incidental materials and labor required to complete installation of the fence.

CROSS REFERENCE:
- For Table of Fence Components, Table of Post Attachment Components, View A-4 and Detail "A" see Sheet No. 2 of 4.
- For Rail Post Assembly Detail for Traffic Railing Barriers see Sheet No. 3 of 4.
- For Rail Post Assembly Detail for Concrete Parapets and Detail "B" see Sheet No. 4 of 4.
### TABLE OF COMPONENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>DESIGNATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuts &amp; Washers</td>
<td>563 Hex Nuts for Pipe Clamp and Base Plates</td>
<td>Pipe Clamp and Base Plate Connections</td>
</tr>
<tr>
<td>Bolts</td>
<td>307</td>
<td>Pipe Clamp and Base Plate Connections</td>
</tr>
<tr>
<td>Washers</td>
<td>436</td>
<td>Pipe Clamp and Base Plate Connections</td>
</tr>
<tr>
<td>Expansion Rails</td>
<td>Galvanized Steel Pipe</td>
<td>Fence Framework and Post Attachment</td>
</tr>
<tr>
<td>Tension Wire</td>
<td>A 824</td>
<td>Fence Framework and Post Attachment</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>A 749</td>
<td>Fence Framework and Post Attachment</td>
</tr>
<tr>
<td>Hog Rings</td>
<td>A 626</td>
<td>Fence Framework and Post Attachment</td>
</tr>
<tr>
<td>Brace Bands</td>
<td>-</td>
<td>Fence Framework and Post Attachment</td>
</tr>
<tr>
<td>Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Anchor Rods, Nuts, and Washers - Post Attachment</td>
</tr>
</tbody>
</table>

### POST ATTACHMENT NOTES

- Nuts, washers, and bolts should be tightened in accordance with the American Welding Society Structural Code (AWS-17.1, 1997 Edition) and the American Society for Testing and Materials (ASTM) standards.
- The use of adhesive bonding material systems for anchors and dowels is required. See Sheet No. 1 of 4 for more information.

### COMPONENT INFORMATION

- All components are made in accordance with Specification Section 932.
- All nuts, washers, bolts, and anchor rods are hot-dip galvanized all around.
- Adhesive bonding material systems for anchors and dowels should be used as specified in the General Notes.
- All components are installed in accordance with Specification Section 932.

**NOTE:** All dimensions are in inches unless otherwise specified.
**PULL POST ASSEMBLY DETAIL FOR TRAFFIC RAILING BARRIERS**

- **Traffic Railing Barrier**
  - Type varies, 52" F-Shape shown

- **Tension Wire**
  - Pull Post and 5 3/8" Holes for 56" Post with Hex Nut and Washer

- **Bulge Chain Link Fabric**
  - To allow for joint movement

- **Pipe Clamp Connection Detail**
  - Connection without spacer shown,
    Connection with spacer similar

- **Pipe Clamp Detail**
  - Last Revision 07/01/05

**NOTES:**
1. For treatment at bridge ends, see Sheet No. 1 of 4.
2. The 3'-0" dimension shown is for expansion joint openings 9" or less. If the expansion joint opening exceeds 9", increase this dimension by the difference between the expansion joint opening and 9".

**EXPANSION ASSEMBLY DETAIL**
(Required only at expansion joint locations where total movement exceeds 6")

- **Outside Edges of Post**
  - 1/4" & Pipe Clamp
  - 3/8" & Holes for 56" Anchors (Typ.)

- **Pipe Clamp Connection**
  - Connection similar

- ** Spacer Detail**
  - Must be manufactured from an incompressible material (i.e., steel or aluminum)
PULL POST ASSEMBLY DETAIL FOR CONCRETE PARAPETS

EXPANSION ASSEMBLY DETAIL
(Required only at expansion joint locations where total movement exceeds 6")

NOTES:

1. For treatment at bridge ends, see Sheet No. 1 of 4.
2. The 3'-0" dimension shown is for expansion joint openings 9" or less. If the expansion joint opening exceeds 9", increase this dimension by the difference between the expansion joint opening and 9".
3. This Dimension is the expansion joint opening plus 1/4". Expansion rails are required at expansion joint locations where the total movement exceeds 1", but is less than or equal to 6". Expansion rails are part of expansion assemblies when the total movement exceeds 6". Install expansion rails midway between the fence posts spanning the expansion joint.
4. Install nuts for expansion rails finger-tight. Nuts will fully engage bolts with a minimum of one bolt thread extending beyond the nuts. Distort the first thread on the outside of the nut to prevent loosening.

CROSS REFERENCE:
For location of Detail "B" see Sheet No. 1 of 4.
**FENCING NOTES**

**FENCE APPLICATION:**
This bridge fence can only be used on sidewalk installations separated from traffic by a traffic railing barrier.

**FENCE INSTALLATION:**
Install posts plumb (within a tolerance of ± 1/8”). Use shim plates as required to achieve plumb. The required quantity and thickness of shim plates will be determined in the field. Install chain link fence in accordance with ASTM F 567 as applicable.

**CONCRETE PARAPET DETAILS:**
See Index No. 520 — Pedestrian/Bicycle Railing for Concrete Parapet details. Provide fencing in lieu of aluminum bullet railings as shown on Index No. 920.

**LIMITS OF FENCING:**
Limits of fencing are from begin of approach slab at Begin Bridge to end of approach slab at End Bridge, unless otherwise shown in the plans.

**PAYMENT:**
Payment will be made under Fencing, Type R. Payment includes posts, horizontal and expansion rails, brace bands, roll ends, combination rail ends, boulevard clamps, chain link fabric, ties, tension bars and bands, post and loop caps, base plates, anchor rods, bolts, nuts, washers, shim plates, neoprene pads, miscellaneous fence fittings and hardware and all incidental materials and labor required to complete installation of the fence.

**ELEVATION OF OUTSIDE FACE OF BARRIER**

**NOTES:**
1. A Pull Post Assembly is required at maximum intervals of 500'-0". See Sheet No. 2 of 3. 

**CROSS REFERENCE:**
For Table of Fence Components and Pull Post Assembly Details see Sheet No. 2 of 3. 
For Table of Post Attachment Components and Detail "A" see Sheet No. 3 of 3.
TABLE OF CHAIN LINK FENCE COMPONENTS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM DESIGNATION</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td>F 6083</td>
<td>Galvanized Steel Pipe - 4 1/2&quot; NPS, Schedule 40 (4.000&quot; Outside Diameter, 0.226&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Horizontal Rails</td>
<td>F 6083</td>
<td>Galvanized Steel Pipe - 3&quot; NPS, Schedule 40 (3.500&quot; Outside Diameter, 0.210&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Expansion Rails</td>
<td>F 6083</td>
<td>Galvanized Steel Pipe - 2 1/2&quot; NPS, Schedule 40 (2.875&quot; Outside Diameter, 0.203&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Bolts</td>
<td>A 527</td>
<td>Zinc Coated Steel - No. 9 gage (coated wire diameter), Class 2 Coating</td>
</tr>
<tr>
<td>Nuts</td>
<td>A 567</td>
<td>Hex Nuts for Expansion Rail Connections</td>
</tr>
<tr>
<td>Washers</td>
<td>F 436</td>
<td>Flat Washers for Expansion Rail Connections</td>
</tr>
<tr>
<td>Washing Screws</td>
<td>A 392</td>
<td>Zinc Coated Steel - No. 9 gage (coated wire diameter), Class 2 Coating</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>F 626</td>
<td>Tension Bars - Includes post or loop caps, horizontal and brace rail ends, combination rail ends, wallboard clamps and all other miscellaneous fittings and hardware</td>
</tr>
<tr>
<td>Brace Bands</td>
<td>F 626</td>
<td>Brace Bands - Includes post or loop caps, horizontal and brace rail ends, combination rail ends, wallboard clamps and all other miscellaneous fittings and hardware</td>
</tr>
</tbody>
</table>

NOTES:
1. This Dimension is the expansion joint opening plus 1 1/2". Expansion rails are required at expansion joint locations where the total movement exceeds 9" but is less than or equal to 12". Expansion rolls are part of expansion assemblies when the total movement exceeds 9".
2. Install expansion rails midway between the fence posts spanning the expansion joint.
3. Expansion rails should be used at bridge ends, see Sheet No. 1 of 3.
4. The 3"-0" dimension shown is for expansion joint openings 9" or less. If the expansion joint opening exceeds 9", increase this dimension by the difference between the expansion joint opening and 9".

Concrete Parapet

BRIDGE FENCING (CURVED TOP)
TABLE OF POST ATTACHMENT COMPONENTS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM DESIGNATION</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Plates</td>
<td>A 36 or A 709 Grade 56</td>
<td>⅜&quot; Steel P</td>
</tr>
<tr>
<td>Shim Plates</td>
<td>A 36 or A 709 Grade 36 or B 209 Alloy 6061-T6 or B 221 Alloy 6063-T6</td>
<td>Plate thicknesses as required, holes in shim plates will be ⅜&quot; Ø</td>
</tr>
<tr>
<td>Adhesive Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Fully threaded Hex Headless Anchor Rods ~ ⅜&quot; Ø x 14½&quot;</td>
</tr>
<tr>
<td>CJP Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Max Head Anchor Rods ~ ¼&quot; Ø x 14½&quot;</td>
</tr>
<tr>
<td>Nuts</td>
<td>A 563</td>
<td>Hex Nuts for Base Plate Connections</td>
</tr>
<tr>
<td>Washers</td>
<td>F 436</td>
<td>Flat Washers for Base Plate Connections</td>
</tr>
<tr>
<td>Neoprene Pads</td>
<td>-</td>
<td>In accordance with Specification Section 832</td>
</tr>
</tbody>
</table>

POST ATTACHMENT NOTES:

ANCHOR ROODS, NUTS AND WASHERS:
After the nuts have been tightened, distort the Anchor Rod threads to prevent removal of the nuts. Coat distorted threads and exposed trimmed ends of anchors with a galvanizing compound in accordance with Specification Section 971.

COATINGS:

ADHESIVE-BONDED ANCHORS AND DOWELS:
Adhesive Bonding Material Systems for Anchors and Dowels will comply with Specification Section 937 and be installed in accordance with Specification Section 416. Cutting of reinforcing steels permitted for drilled hole installation.

WELDING:
All welding will be in accordance with the American Welding Society Structural Welding Code (Steel) ANSI/AWS D1.1 (current edition). Weld metal will be E60XX or E70XX. Nondestructive testing of welds is not required.

CROSS REFERENCE:
For location of Detail "A" see Sheet No. 1 of 3.
LIMITS OF CONCRETE PARAPET DETAILS:

TRAFFIC RAILING BARRIER

INSTALLATION:

FENCING:

LIMITS OF FENCING:

NOTE:

FENCING NOTES

CROSS REFERENCE:

For Table of Fence Components and Table of Post Attachment Components see Sheet No. 2.
For PullPost Assembly Detail, View A-4 and Detail "A" see Sheet No. 3.
For Detail "B" and "E" see Sheet No. 4.

DATE: 07/01/07

BRIIDGE FENCING (ENCLOSED)
**TABLE OF CHAIN LINK FENCE COMPONENTS**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM DESIGNATION</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td>F 1083</td>
<td>Galvanized Steel Pipe - 3&quot; NPS, Schedule 40: 13.500&quot; Outside Diameter, 0.254&quot; Wall Thickness</td>
</tr>
<tr>
<td>Horizontal Rail and Internal Sleeves</td>
<td>F 1083</td>
<td>Galvanized Steel Pipe - 2½&quot; NPS, Schedule 40: 12.875&quot; Outside Diameter, 0.2037&quot; Wall Thickness</td>
</tr>
<tr>
<td>Expansion Ralls</td>
<td>F 1083</td>
<td>Galvanized Steel Pipe - 2½&quot; NPS, Schedule 40: 12.375&quot; Outside Diameter, 0.154&quot; Wall Thickness</td>
</tr>
<tr>
<td>Chain Link Fabric (12&quot; mesh with knuckled bottom selvages)</td>
<td>A 322</td>
<td>Zinc Coated Steel - No. 9 gage (coated wire diameter), Class 2 Coating</td>
</tr>
<tr>
<td></td>
<td>A 491</td>
<td>Aluminum Coated Steel - No. 9 gage (coated wire diameter)</td>
</tr>
<tr>
<td></td>
<td>A 568</td>
<td>Polyvinyl Chloride (PVC) Coated Steel - No. 9 gage Zinc Coated Wire (metallic-coated core wire diameter) - Specify the color of the polymer coating in the General Notes</td>
</tr>
<tr>
<td>Tension Wire</td>
<td>A 824 &amp; A 817</td>
<td>Type II (Zinc Coated Steel Wire) - No. 7 gage, Class 4 Coating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type I (Aluminum Coated Steel Wire) - No. 7 gage</td>
</tr>
<tr>
<td>Tie Wires</td>
<td>F 626</td>
<td>Zinc Coated Steel Wire - No. 9 gage</td>
</tr>
<tr>
<td>Hog Rings</td>
<td>F 626</td>
<td>Zinc Coated Steel Wire - No. 12 gage</td>
</tr>
<tr>
<td>Brace Bands</td>
<td>F 626</td>
<td>No. 12 Gage (min. thickness) x 1/4&quot; (min. width) Steel Bands (Beaded or Heavy)</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>F 626</td>
<td>1¾&quot; (min. thickness) x 1¼&quot; (min. width) Steel Bands (Beaded or Heavy)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1½&quot; (min. thickness) x 1¼&quot; (min. width) x Variable Height Steel Bands (Top = Tapered or Half Length = Barier or Parapet Height = 2&quot; max)</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>F 626</td>
<td>No. 14 Gage (min. thickness) x 1¾&quot; (min. width) Steel Bands</td>
</tr>
<tr>
<td>Miscellaneous Fence Components</td>
<td>F 626</td>
<td>Zinc Coated Steel - Includes horizontal rails, combination rails, end clamps and all other miscellaneous fittings and hardware</td>
</tr>
<tr>
<td>Bolts</td>
<td>A 307</td>
<td>9/16&quot; x 4¼&quot; Hex Head Bolts for Internal Sleeve connections</td>
</tr>
<tr>
<td></td>
<td>A 563</td>
<td>Hex Nuts for Internal Sleeve and Expansion Rail connections</td>
</tr>
<tr>
<td>Washers</td>
<td>F 436</td>
<td>Flat Washers for Internal Sleeve and Expansion Rail connections</td>
</tr>
</tbody>
</table>

**TABLE OF POST ATTACHMENT COMPONENTS**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM DESIGNATION</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Clamps</td>
<td>A 36 or A 709 Grade 36</td>
<td>5/8&quot; Steel E</td>
</tr>
<tr>
<td>Base Plates</td>
<td>A 36 or A 709 Grade 36</td>
<td>5/8&quot; Steel E</td>
</tr>
<tr>
<td>Shim Plates</td>
<td>A 709 Grade 36 or A 209 Alloy 6201-T56 or 0.024 AL61-75 or 0.024 AL6084</td>
<td>Plate thicknesses as required for shim plate width 1/4&quot;</td>
</tr>
<tr>
<td>Spacers</td>
<td></td>
<td>5/8&quot; G for all materials</td>
</tr>
<tr>
<td>Adhesive Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Fully threaded Resin coated anchor rods ~ 5/8&quot; Ø x 6&quot; (no spacer) or 5/8&quot; Ø x 7½&quot; (with spacer)</td>
</tr>
<tr>
<td>CIP Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Hex Head Anchor Rods ~ 5/8&quot; Ø x 6&quot; (no spacer) or 5/8&quot; Ø x 7½&quot; (with spacer)</td>
</tr>
<tr>
<td>Adhesive Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Fully threaded Resin coated anchor rods ~ 5/8&quot; Ø x 14½&quot;</td>
</tr>
<tr>
<td>CIP Anchor Rods</td>
<td>F 1554 Grade 36</td>
<td>Hex Head Anchor Rods ~ 5/8&quot; Ø x 14½&quot;</td>
</tr>
<tr>
<td>Bolts</td>
<td>A 307</td>
<td>5/8&quot; x 4½&quot; Hex Head Bolts for Pipe Clamp Connections to Posts</td>
</tr>
<tr>
<td>Nuts</td>
<td>A 563</td>
<td>Hex Nuts for Pipe Clamp and Base Plate Connections</td>
</tr>
<tr>
<td>Washers</td>
<td>F 436</td>
<td>Flat Washers for Pipe Clamp and Base Plate Connections</td>
</tr>
<tr>
<td>Neoprene Rods</td>
<td></td>
<td>In accordance with Specification Section 933</td>
</tr>
</tbody>
</table>

**POST ATTACHMENT NOTES**

ANCHOR RODS, NUTS AND WASHERS:

- After the nuts have been tightened, distort the Anchor Rod threads to prevent removal of the nuts. Coat distorted threads and exposed trimmed ends of anchors with a galvanizing compound in accordance with Specification Section 971.
- **Coatings:** Hot-dip galvanizing of anchor rods, washers, bolts, CIP Anchor Rods, Adhesive Anchors and Fence Framework (Posts, Internal Sleeves, Shim Plates, Base Plates, Pipe Clamps, and Spacers) in accordance with Specification Section 962. Hot-dip galvanizing Fence Framework after fabrication.
- **ADHESIVE-ANCHORED ANCHORS AND DOWELS:** Adhesive Bonding Material Systems for Anchors and Dowels will comply with Specification Section 917 and be installed in accordance with Specification Section 946. Coatings of reinforcing steels permitted for drilled hole installation.
- **WELDING:** All welding will be in accordance with the American Welding Society Structural Welding Code (Steel ANSI/AWS D1.1 current edition). Weld metal will be E5XX or E7XX. Nondestructive testing of welds is not required.

**EXPANSION RAIL DETAIL**

- **NOTES:**
  1. This dimension is the expansion joint opening plus 5/16". Expansion rails are required at expansion joint locations where the total movement exceeds 1", but is less than or equal to 3/4". Expansion rails are part of expansion assemblies when the total movement exceeds 6". Install expansion rails midway between the fence posts spanning the expansion joint.
  2. Distribute rails for expansion rails Finger-Sight. Nuts will fully engage bolts with a minimum of one bolt thread extending beyond the nuts. Distort the first thread on the outside of the nut to prevent loosening.

**LEGEND:** NPS = Nominal Pipe Size

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>07/13/07</th>
<th>Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>812</td>
<td>2</td>
<td>2 of 4</td>
</tr>
</tbody>
</table>

**BRIDGE FENCING (ENCLOSED)**
Pull Post Assembly (required at maximum intervals of 500'-0")

- Ties II'-0" Centers (Typ.)
- Horizontal Nails

Tension Bars (Square Equally @ 1'-0" Maximum (Centers) Typ.)

Tension Wire

Pipe Clamp Connection (see Detail) (Typ.)

Traffic Railing Barrier (Type varies, 32" F-Shop shown)

Pipe Clamp Connection (Connection without spacer shown, Connection with spacer similar)

Pipe Clamp

Post

Traffic Railing Barrier

2 - 3/8" CIP Anchor Rods or Adhesive-Bonded Anchors (shown) set in drilled holes with Heavy Hex Nuts and Washers

9/16" x 3" x 1/4" Thick Neoprene Pad

Traffic Railing Barrier (Required only at expansion joint locations where total movement exceeds 6")

Expansion Joint Opening

Expansion Joint Opening

Bridge Deck

Expansion Joint Opening

Post

Pipe Clamp

Pipe Clamp

9/16" Spacer must be manufactured from an incompressible material (i.e., steel or aluminum)
For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.

Notes:
1. Values shown for DIM. H are for a 5'-0" clear sidewalk width. Adjust as required for clear sidewalk widths greater than 5'-0".
2. For clear sidewalk widths greater than 5'-0" increase radius and height by 6" for every one foot increase in sidewalk width.
3. Spacer plate thickness shown is for the 32" F-Shape Traffic Railing shown in Index No. 120. Adjust thickness as required for other Traffic Railings.

For location of Details "B" and "E" see Sheet No. 1 of 4.
NOTE: Place wire panels to minimize the end overhang. End overhang greater than 4 1/2" is not permitted.

** Alternate Reinforcing (Welded Wire Reinforcement) Details

ALTERNATE REINFORCING (WELDED WIRE REINF.) DETAILS

NOTE: Place wire panels to minimize the end overhang. End overhang greater than 4 1/2" is not permitted.

** See Structures Plans, Superstructure Sheets for actual dimensions and joint orientation. Open Parapet Joints at Deck Expansion Joint locations shall match the dimension of the Deck Joint. For treatment of Railing on skewed bridges see Index No. 430. Deck Joint at Begin Bridge or End Bridge shown. Deck Joint is &/4 or Intermediate Reinforcing similar.

ELEVATION OF INSIDE FACE OF RAILING

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

ITEM UNIT QUANTITY

Concrete 61/2"P 0.096

Reinforcing Steel LB/LF 6.29

(Under the above quantities are based on a deck with a 24' cross slope)

REINFORCING STEEL NOTES:

1. All bars dimensions in the bending diagrams are cut to 8".

2. The reinforcement for the parapet on a retaining wall shall be the same as detailed above for a 8" deck.

3. Above reinforcing steel at the open joints shall have a 2" minimum cover.

4. Bars 4S may be continuous or spiked at the construction joints. Spikes for bars 4S shall be a minimum of 1 1/8".

5. At the option of the Contractor, welded wire reinforcement (WWR) may be used in lieu of all bars 4P and 4S. Welded Wire Reinforcement shall conform to ASTM A469.

PEDESTRIAN/BICYCLE RAILING NOTES:

CONCRETE PARAPET: Concrete parapet shall be placed vertical and top surface shall lie a level transversely.

RAIL AND POST DETAIL: For Rail, Post, Rail Expansion Joint fabrication and installation details and notes see Index No. 825.

HORIZONTAL FENCING: For Bridge Fencing see Index Nos. 810, 811 or 812.
ELEVATION OF INSIDE FACE OF TRAFFIC RAILING WITH BICYCLE BULLET RAILING

NOTES:

BICYCLE RAILING: Railing shown above (see Section A-A) is intended to be used where a Bicycle Lane is required and a raised pedestrian sidewalk is not required.

RAIL AND POST DETAILS: For Post, Rail and Rail Expansion Joint fabrication and installation Details and Notes see Index No. 822.

TRAFFIC RAILING DETAILS: For Traffic Railings Details, Reinforcement and Notes see Index No. 420.

SECTION A-A
TYPICAL SECTION THRU BRIDGE DECK
(APPROACH SLAB SIMILAR)
**ALUMINUM PEDESTRIAN/BICYCLE BULLET RAILING DETAILS**

**SECTION C-C** (RAILS NOT SHOWN)

**POST "A" DETAILS FOR PEDESTRIAN/BICYCLE RAILING (INDEX NO. 820)

**ALTERNATE ANCHOR BOLT DETAIL "A"** (HANDRAIL PARAPET SHOWN, TRAFFIC RAILINGS SIMILAR)

2 - 3/4" Ø x 11" Anchor Bolts threaded full length with hex nuts and washers set in drilled holes (diameter per manufacturer's recommendation) with an Adhesive Bonding System in accordance with Sections 416 and 937 of the Specifications. Expansion Anchors are not permitted. Cutting of reinforcing steels permitted for drilled hole installation.

**NOTE:** After nuts have been tightened, the bolt threads shall be deformed to prevent removal of nuts. Tack welding of nuts to anchor bolts to prevent theft is permitted. Coat deformed or tack welded threads with a galvanizing compound in accordance with Section 562 of the Specifications.

**SECTION D-D** (RAILS NOT SHOWN)

**ELEVATION OF POST "B"**

**POST "B" DETAILS FOR BICYCLE BULLET RAILING FOR TRAFFIC RAILINGS (INDEX NO. 821 OR 423)

**SECTION E-E**

**ELEVATION OF POST "C"** (RAIL NOT SHOWN)

**POST "C" DETAILS FOR PEDESTRIAN BULLET RAILING FOR TRAFFIC RAILINGS (INDEX NO. 423)

**CROSS REFERENCES:**

- For Post "A" spacing see Index No. 820.
- For Post "B" & Post "C" spacing see Index Nos. 423 or 822.
- For Rail Details and Notes see Index No. 822, Sheet 2 of 2.

**DETAILS:**

- For Index Nos. 423 or 821.
RADIUS, PICTURES & POSTS

Pipe rail and picket shafts shall be in accordance with ASTM A53 Grade B for standard weight pipe (Schedule 40) or ASTM A46 for bars. Structural Tube Pipes shall be in accordance with ASTM A500 Grade A, B, C or D, or ASTM A501 or Rectangular Tube. Pipe rail and End Rails shall be fabricated and installed, in tolerance when measured at 3'-0" above the finished grade. Pipe rail shall be fabricated parallel to the posts. Corners and chamfers in tangential longitudinal alignment, shall be made continuous with a 9” bend radius. For changes in tangential longitudinal alignment greater than 45°, posts shafts shall be at a maximum distance of 2'-0" each side of the corner and shall not be located at the corner apex. For curved longitudinal alignments the top and bottom rails and handrail shaft shall be bent to the alignment.

RAILING MEMBER DIMENSIONS TABLE

<table>
<thead>
<tr>
<th>RAILING MEMBER</th>
<th>DESIGNATION</th>
<th>OUTSIDE DIMENSION</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td></td>
<td>2&quot; x 4&quot; Rectangular Tube</td>
<td>2.00&quot; x 4.00&quot;</td>
</tr>
<tr>
<td>Rods</td>
<td></td>
<td>1&quot; NPS (Sch. 40)</td>
<td>1.00&quot;</td>
</tr>
<tr>
<td>Rail Joint/Sleeve</td>
<td></td>
<td>1&quot; NPS (Sch. 40)</td>
<td>1.50&quot;</td>
</tr>
<tr>
<td>Handrail Joint/Sleeve</td>
<td></td>
<td>1&quot; NPS (Sch. 40)</td>
<td>1.25&quot;</td>
</tr>
<tr>
<td>Handrail Support Rod</td>
<td></td>
<td>1&quot; round bar</td>
<td>1.000&quot;</td>
</tr>
<tr>
<td>Pickets</td>
<td></td>
<td>2&quot; x 0.5&quot; (40)</td>
<td>0.56&quot;</td>
</tr>
<tr>
<td>3/4&quot; Round Bar</td>
<td></td>
<td>0.750&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

BASE PLATES & POST CAPS

Base Plates and Post Cap plates shall be in accordance with ASTM A46 or ASTM A705 Grade 36.

Pipe Placed: Steel Plates shall be full thickness in accordance with ASTM B204, Alloy 6063 or 6063. Steel plates shall be used for foundation height adjustments greater than 4" and located irregularities greater than 1". Field trim thin plates when necessary to match the contours of the foundation. Battered thin plates may be used in lieu of flattened thin plates shown. Stacked thin plates must be bolted together for anchorage. For an adhesive bonding materialized to a minimum thickness of 0.025", unless longer anchor bolts are provided for the exposed thread length.

ANCHOR BOLTS

Anchor bolts shall be in accordance with ASTM F2554 Grade 36. Headless anchor bolts for Anchorage shall be threaded full length for anchorage. Cross section of reinforcing steel permitted based on anchor bolt size. Expansion anchors are not permitted. Anchor bolts shall have self-locking hex nuts. Tack welding of the nut to the anchor bolt shall be in accordance with the American Welding Society Structural Welding Code (AWS D1.4-2004) or ASTM A495. Flat Washers and should be hot-dip galvanized in accordance with Section 962 of the Specifications.

RESISTANT AND NEUTRAL PADS

Resistant and Neoprene pads shall be in accordance with Specification Section 932 except that testing of finished pads shall not be required. Neoprene pads shall be curvatures hardness 60° or 70°.

JOINTS

All fixed joints are to be welded at ground and smooth, Expansion joints shall be spaced at a maximum of 10'-0" or 12'-0" apart. Welding and splices similar to the expansion joint detail shall be approved by the Engineer to facilitate the fabrication of welding and handling, but jointing shall be continuous across a minimum of two posts. See Figure 2.271 (E) for Soft Splice Detail (E) to make the connection for expansion field adjustments. Metalize rails with an galvanizing compound when held adjustments are required.

WEIGHT

All welding shall be in accordance with the American Welding Society Structural Welding Code (Csteel and A572 Grade 50) (current edition). Weld metal shall be ASTM A522 or S850. Nondestructive testing of welding is not required.

WEAR PLATE

Keep pads shall be 3/4" and at the local point between adjacent posts for both top and bottom rails. Rails shall be drilled through the underside of the rails prior to hot-dip galvanizing.

SHAPED (GIRDER)

Complete details addressing project specific geometry, line & grade will show expansion and joint locations, and wearing pads for galvanizing, must be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.
RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%
RAILING CONTINUATION BEYOND STEPS OR STAIRS
(Bottom shown, Top similar)

Steel Handrail required for three or more steps (Handrail and cheekwalls continuous at landings)
Handrails ~ 1½" NPS (Sch. 40)

RAILINGS ON STEPS & STAIRS

See "Typical Railing Details" Sheet 2 of 5 for post, rail & picket details

See Index No. 521 or Contract Plans for Step Details

Concrete sidewalk to extend 6" min. behind rail

ALTERNATE END TREATMENT DETAILS

ALTERNATE END TREATMENT
TYPICAL SECTION ON CONCRETE SIDEWALK  
(Case I)

- 8" Bolts & Post
- 4" Sidewalk with Thickened Edge
- Slope 2X Max. (away from drop-off)

TYPICAL SECTION ON RETAINING WALL  
(Case II)

- 8" Bolts & Post
- 4" (Case I) / 4½" (Case II)

ANCHOR BOLT TABLE

<table>
<thead>
<tr>
<th></th>
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DETAIL "A"  
(Cast-In-Place Anchor Bolts shown, Adhesive Anchors similar)
Traffic Railing required for all Schemes (Type Varies, 32' F-Shape shown, see Plans)

Index No. 850, Steel Pedestrian/Bicycle Picket Railing

Index No. 850, Steel Pedestrian/Bicycle Picket Railing

---

Existing railing to be removed (See Plans)

---

Bridge Deck Sidewalk

---

Bridge Deck Sidewalk

---

SCHEME 1 - TYPICAL SECTION THROUGH DECK MOUNTED RAILING
(Adhesive Anchor Option shown = SCHEME 1A)

---

THRU-BOLT PLATE WASHER DETAIL

---

SCHEME 1B - DETAILS
(Thru-Bolt Option)

---

Bridge Deck Sidewalk

---

Bridge Deck Sidewalk

---

SCHEME 2 - TYPICAL SECTION THROUGH CURB MOUNTED RAILING

---

Bridge Coping

---

Bridge Coping

---

SCHEME 3 - TYPICAL SECTION THROUGH SIDE MOUNTED RAILING (RETOFIT)

---

Bridge Deck Sidewalk

---

Bridge Deck Sidewalk

---

INSTRUCTIONS TO DESIGNER:

1. Provide railing layout Control Drawings in the Plans to show post spacing, curb joint, V-groove, deck joint, expansion joint locations and Scheme number.

2. For existing bridge retrofits special end treatment details may be required for perpendicular or flared wingwalls at Begin and End Bridge. Provide existing railing removal details when required.

---

PLAN

(Scheme 2 shown, other Schemes similar, Reinforcing Steel not shown for clarity)

---

ELEVATION OF INSIDE FACE OF RAILING

(Scheme 2 shown, other Schemes similar, Reinforcing Steel not shown for clarity)
**Alternate Reinforcing (Welded Wire Reinforcement) Details**

**Conventional Reinforcing Steel Bending Diagrams**

**Bill of Reinforcing Steel**

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**Concrete Curbing Quantities (Scheme 2)**

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**Expansion Joint Details (Between WWR Sections)**

- All dimensions in the bending diagrams are out to out.
- The reinforcement for the curb on a retaining wall shall be the same as detailed for an 8" deck.
- All reinforcing steel at open joints shall have a 2" minimum cover.
- All reinforcing steel shall be spliced or spliced in steel joints at the open joints.
- All reinforcing steel shall be of the same quality as specified in the project specifications.
- All reinforcing steel shall be detailed to conform to ASTM A497.

**Detail "A" - Section at Intermediate Open Joint Note:**

- At Intermediate Open Joints, the lower 3" portion of the open joint shall be plugged by filling it with mortar in accordance with Section 400 of the Specifications.

**Scheme 2 - Concrete Curb Details**

**Scheme 3 - Side Mounted Support Bracket Details**

- Bridge Pedestrian/Bicycle Picket Railing (Steel)

**Bracket Details**

- Applicability Note: Bridge Picket Railing is limited to use on bridges with an expansion joint thermal movements not exceeding 5". Scheme 3 is limited to bridge retrofit applications where additional sidewalk width is required.

**Railing Details**

- For Railing fabrication and installation details and notes see Index No. 850.

**Concrete Curb** (Scheme 2): Construct concrete curb vertical with the top surface finished to the level and transversely. Concrete curb shall be the same as the bridge deck. Concrete and reinforcing steel quantities for the concrete curb (Scheme 2) will be included in the bridge deck plan quantity pay items. Payment will be plan quantity measured as the length along the center line of the top rail, and includes rails, posts, pickets, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the railing.

**Elevations View**

**Plan View**

**Typical Section**

---

*Note: All references to 'Handrail' are to be interpreted as 'Picket Railings' where appropriate.*
DESIGN SPECIFICATIONS


DESIGN LOADS

Post and Base Plate: Equivalent point load = 200 lb load + (150 lb/ft x Post Spacing (ft)) applied transversely at top rail connection.

Top & Bottom Rails: 50 lb/ft uniform load applied simultaneously and transversely to = 250 lb. concentrated point load applied at midspan in the directions for both maximum stress and deflection.

Hurdle: Maximum of either 50 lb/ft uniform load applied in any direction or 250 lb. concentrated load applied in any direction at any point along the top.

Pickets: Concentrated 200 lb load applied transversely over an area of 1.0 square foot.

GEOMETRY

Clear Opening between Pickets: Shall reject the passage of a 4" diameter sphere below 42" height, and a 0.8 diameter sphere above 42" height.

Clear Opening between Bottom Rail: Shall reject the passage of a 2" diameter sphere.

ALUMINUM HANDRAIL Height: 14".

Pedestrian Railing Height: 42" minimum. Bicycle Railing Height: 54" minimum.

ACORN: Total combined deflection of the railing system, including the resilient or neoprene pads, due to the top rail design live loads, shall not exceed 1/4" when measured at midpoint of the top rail.

APPLICABILITY NOTE TO DESIGNER:

This railing is not applicable for shielding drop-off hazards for vehicular traffic. This railing is applicable for all cases where a pedestrian or bicyclist drop-off hazard exceeds 2-1/2" or when a drop-off hazard is less than 2-1/2" and is required by design. See Index No. 087 for special requirements and modifications for use on bridges.

Joints shall be fabricated by the responsible engineer. The railing shown on these drawings requires a handrail for ramps steeper than 5% grade to conform with the requirements of the Americans with Disabilities Act (ADA) & its successor, the ADA Accessibility Guidelines. Refer to FDOT Plans Preparation Manual, Volume 1, Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards".

ALTERATIVE DESIGN:

Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the design life, live loads, geometry and deflection requirements specified herein. All field sections of railing must be fabricated by the manufacturer's name and the QPL approval number. Labels must be placed in accordance with Section 962 of the Specifications.

NOTES

References for design loads,五金 joints, and anchor plate dimensions are in accordance with ASTM A36 or ASTM A709 Grade 36.

ANCHOR BOLTS:

Anchor bolt shall be in accordance with ASTM F1554 Grade 36. Anchor bolts shall be fabricated and Field Splice when necessary to match the contours of the foundation. Shallow headed plate shall be in lieu of trimmed flat headed plate shown. Stocked shallow plate must be bored together with adhesive bonding material and limited to a maximum total thickness of 1/2", unless longer anchor bolts are provided for the exposed thread length.

COATINGS:

The aluminum railing shall be galvanized unless otherwise noted in the Contract Documents. All nuts, bolts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications.

ANCHOR LINKS:

Anchor links shall be in accordance with ASTM F1554 Grade 36. Anchor links shall be fabricated and Field Splice when necessary to match the contours of the foundation. Shallow headed plate shall be in lieu of trimmed flat headed plate shown. Stocked shallow plate shall be coated with a galvanizing compound in accordance with the Specifications.

RESIDENT AND NEOPRENE PADS:

Resident and Neoprene pads shall be in accordance with Specification Section 932 except that riveting of finished pads shall not be required. Neoprene pads shall be dimensional hardness 60 or 70.

JOINTS:

Aluvent joints are to be welded all around and ground smooth. Expansion joints spaced to allow for expansion joint detail may be approved by the Contractor to facilitate handling, but railing must be continuous across a minimum of two posts. Only use the full aluminum Field Splice (Sch. 40) to make the railing continuous for unforeseen field adjustments.

WELDING:

All welding in accordance with the American Welding Society Structural Welding Code (Aluminum) ANSI/AWS D1.2 (current edition). Filler metal shall be either ER5183, ER5356 or ER5556. Nondestructive testing of welds is not required.

SHOP DRAWINGS:

Complete details addressing project specific geometry (line & grade) showing post and expansion joint shall be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.

PAYMENT:

Railing shall be paid per linear foot (Item No. 15, 2-legs). Payment on line quantity measured as the length along the center line of the top rail, and includes rails, posts, pickets, rail splice assembly, base plates, anchor bolts, nuts, washers, resident and neoprene pads and incidental materials and labor required to complete installation of the railing.
RAILING CONTINUATION BEYOND STEPS OR STAIRS
(Bottom shown, Top similar)

Concrete sidewalk to extend 6" min. behind railing

RAILINGS ON STEPS & STAIRS

See "Typical Railing Details": Sheet 2 of 5 for post, rail & picket details

ALUMINUM PEDESTRIAN/BICYCLE PICKET RAILING

2008 FDOT Design Standards

ALTERNATE END TREATMENT DETAILS

ALTERNATE END TREATMENT

See Index No. 521 or Contract Plans for Step Details

DETAIL "J" - PLAN VIEW
TOP RAIL TERMINATION

DETAIL "K" - PLAN VIEW
BOTTOM RAIL TERMINATION

ELEVATION
(At-Grade Steps shown,
Elevated Stairs similar)

See "Typical Railing Details": Sheet 2 of 5 for post, rail & picket details

ALTERNATE END TREATMENT

Length of Landing 5'-0" Min.
Top Landing

Length of Landing 5'-0" Min.
Bottom Landing

9'-0" Min. - Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

Top Rail termination see Detail "J"

Handrail Continuation
At Landing

Equal to one tread length

9'-0" Min. - Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

Top Rail termination see Detail "J"

Handrail Continuation
At Landing

Equal to one tread length

9'-0" Min. - Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

Top Rail termination see Detail "J"

Handrail Continuation
At Landing

Equal to one tread length

9'-0" Min. - Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

Top Rail termination see Detail "J"
TYPICAL SECTION ON CONCRETE SIDEWALK

1. FOR CONCRETE SIDEWALKS:
   - Edge Dist. 6" Embedment 9"
   - Vertical clearance 4-1/2" for bicycle railing
   - Slope 27° Max. away from drop-off
   - Reinforced Concrete Structure
   - Minimum 2 - 1/4" #4 Bars in Top of Structure for Case Ia & III
   - Minimum 4 Bars @ 1" Offset (Max. spacing for Case IIb)
   - Inside Face of Concrete Structure or Sidewalk (See Concrete Structure Plans for actual dimensions and reinforcing details)

TYPICAL SECTION ON RETAINING WALL

- Edge Dist. 4" Embedment 9"
- Post & Anchor Bolts
- Slope 27° Max. away from drop-off
- Reinforced Concrete Structure

ANCHOR BOLT TABLE

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NOTE: Adhesive Anchors similar

See Section "A-A" Sheet 4 of 5

See Detail "A"

See Section "A-A" Sheet 4 of 5

See Detail "A"

SEE SECTION "A-A" SHEET 4 OF 5

SEE DETAIL "A"

TYPICAL SECTION ON STEPS & STAIRS

(Case III)

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NOTE: Adhesive Anchors similar

See Section "A-A" Sheet 4 of 5

See Detail "A"
**INSTRUCTIONS TO DESIGNER:**

1. Provide railing layout Control Drawings in the Plans to show post spacing, curb joint, V-groove, deck joint, expansion joint locations and Scheme number.

2. For existing bridge retrofits special end treatment details may be required for perpendicular or flared wingwalls at Begin and End Bridge. Provide existing railing removal details when required.

**SCHEME 1 - TYPICAL SECTION THROUGH DECK MOUNTED RAILING** (Adhesive Anchor Option shown - SCHEME 1A)

- **Intermediate**
  - Open Joint

- **V-Groove**
  - in both faces and top of Concrete Curb (Equally spaced between open joints)

- **Deck Joint**
  - With V-Groove

- Bridge Deck/Sidewalk

- Expansion Joint (Typ.)

- **Railing Expansion Joint** (Typ.) See Detail 13, Sheet 2

- **Thru-Bolt Plate Washer**

**SCHEME 2 - TYPICAL SECTION THROUGH CURB MOUNTED RAILING**

- **Intermediate**
  - Open Joint

- **V-Groove**
  - in both faces and top of Concrete Curb (Equally spaced between open joints)

- **Deck Joint**
  - With V-Groove

- Bridge Deck/Sidewalk

- Expansion Joint (Typ.)

- **Railing Expansion Joint** (Typ.) See Detail 13, Sheet 2

- **Thru-Bolt Plate Washer**

**SCHEME 3 - TYPICAL SECTION THROUGH SIDE MOUNTED RAILING (RETROFIT)**

- **Intermediate**
  - Open Joint

- **V-Groove**
  - in both faces and top of Concrete Curb (Equally spaced between open joints)

- **Deck Joint**
  - With V-Groove

- Bridge Deck/Sidewalk

- Expansion Joint (Typ.)

- **Railing Expansion Joint** (Typ.) See Detail 13, Sheet 2

- **Thru-Bolt Plate Washer**

**ELEVATION OF INSIDE FACE OF RAILING** (Scheme 2 shown, other Schemes similar, Reinforcing Steel not shown for clarity)

- **Intermediate**
  - Open Joint

- **V-Groove**
  - in both faces and top of Concrete Curb (Equally spaced between open joints)

- **Deck Joint**
  - With V-Groove

- Bridge Deck/Sidewalk

- Expansion Joint (Typ.)

- **Railing Expansion Joint** (Typ.) See Detail 13, Sheet 2

- **Thru-Bolt Plate Washer**

**Joints & Post**

- **Bridge Deck/Sidewalk**

- **Concrete Curb**

- **Front Face of Backwall & Begin or End Bridge**

- **Approach Slope**

- **Conclusion to limit opening for adjoining railings**
**CONCRETE CURB SECTION**

- **Concrete**
- **Reinforcing Steel**

**Note**: Place wire panels to minimize the end overhang. End Overhangs greater than 4" are not permitted.

**Bill of Reinforcing Steel**

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**Estimated Concrete Curb Quantities (Scheme 2)**

- **Scheme 2 - Concrete Curb Details**

**ALTERNATE REINFORCING (WELDED WIRE REINF.) DETAILS**

**Note**: Place wire panels to minimize the end overhang. End Overhangs greater than 4" are not permitted.

**Conventional Reinforcing Steel Bending Diagrams**

- **Bar 4P**
- **Bar 4S**

**Splice Detail (Between WWR Sections)**

**Welded Wire Reinforcement (WWR)**

**Curve Reinforcing Steel Notes**

1. All dimensions in the bending diagrams are out to out.
2. The reinforcing for the curb on a retaining wall shall be the same as detailed for an 8" deck.
3. All reinforcing steel in the open joints shall have a 2" minimum cover.
4. Bars 4S may be continuous or spliced at the construction joints. Bar splices for Bars 4S shall be a minimum of 1'-9".
5. At the option of the Contractor Welded Wire Reinforcement (WWR) may be used in lieu of splitters 4P and 4S. Welded Wire Reinforcement shall conform to ASTM A497.

**Scheme 3 - Side Mounted Support Bracket Details**

**Bridge Pedestrian/Bicycle Picket Railing**

**Applicability Note**: Bridge Picket Railing is limited to use on bridges with an expansion joint thermal-movement not exceeding 3". Scheme 3 is limited to bridge retrofit applications where additional widespread is required.

**Details**

For Railing fabrication and installation details and notes see Index No. 850, except that railing shall be fabricated and installed normal to the Profile Grade longitudinally and vertically transversely.

**Concrete Curb (Scheme 2)**: Construct concrete curb vertical with the top surface finished and includes incidental materials and fob required to complete installation of the railing.

**Concrete SPICE (Scheme 3)**: 1"-2& x 3'-0" Step Joint, and Curb Intermediate Open Joint shall be fabricated and installed normal to the Profile Grade longitudinally and vertically transversely.

**Details**

- **Expansion Joint (Field Splice Slip Joint Similar)**
  - **Plug Weld**
  - **Round over both ends of rails 1/2" (Typ.)**

- **Deck Expansion Joint**
  - **Flange Splice Slip Joint or Curb Intermediate Open Joint**
  - **Rail Handrail Section**

**Note**: At Intermediate Open Joints, the lower 3" portion of the open joint shall be plugged by filling it with mortar in accordance with Section 400 of the Specifications.
**DESIGN SPECIFICATIONS**


**LONG DESIGN**

The Pedestrian GUiderail was tested by the UDOT Structural Research Center and found to resist an equivalent Service Loading of 50 lbs./ft. acting simultaneously in the transverse and vertical direction when applied at the height of the Top Rail.

**APPLICABILITY NOTE TO DESIGNER**

This Det. is not approved for use on bridges. This Det. is not applicable for shielding drop-off hazards for vehicular Traffic. This railing is applicable for sidewalks where a pedestrian or bicyclist drop-off hazard does not exceed 20 ft. Pedestrian/Bicycle Railings for customary applications are provided in Index Nos. 850 or 860. Also applicable for select uses on sidewalks within service areas and adjacent locations. Adequate foundation support shall be provided for anchorage and stability against overturning. For unusual site conditions a site specific railing is to be designed by the responsible engineer. Refer to UDOT Plans Preparation Manual/Volume II Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards".

**ALTERNATE DESIGN**

Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the load and geometric requirements specified herein, provides a minimum 50 year life design and that deflections due to the Design Live Loads do not exceed 1/4 at midspan of the top rail for the Pedestrian GUiderail (20") at midspan of the top rail for the Bicycle GUiderail. All fixed joints are to be either welded or commercially designed tee or joint systems. Each field section of railing shall be identified with a permanently affixed label with the manufacturer’s name and the UDOT QPL number. Labels shall be a maximum of 8" x 3" and located at the base of a post within the field section. Project specific shop drawings are required for QPL approved railings, see Drawing Notes. In lieu of design calculations, submit certified test reports from an approved independent testing agency. Test railings in accordance with ASTM E335 (Test Method & CL) using test loads of at least 1.5L of the design load. Test proprietary or nonstandard anchorage systems in accordance with ASTM E694 (Flexural Test). Anchorage systems must resist the minimum of 1.5L of the design load for failure of the steelanchors or 200% of the design load for failure in the concrete foundation. This Det. is not approved for use on bridges. This Det. is not applicable for shielding drop-off hazards for vehicular Traffic. This railing is applicable for sidewalks where a pedestrian or bicyclist drop-off hazard does not exceed 20 ft. Pedestrian/Bicycle Railings for customary applications are provided in Index Nos. 850 or 860. Also applicable for select uses on sidewalks within service areas and adjacent locations. Adequate foundation support shall be provided for anchorage and stability against overturning. For unusual site conditions a site specific railing is to be designed by the responsible engineer. Refer to UDOT Plans Preparation Manual/Volume II Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards".

**BASE PLATES**

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**NOTES**

- **AMERICAN NATIONAL STANDARDS INSTITUTE**

For curved longitudinal alignments the top and bottom rails shall be shop bent to match the foundation radius.

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**BASE PLATES**

- **BASE PLATES**

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**ANCHOR BOLTS**

- **ANCHOR BOLTS**

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<tr>
<td>Rail/Link/Splice Sleeves</td>
<td>5/8&quot; NPS (Sch. 40)</td>
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<tr>
<td>Handrails/Splice Sleeves</td>
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**RECIPIENT AND NEOPRENE PADS**

- **RECIPIENT AND NEOPRENE PADS**

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**JOINTS**

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<tr>
<td>Handrails/Splice Sleeves</td>
<td>1&quot; NPS (Sch. 40)</td>
<td>0.250&quot;</td>
</tr>
</tbody>
</table>
ELEVATION

TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%

- End Rail ~ 2" NPS Sch. 40, 90° bend (Typ.) see Detail "C"
- Rail Expansion Joint (Typ.) see Detail "D" Sheet 4 of 5
- Rail Expansion Joint (Typ.) see Detail "E" Sheet 4 of 5
- Post spacing: Max. 1'-6" Min. 1'-4"
- See plans for continuation or termination limits of railing
- See "Typical Railing Details" for post & rail details

NOTES:
- End Rail bend varies for Railings on grades steeper than 2.4/16
- NPS = Nominal Pipe Size

STRUCTURES EXPANSION JOINTS NOTE:
- Keyed construction joints in Index No. 520 Gravity Wall are not considered to be expansion joints.

CROSS REFERENCE:
For Details "C", "D" and "E", see Sheet 4 of 5.

ELEVATION

(Showing Inside Face of Railing)

RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%

- Min陆 from free end of concrete
- Top of sidewalk

RAMP REQUIREMENTS
For slopes greater than 5%
Max. ramp slope = 8.33%
Max. ramp cross-slope = 2.0%

LANDING REQUIREMENTS
Max. landing slope = 2.0%
Max. landing cross-slope = 2.0%
Concrete sidewalk to extend 6" min. behind railing.

**RAILING CONTINUATION BEYOND STEPS**
(Bottom shown, Top similar)

- Aluminum Handrail required for three or more steps (Handrail and cheekwalls continuous at landings)
- Handrail = 3/4" NPS (Sch. 40)
- See "Typical Railing Details", Sheet 2 of 5 for post & rail details
- See Index No. 521 or Contract Plans for Step Details
- Handrail Continuation at Landing
- Handrail Continuous at Landing
- Handrail Termination, See Detail "A" (Typ.)
- ALTERNATE END TREATMENT

**ELEVATION**
(At-Grade Steps)

- Length of Landing 5" Min.
- 9" Min. Wide cheekwall both sides
- See Index No. 521 or Contract Plans for Step Details
- Handrail Termination, See Detail "A" (Typ.)

**RAILINGS ON STEPS & STAIRS**

- 6'-0" (Max.) = Equal Panels
- 6'-0" Max on Steps
- 1'-6" Min. Handrail Extension
- Equal to one tread length

- Varies = Equal spacing
- 6'-0" Max on Steps
- 1'-6" Min. Handrail Extension
- Equal to one tread length

- See "Typical Railing Details", Sheet 2 of 5 for post & rail details
- See Index No. 521 or Contract Plans for Step Details

**2008 FDOT Design Standards**

- Sheet No. 3 of 5
- Index No. 870
DESIGN SPECIFICATIONS


DESIGN LOADS:
The Guiderail shall resist an equivalent Service Loading of 50 lbs./ft. acting simultaneously in the transverse and vertical direction when applied at the height of the top pedestrian rail (42”).

APPLICABILITY NOTE:

Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified List as pre-approved alternate designs must submit application along with design documentation specified herein, provides a minimum by the responsible engineer. Refer to FDOT Plans Preparation Manual (Volume I), Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards".

ALTERNATE DESIGN:

Manufacturer's seeking approval of proprietary railing systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the live load and geometric requirements specified herein, provides a minimum 50 year design life and that deflections due to the Design Live Loads do not exceed 1/8" at midpoint of the top rail for the Pedestrian Guiderail, 2/5" at midpoint of the top rail for the Bicycle Guiderail. All fixed joints are to be either welded or commercially designed fixed joint systems. Each field section of railing must be identified with a permanently affixed label with the manufacturer's name and the FDOT QPL approval number. Labels must be a minimum of 3" by 3" and located at the base of a post within the field section. Project specific shop drawings are required for QPL approved railings. Drawings note.

In lieu of design calculations, submit certified test reports from an approved independent testing agency. Test railing systems in accordance with ASTM E935. Test Method A & B (using test loads at least 75% of the design load). Test proprietary or nonstandard anchorage systems in accordance with FDOT SF94 (Tensile Test). Anchorage systems must meet the minimum of 175% of the design load for failure of the steel anchors or 220% of the design load for failure in the concrete foundation.

PAYMENT:

Guiderail shall be paid for under the contract unit price for Pipe Guiderail (Steel, LF) Item 3.2, 21/4" NPS, 1.900, 0.154, No.A.

NOTES:

RAILING MEMBER DIMENSIONS TABLE

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>DESIGNATION</th>
<th>OUTSIDE DIMENSION</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td>2&quot; NPS (Sch. 40)</td>
<td>2.375&quot;</td>
<td>0.139&quot;</td>
</tr>
<tr>
<td>Rods</td>
<td>2&quot; NPS (Sch. 40)</td>
<td>2.375&quot;</td>
<td>0.154&quot;</td>
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<tr>
<td>Handrail Joint/Splice Sleeves</td>
<td>2 1/2&quot; NPS (Sch. 40)</td>
<td>2.220&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Handrail</td>
<td>1 1/2&quot; NPS (Sch. 40)</td>
<td>1.375&quot;</td>
<td>0.133&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>1 1/2&quot; Round Bar</td>
<td>1.900&quot;</td>
<td>0.154&quot;</td>
</tr>
</tbody>
</table>

BASE PLATES:

Base Plates shall be in accordance with ASTM A36 or ASTM A572 Grade 36.

SMALL PLATE:

Small Plates shall be aluminum in accordance with ASTM 8209, Alloy 6061 or 6063. Small Plates shall be used for foundation height adjustments greater than 1/2" and localized irregularities greater than 1/2".

Field trim shim plates may be used in lieu of trimmed 4x4 shim plates shown. Shimmed plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of 1/2", unless longer anchor bolts are provided for the exposed thread length.

ANCHORS:

The railing shall be hot-dip galvanized after fabrication in accordance with Section 962 of the Specifications. Anchor bolts, nuts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications.

ANCHOR BOLTS:

Anchor bolts shall be in accordance with ASTM F1554 Grade 56. Nuts shall be Grade 56 or Grade 36. Anchors shall be a minimum of 175% of the design load for failure of the steel anchors or 220% of the design load for failure in the concrete foundation.

HANDRAILS:

All fixed joints are to be welded all around and ground smooth. Expansion Joints shall be spaced at a maximum of 30'-0". Field splices similar to the expansion joint detail may be approved by the Engineer to facilitate shipments and handling, but rail must be continuous across a minimum of two posts. Only use the Continuity Field Splice (Detail 054) to make the railing continuous for unforeseen field adjustments.

WEIGHT:

Welding shall be in accordance with the American Welding Society Structural Welding Code (Steel) AWS/D1.1 (current edition). Weld metal shall be E60XX or E7DXX. Nondestructive testing of welds is not required.

SHAFTS (1/4" MAX):

Complete details addressing project specific geometry (line & grade) showing post and expansion joint locations must be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.

PAYMENT:

Guiderail shall be paid for under the contract unit price for Pipe Guiderail (Steel, LF) Item 3.2, 21/4" NPS, 1.900, 0.154, No.A. Payment for the Guiderail shall be prorated to measure the length as along the center line of the top rail, and includes rails, posts, rail splice assembly, base plates, anchor bolts, nuts, washers, rebar or rebar plates and incidental materials and labor required to complete installation of the Guiderail.
RAILING CONTINUATION BEYOND STEPS
(Bottom shown, Top similar)

Concrete sidewalk to extend 6" min. behind Post

Steel Handrail required for three or more steps

Handrail - 1-1/2" NPS (Sch. 40)

See "Typical Railing Details", Sheet 2 of 5 for post & rail details

See Index No. 521 or Contract Plans for Step Details

Length of Landing 5' Min.

ALTERNATE END TREATMENT
SECTION B-B
(Handrail Connection)

4" Long Slotted Holes for Anchor Bolts with
Plate Washers (Typ.) or 11/2" x 11/2" (Max.) Holes for Anchor Bolts with
Post Washers (Typ.)

1/8" O Venting Hole

PLATE WASHER DETAIL

(Recommended for Top of Step Cheekwalls)

DETAIL "B" – RAIL CONNECTIONS
(Intermediate Rail and Handrail Not Shown)

DETAIL "D" – EXPANSION JOINT
(FIELD SPlice SLIP JOINT SIMILAR)

DETAIL "E" – CONTINUITY
FIELD SPlice

DETAIL "C" – RAIL CONNECTIONS
(Intermediate Rail and Handrail Not Shown)

Top Rail

Match Grade of
Post
Bottom Rail

Steel Sleeve:
11/2" NPS (Sch 40) for Rails
1" NPS (Sch 40) for Handrals

1/8" x 1/2" (Max.) Holes for Anchor Bolts with
Plate Washers (Typ.) or 11/2" x 11/2" Long Slotted
Holes for Anchor Bolts with Post Washers (Typ.)

Bevel bottom of post as required
to maintain plumb posts (Typ.)

Round over both ends
of rails 1/8" (Typ.)

Steel Sleeve:
11/2" NPS (Sch 40) for Rails
1" NPS (Sch 40) for Handrals

1/8" x 1/2" (Min.) – Expansion Joint

Stainless Steel (Type 316) Set Screws. Set Screws
must penetrate the full
wall thickness of the inner
sleeve. (Typ.)

Round over both ends
of rails 1/8" (Typ.)

DETAIL "E" – CONTINUITY
FIELD SPlice

CROSS REFERENCE:
For locations of Details "C", "D" and "E", see Sheet 2 of 5.
TYPICAL SECTION ON CONCRETE SIDEWALK

TYPICAL SECTION ON GRavity WALL
(Other Retaining Walls Similar)

TYPICAL SECTION ON STEPS & STAIRS

NOTES:

* 2 - 3/8" Ø x 8" Steel Anchors: Galvanized Steel Bolts (As Shown) (C-1=17); Galvanized U-Bolts Permitted (C-1=17); Galvanized Adhesive Anchors Permitted (****); Expansion Anchors Not Permitted.

*** Adhesive anchors shall be fully threaded headless anchor bolts set in drilled holes (manufacturer recommended diameter) with an adhesive bonding material system in accordance with Specification Section 937 and installed in accordance with Specification Section 416. The minimum embedment is 6".

OPTIONAL SIDEWALK ANCHORAGE DETAIL
NOTES

DESIGN SPECIFICATIONS:

MATERIALS:
All reinforcing steel shall conform to ASTM A615 Grade 60.

SURFACE FINISH:
A Class 5 Applied Finish Coating shall be applied to the top of the wall and the exposed face above ground line.

ARCHITECTURAL TREATMENT:
Alternate Architectural Treatments may be substituted for the Striated Pattern shown when approved by the Engineer. Concrete required for Architectural Treatment is not included in the quantities.

TRAFFIC RAILING BARRIERS:
If there is a Traffic Railing Barrier on the wall. Wall Joints and Barrier J-Grooves shall align and Wall Expansion Joints and Barrier Open Joints shall align.

FOUNDATION:
Prepare the soil below the footing in accordance with the requirements for spread footings in Specification Section 455.

PAYMENT:
All Retaining Wall costs, including all miscellaneous costs, shall be paid for at the unit contract price for either Class II, III or IV Concrete (Retaining Walls) (CY) and Reinforcing Steel (Retaining Walls) (LBS).
Retaining Wall quantities shall not include concrete nor rebar steel for Traffic Railings. Traffic Railing (including Bars J) shall be paid for under Concrete Traffic Railing (Bridge).

NOTE:
Shear Key is required only when specified by the Engineer.
NOTES

4. SPECIFICATIONS:
   a. Florida Department of Transportation Standard Specifications for Road and Bridge Construction
      (Current Edition) and Supplements as amended.

5. DESIGN CRITERIA:
   The Precast Sound Barriers are pre-designed and based on the criteria in the Plans Preparation Manual
   Section 2 and the following soil conditions:
   - Sites with soil SPT N values between 10 and 40.

6. CONCRETE AND GROUT:
   a. Concrete Class and Compressive Strength:
      - a. Concrete Cover:
      - b. Precast Panels & Collars: Class IV (f’c = 5500 psi)
      - c. Posts: Class IV (f’c = 5500 psi)
   b. Grout for Auger Cast Piling:
      - Maximum: Working Compressive Strength = 2200 psi
      - Minimum: 28 Day Strength = 5500 psi
   c. Minimum Compressive Strength for Form Removal and Handling of Posts and Panels:
      - a. 2,500 psi for horizontally cast post and panels;
      - b. 2,000 psi for vertically cast panels or when hit-up form tables are used for horizontally cast panels.

7. REINFORCING STEEL:
   a. Reinforcing steel shall conform to ASTM A 416, Grade 60.
   b. Welded wire fabric shall conform to ASTM A 896 (smooth wire) or ASTM A 647 (deformed wire).
   c. Concrete Cover of 2” shall provide, unless otherwise noted.
   d. In addition to the requirements of Specification Section 415, tie post and pile struts at the following
      locations as a minimum:
      - a. Post Struts = Tie at four corner bars and at every third interior bar intersection.
      - b. Post Struts = Tie to the main vertical reinforcement at alternate intersections for circular configurations
         and for rectangular configurations at the four corners and at every third interior bar intersection.

8. SURFACE FINISH:
   Provide a Class 5 Finish in accordance with Specification Section 400, unless otherwise shown on the
   Wall Control Drawings. See Index No. 5201 for texture finish options.

9. FILLING:
   Construct Auger Cast Piling in accordance with the Plans and Specification Section 455.

10. UTILITIES:
    Field verify the locations of all overhead and underground utilities shown in the Wall Control Drawings.

11. NEOPRENE PADS AND RESIDENTIAL PADS:
    a. Neoprene Pads for Panel Bearing Points Between the Stacked Panels:
       Neoprene pads for the panel bearing points shall be plain Neoprene pads. The plain Neoprene pads
       shall be in accordance with the requirements of Section 932-2.5. The pads shall be 100 percent Polychloroprene
       (Neoprene) Grade 50 durometer hardness and may be molded or extruded and vulcanized in large sheets
       and cut to size.
    b. Neoprene Pads for Collar Bearing Points:
       a. Neoprene Pads:
       b. Precast Collar:
    c. Resilient Pads:
    i. Neoprene pads may be substituted for Neoprene Pads. Resilient pads shall meet the requirements of Section
       932-2.7. Resilient pads that meet the minimum ultimate compressive shall be 8,000 lb/sq.in and the use of high
       strength random oriented synthetic fiber cords are permitted in lieu of 8 ounce cotton duck reinforcement.

12. CASTING TOLERANCES:
    a. Overall Height & Width: ± 1/2"
    b. Thickness: ± 1/8"
    c. Plane of aisle mold: ± 1/4"
    d. Openings: ± 1/8"
    e. Out of Square: 1/32" per 6 ft, but not more than 3/32" total on any side
    f. Warping: 1/32" per foot distance to nearest corner
    g. Bowing: 1/16" per 1000 paneermeter
    h. Surface Smoothness for Type "A" Smooth Surface Texture Option: ± 1/32" along a 10 ft. straightedge.

13. SOUND BARRIER WALL NOTES:
    a. Distance between pile shales shall be a maximum of 20 ft from centerline to centerline. These Sound Barrier Wall
       Standards indexes allow for 5 Pile/Pot connection options based on either 10 or 20 ft post spacing.
       The post shall be specified in Table Nos. 5202 through 5204 based on a 20 ft post spacing.
    b. Walls greater than 18 ft in height shall consist of 2 stacked panels upper and lower, each less than 18 ft in
       height and in height shall consist of a single panel.
    c. Horizontal panel joints shall be located outside of the graphic relief (if applicable), horizontal panel joints shall
       be held at a constant elevation for a given wall, where possible.
    d. Posts shall be "W" type cross-section with panels installed from above. Panels shall not be installed under
       cast piles and C.G. colors have reached their 28 day design strength.
    e. See Index No. 5205 for the five pile/post connection options. The Contractor may choose any of these options,
       unless specifically excluded in the Wall Control Drawings.
    f. Precast posts shall have push in auger cast piles with an installation template. The template shall provide for
       horizontal placement, vertical placement and plumness of posts. The template shall such that the installation
       tolerances can be held. Template shall remain in place for a minimum of 24 hours after post installation.
    g. The Contractor shall be responsible for meeting GS44 requirements. Any utility adjustments, charges for power
       shutoffs, road realignments, special erection methods, etc. to meet these requirements shall be included in bid.
    h. Structural Steel shall be in accordance with AASHTO A 61.
    i. Precast Concrete shall be in accordance with Specification Section 460. Welding details and welding operations
       shall be in accordance with the requirements of AWS/AWS D1.1 Welding Code. Field welding is not permitted.
    j. Structural Steel with Concrete Coating = Pile/Post Connection Option D: Store shopwelds in a location protected
       against environmental conditions. Prior to pouring the concrete around the structural post, post shall be free of
       loose rust, scale, dirt, paint, oil and foreign material.

1. VENDOR OR CONTRACTOR DESIGN:
   a. In no case will Vendors or Contractors redesigns be allowed to modify foundation designs, or post spacing.
   b. Substitution of proprietary panels or systems not listed in the Wall Control Drawings will be allowed.

M. QUALIFIED PRODUCTS LIST:

Manufacturers seeking approval of proprietary sound barrier panels, posts and foundations or systems for inclusion
in the Approved Products List must complete the following procedure along with design documentation, vendor drawings
and other information as required in the Sound Barrier Quality Acceptance Criteria. All the proprietary product
is designed to meet all specified requirements. Project specific Shop Drawings are required for sound barrier projects in accordance with Specification Section 534.

N. TERMINALS:

The Contractor shall construct the standard precast 20'-0" post panel option depicted in the plans or shall construct
one of the proprietary sound barrier panel or proprietary system options (panel and foundation) listed in the
Wall Control Drawings.

O. FINISH COATING:

a. All areas not shown to receive an anti-graffiti coating shall be coated in accordance with Specification Section
   900. Neoprene coated steel post and panel assemblies with a Class 3 Applied Finish Coating shall be the same as the
   anti-graffiti system, or as directed by the Engineer.
   b. Structural/Steel/Panels/Assemblies, Coating System = Pile/Post Connection Option D: The steel post assembly shall
      receive a shop applied three-coat system comprised of one coat of an approved self-curing inorganic zinc
      primer, followed by two coats of an approved Type M coating epoxy consisting of a minimum dry film thickness
      of 4 mils each to yield a minimum total dry film thickness of 8 mils. The color of the coating epoxy coating shall
      be a maximum of 20 ft from centerline to centerline. These Sound Barrier Wall Standards indexes allow for
      5 Pile/Pot connection options based on either 10 or 20 ft post spacing. The color of the Class 5 Coating
      shall match the color of the panel unless otherwise noted in the plans. All components of coating system shall
      be shopcoated in accordance with the Department's Qualified Product List. The material supplier shall certify compatibility of paint system.

P. TEST WALL:

The Contractor shall construct a test wall at the beginning of the project consistent with the Sound Barrier Wall
Standard specifications. The Contractor shall demonstrate that the coating and erection tolerances can be met in order to assure that the
prefabricated elements fit together as intended.

PRECAST SOUND BARRIERS - GENERAL NOTES

2008 PRECAST PRODUCTS DESIGN STANDARDS

PRECAST NO. 5200, Sheet 1 of 1

PRECAST NO. 5200, Sheet 1 of 1
NOTES:

1. Surfaces shall be formed, rolled, or pressed using form liners in accordance with the Plans and Specifications (Class 3 Surface Finish).

2. See Wall Control Drawings for project aesthetic requirements.
Non-roadway face of wall
(Broom Finish)

Roadway face of wall
(Front Face) (Typ.)

Plan

Non-roadway face of wall
(Plain Finish)

Roadway face of wall
(Front Face Panel Texture)
(Poured)

Section B-B

TYPICAL ELEVATION
(Pile/Post Connection Option A Shown)

ELEVATION STEP AT TOP OF WALL

ELEVATION STEP AT BOTTOM OF WALL
(Pile/Post Connection Option A Shown)

TYPICAL PANELS AND POSTS
**TYPICAL PANEL ELEVATION**

* In lieu of utilizing the pick up points below, panels may be cast vertically or cost horizontally then tilted upright using tilt-tables prior to lifting from form. In this case, the vertical steel may be reduced to #4 Bars @ 1'-3" (As=0.15 in.²/ft.).

**REQUIRED PICK UP POINTS FOR PANELS**

(Panel shall be rotated about long axis only.)

**NOTE**

- At the Contractor's option, Smooth or Deformed Welded Wire Reinforcement may be used (equal areas).
HALF ELEVATION

(Pile/Post Connection Options A, B, C and E Shown.)
(Front Face Panel Texture Type "H" and Front Face Post Texture Type "H" Shown.)
(Graphic Type SE-2 Shown.)

TYPICAL FORMING DETAIL
(Front Face Panel Texture Type "H" Shown.)

NOTES:
1. Broom Knish shall be scored in plastic concrete on the back face of precast panels.
2. Contractor shall submit specific form liner samples for approval by the Engineer.
3. Textures and graphics shown are for demonstration purposes only. See WallControlDrawings for project specific texture and graphic requirements.

GRAPHICS AND TEXTURE DETAILS
Non-roadway face of wall

Back Face Panel Texture

$\frac{3}{4}''$ Max. (Typ.)

Roadway face of wall

Front Face Panel Texture (Formed)

Texture may be Formed, Rolled or Pressed into Plastic Concrete.

Max. (Typ.)

Roadway face of wall

Front Face Panel Texture (Formed)

Max. (Typ.)

TYPICAL ELEVATION

(Textured Finish not Shown for Clarity)

(Pile/Post Connection Option A Shown)

---

TYPICAL PANELS AND POSTS
### TYPICAL PANEL ELEVATION

In lieu of utilizing the pick up points below, panels may be cast vertically or cast horizontally then lifted upright using tilt-tables prior to lifting from form. In this case, the vertical steel may be reduced to #4 Bars @ 1'-3" (As=0.15 in.²/ft.).

**Panel Height:**
- 207 L
- 207 L
- 207 L
- 588 L

**Panel Length (L):**
- 0.207 L
- 0.586 L
- 0.207 L

**REQUIRED PICK UP POINTS FOR PANELS**
(Panels shall be rotated about long axis only)

**SECTION D-D**
- Texture
- Roadway Face
- Block Face
- Non-Roadway Face
- Front Face

**SECTION E-E**
- Texture
- Roadway Face
- Front Face

**SECTION F-F**
- 1" Wide V-Groove
- V Groove

**DETAIL A**
- 2 Eq. Sp.
- 6" Typ.
- Formed, Rolled or Pressed Texture
- Block Face
- Reinforcing Mat

**DETAIL B**
(Typical both ends)
NOTES:
1. Contractor shall submit specific form liner samples for approval by the Engineer.
2. Textures and graphics shown are for demonstration purposes only. See WallControlDrawings for project specific texture and graphic requirements.
FIRE HOSE ACCESS HOLE TYPICAL DETAIL
(Front Face of Wall Shown)
(Flush Panel Option Shown
Recessed Panel Option Similar)

NOTE: Fire Hose Access Point to be located at or near fire hydrants.

DRAINAGE HOLES TYPES A, B, C & D
(Front Face of Wall Shown)
(Flush Panel Option Shown
Recessed Panel Option Similar)

NOTE: Place double mat of welded wire reinforcement in bottom 5'-0" of panels with drainage holes. Hole Types A, B, C and D refer to distance from bottom of panel to center of opening. See Wall Control Drawings.

PLUG DETAIL

NOTES:
Grating shall be ASTM A36 steel and shall be hot dip galvanized after assembly with ASTM Specification A123.

Expansion anchors shall be in accordance with ASTM A307 (Galvanized).

Welding shall be in accordance with the current edition of the ANSI/AWS D1.1: Welding Code.
1. For Post and Pile Lengths, see Index No. 5206.
2. For Table of Reinforcing Steel Sizes and DIM 'A', see Index No. 5206.
3. For Precast Collar Option, see Sheet No. 2 of 7. 

NOTES:

POST IN AUGERED HOLE
(Cast-In-Place Collar Shown, Precast Collar Similar)
NOTES:
1. The W12 X 79 load carrying member is coated with concrete for durability, aesthetic reasons and to make the connection to the panels.
2. The steel and concrete post assembly is not a reinforced concrete design.
3. The steel and concrete post assembly shall be cast vertical or cast horizontal according to the casting orientation shown above.
4. All Structural Steel shall be in accordance with ASTM A 36.
5. A precast collar shall not be permitted with this Pile/Post Connection Option.
6. For Post and Pile Lengths, see Index No. 5206.

PILE/POST CONNECTION OPTION C

PRECAST SOUND BARRIERS - PILE AND POST REINFORCING STEEL

2008 FOOT Design Standards

PRECAST SOUND BARRIERS - PILE AND POST REINFORCING STEEL

Last Revision Sheet No.
07/01/05 4 of 7

Index No.
5205
NOTES:
1. The construction of this option utilizes a patented process covered by patents held by State Contracting and Engineering Inc. Any use of this design is subject to the rights of the patent holder (U.S. Patent Nos. 5,234,288 & 5,429,455) and all patent royalties or license fees shall be the sole responsibility of the user.
2. For Post and Pile Lengths, see Index No. 5206.
3. For Table of Reinforcing Steel Sizes and DIM, see Index No. 5206.
4. For Precast Collar Option, see Sheet No. 7 of 7.

To use this design contact:
State Contracting and Engineering, Corp.
3800 North 29th Avenue
Hollywood, FL 33020
Phone: (954) 923-4747
NOTES:
1. For Post and Pile Lengths, see Index No. 5206.
2. For Reinforcing Steel Sizes, see Index No. 5206.
3. For Pile/Post Connection Option E, see Sheet No. 6 of 7.
### POST AND PILE DIMENSIONS

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<th>WALL TYPE</th>
<th>POST LENGTH</th>
<th>PILE LENGTH (OPTION A)</th>
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* For Steel/Post Option "0", use 30'-0".
ELEVATION OF INSIDE FACE OF RAILING/SOUND BARRIER (BRIDGE MOUNTED RAILING/SOUND BARRIER SHOWN, WALL OR FOOTING MOUNTED RAILING/SOUND BARRIER SIMILAR) (Reinforcing Steel not shown for clarity)

On Bridges see Superstructure and Approach Slab Sheets for actual dimensions and joint orientation. Open Railing/Sound Barrier Joints at Deck Expansion Joint locations shall match the dimensions of the Deck Joint. For treatment of Railing/Sound Barrier walls on skewed bridges see Index No. 450. Deck Joint at Begin Bridge or End Bridge shown, Deck Joint at Pier or Intermediate Bent, Junction Slab or Footing similar.

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## Interim Joint (Open Joint #)

### V-Groove in both faces and top of Railing/Sound barrier (Equally spaced between open joints)

### Deck Joint #

### Edge of Approach Slab (Coping)

### Guardrail (when called for in Roadway Plans)

### Railing/End Transition required when Guardrail called for in Roadway Plans

### Railing/Sound Barrier shown continuing on Roadway

### PLAN (BRIDGE MOUNTED RAILING/SOUND BARRIER SHOWN, WALL OR FOOTING MOUNTED RAILING/SOUND BARRIER SIMILAR) (Reinforcing Steel not shown for clarity)

### CROSS REFERENCE

For Details and V-Groove Lettering Details see Sheet 2.
For Section 4-4 see Sheet 4.
For Section 4-1 and Detail 4-1 see Sheet 5.
For Wall-mounted Railing/Sound Barrier Details see Index Nos. 5212.
For Footing mounted Railing/Sound Barrier Details see Index Nos. 5213 (T-Shaped), 5214 (L-Shaped) or 5215 (Trench).

### DESIGN STANDARDS

T-Shape Spread Footing Shown, L-Shaped Spread Footing, Trench Footing Similar and Junction Slab similar.

### INSTRUCTIONS TO DESIGNER

**FORM LINERS:** Form liners providing a textured finish are permitted on the outside face of the Traffic Railing Barrier/Soundwall. The following provisions apply:

1. The maximum amplitude of the form liner on the lower 2"-8" section shall be limited to 0.5 inch (12 mm). Any form liner used above 2"-8" shall be limited to 1 inch (25 mm). The maximum amplitude of the form liner shall be limited to 1"-8" (25 mm) on the upper 2"-8" section.

2. For details on the use of form liners in the inside face of the Traffic Railing Barrier/Soundwall, refer to Section 5211.

### END TAPER LOCATION

When the Soundwall terminates on the bridge, the End Taper shall be located at an open joint. When the Soundwall terminates on the Approach Slab, the End Taper shall terminate at Begin or End Approach Slab, as shown above.

### T-Shape Spread Footing Shown

### L-Shaped Spread Footing, Trench Footing Similar and Junction Slab similar
CONSTRUCTION REQUIREMENTS: The Traffic Railings/Sound Barriers and Joints shall be constructed plumb, they shall not be constructed perpendicular to the roadway surface. Slip forming is not permitted.

CONCRETE AND REINFORCING STEEL: For Railings/Sound Barrier on bridges, see General Notes. For Wall and footing mounted Railings/Sound Barrier, concrete shall be Class II for slightly aggressive environments and Class IV for moderately or extremely aggressive environments. Reinforcing steel shall be Grade 60.

NAME, DATE AND BRIDGE NUMBER: For Railings/Sound Barrier on bridges, the name and bridge number shall be placed on the Traffic Railing so as to be seen on the driver's side when approaching the bridge. The date shall be placed on the driver's left side when approaching the bridge. The date shall have the year of the widening. Black plastic letters and figures shall not be constructed perpendicular to the roadway surface. Slip forming is not allowed. All reinforcing steel at the open joints shall have a V-Groove. V-Grooves shall be formed by preformed letters and figures.

MARKERS: For Railings/Sound Barrier on bridges, elevation markers shall be placed on top of the Traffic Railings/Sound Barrier or Bridge Deck at the end bents as directed by the Engineer. Markers are to be furnished by the Florida Department of Transportation and installed by the Contractor. The cost of installing the markers shall be included in the Contract Unit Price for the Railings/Sound Barrier.

REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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NEOPRENE DIAPHRAGM PLUG DETAIL

- 25/6" Hole
- 60" (Typ.)
- 5" (Typ.)

TRAFFIC HOSE ACCESS DETAIL

- Fire hose access holes are required at or near the hydrant locations. Field cut reinforcement as required to maintain minimum cover at access holes. Locate the fire hose access holes a minimum of 10'-0" from 3/4" open joints when possible.

REINFORCING STEEL NOTES:

1. All dimensions in the bending diagrams are cut to cut.
2. All reinforcing steel, the open joints shall have a 2" minimum cover.
3. Bars S5I may be continuous or spliced at the construction joints. Lap splices for Bars S5I shall be one continuous bar. No mechanical couplers or lap splices are permitted.
4. The Contractor may use Welded Wire Fabric when approved by the Engineer. Welded Wire Fabric shall conform to ASTM A 497.
5. Bars 55R shall be one continuous bar. No mechanical couplers or lap splices are permitted.

TRAFFIC RAILING/SOUND BARRIER (6'-0")

TRAFFIC RAILING/SOUND BARRIER NOTES

This railing has been structurally evaluated to be equivalent or greater in strength to a safety shape/sound barrier combination railing which has been crash tested to NCHRP Report 350 7-4 Criteria. The Transverse Design Force for the design of bridge deck overhang shall be applied horizontally at 3'-6" height above the deck.

REINFORCING STEEL:

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RESEARCH AND DEVELOPMENT PROGRAMS

- Traffic Railing/Sound Barrier
- Investigation of Moderately or Extremely Aggressive Environments
- Safety Shape/Sound Barrier
- Reinforcing Steel
- Reinforcing Steel Bending Diagrams
INSTRUCTIONS TO DESIGNER:
For bridge decks up to a maximum thickness of 9", the two Bars 5S1 placed in the bridge deck may substitute for the longitudinal deck steel located within the limits of Bars 5V, provided that the total area of longitudinal deck steel beneath the barrier, as required by calculation, is not reduced. Show these bars on the Superstructure Sheets with the deck steel.

NOTES:
1. Bottom Bars 5S1 and End Bar 5V are not present in "L"-Shaped (Index No. 5214) or Trench (Index No. 5215) footings. For Bridge Mounted installations, see the Superstructure Sheets for Deck Steel. Omit Bars 5S1 if not specifically shown on the Superstructure Sheets.

SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING/SOUND BARRIER
(Section Thru Bridge Deck Shown, Section Thru Approach Slab, Junction Slab or footing Similar)

VIEW B-B
END VIEW OF RAILING END TRANSITION FOR GUARDRAIL ATTACHMENT AT END OF APPROACH SLAB
(Flexible Pavement Approach Slab Shown, Rigid Pavement Approach Slab, Junction Slab or Footing Similar)
**DETAIL "A" NOTES:**

1. Rotate Bars 5P & 5V in Railing End Transition to maintain cover. Begin placing Railing Bars 5P and 5V at the railing end and proceed toward the guardrail/thrie beam terminal connector to ensure placement of guardrail bolt holes. Pour Bars 5R with Bars 5P as shown. Clearance of Bars 5P, 5R & 5V to guardrail bolt holes shall be checked to prevent cutting of bars if holes are to be drilled. Shift bars locally where conflicts occur.

2. For Guardrail connection details see Design Standards Index No. 450.

3. Omit Railing End Transition if a 32" F-Shape Traffic Railing is used beyond the End Taper. See the Plan Sheets.

4. For L-Shaped (Index No. 5214) and Trench (Index No. 5215) footings, Bars 5V and 5T replace Bars 5V as shown at left. Details and bar spacing shown apply except that it is not necessary to rotate Bars 5V and 5T to maintain cover and there is no field cut End Bar 5V.

5. Bottom Bars 5S1 are not present in L-Shaped or Trench Footings.

**PLAN - RAILING END TRANSITION**

(Showing Bars 5P, 5R, and Bars 5S1) (Bars 5V, Soundwall & Reinforcement not shown for Clarity)

6. "spacing (Typ.)" 2'-8½"

**PLAN - RAILING END TRANSITION**

(Showing Bars 5V and Bars 5S1) (Bars 5P, 5R, Soundwall & Reinforcement not shown for Clarity)

**SECTION C-C**

THRU SOUNDWALL END TAPER
1. This railing has been structurally evaluated to be equivalent or greater in strength to a safety shape/sound barrier combination railing which has been crash tested to NCHRP Report 550 TL-4 Criteria.

2. CONSTRUCTION REQUIREMENTS: Construct the Traffic Railing/Sound Barrier perpendicular to the roadway surface. Slip forming is not permitted.

3. CONCRETE: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 346.

4. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 932.

5. Construct & Open Joint locations are to coincide with V-Groove locations in footings.

6. Construct ½" V-Grooves to provide at least 30" maximum intervals as shown. ½" Open Joint locations are to coincide with ½" Expansion Joints in footings.

7. Space V-Grooves equally between ½" Open Joints and/or Begin or End Traffic Railing/Sound Barrier. V-Groove locations are to coincide with V-Groove locations in footings.

8. Traffic Railing/Sound Barrier is required when Traffic Railing/Sound Barrier is adjacent to an 8'-0" Traffic Railing/Sound Barrier and may be used when an 8'-0" Traffic Railing/Sound Barrier is shown.

ELEVATION OF TRAFFIC RAILING/SOUND BARRIER REINFORCING STEEL
(Bars 5S1 in Railing not shown for clarity)

ELEVATION OF TRAFFIC RAILING/SOUND BARRIER END TAPER
(Bars 5S1 in Railing not shown for clarity)

NOTE:
1. Field Cut Bars 5P & 5S1 in Sound Barrier End Taper as required to maintain minimum cover.
2. See Index Nos. 5213, 5214 and 5215 for footing reinforcement.
3. 3/4" Open Joint may be omitted when 8'-0" Traffic Railing/Sound Barrier End Taper is adjacent to a Traffic Railing/Sound Barrier End Taper as shown on Sheet 1. See Index No. 5210 for reinforcement details and spacing. Bars 5S2 are not required when 3/4" Open Joint is omitted.
4. Bar spacing shown is along the Gutter Line.
**NEOPRENE DIAPHRAGM PLUG DETAIL**

- **TYPICAL SECTION**
  - **FIRE HOSE ACCESS DETAIL**
    - **DETAIL "A" - SECTION AT OPEN JOINT**
      - Mortar Plug
      - Footing
      - Cap (See Note 2)

**SECTION A-A**

**TYPICAL SECTION THRU TRAFFIC RAILING/SOUND BARRIER**

**REINFORCING STEEL BENDING DIAGRAMS**

**BILL OF REINFORCING STEEL**

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**BARS 5S1 & 5S2**

**STIRRUP BAR 5P**

**BAR 5R**

(Field Cut for End Taper)

**REINFORCING STEEL NOTES**

1. All bar dimensions in the bending diagrams are out to out.
2. All reinforcing steel at the open joints shall have a 2" minimum cover.
3. Bars 5R may be continuous or spliced at construction joints. Lap splices for Bars 5R and 5S2 shall be a minimum of 2'-2".
4. The Contractor may use Welded Wire Fabric when approved by the Engineer. Welded Wire Fabric will conform to ASTN A 497.

**ESTIMATED TRAFFIC RAILING BARRIER/SOUNDWALL QUANTITIES**

**ITEM** | **UNIT** | **QUANTITY**
---|---|---
Concrete (Traffic Railing) | CY/FT. | 0.104
Concrete (Sound Barrier, excluding any thickening) | CY/FT. | 0.302
Reinforcing Steel (Railing/Sound Barrier) (Typical, excluding Footing Reinforcement) | Lb./FT. | 103.43
Additional/Per Open Joint (Railing/Sound Barrier) | Lb. | 761.94

**CROSS REFERENCE**

For locations of Section A-A and Detail "A", see Sheet 1.
JUNCTION SLAB ADJACENT TO SKewed APPROACH SLAB AND WITH BARRIER WALL INLET

PLAN

SECTION A-A

SECTION THRU JUNCTION SLAB, BARRIER WALL INLET AND RETAINING WALL

NOTES:

1. CONSTRUCTION REQUIREMENTS: Construct the Junction Slab level, transversely and expansion joints plumb. do not construct the junction slab perpendicular to the roadway surface. Slab forming is not permitted.

2. CONCRETE: Use Class IV concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Use Class V concrete in accordance with Specification Section 346.

3. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 931. Dowel Load Transfer Devices shall be in accordance with Specification Section 962. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

4. Construct 1/4" Expansion Joint limits and perpendicular to the Gutter Line. Provide at 90'-0" maximum intervals as shown.

5. Provide and Install Preformed Expansion Joint Filler in accordance with Specification Section 932.

6. Construct 1/4" V-Grooves and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between 1/4" Expansion Joints and/or begin at the 30'-0" maximum intervals. V-Groove locations are to coincide with V-Groove locations in the Railing/Sound Barrier.

7. FILL REQUIREMENTS: Shoulder or roadway pavement or fill is required at the top of the junction slab for its entire length on the traffic side of the Railing/Sound Barrier. See Section B-B for details.

8. Actual location & width vary depending on type of Retaining Wall used.

9. Field cut Bar 54 and 58 as required to maintain minimum cover for skewed Approach Slab.

10. Spacing shown is along the Gutter Line. See Index No. 5220 for Bars 54 and 58.

11. Work with Standard Drawing with the following:

   Index No. 5210 = Traffic Railing/Sound Barrier (8'-0').

12. Cross Reference:

   For Section B-B and Details 14", see Sheet 2.
SPREAD FOOTING ADJACENT TO SKEWED APPROACH SLAB AND WITH BARRIER WALL INLET

**PLAN**

**NOTES**

1. CONSTRUCTION REQUIREMENTS: Construct the Spread Footing level/transversely and expansion joints/plumb do not construct the spread footing perpendicular to the roadway surface. Slip forming is not permitted.

2. CONCRETE: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 346.

3. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 931. Dowel/Load Transfer Devices will be ASTM A 36 smooth round bar and hot-dip galvanized in accordance with Specification Section 962. Install Dowel/Load Transfer Devices in accordance with Specification Section 350.


5. Provide and install Preformed Expansion Joint Filler in accordance with Specification Section 932.

6. Construct V-Grooves and provide at 30'-0" maximum intervals as shown.

7. FILL REQUIREMENTS: Shoulder or Roadway Pavement or Fill is required on top of Gutter Line. Provide at 30'-0" maximum intervals as shown.

8. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

9. Spacing shown is along the Gutter Line.

10. This Standard Drawing with one or both of the following:

   a. Index No. 5210 - Traffic Railing/Sound Barrier (14'-0').

   b. Index No. 5211 - Traffic Railing/Sound Barrier (14'-0').

   c. See Index No. 5210 for Bars 5B and 5V.

   d. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

   e. Spacing shown is along the Gutter Line.

   f. Construct V-Grooves and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between Expansion Joints and/or Begin or End Spread Footing. V-Groove locations are to coincide with V-Groove locations in the Railing/Sound Barrier.

   g. Expansion Joint Filler is required at 3'-0" open joints in Traffic Railing/Sound Barrier.

   h. See Index No. 5211 for Bars 5B and 5V.

   i. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

   j. Spacing shown is along the Gutter Line.

   k. This Standard Drawing with one or both of the following:

      a. Index No. 5210 - Traffic Railing/Sound Barrier (14'-0').

      b. Index No. 5211 - Traffic Railing/Sound Barrier (14'-0').

   l. See Index No. 5210 for Bars 5B and 5V.

   m. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

   n. Spacing shown is along the Gutter Line.

   o. This Standard Drawing with one or both of the following:

      a. Index No. 5210 - Traffic Railing/Sound Barrier (14'-0').

      b. Index No. 5211 - Traffic Railing/Sound Barrier (14'-0').

   p. See Index No. 5210 for Bars 5B and 5V.

   q. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

   r. Spacing shown is along the Gutter Line.

   s. This Standard Drawing with one or both of the following:

      a. Index No. 5210 - Traffic Railing/Sound Barrier (14'-0').

      b. Index No. 5211 - Traffic Railing/Sound Barrier (14'-0').

   t. See Index No. 5210 for Bars 5B and 5V.

   u. Place 6" - Bars 5B inside Stirrup Bars 5V as shown.

   v. Spacing shown is along the Gutter Line.

   w. This Standard Drawing with one or both of the following:

      a. Index No. 5210 - Traffic Railing/Sound Barrier (14'-0').
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
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<tbody>
<tr>
<td>A</td>
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</tr>
<tr>
<td>B</td>
<td>5</td>
<td>4'-8&quot;</td>
</tr>
<tr>
<td>U</td>
<td>5</td>
<td>11'-0&quot;</td>
</tr>
</tbody>
</table>

DOWEL: 1" Ø Smooth Bar 2'-0"

BARS 5A & 5B

MARK SIZE LENGTH

5A 6'-8" Length as Required

A 5 6'-8"

B 5 AS REQ'D.

BARS 5B

In-Dowel

Top of Spread Footing (Preformed Joint Req'd.)

3" Cover

1'-0½"

1 1/8" V-Groove

Bars 5A (Field Bents) (Typ.)

BARS 5B (Field Bents) (Typ.)

End Stirrup Bars 5V

Spreading Bars 5B

Bar 5U

SECTION B-B

TYPICAL SECTION THRU SPREAD FOOTING

(Bars 5P, 5R and 5Sl in Traffic Railing/Sound Barrier not shown for clarity)

NOTES:

1. Match Cross Slope of Travel Lane or Shoulder;
2. Place 6" - Bars 5B inside Stirrup Bars 5V as shown;
3. See Index No. 5210 for Bars 5V and Bars 5Sl.

ESTIMATED T-SHAPED SPREAD FOOTING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Footing)</td>
<td>CY/Ft.</td>
<td>0.31</td>
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<tr>
<td>Reinforcing Steel (Typical)</td>
<td>LB/Ft.</td>
<td>51.80</td>
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<tr>
<td>1&quot;Ø Dowel, and Transfer Devices at expansion joints (Typ.)</td>
<td>Lb</td>
<td>37.38</td>
</tr>
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</table>

Note: The reinforcing steel quantity accounts for the difference between the shorter Stirrup Bars 5V for junction slabs or bridges and the longer Stirrup Bars 5V for spread footings.

CROSS REFERENCE

For location of Section B-B, see Sheet 1.
PLAN - OPTION B
SPREAD FOOTING ADJACENT TO SKEWED APPROACH SLAB AND WITH BARRIER WALL INLET

NOTES

1. CONSTRUCTION REQUIREMENTS: Construct the Spread Footing horizontally and expansion joints plumb; do not construct the spread footing perpendicular to the roadway surface. Spacing of expansion joints is not permitted.

2. CONCRETE: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 346.

3. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 346. Dowel/Load Transfer Devices will be ASTM A-36 smooth round bar and hot-dip galvanized in accordance with Specification Section 362. Install Dowel/Load Transfer Devices in accordance with Specification Section 350.

4. Provide and Note Preformed Expansion Joint Filler in accordance with Specification Section 932.

5. Construct .5" V-Groove plumb and perpendicular to the roadway and expansion joints.

6. Construct .5" V-Groove per the spread footing plumb and perpendicular to the roadway, expansion joints and perpendicular to the roadway. Provide at 90'-0" maximum intervals as shown.

7. Fill REQUIREMENTS: Shoulder or Roadway Pavement and PAHs required on the traffic side of the spread footing for a distance of 4'-0" and the full length of the spread footing (3'-0" minimum depth) on the backside of the spread footing for Option A. PAHs required for a distance of 4'-0" on the backside of the spread footing for Option B. See Typical Sections on Sheet Nos. 2 and 3 for details.

8. Spacing shown is along the Gutter Line.

9. Work to Standard Drawing with one or both of the following:
   a. Index No. 5210 - Traffic Railing/Sound Barrier (R-5'-0")
   b. Index No. 5211 - Traffic Railing/Sound Barrier (4'-0')

CROSS REFERENCE
For Detail "A", see Sheet 3.
For Section "A" and Estimated Quantities, see Sheet 4.
TYPICAL SECTION THRU SPREAD FOOTING - OPTION B
(Bars SP, SR and SL in Traffic Railing/Sound Barrier not shown for clarity)

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 10 - Bars SP inside Bars SL as shown.
3. Provide 3" lip when optional construction joint is used.
**SECTION A-A**

**TYPICAL SECTION THRU SPREAD FOOTING AND BARRIER WALL INLET - OPTION B**

(Bars 5P, 5R and 5S1 in Traffic Railing/Sound Barrier not shown for clarity)

**NOTES:**
1. Place 10 ~ Bars 5B inside Bars 5U1 as shown.
2. For Reinforcing Steel Spacing, see Typical Section Thru Spread Footing – Option B on Sheet 3.
3. Provide 3" Lip when optional construction joint is used.

**ESTIMATED L-SHAPED SPREAD FOOTING QUANTITIES**

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<tr>
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<td>Concrete (Footing)</td>
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<td>Reinforcing Steel (Typical)</td>
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<tr>
<td>Additional Rein. @ Expansion Joint</td>
<td>LD</td>
<td>48.06</td>
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(Subtract 12.69 lb/Ft from typical reinforcing steel quantity shown on Index No. 5210 to account for the absence of Stirrup Bars 5V and 5S1 in L-Shaped Spread Footings.)

**BILL OF REINFORCING STEEL**

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<td>C</td>
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<td>S3</td>
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<tr>
<td>U3</td>
<td>5</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>3'-10&quot;</td>
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</tbody>
</table>

**ODOWEL**

1" ODOWEL

**REINFORCING STEEL BENDING DIAGRAMS**

**REINFORCING STEEL NOTES:**
1. All bar dimensions in the bending diagrams are out to out.
2. All reinforcing steel at the open joints will have a 2" minimum cover.
3. Lap splice for Bars 5B will have a minimum of 2'-2".
4. Lap splice Bars 5T and 5V with 5U1 will have a minimum of 2'-2".
5. The Contractor may use Welded Wire Fabric when approved by the Engineer. Welded Wire Fabric will conform to ASTM A 497.
Coping

I I I I

SW

1

Bors 5V

Bars 5V

Bars 5A

Spacing

REINFORCING

2.

3. Lap splices for Bars 5B

4. Lap splices Bars 5T and 5V with

approved by the Engineer. Welded

BAR 5A BAR 5T BAR 5V

minimum of

minimum cover.

conform to ASTM A 497. Expansion Joint Filler) or fiber cap

I I I

In

(8'-0"

MARK SIZE LENGTH

A (8"-0" SW) 5 6'-0"

A (12"-0" SW) 5 8'-0"

B 5 AS REQD.

V 5 3'-10"

DOWEL: 1" O DOWEL

Length as Required

2'-0"

BAR 5B

1" O DOWEL

BAR 5A BAR 5T

BAR 5V

REINFORCING STEEL NOTES:

1. All bar dimensions in the bending diagrams are cut to cut.

2. Reinforcing steel the open joints will be a 2" minimum cover.

3. Lap splices for Bars 5B will be a minimum of 2'-0".

4. Lap splices Bars 5T and 5V with 5U1 will be a minimum of 2'-0".

5. The Contractor may use Welded Wire Fabric when approved by the Engineer. Welded Wire Fabric will conform to ASTM A 497.

NOTES

1. CONSTRUCTION REQUIREMENTS: Construct the Trench Footing and expansion joints plumb, do not construct the Trench Footing perpendicular to the roadway surface. Slope forming is not permitted.

2. CONCRETE: Use Class II concrete for moderately or extremely aggressive environments. Use Class III concrete for slightly aggressive environments. Concrete will be in accordance with Specification Section 346.

3. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 931. Install Load Transfer Devices in accordance with ASTM A 497. Smoothing round bar and hot-dip galvanized in accordance with Specification Section 945. Install Dowel and Transfer Devices in accordance with Specification Section 350.

4. Construct ½" Expansion joints plumb and perpendicular or radial to Gutter Line. Provide at 50'-0" maximum intervals as shown.

5. Provide and install Preformed Expansion Joint Filler in accordance with Specification Section 322.

6. Construct ½" V-Grooves plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between ½" Expansion Joints and/or Begins or Ends Trench Footing. V-Groove locations are to coincide with V-Groove locations in the Gutter/Shoulder Barrier.

7. Fill REQUISITE: Filler is required a distance of 4'-0" on both sides for the entire length of the trench footing. See Typical Section for details.

8. Match Cross Slope of Travel/Lane or Shoulder.

9. Spacing shown is along the Gutter Line.

10. Work this Standard Growing with one or both of the following:

a. Index No. 5211 - Traffic Railing/shoulder Barrier (5'-0"

b. Index No. 5211 - Traffic Railing/Barrier Smooth Bar Load Transfer Devices (Typical)

LEGEND: SW - Traffic Railing

B - Barrier

TRENCH FOOTING QUANTITIES

ITEM UNIT QUANTITY

Concrete (Footings) CY/FT 0.336 0.439

Reinforcing Steel (Typical) LB/FT 4.8/FT 56.84 60.76

Additional Reinforcement Joint LB 30.04 42.72

Expansion Joint (Typical) ft/2 12.59 14.59

Estimated Trench Footing Quantities

BARS 5 V 6" (Lap with Bars 5V & 5T) (Typ)

BARS 5V (Typ)

Spacing

V-Groove Spacing - 30'-0" Max. (See Note 9)

½" Expansion Joint Spacing - (50'-0" Min. 30'-0"

90'-0" Max.) (See Note 4)

PLAN

EXHIBIT JOINT DETAIL

(Trench Footing expansion joints are required at ½" open joints in Traffic Railing/Barrier/Soundwall not shown for clarity.)

Evaluation

Looking for EXPANSION JOINT DETAIL

(Typical) (See Detail this sheet)

2" Cover (Top)

3" Spacing

3" Cover (Bottom & Sides)

BARS 54 & 6" sp.

BARS 54 & 6" sp.

BARS 58 (Typ)
1. General Specifications:

NOTES

2. It is the responsibility of the Engineer of Record to determine that the reinforced soil volume, methods of construction and quality of prefabricated materials are in accordance with Specification Section 548 and the reinforced soil system is designed to meet all the requirements of this project.

3. If present, consider in design and analysis and locate manholes and drop inlets as shown on Company Drawings. The Contractor is responsible for gradually displacing upper layer(s) of the Contractor.

4. For additional material notes see "Insitu Soil Improvement Techniques", January 1990.

5. The Contractor is responsible for water retention as needed during construction of the retaining wall system. The Contractor shall provide soil reinforcement and specific directions have not been provided on the Shop Drawings. Submit Shop Drawings and design calculations signed and sealed by a Professional Engineer registered in the State of Florida.

6. The Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", Current Edition and Supplements as Amended.

7. In existing or future structures, pipes, foundations or guardrail posts within the reinforced soil volume interfere with the normal placement of soil reinforcement and specific directions have not been provided on the plans, the Contractor will notify the Engineer to determine what course of action should be taken.

8. It is the responsibility of the Contractor to provide a composite reinforcing mesh or strip/mesh length, factored bearing resistances, minimum wall height and all other pertinent notes required for design and construction of the walls. Provide factored bearing resistances and factored bearing pressures for each wall height increment.

9. Show detailed views of each precast wall facing panel, sp. joint and other concrete elements incorporated in the wall. Include reinforcing bars and stirrups, drainage pipes, etc. that affect the walls. Locate all plan view stiples within the reinforced soil volume, including those for future widening, as shown on Foundation Layout Drawings. Provide full detailed design calculations for each wall height increment detailed in the Shop Drawings. Submit Shop Drawings and design calculations signed and sealed by a Professional Engineer registered in the State of Florida.

10. For reinforcement a Group B Value Counting in accordance with Specification Section 400. Refer to Typical Sections on Sheet 2 and the following notes for limits of applied finish:

a. The inside, outside and top of Precast Railings and Pedestrian/Bicycle Railings.

b. Exposed surfaces of coping on top of retaining wall. Other coatings, colors or textures will be applied as required in the Wall Control Drawings.

11. The design and analysis, including foundation and slope stability, is the responsibility of the Engineer of Record. The Engineer and Wall Company, is proposed and approved in writing.

12. The Contractor is responsible for gradually displacing upper layer(s) of the Contractor.

13. A structural continuation of the retaining wall system to soil reinforcement will be used whenever necessary to avoid cutting or excessive sloping (greater than 1:1) of the soil reinforcement ground excavation (i.e., piles, pipes, etc.).

14. For Mechanically Stabilized Earth (MSE) Walls, steps in leveling pads will occur at panel interfaces. Panels will not deviate more than 2" past the end of the leveling pad.

15. The top of the leveling pad or footing will be 2'-0" minimum below final ground line.

16. The height of panels in the bottom course of MSE Walls must not be less than half the height of a standard panel.

QUALIFIED PRODUCTS LIST:

1. Manufacturers seeking approval of proprietary retaining wall systems for inclusion on the Qualified Products List as per QPL Specification Section 546 please submit a QPL Product Evaluation Application along with product documentation, vendor drawings, wall system, construction manual and other information at required in the Retaining Wall System QPL Acceptance Criteria showing the proprietary wall system is designed to meet all required specifications. Project Specific Shop Drawings are required for QPL approved wall systems (See Shop Drawing Requirements below).

SHOP DRAWING REQUIREMENTS:

The successful bidder will submit the final design of the wall to the Engineer for review. Shop Drawings must be submitted on the approved QPL Vendors Drawings. The Shop Drawings will include detailed design calculations and all required information necessary to construct the wall. The design and detailed plans will be prepared as required by current QPL standards at time of bidding and will include, but not be limited to, presentation of required information as follows:

1. Provide an elevation view of the wall indicating:

a. Elevations/Stations of the top of wall, top of leveling pad and bottom of footing for Begin/End points, all anticipated in vertical alignment, of whole station and every 25 foot station increments.

b. Panel designation and the length used in the wall. Designation in elevation view.

c. Location of the proposed final ground line.

2. Provide a plan view defining all design parameters and offsets from the horizontal along the wall line (s) to the exterior face of the wall.

3. Show in plan and elevation views, light pole pilasters, drainage structures, drainage pipes, etc. that affect the walls. Locate all plan view stiples within the reinforced soil volume, including those for future widening, as shown on Foundation Layout Drawings.
# FOOT WALL TYPE TABLE NOTES

1. Listed in the Plans: Wall Type combines both Settlement Limitations and Durability Factors.

2. Amount of wall settlements that will occur in its design life and includes both short and long term settlements. Short term settlements occur during wall construction and may contain elastic deformation and densification settlement. Long term settlements continue after the completion of the wall and may include consolidation and secondary consolidation/creep settlements.

3. Settlements along the alignment of and perpendicular to the wall usually are not uniform. Expansion joints for the cast-in-place walls and slip joints for MSE walls are provided to control wall and wall panel cracks, respectively.

4. Includes all groundwater walls and walls submerged in water.

5. For concrete requirements, see Specification Section 346 using slightly aggressive environment.

6. For concrete requirements, see Specification Section 346 using extremely aggressive environment.

7. "Other Allowable Wall Types" listed with an "✓" have Settlement Limitations and Durability Factors greater than those required by the "Wall Type" (Column 1),

---

## TABLE OF FOOT WALL TYPES

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>GPL Item</th>
<th>Typical Wall Construction</th>
<th>Durability Factors</th>
<th>Other Allowable Wall Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>Cantilever, and Counterfort Walls</td>
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<td>✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔</td>
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</tbody>
</table>

---

## TYPICAL RETAINING WALL SECTION

**WITH A TRAFFIC RAILING**

(MSE Wall Type Shown, Others Similar)

(Showing Limits of the Reinforced Soil Volume)

---

## TYPICAL RETAINING WALL SECTION

**WITHOUT A TRAFFIC RAILING**

(Counterfort Wall Type Shown, Others Similar)

(Showing Limits of the Soil Volume)
PRECAST COPING - PARTIAL ELEVATION VIEW

C.I.P. COPING - PARTIAL ELEVATION VIEW

PRECAST AND C.I.P. COPING NOTES:
1. Dowel Bars 4D extend 1'-0" above the top of retaining wall panel. Field cut as necessary to maintain 2" minimum cover. See Wall Company Drawings for number and spacing of Dowel Bars 4D.
2. For Slightly and Moderately Aggressive environments.
3. For Extremely Aggressive environments.

SECTION A-A
PRECAST COPING

SECTION B-B
PRECAST COPING

PRECAST AND C.I.P. COPING DETAILS

PERMANENT RETAINING WALL SYSTEMS

2008 FDOT Design Standards

PERMANENT RETAINING WALL SYSTEMS

Sheet No. 3 of 19

5300
REINFORCING STEEL BENDING DIAGRAMS - PRECAST AND C.I.P. COPINGS

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
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<tr>
<td>C</td>
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<tr>
<td>U1</td>
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<td>U3</td>
<td>4</td>
<td>Panel width = 4&quot;</td>
<td>Panel width = 3&quot;</td>
</tr>
</tbody>
</table>

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are cut to cut.
2. All reinforcing steel at the open joints will have a 2" minimum cover.
3. Bars 4A may be continuous or spliced at the construction joints. Lap splices for Bars 4A will be a minimum of 2'-8".
4. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement will conform to ASTM A 497.

- S = Slightly Aggressive
- M = Moderately Aggressive
- E = Extremely Aggressive

- Bors 4A (for/for) shown as Slope of C.I.P. Coping Enclosure
- Bars 4A (Horizontal) (Field cut as required to maintain minimum cover)
- Bars 4B (Horizontal) (Field cut as required to maintain 2" minimum cover)
- Bars 4D shown as (•) (Typ.)
- Edge of C.I.P. Coping Enclosure
- Edge of Retaining Wall End Panel
- Top of Retaining Wall End Panel
- Drainage Ditch when required (See Wall Control Drawings for details)

C.I.P. COPING ENCLOSURE DETAIL

C.I.P. COPING USED WITH PRECAST COPING

Note: When precast coping units do not fit the entire length of the retaining wall, use this similar C.I.P. coping for short portions between precast coping units. This C.I.P. coping may also be used for vertical copings.
The following Indexes contain details of the intersection of the retaining wall at approach

8. Spacing shown is along the Gutter Line.

3. Construct F-SHAPE TRAFFIC RAILING (Skewed Approach Slab Shown, Perpendicular Approach Slab Similar) (Precast Coping Shown, C.I.P. Coping Similar) (Traffic Railing not Shown for Clarity)

10'-0" Typical Precast Coping (50'-0" Min.)

PARTIAL ELEVATION VIEW
(Precast Coping and Junction Slab Reinforcing not Shown for Clarity) (Precast Coping Shown, C.I.P. Coping Similar) (Precast or C.I.P. Coping with C.I.P. JUNCTION SLAB DETAILS)

4. Spacing shown in along the Gutter Line.

11. For Precast Coping only, Dowel Bars 40 are to extend 2'-0" above the top of retaining wall. Field cut in necessary to maintain 2' minimum cover to the top of the buildup concrete. See Wall Company Drawings for number and spacing of Dowel Bars 40.

10. Work this Index with the following:
   Index No. 425 = Traffic Railing — (42") F-Shape
   Index No. 425 = Traffic Railing — (42") F-Shape

9. For Precast Coping only, Dowel Bars 40 are to extend 2'-0" above the top of retaining wall. Field cut in necessary to maintain 2' minimum cover to the top of the buildup concrete. See Wall Company Drawings for number and spacing of Dowel Bars 40.

8. Spacing shown is along the Gutter Line.

7. FILL REQUIREMENTS: Shoulder or Roadway Pavement or Railing to coincide with 3/8" Expansion Joint in Precast Coping

6. Spacing shown is along the Gutter Line.

5. Provide and Install 3/8" Expansion Joint in retaining wall in accordance with Specification Section 932.

4. Construct 3/8" Expansion Joints in retaining wall and Precast or C.I.P. Coping. 3/8" Expansion Joint spacing ~ 50'-0" Min., 90'-0" Max. (See Note 4).

3. Construct 3/8" Expansion Joints in retaining wall and Precast or C.I.P. Coping. 3/8" Expansion Joint spacing ~ 50'-0" Min., 90'-0" Max. (See Note 4).

2. Spacing shown is along the Gutter Line.

1. Spacing shown is along the Gutter Line.

JUNCTION SLAB NOTES:
1. CONSTRUCTION REQUIREMENTS: Construct the Junction Slab level transversely and expansion joints plumb. Do not construct the junction slab or C.I.P. coping perpendicular to the roadway surface. Slop forming is not permitted.

2. APPLICATIONS: This junction slab is only applicable for a TL-4 crash test rating. Precast Traffic Railings are not allowed.

3. REINFORCING STEEL: Dowel Load Transfer Devices will be ASTM A 56 smooth round bar and spot welded in accordance with Specification Section 962. Install Dowel Load Transfer Devices in accordance with Specification Section 962.

4. Construct 3/8" Expansion Joints in junction slabs and C.I.P. coping's plumb and perpendicular to the Gutter Line. Provide at 30'-0" maximum intervals as shown.

5. Provide and Install Expansion Joint in Precast Coping in accordance with Specification Section 932.

6. Construct 3/8" V-Grooves in junction slabs and C.I.P. coping's plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between 3/8" Expansion Joints and/or Begin or End of Retaining Wall. V-Groove locations are to coincide with V-Groove locations in the Traffic Railing.

7. FILL REQUIREMENTS: Shoulder or Roadway Pavement or Railing to coincide with 3/8" Expansion Joint in Precast Coping

8. Spacing shown is along the Gutter Line.

9. For Precast Coping only, Dowel Bars 40 are to extend 2'-0" above the top of retaining wall. Field cut in necessary to maintain 2' minimum cover to the top of the buildup concrete. See Wall Company Drawings for number and spacing of Dowel Bars 40.

10. Work this Index with the following:
   Index No. 425 = Traffic Railing — (32") F-Shape
   Index No. 425 = Traffic Railing — (42") F-Shape

9. For Precast Coping only, Dowel Bars 40 are to extend 2'-0" above the top of retaining wall. Field cut in necessary to maintain 2' minimum cover to the top of the buildup concrete. See Wall Company Drawings for number and spacing of Dowel Bars 40.

8. Spacing shown is along the Gutter Line.

7. FILL REQUIREMENTS: Shoulder or Roadway Pavement or Railing to coincide with 3/8" Expansion Joint in Precast Coping

6. Spacing shown is along the Gutter Line.

5. Provide and Install Expansion Joint in Precast Coping in accordance with Specification Section 932.

4. Construct 3/8" Expansion Joints in junction slabs and C.I.P. coping's plumb and perpendicular to the Gutter Line. Provide at 30'-0" maximum intervals as shown.

3. Construct 3/8" Expansion Joints in junction slabs and C.I.P. coping's plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between 3/8" Expansion Joints and/or Begin or End of Retaining Wall. V-Groove locations are to coincide with V-Groove locations in the Traffic Railing.

2. Spacing shown is along the Gutter Line.

1. Spacing shown is along the Gutter Line.
PARTIAL END VIEW OF TRAFFIC RAILING END TRANSITION FOR GUARDRAIL ATTACHMENT
(Showing Bars 5V and Bars 5S)
(Precast Coping Shown, C.I.P. Coping Similar)

NOTE: See Index No. 420 and Index No. 425. Detail 4" for details.

ESTIMATED QUANTITIES FOR PRECAST COPING

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<td>Additional Reinforcement Expansion Joints</td>
<td>LB</td>
<td>42.72</td>
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(The above concrete quantities are based on a superelevation of 6.25% and a 5" wide retaining wall panel beneath a 32" F-Shape Traffic Rail. The above Precast Coping quantities are based on one 10'-0" Precast Coping segment.)

TYPICAL SECTION THRU PRECAST COPING WITH C.I.P. JUNCTION SLAB AND RETAINING WALL AT EXPANSION JOINTS

JUNCTION SLAB NOTES:
1. Matching Cross Slope of Travel Lane or Shoulder.
2. The minimum dimension of 6" corresponds to a superelevation of 6.25%. For superelevations exceeding 6.25%, increase this dimension (i.e., shift control points down) as required to match roadway superelevation.
3. Actual width varies depending on type of retaining wall used.
4. See Index No. 420 and Index No. 425 for Bars 5V and 5S.
5. The Precast Coping width is based on a maximum 65" wide Retaining Wall Panel. If the Retaining Wall Panel is wider than 65", increase the width by the difference between the two Retaining Wall Panel widths. Increase the length of Bars 5V and decrease the length of Bars 5A and 5C as required when the coping width is increased and adjust spacing to Bar 5V as required to maintain 2" minimum cover.
6. Increase the width (2-3/4") of Bars 6U as required to maintain 2" minimum cover when recess width exceeds 8".
7. At the Contractor’s option, mechanical couplers may be used to splice reinforcing. Complete details, including reinforcement lengths are required in the Shop Drawings. Mechanical couplers shall develop 25% of the bar yield strength.

PRECAST OR C.I.P. COPING WITH C.I.P. JUNCTION SLAB DETAILS (F-SHAPE TRAFFIC RAILINGS)
REINFORCING STEEL BENDING DIAGRAMS - JUNCTION SLAB

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>PRECAST COPING</th>
<th>C.I.P. COPING</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>(32&quot; F-SHAPE)</td>
<td>(42&quot; F-SHAPE)</td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>7'-8&quot;</td>
<td>7'-8&quot;</td>
</tr>
<tr>
<td>B1</td>
<td>5</td>
<td>9'-6&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>B2</td>
<td>5</td>
<td>45 REQD.</td>
<td>45 REQD.</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>7'-8&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>2'-0&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>F</td>
<td>5</td>
<td>8'-3&quot;</td>
<td>8'-3&quot;</td>
</tr>
<tr>
<td>L</td>
<td>6</td>
<td>5'-4&quot;</td>
<td>10'-2&quot;</td>
</tr>
<tr>
<td>U1</td>
<td>6</td>
<td>3'-8&quot;</td>
<td>3'-8&quot;</td>
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1" Ø Dowel Smooth shear tab
2'-0" 2'-0" 2'-0"

For mechanical coupler option, this dimension is 7'-9".

For weld wire reinforcement when approved by the Engineer, Welded Wire Reinforcement will conform to ASTM A 497.

REINFORCING STEEL NOTES:
1. All bars in the bending diagrams are to cut to size.
2. All reinforcing steel at expansion joints will have a 2" minimum cover.
3. Lap splices for Bars 582 within a maximum of 3'-2".
4. For Precast Coping only, lap splice Bars 6L with Bars 5C.
5. Lap splices within a maximum of 2'-9".
6. See Index No. 420 and Index No. 425 for Bars 5S and 5V.
7. Dimension shown is for lap splice option. For mechanical coupler option, this dimension is 7'-9".
8. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement will conform to ASTM A 497.

ESTIMATED QUANTITIES FOR C.I.P. COPING

<table>
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<tr>
<th>ITEM</th>
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<td>Reinforcing Steel (Typical) excluding Bars 5V and 5S (Typical)</td>
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<tr>
<td>Additional Rein. @ Expansion Joint</td>
<td>LB/FL</td>
<td>42.72</td>
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(Typical quantities are based on a super-elevation of 6.25% and a 5" wide retaining wall panel beneath a 32" F-Shape Traffic Railing.)

JUNCTION SLAB NOTES:
1. Match Cross Slope at Travel Lane or Shoulder.
2. The minimum dimension of 6" corresponds to a super-elevation of 6.25%. For super-elevations exceeding 6.25%, increase this dimension (i.e., shift control points down) as required to match roadway super-elevation.
3. Actual width varies depending on type of Retaining Wall used.
4. See Index No. 420 and Index No. 425 for Bars 5S and 5V.
5. Increase the width (1" - 2") of Bars 6UJ to reflect to maintain 2" minimum cover when recess width exceeds 8".

PRECAST OR C.I.P. COPING WITH C.I.P. JUNCTION SLAB DETAILS (F-SHAPE TRAFFIC RAILINGS)

PERMANENT RETAINING WALL SYSTEMS
SECTION A-A
(TYPICAL SECTION PRECAST COPING WITHOUT CURB)

SECTION A-A
(TYPICAL SECTION C.I.P. COPING WITHOUT CURB)

SECTION B-B
(TYPICAL SECTION WITH CURB)
(Precast Coping shown, C.I.P. Coping similar)

SECTION C-C
(TYPICAL SECTION COPING TRANSITION)
(Precast Coping shown, C.I.P. Coping similar)

END VIEW D-D
(TYPICAL SECTION COPING TRANSITION)
(Precast Coping shown, C.I.P. Coping similar)

NOTES:
1. See Sheets 6 & 7 of 19 for Junction Slab and Coping details.
3. Actual width varies depending on type of Retaining Wall used.
4. See Index No. 424 for Traffic Railing details and bars 7P1, 4P5, 4P3, 4P5 & 4V1. Bars 5P2 and 5U are not required in Retaining Wall Coping.

Joint sealant required at all expansion joints and between prestressed and C.I.P. curb openings.

LOW MODULUS SILICONE SEALANT
(See detail "A")

PRECAST OR C.I.P. COPING WITH JUNCTION SLAB (CORRAL SHAPE TRAFFIC RAILING)

PERMANENT RETAINING WALL SYSTEMS
Raised Sidewalk details:

1. **CONSTRUCTION REQUIREMENTS:** Construct the raised sidewalk level transversely and expansion joints plumb. Do not construct the raised sidewalk or C.I.P. copings perpendicular to the roadway surface. Slope forming is not permitted.

2. **APPLICATIONS:** This raised sidewalk is only applicable for a TL-4 crash test rating.

3. **REINFORCING STEEL (Dowelload) Transfer Devices** in accordance with Specification Section 962. Install Dowelload Transfer Devices in accordance with Specification Section 350.

4. **Provide and install/or Preformed Expansion Joint** in accordance with Specification Section 322.

5. **Construct ⅛" V-Grooves in raised sidewalk and C.I.P. copings plumb and perpendicular to radiate the Gutter Line. Provide 30'-0" maximum alternating bars.**

6. **Provide and install/or Preformed Expansion Joint Filler** in accordance with Specification Section 322.

7. **Begin or End Retaining Wall** or Precast or C.I.P. Coping.

8. **Spacing shown is along the Gutter Line. Provide at 30'-0" maximum intervals as shown.**

9. **Install Preformed Expansion Joint Filler in accordance with Specification Section 322.**

10. **For Precast Coping only, Dowel Bars 40" extend to 1'-0" above the top of retaining wall panel. Field cut as necessary to maintain 2'-0" minimum cover to the top of the building concrete. See Wall Company Drawings for number and spacing of Dowel Bars.**

11. **Work this Index with the following:**

   - **Index No. 422 - Traffic Railing**
   - **Index No. 423 - Traffic Railing**

   **The following Indexes contain details of the intersection of the retaining wall at approach slab:**

   - **Index No. 20900 - Approach Slabs (Flexible Pavement Approaches)**
   - **Index No. 20910 - Approach Slabs (Rigid Pavement Approaches)**

**CROSS REFERENCE:** For Details "B", see Sheet 12 of 19.
PARTIAL END VIEW OF TRAFFIC RAILING END TRANSITION FOR GUARDRAIL ATTACHMENT
(Shoming Bars 5S, Bars 5T and Bars 5X) (Precast Coping Shown, C.I.P. Coping Similar)

NOTE: See Index No. 422 and Index No. 423, Railing End Detail for details.

ESTIMATED QUANTITIES FOR PRECAST COPING

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<tr>
<th>ITEM</th>
<th>UNIT</th>
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<td>Concrete (Precast Coping)</td>
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<td>CY/FT.</td>
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<td>Reinforcing Steel (Precast Coping) excluding Bars 5T, 5X and 5S (Typ.)</td>
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<td>Reinforcing Steel (C.I.P. Raised Sidewalk) (Typ.)</td>
<td>Lb./FT.</td>
<td>31.73</td>
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<tr>
<td>Additional Rein. &amp; Expansion Joints</td>
<td>Lb.</td>
<td>39.38</td>
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(The above concrete quantities are based on a 5" wide retaining wall panel and a Type 1) Concrete Curb (See Note 2). The above Precast Coping quantities are based on one 10'-0" Precast Coping segment.)

TYPICAL SECTION THRU PRECAST COPING WITH C.I.P. RAISED SIDEWALK AND RETAINING WALL AT EXPANSION JOINTS

RAISED SIDEWALK NOTES:
1. Actual width varies depending on type of Retaining Wall used.
2. Match roadway curb shape (Type) and height. See roadway plans and Index No. 300. 5'-11" dimension is based on a 5'-11" Vertical Shape Traffic Railing with a Type 1 curb adjacent to a 6'-0" wide sidewalk. Adjust this dimension as required for other curb types or transitions at Begin or End Retaining Wall.
3. See Index No. 422 and Index No. 423 for Bars 5S, 5T & 5X and Bullet Railing details. Adjust vertical dimension of Bars 5T and 5X see reinforcing Steel Note 5.
4. Increase the width (1'-2") of Bars 5U4 as required to maintain 2" minimum cover when recess width exceeds 6".
5. At the Contractor's option, mechanical couplers may be used to splice reinforcing. Complete details including reinforcement lengths are required in the Shop Drawings. Mechanical couplers shall develop 125% of the bar yield strength.
6. Trim end of Bars 5T and 5X to clear construction joint for 42" Vertical Shape Traffic Railing.

PRECOR OR C.I.P. COPING WITH C.I.P. RAISED SIDEWALK DETAILS (VERTICAL SHAPE TRAFFIC RAILINGS)
The above concrete quantities are based on a 5' wide retaining wall panel and a Type D Concrete Curb (See Note 2).

TYPICAL SECTION THRU C.I.P. COPING AND RAISED SIDEWALK AND RETAINING WALL AT EXPANSION JOINTS

RAISED SIDEWALK NOTES:
1. Actual width varies depending on type of retaining wall used.
2. Match roadway curb shape (Type) and height. See roadway plans and Index No. 300. 6'-8" dimension is based on a 32" Vertical Shape Traffic Railing with a Type D curb adjacent to a 0'-6" wide sidewalk. Adjust this dimension as required for other curb types or transitions of Begin or End Retaining Wall.
3. See Index No. 420 and Index No. 423 for Bars 5S, 5T & 5X and bullet railing details. Adjust vertical dimension of Bars 5T and 5X, see Reinforcing Steel Note 5.
4. Increase the width (1' = 24") of Bars 5U as required to maintain 2" minimum cover when recess width exceeds 6'.

PRECAST OR C.I.P. COPING WITH C.I.P. RAISED SIDEWALK DETAILS (VERTICAL SHAPE TRAFFIC RAILINGS)
1. Construct PRECAST COPING/PARAPET AND SIDEWALK

2. Provide and place Concrete Parapet

3. Construct PRECAST COPING/PARAPET AND SIDEWALK

4. Spacing shown is along the Gutter Line.

5. For Precast Coping only, Dowel/Bars 40" are to extend 1'-0" above the top of retaining wall panel. Field cut as necessary to maintain minimum cover to the top of the buildup concrete. See Wall Panel Drawings for number and spacing of Dowel/Bars 40".

6. Work this Index with the following:
   - Index No. 410 - Concrete Barrier Wall
   - Index No. 820 - Pedestrian/Bicycle Railing

7. For C.I.P. Coping only, work this Index with the following:
   - Index No. 29400 - Approach Slabs (Flexible Pavement Approach)
   - Index No. 29500 - Approach Slabs (Rigid Pavement Approach)

8. The following Indexes contain details of the intersection of the retaining wall and/or sidewalk:
   - Index No. 29400 - Approach Slabs (Flexible Pavement Approach)
   - Index No. 29500 - Approach Slabs (Rigid Pavement Approach)

PARTIAL PLAN VIEW
(Skewed Approach Slab Shown, Perpendicular Approach Slab Similar)
(Precast Coping Shown, C.I.P. Coping Similar) (Concrete Parapet not Shown for Clarity)

PARTIAL ELEVATION VIEW
(Precast Coping and Sidewalk Reinforcing not Shown for Clarity)
(Precast Coping Shown, C.I.P. Coping Similar)

PRECAST COPING/_PARAPET AND SIDEWALK NOTES:

1. Construct 1" V-Groove Expansion Joints in sidewalk and C.I.P. coping plumb and perpendicular or radial to the Gutter Line. Provide at 90'-0" maximum intervals as shown.

2. Provide and install Preformed Expansion Joint Filler in accordance with Specification Section 932.

3. Construct ½" V-Grooves in sidewalk and C.I.P. coping plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between ½" Expansion Joints and/or Begin or End Sidewalk. For C.I.P. Coping only, V-Groove locations are to coincide with V-Groove locations in the Concrete Parapet.

4. Spacing shown is along the Gutter Line.

5. For Precast Coping only, Dowel/Bars 40" are to extend 1'-0" above the top of retaining wall panel. Field cut as necessary to maintain 2" minimum cover to the top of the buildup concrete. See Wall Panel Drawings for number and spacing of Dowel/Bars 40".

6. Work this Index with the following:
   - Index No. 410 - Concrete Barrier Wall
   - Index No. 820 - Pedestrian/Bicycle Railing

7. For C.I.P. Coping only, work this Index with the following:
   - Index No. 29400 - Approach Slabs (Flexible Pavement Approach)
   - Index No. 29500 - Approach Slabs (Rigid Pavement Approach)

8. The following Indexes contain details of the intersection of the retaining wall and/or sidewalk:
   - Index No. 29400 - Approach Slabs (Flexible Pavement Approach)
   - Index No. 29500 - Approach Slabs (Rigid Pavement Approach)

PARTIAL ELEVATION VIEW
(Precast Coping and Sidewalk Reinforcing not Shown for Clarity)
(Precast Coping Shown, C.I.P. Coping Similar)

PRECAST COPING/ PARAPET OR C.I.P. COPING WITH C.I.P. SIDEWALK DETAILS

PERMANENT RETAINING WALL SYSTEMS
LIGHT PILASTER DETAILS

1. The pilaster and junction slab are designed to resist the following working loads from the light pole applied at the top of the Pilaster:
   - Axial Deadload = 1,560 kip
   - Windload Moment about Transverse Axis (N) = 40.60 kip-ft
   - Windload Moment about Longitudinal Axis (N) = 28.30 kip-ft
   - Deadload Moment about Longitudinal Axis (N) = 1,690 kip-ft
   - Maximum Shear = 1,580 kip
   - Torque about Pole Axis = 3,560 kip-ft

2. Provide grout in accordance with Specification Section 934.
3. It is the Contractor's responsibility to provide anchor bolts, nuts, washers and anchor plates that effectively transmit the light pole loads to the pilaster and the reinforcing cage. Submit calculations for anchor bolt design and embedment depth, signed and sealed by a Professional Engineer registered in the State of Florida to the Engineer for review and approval prior to construction.
4. Install Anchor Bolts plumb.
5. For conduit, pullbox and expansion/deflection fitting details, see Utility Conduit Detail Drawings.

The cost of anchor bolts, nuts, washers and anchor plates will be included in the Bid Price for light poles. Include the cost of all anchor, concrete and reinforcing steel required for construction of the pilasters, grout pods, pull boxes and miscellaneous hardware required for the completion of the electrical system in the Bid Price for either the Traffic Railing or Concrete Parapet that the pilaster is behind.

Field Cut Bars 4M2 as required to maintain clearance.
6. Anchor Bolt pattern orientation will be shown.
7. Slip Forming Method of construction is not allowed within the limits shown.
10. Reinforcing shown for light pole pilasters is in addition to typical reinforcing for C.I.P. Junction Slabs and Raised Sidewalks (Bars 5A and 5B2). Omit Junction Slab Bars 6U1 and Raised Sidewalk Bars 5U1 within light pole pilaster limits.
11. Work this Sheet with the following as appropriate:
   - Sheet Nos. 5 thru 10 of 19 = Precast or C.I.P. Coping with C.I.P. Junction Slab Details
   - Sheet Nos. 11 thru 15 of 19 = Precast or C.I.P. Coping with C.I.P. Raised Sidewalk Details
   - Sheet Nos. 16 and 17 of 19 = Precast Coping/Parapet or C.I.P. Coping with C.I.P. Sidewalk Details

CROSS REFERENCE: For Estimated Quantities, see Sheet No. 18 of 19.

C.I.P. LIGHT POLE PILASTER DETAILS

PLAN VIEW

(Junction Slab reinforcing not shown for clarity)

(Junction Slab Shown, Raised Sidewalk or Sidewalk Similar)
NOTES:
1. The 8'-0" dimension shown is for Junction Slabs. This dimension must be a minimum of 3'-0" for all applications.
2. For junction slabs, increase the 1'-0" depth dimension to 1'-6". For raised sidewalks, increase the 2'-0" depth dimension to 2'-6". For sidewalks, increase 6" depth dimension to 1'-6". The minimum length of the Junction Slabs, Raised sidewalks and Sidewalks is 50'-0" measured along the Gutter Line.
3. Bars 4J are only required when plasters are behind a Traffic Railing.
4. Match the slope of the adjoining junction slab and shoulder or roadway pavement, raised sidewalk or sidewalk.
5. Actual width varies depending on type of Retaining Wall used.
6. See Index No. 420 for Bars 5V and 5S.
REINFORCING STEEL BENDING DIAGRAMS - LIGHT PILASTER

BILL OF REINFORCING STEEL

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<td>G2</td>
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<tr>
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<td>4</td>
<td>10</td>
<td>3'-6&quot;</td>
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BARS 5B3 & 4J

BAR 4H2

BAR 4H1

BAR 4M1 & 4M2

BARS 4G1, 4G2, 4G3, 4G4 & 4G5

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are cut to size.
2. Lap splice for bars 4G1, 4G2 & 4G3 with a minimum of 1'-4". Lap splice for bars 4G4 & 4G5 with a minimum of 1'-8".
3. The contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A 497.

DETAIL "A"

ELEVATION VIEW
(Junction Slab Reinforcing & Bars 4J not shown for clarity)
(Traffic Railing shown, Concrete Parapet Similar)
(Junction Slab Shown, Raised Sidewalk or Sidewalk Similar)

NOTES:
1. Field Cut Bars 4M2 as required to maintain minimum cover.
2. Maximum clearance between leveling nut and top of plaster without exceeding anchor bolt diameter.

ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Pilaster)</td>
<td>CY</td>
<td>0.926</td>
</tr>
<tr>
<td>Concrete (Thickened Junction Slab)</td>
<td>CY</td>
<td>1.180</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>Lb.</td>
<td>431.65</td>
</tr>
</tbody>
</table>

(The quantities above are for one C.I.P. Light Pole Pilaster. The concrete quantity for the thickened portion slab is based on a 6" increase in thickness and a 5' wide retaining wall panel. Adjust thickened concrete quantity as required for raised sidewalks and sidewalks.)

C.I.P. LIGHT POLE PILASTER DETAILS

PERMANENT RETAINING WALL SYSTEMS
PLAN VIEW
(Junction Slab Shown, Raised Sidewalk Similar)

SECTION A-A
SECTION THRU JUNCTION SLAB, BARRIER WALL INLET AND RETAINING WALL
(Junction Slab Shown, Raised Sidewalk Similar)
1. Provide soil reinforcement in accordance with Specification Section 548.

2. The responsibility of the Engineer is to determine that the factored bearing pressure shown for the wall does not exceed the factored bearing resistance of the foundation for that specific wall location.

3. The wall reinforcement must be designed for internal stability of the wall. External stability design, including foundation and slope stability, is the responsibility of the Engineer.

NOTE: It is the responsibility of the Contractor to determine the factored bearing resistance of the foundation for that specific wall location.

CONSTRUCTION:

1. Walls must be in accordance with Specifications Section 548 and the Contractor’s instructions.

2. For location and alignment of retaining walls, refer to Wall Control Drawings.

3. If present, consider design and analysis and locate manholes and drop inlets as shown on wall elevations.

4. Refer to Plan and Elevation sheets of individual walls for minimum reinforcement strip length, factored bearing resistances, minimum embedment, and anticipated long-term and differential settlements.

5. It is the Contractor’s responsibility to determine the location of any guardrail posts behind retaining walls. Prior to placement of the top layer of soil reinforcement, individual reinforcing strips/lengths may be skewed horizontally (≤ 15°) maximum to avoid the post locations if approved by the Engineer.

6. Provide a plan view detailing the horizontal alignment and offsets from the horizontal control lines to the exterior face of the wall.

7. Show in plan and elevation views all drainage structures, drainage pipes, etc. that affect the wall(s). Locate in the plan view all drainage structures, drainage pipes, etc. that affect the wall(s). Locate in the plan view all drainage structures, drainage pipes, etc. that affect the wall(s).

8. Provide detailed design calculations and draw details for construction of the walls. Provide the factored bearing resistance and factored bearing pressure for each wall height increment.

9. The Contractor is responsible for gradually deflecting upper layers of soil reinforcement downward (≤ 15°) maximum from horizontal to avoid cutting soil reinforcement and conflicts with paving and subgrade preparation. The Contractor’s attention is directed especially to situations where roadway super-elevation and/or spiraling are anticipated.

QUALIFIED PRODUCTS LIST:

1. Manufacturers and suppliers are required to submit their products for review as Shop Drawings. Details and Design Criteria shown on the Shop Drawings must be submitted to the Engineer for review.

2. All Shop Drawings must include details, dimensions, and quantities necessary to construct the wall. The design and construction details must be approved by the Engineer.

SHOP DRAWING REQUIREMENTS:

The successful bidder must submit the final design of the wall for review as Shop Drawings. Details and Design Criteria shown on the Shop Drawings must be approved by the Engineer. Any damage done to the soil reinforcement due to the installation of the guardrail must be repaired by the Contractor at the Contractor’s expense.

CONSTRUCTION (CONT.)

8. Piles within the soil volume must be driven prior to construction of the retaining wall. The portion of the pile within the soil volume must be wrapped with polyethylene sheathing in accordance with Specification Section 459. Drive piles located within soil volume to construction of the retaining wall, unless a method to protect the structure is acceptable to the Engineer and Contractor. Proposed design is submitted and approved in writing.

9. A structural extension of the connection of the reinforcing wall panel to soil reinforcement must be used whenever necessary to avoid cutting or excessive sloughing (greater than 15°) of the soil reinforcement around obstructions (i.e., piles, pipes, etc.).
NOTE: If the sign panels are deeper than 12" a Horizontal Panel Splice is allowed at an interior # bar support. Shop drawings shall be required. Minimum panel section width = 2'-6".

To prevent wind damage, three posts are required. Use a Horizontal Panel Splice at the base plate of each column. The splice must be 0.125" thick and made of aluminum. Use #4-40 machine screws with nuts and lock washers, spaced 8" on centers maximum.


Broward, Collier, Escambia, Indian River, Martin, Miami-Dade, Monroe, Palm Beach, Santa Rosa, and St. Lucie Counties.

**Multi-Column Ground Sign**

See Tables for size and number of wind beams.

See backing strip details.

See detail to right of type wind beam.

See table for size and number of type wind beams.

See Table for Size and Number Of Backing Strip Details.

See Detail To Right Of Type Wind Beam.

See Shock Plate Details.

**Design Wind Speeds by County**

110 mph


130 mph

Broward, Collier, Escambia, Indian River, Martin, Miami-Dade, Monroe, Palm Beach, Santa Rosa, and St. Lucie Counties.

150 mph

**Wind Speeds**

- **110 mph**

- **130 mph**

- **150 mph**
  - Broward, Collier, Escambia, Indian River, Martin, Miami-Dade, Monroe, Palm Beach, Santa Rosa, and St. Lucie Counties.

**Wind Speeds by County**

- **110 mph**

- **130 mph**

- **150 mph**
  - Broward, Collier, Escambia, Indian River, Martin, Miami-Dade, Monroe, Palm Beach, Santa Rosa, and St. Lucie Counties.
GENERAL NOTES

DESIGN SPECIFICATION
For welding refer to the latest editions of the AWS Structural Welding Codes for Steel and Aluminum, the AASHTO Standard Specifications for Welding Structural Steel/Highway Bridges.

ALUMINUM MATERIALS
All aluminum materials shall meet the requirements of the Aluminum Association's Alloy 6061-T6 and also the following ASTM specifications: Sheets and plates, B209; extruded tube, bars, rods & shapes, B221; and standard structural shapes, B308. Sheets are to be degreased, etched, neutralized and treated with Alodine 1200, Iridite 14-2, Bonderite 721, or equal. No stenciling permitted on sheets. Aluminum welding rods shall meet the requirements of Aluminum Association Alloy No. 5556 filler wire.

STRUCTURAL STEEL
All structural steel shall meet the requirements of ASTM A36.

ALUMINUM BOLTS, NUTS, & LOCK WASHERS
Aluminum bolts shall meet the requirements of Aluminum Association Alloy 2024-T4 (ASTM F458). The bolts shall have an anodic coating at least 0.0002" thick and be Chromate sealed. Lock washers shall meet the requirements of Aluminum Association Alloy 7075-T6 (ASTM B221). Nuts shall meet the requirements of Aluminum Association Alloy 5056-T6 or 6262-T9 (ASTM F467).

STEEL BOLTS, NUTS, & WASHERS
All steel bolts, nuts and washers shall meet the requirements of ASTM A325.

ALTERNATE MATERIAL
Material meeting the requirements of ASTM B209 or Aluminum Association Alloys 5154-H38 or 5052-H38 may be used for sheet and plate. Material meeting the requirements of Aluminum Association Alloy 6351-T5 and ASTM B221 may be used for extruded bars, rods, shapes and tubes.

TOLERANCES
All above materials shall be in accordance with the governing ASTM specifications.

GALVANIZING
All steel shapes, angles, tees, plates, bolts, nuts and washers shall be galvanized in accordance with Standard Specifications B92-7.

BASE CONNECTION
High strength bolts L2 in the base connection shall be tightened only to the torque shown in the table on sheets 1 of 3. Overtightened base connections will not be accepted.

FUSE PLATES
All holes in fuse plates shall be drilled. All plate cuts shall be made preferably, be saw cuts; however, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be tolerated.

SIGN FACE
All sign face corners shall be rounded. See Sign Layout Sheet.

SHOP DRAWINGS
When ground sign supports are fabricated in accordance with these plans no shop drawings are required. Shop drawings will be required for approval when the column length exceeds the length shown in the plans by more than 2'-0". However, shop drawings for sign panels, messages, lettering and quantities shall be submitted to the Engineer of Record for approval.

FABRICATOR NOTE
All bolts shall be high strength bolts. All bolts, except L2 bolts and zee to post bolts, shall be tightened in the shop following a method approved by the engineer. Tightening shall be to such a degree so as to attain the residual tension specified in the tabulation on sheet 1 of 3.

FOUNDATION
Contractor may use precast foundations in pre-drilled holes a minimum of 12" larger than the foundation indicated on the plans in either wet or dry conditions. The holes shall be clean and without loose material. Temporary casing shall be required if the soil is unstable. The holes shall be filled with flowable fill after the precast foundation is in place. The cost of flowable fill, installing and removal of casing shall be included in the unit price of Sign Multi-Post.
Each Hex Nut
Stub

See Detail
Top

"0.0149" Thick Aluminum (6061-T6)

Provide 2 - 0.0149" Thick and 2 - 0.0329" Thick Shims For Post

ALTERNATE BOLT KEEPER WASHER

H. S. Bolt With Hex Head, Hex Nut & 3 Washers With Each Bolt. See Table For Bolt Diameter And Torque. See Bolting Procedure.

Remove All Galvanizing Humps Or Beads In Washer Area

See Bolt Keeper Washer Detail

Top Of Foundation - See Detail Below

BOLT KEEPER WASHER

E Thickness = t3

Hinge Plate (Match Post Flange Thickness)

Chapter Plate

Flange Holes For Fuse And Hinge Plates Shall Drilled Or Sub-Punched And Reamed H.S. Bolts (See Table For Size), For Bolt Tension See Sheet 1 (H.3.)

Cut Flange And Web, Post Shall Be Slow Cut After Galvanizing And The Cut Surface Treated With A Galvanizing Compound Coat C-G

Foundation Bolt = L2

Grind

Foundation Bolt Keeper = L2

Bolt Lengths

Hole Diameter = D2

Bolt Diameter = D1

Bolt Diameter = D0

WASHER DETAIL

Foundation Data

Base E Detail

SECTION AA

See Bolt Keeper Washer Detail

finished Grade

See Bolt Keeper Washer Detail

SECTION VIEW

Stiffener Plate

Opt Optional Hinge

Fuse & Hinge Plates

Typ.

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**CANTILEVER SIGN STRUCTURE NOTES**

1. Design according to FDOT Structures Manual. Alternate Designs are not allowed.

2. Submit shop drawings for all work. Include:
   a. Field verification of upright heights.
   b. Foundation elevations necessary to insure minimum vertical clearances as per traffic plans.
   c. Anchor bolt orientation with respect to centerline of truss and the direction of traffic.
   d. Show chord splices a minimum distance of 2 truss panel lengths apart. "50" Panel from upright is the closest panel in which an anchor splice may be used. See plans for Cantilever Sign Structure Data Table. Upright splices are not allowed.

3. Shop Fabrication, Assembly, Handling and Shipping:
   a. Do not begin fabrication before receiving shop drawing approval.
   c. Shop assemble the entire structure after galvanizing and prior to shipment.

4. Sign Structure Materials:
   a. Upright and Chords (Steel Pipe): ASTM A500 Grade B.
   b. Steel Angles: ASTM A 369, Grade 50.
   c. Steel Plates: ASTM A 441, Grade 36.
   d. Weld Metal: E70XX.
   e. Bolts: ASTM A325, Grade 50.
   f. Anchor Bolts: ASTM A325, Grade 50.
   g. Field verification of all upright heights.
   h. Anchor bolts: Minimum 5.5 ksi compressive strength.


7. Foundation Materials:
   a. Reinforcing Steel: ASTM A615, Grade 60.
   b. Concrete: Class IV, minimum 5.5 ksi compressive strength.
   c. Grout: Minimum 5.5 ksi compressive strength at 28 days. Conform to Specification Section 934 using procedures outlined in Section 649-2.

8. Attach the screen to the base plate with stainless steel self-tapping screws at 3" centers.

9. Payment: All costs associated with the Sign Structure, Sign Panels, Foundation and all incidental items will be paid for under the Sign Structure pay item.

**NOTE:** Contractor shall verify these Dimensions prior to Fabrication of Upright.
FRONT OF TRUSS ELEVATION
(Back Truss Chord and attached Angles not shown for clarity)
SPAN SIGN STRUCTURE NOTES

1) Design according to FDOT Structures Manual. Alternate Designs are not allowed.
2) Submit shop drawings for all work. Include:
   a. Field verification of all upright heights.
   b. Foundation elevations necessary to insure minimum vertical clearances as per traffic plans.
   c. Anchor bolt orientation with respect to centerline of truss and the direction of traffic.
   d. The method to be used to provide the required parabolic camber. (See Camber Diagram)
3) Shop Fabrication, Assembly, Handling and Shipping:
   a. Do not begin fabrication before receiving shop drawing approval.
   c. Shop assemble the entire structure after galvanizing and prior to shipment.
   d. If necessary, disassemble and secure components for shipment.
4) Sign Structure Materials:
   a. Upright and Chords (Steel Pipe): API-5L-X42 (42 ksi yield) or ASTM A500, Grade B.
   b. Steel Angles: ASTM A709, Grade 36.
   c. Steel Plates: ASTM A709, Grade 36.
   d. Weld Metal: E70XX.
   f. Anchor Bolts: ASTM F1554, Grade 55 with ASTM A563 Grade A heavy-hex double nuts.
   g. Install nuts per manufacturer's instructions.
5) Galvanization; Nuts, bolts and washers: ASTM F2329. Other steel items: ASTM A123
6) Sign Panels: Aluminum. See Elevation drawing for sizes and locations.
7) Foundation Materials:
   a. Reinforcing Steel: ASTM A615, Grade 60.
   b. Concrete: Class IV, minimum 5.5 ksi compressive strength at 28-days for all environmental classifications.
   c. Grout: Minimum 5.0 ksi compressive strength at 28-days. Conform to Specification Section 934 using procedures outlined in Section 649-6.
8) Construct the Sign Structure foundation in accordance with FDOT Specification Section 455.
9) Prior to erection, record the as-built anchor locations and provide to the Engineer.
10) Provide a parabolic camber with the maximum upward deflection as shown on the Camber Diagram.
11) Locate Chord splices a minimum of 3 truss panel lengths apart. Chord splices may be either the Standard splice or the Alternate splice but not both on this structure. Upright splices are not allowed.
12) Install Sign Panels as shown on the Elevation drawing.
13) Payment: All costs associated with the Sign Structure, Sign Panels, Foundation and all incidental items will be paid for under the Sign Structure pay item.
See Plug Detail (Typ.)

See Detail H

Similar to Detail H

Truss Web Angles (Typ.)

VIEW F-F

VIEW G-G Similar

Out-of-Plane Members not shown for clarity

Span Length, \( A \), comprised of \( N \) Equal Panels

\( \frac{N}{2} \) The Number Of Panels For An Even Number Of Panels

\( \frac{N}{2} \) The Number Of Panels Rounded Down To The Closest Whole Number For An Odd Number Of Panels

For attachment of Luminaire Support

Provide this Detail for Back Mounted Signs at all Sign Hanger Locations

NOTE: See Index No. 11300.

Abbreviation

OD = Outside Diameter

BACK-SIDE SIGN MOUNTING DETAIL

NOTE: See Index No. 11350.
ELEVATION
ALTERNATE SPLICE CONNECTION

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

PLAN VIEW
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"

SECTION P-P

ELEVATION
SPLICE CONNECTION

SECTION Q-Q

PLAN VIEW
DRILLED SHAFT

SECTION R-R

ELEVATION
DRILLED SHAFT

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes 1/4"
Using 130 MPH Wind Speeds by County.

2) GENERAL SPECIFICATIONS: Current FDOT Standard Specifications for Road and Bridge Construction and supplements thereto.


4) ALUMINUM: Aluminum Materials shall meet the requirements of Aluminum Association Alloy 6061-T6 (ASTM B209, B221, or B308), except as noted below.

5) CONCRETE: Class I (Special).

6) SIGN FRAMES: 0.08 inches thick aluminum plate with all corners rounded.

7) ALUMINUM BOLTS, NUTS, AND LOCK WASHERS:
   a. Aluminum bolts: ASTM F468, Alloy 6061-T6 with at least 0.002 inches thick anodic coating and chromate sealed.

8) STAINLESS STEEL BOLTS, NUTS, AND LOCK WASHERS:
   b. Condition 1, CK2, or SS4 may be provided in lieu of Aluminum Bolts, Nuts, and Washers.

9) U-BOLTS, NUTS, AND LOCK WASHERS:

10) INSTALLING THIN-WALLED COLUMN SUPPORTS:
    Columns (posts) may be installed by driving the columns in accordance with this Index, or as an alternate method, the columns (posts) may be set to the depth indicated in the post and foundation table.

11) BREAKAWAY SUPPORTS REQUIREMENTS:
    Installation of steel column (post) (larger than 3½") with breakaway supports as shown on Sheet 5 of B.

12) QPL: Manufacturers seeking approval of alternate aluminum round tube, steel "H" = "A" + "B" + 1.5 + 12 = 436 5,886 13,208
    Condition 1, CK2, or SS4 may be provided in lieu of Aluminum Bolts, Nuts, and Washers.

WIND SPEEDS BY COUNTY:

110 MPH

110 MPH

Broward, Collier, Dade, Escambia, Indian River, Martin, Monroe, Palm Beach, Santa Rosa, and St. Lucie counties.

GUIDE TO USE THIS STANDARD:
1. Calculate the area and the centroid for an individual sign or a sign cluster. Note that the centroid and areas have been calculated for frequently used sign clusters. These are shown on Sheet No. 6, 7 & 8 of B.
2. Determine the height "H" from groundline for the individual sign or the cluster.
3. Select the appropriate Column (Post) Selection Tables by Wind Speed and find the intersection point.
4. Design the post and the foundation according to the data-bold lines or shaded area (if cantilever sign) in the Column (Post) Selection Tables and Post and Foundation Table.

EXAMPLE:

1. Determine the centroid and area for the individual sign or the cluster, as shown on Sheet 6, 7 & 8 of B.
2. Select the appropriate Column (Post) Selection Tables by Wind Speed, as shown on Sheet 8 of B.
3. Find the intersection point, which gives the appropriate column size and post and foundation details.

NOTES AND EXAMPLE:

- If Cantilever Sign configuration (see Cantilever Sign Details) falls in this region, use next larger post size than indicated.

COLUMN (POST) SELECTION TABLE (WIND SPEED = 130 MPH)

<table>
<thead>
<tr>
<th>Wind Speed (MPH)</th>
<th>Post Size</th>
<th>Area (Sq Ft)</th>
<th>Height (FT)</th>
<th>Width (FT)</th>
<th>Shear (PSI)</th>
<th>Torsion (Kip)</th>
<th>Moment (In LB FT)</th>
<th>Total Shear (PSI)</th>
<th>Total Torsion (Kip)</th>
<th>Total Moment (In LB FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>130 MPH</td>
<td></td>
<td></td>
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</tbody>
</table>

For Wind Speed = 130 MPH:
- Refer to the 130 MPH Column (Post) Selection Table, as copied from Sheet 8 of B and shown here.
- Using the "H" cell on the left hand side of the table, go across to the II ft height and find the column with "H".
- Find the symbol \[\pm\] which is the bold line under the "I" cell (fasteners) and in the column (Post) area on the right hand side of the table.
- In the Post and Foundation Table, the symbol \[\pm\] concludes that the design requires a 4" diameter and 2.25" thick Aluminum Column (Post) and a 0.5" diameter and 0.5" deep Concrete Foundation.
CALCULATION OF SIGN CLUSTER CENTROID

\[ y_i = \frac{Y_i \cdot A_i}{\sum A_i} \]

\[ y_n = \frac{Y_n \cdot A_n}{\sum A_n} \]

- \( y_i \): Centroid horizontal location of sign or cluster from \( \xi \) Column (post)
- \( y_n \): Centroid horizontal location of sign or cluster from centroid of \( \xi \) Column (post)
- \( Y_i \): Height of sign or cluster centroid from groundline
- \( Y_n \): Height of sign or cluster centroid from bottommost edge
- \( A_i \): Area of individual sign
- \( A_n \): Area of individual sign

For 'A' & 'B' see Index No. 17302 and roadway plans.

NOTE
No sign or sign cluster area shall exceed 20 SF nor shall any sign or sign cluster have a total horizontal dimension exceeding 48 inches.

CENTROID AND HEIGHT
### Aluminum Column (Post) Selection Table (Wind Speed = 110 MPH)

<table>
<thead>
<tr>
<th>TOTAL PANEL AREA (SF)</th>
<th>W (FT)</th>
<th>6.0</th>
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<th>11.0</th>
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### Aluminum Column (Post) Selection Table (Wind Speed = 130 MPH)

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### Aluminum Column (Post) Selection Table (Wind Speed = 150 MPH)

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### Note
- CANTILEVER SIGN configuration (see CANTILEVER SIGN Details) falls in this region, use next larger post size than that indicated.

### POST AND FOUNDATION TABLES

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<th>Post Size</th>
<th>Driven Post</th>
<th>Concrete Post</th>
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* See Note on Sheet 1 of 8.
SINGLE COLUMN GROUND SIGNS

BRACKET DETAIL

NOTES:
1. 3/8" Stainless Steel Hex Head Bolts with Flat Washer under Head and Lockwasher under Nut may be used in lieu of 3/8" Aluminum Button Head Bolts.
2. Nylon washers provided by the sheeting supplier shall be used on all ground mounted signs. The washers shall be installed under the sign bolt head to protect the sheeting.
3. Vertical spacing of brackets shall not exceed 2'-6". Use additional brackets, spaced evenly, to maintain maximum spacing.

VIEW A-A

SIGNS BACK-TO-BACK

NOTE:
Place largest sign on top. Use the area and the centroid location of the largest sign to determine column (post) size.

SIGNS AT 90°

CONNECTION AND WIND BEAM

STOP

YIELD

RECTANGLE

DIAMOND

RAILROAD

SCHOOL

SHIELD

COUNTY

NOTE:
Use the area and the centroid location of the largest sign to determine column (post) size.
SLIP BASE NOTES:
1. Use sleeves with an inside diameter (I.D.) no more than \(1\frac{1}{8}\)" larger than the outside diameter (O.D.) of the column.
2. Sleeve Bolts: ASTM A307, \(\frac{5}{8}\)" galvanized steelbolts (with lock nuts) or Alloy 2024-T3 or 6061-T6 (ASTM B-211).
3. Base bolts, nuts, and washers: high strength ASTM A4-325 with ASTM B633 SC-3, Type II electroplated zinc coating.
4. Base plates may have either single or double beveled slots.
5. An alternate cast base plate of aluminum 356 and T6 temper in lieu of the fabricated base plate may be submitted for approval.
6. Assemble the slip base connection in the following manner:
   a. Connect column to sleeve using two \(\frac{5}{8}\)" \(\times\) \(\frac{5}{8}\)" machine bolts.
   b. Assemble top base plate to stub base plate using high strength bolts with three hardened washers per bolt. One of the three washers per bolt and two bolt keeper plates go between the base plates.
   c. Use shim stock as required to plumb the column.
   d. Tighten bolts one turn and using a calibrated wrench retighten to the prescribed torque (see table) under the supervision of the Project Engineer.
   e. Loosen each bolt one turn and using a center punch to prevent nut loosening.
7. Use galvanized steelshims to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the \(\frac{5}{8}\)"-\(\frac{5}{8}\)" sleeve bolts. Use shims that are 1" shorter than the height of the sleeve.
8. Both fabricated and cast base assemblies were impact tested by the Texas Transportation Institute, College Station, TX on February 10, 2003, and both alternate assemblies were determined to be compliant with the performance recommendations of the National Cooperative Highway Research Program (NCHRP) report 350.

START DETAILS:

SLIP BASE AND FOOTING DETAIL
(non-frangible post in crossovers, medians, & sidewalks)

SLIP BASE DETAILS

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<tr>
<th>Column Size</th>
<th>Sleeve Size</th>
<th>Sleeve Height</th>
<th>Weld</th>
<th>Base Plate</th>
<th>Radius</th>
<th>Base Bolt</th>
<th>Base Plate Torque</th>
<th>Hole</th>
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<td>(\frac{5}{8})</td>
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Note: Unless noted otherwise, all dimensions are in inches.

BASE AND FOUNDATION DETAILS
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<th>Centroid</th>
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<td>6.31 SF 1.75 Ft.</td>
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<td>57.48 SF</td>
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<td>13.62 SF</td>
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<td>30x36</td>
<td>7.46 SF</td>
<td>22.38 SF</td>
<td>1.75 Ft.</td>
</tr>
<tr>
<td>30x30</td>
<td>5.18 SF</td>
<td>15.54 SF</td>
<td>2.10 Ft.</td>
</tr>
<tr>
<td>24x24</td>
<td>3.12 SF</td>
<td>57.48 SF</td>
<td>5.46 SF 1.16 Ft.</td>
</tr>
<tr>
<td>24x12</td>
<td>3.00 SF</td>
<td>10.80 SF</td>
<td>2.10 Ft.</td>
</tr>
<tr>
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<td>15.54 SF</td>
<td>2.10 Ft.</td>
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<td>75.00 SF</td>
<td>3.10 Ft.</td>
</tr>
<tr>
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<td>5.00 SF</td>
<td>30.00 SF</td>
<td>1.00 Ft.</td>
</tr>
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<td>1.75 Ft.</td>
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<td>13.62 SF</td>
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</tr>
<tr>
<td>30x12</td>
<td>5.00 SF</td>
<td>30.00 SF</td>
<td>1.00 Ft.</td>
</tr>
</tbody>
</table>
NOTE: Exit numbering panels shall be located to the right side for right exit and to the left for left exit.

Mounting of Exit Numbering Panels To Highway Signs

ELEVATION

- Bolt Sign to Post using 5/8" Ø Aluminum Flat Head Bolts, Nuts and Lock Washers (Typ.)
- 12" Max Spacing

\( \text{Spacing: } 1.75 \times 1.75 \times 1.08 \)
\( \text{Mounting: } 2.69 \times 2.33 \)

GENERAL NOTES


SHEETS AND PLATES: Material used shall meet the requirements of Aluminum Association Alloy 6061-T6 and ASTM B209. Sheets are to be degreased, etched, neutralized and treated with Aodine 1200, Iridite 14-2, Bonderite 721, or equal. No stenciling permitted on sheets.

MATERIALS: All aluminum materials shall meet the requirements of the Aluminum Association Alloy 6061-T6 and also the following ASTM specifications for the following: Sheets and plates 8209; extruded shapes 8221 and standard structural shapes 8308.

ALUMINUM BOLTS, NUTS & LOCK WASHERS: Aluminum bolts shall meet the requirements of the Aluminum Association Alloy 2024-T4 (ASTM F468). The bolts shall have an anodic coating of at least 0.0002" thick and be chromate sealed. Lockwashers shall meet the requirement of Aluminum Association Alloy 7075-T6 (ASTM B221). Nuts shall meet the requirement of Aluminum Association Alloy 6262-T9 (ASTM F467) or 6061-T6.

SIGN FACE: All sign face corners shall be rounded. See sign layout sheet for dimension "L" and sign face details. For mounting details refer to Index No. 11300.
CASE I
For Use On Freeway And Expressway Systems For Signs On Mainline.

CASE II
For Use On All-Rural Roads And On Freeway And Expressway Ramps.

CASE III
For Use On All-Rural Roads With Signs Mounted Behind Sidewalk.

CASE IV (MERGE SIGN)
For Use On All-Rural, Freeway And Expressway Systems.

CASE V
For Use In Business Or Residential Areas Only.

CASE VI
For Use On All-Roadways With Signs Behind Guardrail.

CASE VII (REST AREA & EXIT GORE SIGNS)
For Use On All-Freeway And Expressway Systems

CASE VIII
Sign On Island

CASE IX (MILE POST MARKER)

GENERAL NOTES:
1. The typical sections shown herein serve as a guide for locating the traffic signs required under various roadside conditions. For sign and details of sign construction and footing, refer to the appropriate standard index drawing for roadside sign.
2. It shall be the CONTRACTOR'S responsibility to verify the length of sign supports in the field prior to fabrication.
3. Ground signs shall be installed at an angle of 1 to 4 degrees away from the traffic flow (see illustration). Shoulder mounted signs shall be rotated counterclockwise and median mounted signs rotated clockwise. Signs on curves shall be mounted as noted above from the perpendicular to the motorist line of sight.
4. The setback for stop and yield signs may be reduced to 3' minimum from the driving line if required for visibility in business or residential sections with no curb and speeds of 30 MPH or less.
5. The mounting heights are measured from the bottom of the sign plate to a horizontal line extended from the edge of the driving lane. If the standard heights cannot be met, the minimum heights are as follows:
   - Expressway & Freeway Systems: 7'
   - Other Roadway Systems:
     - Rural: 5'
     - Urban (including residential with parking and/or pedestrian activity): 7'
   If a secondary sign is mounted below the major sign, the major sign shall be at least 5' and the secondary sign at least 5' for expressway & freeway systems and for other systems the height to the secondary sign shall be at least 5' for rural and 7' for urban sections.
6. Sign supports should never be placed in the bottom of ditches where erosion might affect the proper operation of the breakaway feature.
7. Sign supports shall not reduce the accessible route/continuous passage to less than 4 min clear width, as required by the Americans with Disabilities Act (ADA) Accessibility Guidelines.

For Median Installation:
If Median Width Does Not Allow Std. Offset From Both Roadways, Center Sign In Median.

CASE VII (REST AREA & EXIT GORE SIGNS)
For Use On All-Freeway And Expressway Systems.

Mainline Driving Lone
14 Min. 6 Min. 2 Min.

Driving Lane
Center Sign Column On Island

Min.
Driving Lane

Ramp

Min.
Driving Lane

Min.
Gutter Sidewalk

Curb & Gutter Sidewalk

R/W

Ramp

Mainline Driving Lane

For Media Installation:
If Median Width Does Not Allow Std. Offset From Both Roadways, Center Sign In Median.

CASE IX (MILE POST MARKER)

GENERAL NOTES:
1. The typical sections shown herein serve as a guide for locating the traffic signs required under various roadside conditions. For sign and details of sign construction and footing, refer to the appropriate standard index drawing for roadside sign.
2. It shall be the CONTRACTOR'S responsibility to verify the length of sign supports in the field prior to fabrication.
3. Ground signs shall be installed at an angle of 1 to 4 degrees away from the traffic flow (see illustration). Shoulder mounted signs shall be rotated counterclockwise and median mounted signs rotated clockwise. Signs on curves shall be mounted as noted above from the perpendicular to the motorist line of sight.
4. The setback for stop and yield signs may be reduced to 3' minimum from the driving line if required for visibility in business or residential sections with no curb and speeds of 30 MPH or less.
5. The mounting heights are measured from the bottom of the sign plate to a horizontal line extended from the edge of the driving lane. If the standard heights cannot be met, the minimum heights are as follows:
   - Expressway & Freeway Systems: 7'
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     - Rural: 5'
     - Urban (including residential with parking and/or pedestrian activity): 7'
   If a secondary sign is mounted below the major sign, the major sign shall be at least 5' and the secondary sign at least 5' for expressway & freeway systems and for other systems the height to the secondary sign shall be at least 5' for rural and 7' for urban sections.
6. Sign supports should never be placed in the bottom of ditches where erosion might affect the proper operation of the breakaway feature.
7. Sign supports shall not reduce the accessible route/continuous passage to less than 4 min clear width, as required by the Americans with Disabilities Act (ADA) Accessibility Guidelines.

For Median Installation:
If Median Width Does Not Allow Std. Offset From Both Roadways, Center Sign In Median.

CASE IX (MILE POST MARKER)

GENERAL NOTES:
1. The typical sections shown herein serve as a guide for locating the traffic signs required under various roadside conditions. For sign and details of sign construction and footing, refer to the appropriate standard index drawing for roadside sign.
2. It shall be the CONTRACTOR'S responsibility to verify the length of sign supports in the field prior to fabrication.
3. Ground signs shall be installed at an angle of 1 to 4 degrees away from the traffic flow (see illustration). Shoulder mounted signs shall be rotated counterclockwise and median mounted signs rotated clockwise. Signs on curves shall be mounted as noted above from the perpendicular to the motorist line of sight.
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   - Expressway & Freeway Systems: 7'
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   If a secondary sign is mounted below the major sign, the major sign shall be at least 5' and the secondary sign at least 5' for expressway & freeway systems and for other systems the height to the secondary sign shall be at least 5' for rural and 7' for urban sections.
6. Sign supports should never be placed in the bottom of ditches where erosion might affect the proper operation of the breakaway feature.
7. Sign supports shall not reduce the accessible route/continuous passage to less than 4 min clear width, as required by the Americans with Disabilities Act (ADA) Accessibility Guidelines.

For Median Installation:
If Median Width Does Not Allow Std. Offset From Both Roadways, Center Sign In Median.
No Right Turn On Red" Signs may be erected as deemed necessary by the local traffic engineers.

Note:

School crosswalk widths at intersections shall be 6' minimum, 10' standard without public sidewalk curb ramps, 12' minimum with public sidewalk curb ramps.

For additional marking information, see Index 17346, Sheet 2.

Notes:

Signs shall be erected in accordance with Index No. 17302.

When computing pavement markings quantities do not include transverse lines.
6. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK WITHOUT A SPEED REDUCTION (2 LANE-2 WAY TRAFFIC)

7. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS (4 LANES DIVIDED-2 WAY TRAFFIC)

8. TRAFFIC CONTROL DEVICES FOR SIGNALIZED MIDBLOCK SCHOOL CROSSWALK

---

**Approach Speed MPH**

<table>
<thead>
<tr>
<th>Speed Range</th>
<th>Minimum Distance</th>
<th>Maximum Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 or Less</td>
<td>200'</td>
<td>10'</td>
</tr>
<tr>
<td>26 To 35</td>
<td>250'</td>
<td>100'</td>
</tr>
<tr>
<td>36 To 45</td>
<td>300'</td>
<td>200'</td>
</tr>
<tr>
<td>46 To 55</td>
<td>350'</td>
<td>125'</td>
</tr>
</tbody>
</table>

---

**SCHOOL CROSSWALK**

10' standard without public sidewalk curb ramps.
10' minimum with public sidewalk curb ramps.
Midblock crosswalk shall be a minimum of 10'.

See Index No. 17344, Sheet 7.
9. TRAFFIC CONTROL DEVICES AT SCHOOL ENTRANCES WITH LOW VOLUMES OF WALKING STUDENTS

These signs are intended for use only at those few locations where the school entrance is not evident to the motorist, and must be approved in advance by the responsible traffic engineering authority.

10. TRAFFIC CONTROL DEVICES FOR A TYPICAL SCHOOL ZONE FRONTING THE SCHOOL PROPERTY

Note:
The school bus stop ahead sign is to be used in advance of locations where a school bus, when stopped to pick up or discharge passengers, is not visible for a distance of 500' in advance. It shall have a min. sign of 30' x 30'. It is not intended that these signs be used whenever a school bus stops to pick up or discharge passengers. These signs are intended for use only where terrain and roadway features limit the approach sight distance and where there is no opportunity to relocate the stop to another location with adequate visibility.

Location of School Speed Limit Sign when a reduced speed limit has been approved.

Note:
Roll-out school signs shall not be utilized to control traffic through an established school zone.
**FRONT VIEW**

- 12" Signal Head (Yellow Lens)

**SIDE VIEW**

- Flashing beacon may be placed within or below panel

**REAR VIEW**

- Catenary Wire
- Signal Head
- Lock Nut
- Wire Rope Clamp
- 1/4" Bolts For Mounting Sign
- 1/4" Flexible Conduit Or 90° Angle Connector
- 3/8" Wire Rope Clamp

**MOUNTING DETAIL**

- 1/4" Aluminum Round Head Bolts with Nuts and Lockwashers, bolts shall be spaced @ 12" centers max.

**CABLE ENTRY DETAIL**

- See Cable Entry Details

**NOTE**

- Flashing beacon may be placed within or below panel

- Optional Location Of Flashing Beacon

**FLASHING BEACON UNIT**

- Flashing beacon may be placed within or below panel

- Optional Location Of Flashing Beacon

**SIDE VIEW**

- Flashing beacon may be placed within or below panel

- Optional Location Of Flashing Beacon
Notes:

1. Standard size signs should be used whenever possible. Minimum sizes may be used only on low volume, low speed (less than 35 mph) streets. Special sizes should be used on expressway facilities where special emphasis is needed.

2. The value of the actual school zone speed limit shall be determined by the District Traffic Operations Engineer in cooperation with local school superintendents. In no case shall it be less than the 15 mph min. as set by law.

3. See Index No. 17355 for sign details.

4. When fluorescent yellow-green background color is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow green background within a zone or area should be avoided.

Note:
Existing ground mount school speed limit signs utilizing a single 8" min. size beacon or two 6" min. size beacons inside the sign border are considered meeting the standard. However, replacement or upgrading of these school speed limit signs shall conform to the above standard. Numerical speed limit displayed shall be established by appropriate regulatory authorities.
**NOTE**

6" Yellow
White-Red reflective
Pavement Markers
Shall Begin at the Transition.

**DETAIL A**

For RPM Location Refer To Index 17345.

**NORMAL TAPERED EXIT**

(TWO THRU LANES)

NOTE:

Reflective pavement markers are installed adjacent to the edge line.

**DETAIL B**

Yellow-Red Reflective
Markers Every 40'.
Notes:
1. Post delineators spaced at 40' on curves of the entrance and exit of ramps. The spacing on the tangent portion of the ramp section shall be 300'. All delineators are to be setback 4' from shoulder break. Post delineators should not be discontinued in sections with guardrail.

2. "For signalized interchanges, the wrong-way pavement arrows shall be deleted which would be located in an area from the slope line to 30 before the lane-use arrow. Wrong way arrows located outside this area shall be installed."
Use Stop Bar At Signalized Intersection Only

White For Crosswalk

50' Min 75' Min 50'

6" White 6" White

6" Dbl Yellow 6" Dbl Yellow

50' Max. Intervals Between Double Arrows
For use in congested urban areas where available storage length between intersections is limited and a permanent point of transition from the two-way turning lane to the exclusive turning lane cannot be determined.

6" Yellow Skip

6" Yellow Solid

Min. 75'

25'

24" White

6" White

6" Dbl Yellow

Radius Point

12' 10'

25'

6" Yellow

10'

30'

6" White

SPECIAL MARKING AREAS

12" White For Crosswalk

12" White For Crosswalk

12" White For Crosswalk

12" White For Crosswalk

TYPICAL CROSSWALK MARKINGS FOR CURB RAMPS

(With Single Lane Left Turn Channelization)

Two Way Left Turn Lane

SCHEME ONE

For use in rural & suburban areas where an adequate storage lane length can be specifically determined.

500' Max. Intervals Between Double Arrows

SCHEME TWO

2008 FDOT Design Standards

Sheet No. 2 of 14

Index No. 17346
These markings may be used for locations with restricted left turn lengths, only when called for on plans.

Minimum by Laws

$W = \frac{W_0}{.85} \leq 45 \text{ mph}$ where

$W$ is the lateral offset in feet and

$.85$ is the 85th percentile speed in miles per hour (speed limit)

For left turn storage lane detail see sheet 2 of 13 of this index.

These markings may be used for locations with restricted left turn lengths, only when called for in plans.

These markings may be used for locations with restricted left turn lengths, only when called for in plans.

STOP BARS, CROSSWALKS AND DOUBLE CENTER LINE DETAILS

NOTES:

1. When public sidewalk curb ramps are present, refer to Index 17346 and Index No. 304 for crosswalk widths.

2. Double yellow longitudinal center lines on all roadway approaches shall be extended back 100' for projects involving intersection improvements only.

3. When specified, "stop" message shall be placed 25' back of stop lines.
NOSE WIDTHS UNDER 30'

Nose Width

6" White

24" White

STOP

R1-1

NOSE WIDTHS 30' AND GREATER

Nose Width

6" White

24" White

STOP

R1-1

FIGURE 1

ONE-WAY SIGNS ON DIVIDED HIGHWAY INTERSECTIONS

ONE WAY signs (R6-1) are not ordinarily needed at divided highway intersections with nose widths of less than 30', and should be installed only if specifically called for in the plans.

FIGURE 2

ONE-WAY SIGNS ON DIVIDED HIGHWAY INTERSECTIONS

PAVEMENT MARKINGS FOR TRAFFIC SEPARATION AT GORE

(TRAFFIC FLOWS IN OPPOSING DIRECTIONS)

PAVEMENT MARKINGS FOR TRAFFIC CHANNELIZATION AT GORE

(TRAFFIC FLOWS IN SAME DIRECTION)

SAFETY_346

3006 FDOT Design Standards

SPECIAL MARKING AREAS

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4 of 14

17346
**TYPICAL TRANSITION MARKING**
**COLOR SHALL BE THE SAME AS RESPECTIVE EDGE LINE**

*Design Speed*

<table>
<thead>
<tr>
<th>Speed (MPH)</th>
<th>6' White Edge Line</th>
<th>Design Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>60</td>
<td>70</td>
<td>90</td>
</tr>
</tbody>
</table>

**Lateral offset**

<table>
<thead>
<tr>
<th>Lateral offset (FT.)</th>
<th>Design Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
</tbody>
</table>

White Delineators Shall Be Used Throughout The Transition Where 85th Percentile Approach Speeds Are Greater Than 50 mph.

**LEFT ROADWAY CENTERED ON EXISTING ROADWAY**

**RIGHT ROADWAY CENTERED ON EXISTING ROADWAY**

**SCHEMES FOR TRANSITION - 2 LANE / 4 LANE ROADWAY**

*SPECIAL MARKING AREAS*
NOTES:
1. Messages shall meet requirements of Specification Section 971-7 and Section TII.
2. The thickness of the preformed message shall be 125 mils.
3. The message shall consist of white letters and numbers with black contrasting material. The black material shall meet the mat dimensions shown and have a minimum skid resistance value of 55 BPN.
4. The "EXIT NUMBER" position remains the same (117'-8") from the beginning of taper regardless of the number of lines of information.
1. When computing pavement messages, quantities do not include transverse lines.

2. When dynamic devices are not present or are to be installed, the crossbuck shall be located at the future location of the RR gate or signal and gate in accordance with Index No. 17882.

3. Placement of sign WJ0-1 in a residential or business district, where low speeds are prevalent, the WJ0-1 sign may be placed a minimum distance of 100' from the crossing. Where street intersections occur between the RR pavement message and the tracks an additional WJ0-1 sign & additional pavement message should be used.

4. Recommended location for FTP-61 or FTP-62 sign, 100' urban & 300' rural in advance of the crossings.

5. A portion of the pavement marking symbol should be directly opposite the WJ0-1 sign.
Yield Lines: 5'-18" X 27" White triangles facing traffic equally spaced within travel lane with 1 additional triangle using same spacing when a bike lane is present.

SPECIAL EMPHASIS CROSSWALK
YIELD MARKINGS

SIGNALIZED OR STOP SIGN CONTROLLED INTERSECTION

SPECIAL EMPHASIS CROSSWALK
MIDBLOCK-SIGNALIZED

PUBLIC SIDEWALK CURB RAMP

SPECIAL MARKING AREAS

GENERAL NOTES
1. For traffic and pedestrian signal installation, refer to Index No. 17721 through 17990.
2. For public sidewalk curb ramps, refer to Index No. 304.
3. For pavement marking and sign installation, refer to Indexes 11200 through 17356.
4. Crosswalk minimum widths: Intersection Crosswalk 6'. Midblock Crosswalk 10'.

NOTE 4 FOR MINIMUM WIDTHS

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APPENDIX SPEED LIMIT SUGGESTED DISTANCE (FT)

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>Distance (ft)</th>
</tr>
</thead>
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<tr>
<td>25 or less</td>
<td>200</td>
</tr>
<tr>
<td>26 to 35</td>
<td>250</td>
</tr>
<tr>
<td>36 to 45</td>
<td>300</td>
</tr>
<tr>
<td>46 to 55</td>
<td>325</td>
</tr>
</tbody>
</table>
**SINGLE LEFT TURNS**

Queue Length is measured from the median nose radial point or, when a stop bar is required, from the stop bar.

**DOUBLE LEFT TURNS**

The only pavement message is required for turn lanes, where the thru lane becomes turn lane.

**Through Lane Becomes Exclusive Left Turn**

**Through Lane Becomes Optional Left Turn**

---

**Notes:**

1. The "Begin Lane Line" locations are based on the standard lengths shown in Design Standard 301. These locations must be adjusted on a case-by-case basis for turn lanes not meeting the standard lengths.

2. Yellow left turn edge marking may be used adjacent to raised curb or gross medians if lane use is not readily apparent to drivers approaching a left turn storage lane.

3. Refer to Design Standard Index 301 for roadway details.

4. This index also applies to right turn lanes.

---

**Arrow Spacing**

Arrow should be evenly spaced between first and last arrow. Turn lanes longer than 200' add one arrow for each 100' additional length.
1. Recommended spacing of symbols: Immediately after intersections and major driveways and at a maximum spacing of 600 feet for urban sections and 1320 feet for rural sections.

2. Raised pavement markings and raised barriers can cause steering difficulties and should not be used to delineate bicycle lanes. All pavement markings and pavement messages shall be white.

3. When used on a bike lane (adjacent to vehicle lane) markings shall be placed adjacent to markings for vehicles & W20-1 sign shall be sized and placed for vehicles.

DETAIL OF BIKE LANE MARKINGS
**Public Sidewalk Curb Ramp**

**Sign No FTP-21-06 and FTP-22-06**

3x6' white chevrons equally spaced per aisle.

**6' White**

**Sign No FTP-21-06 and FTP-22-06**

1. **Dedicated Accessible Parking Spaces**
   - Minimum parking spaces are 26' wide.
   - Parking spaces shall be marked with a universal symbol of accessibility.

2. **Additional Requirements**
   - Parking spaces shall be 8' in depth.
   - The minimum parking space for signalized intersections is 200'.
   - Parking spaces shall be marked with a universal symbol of accessibility.

**MINIMUM PARKING RESTRICTION FOR SIGNALIZED INTERSECTIONS**

<table>
<thead>
<tr>
<th>SPEED LIMIT</th>
<th>0-30</th>
<th>30'</th>
<th>35</th>
<th>50'</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINIMUM RADIUS (Y)</td>
<td>20°</td>
<td>30°</td>
<td>45°</td>
<td>60°</td>
</tr>
<tr>
<td>DISTANCE FROM CURB (Y)</td>
<td>0</td>
<td>35</td>
<td>50'</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. Distances measured longitudinally along the street from driver location of entering vehicle to end of parking restriction.
2. Distances applicable to intersecting street, major driveways and other driveways to the extent practical.
3. For nonsignalized intersections, the values above shall be compared with the values for signalized intersections and the maximum restrictions implemented. These restrictions apply to both accessible and nonaccessible parking.

**MINIMUM PARKING RESTRICTION FOR NONSIGNALIZED INTERSECTIONS**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Use of pavement symbol in accessible parking spaces is optional when used the symbol shall be 3' or 5' high and white in color.</td>
</tr>
<tr>
<td>II</td>
<td>Use of pavement symbol is optional.</td>
</tr>
<tr>
<td>III</td>
<td>Use of pavement symbol is optional.</td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

1. For entrances to a one-way street, the downstream restriction may be reduced to 20'.
2. Parking shall be allowed within 20' of a crosswalk.
3. All parking lane markings shall be 6' wide.
4. Parking lane lines shall be broken at driveways.
5. Refer to Chapter 316, Pa. Statutes, for laws governing parking spaces.
6. Where curb and gutter is used, the gutter pan width may be included as part of the minimum width at parking lane, but desirably the lane width should be in addition to that of the gutter pan.

**PAVEMENT MARKING FOR PUBLIC SIDEWALK CURB RAMPS IN REST AREAS**

**SPECIAL MARKING AREAS (PARKING)**

**PARKING RESTRICTION (FT.) FOR SIGNALIZED INTERSECTION**

**UNIVERSAL SYMBOL OF ACCESSIBILITY**

**INDEX**

<table>
<thead>
<tr>
<th>No.</th>
<th>17346</th>
</tr>
</thead>
</table>

**FOR ACCESSIBLE MARKINGS — SEE ABOVE**

**DIMENSIONS**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
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<tbody>
<tr>
<td>85.6</td>
<td>18.9</td>
<td>12.5</td>
<td>8.5</td>
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<td>65.6</td>
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<td>10.5</td>
<td>6.5</td>
<td>5.0</td>
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<tr>
<td>45.6</td>
<td>22.4</td>
<td>12.5</td>
<td>8.5</td>
<td>7.0</td>
</tr>
<tr>
<td>25.6</td>
<td>24.4</td>
<td>14.5</td>
<td>10.5</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**NOTES**

1. Dimensions are to the centerline of markings.
2. An Accessible space is required for each accessible space when angle parking is used.
3. Criteria for pavement markings only, not public sidewalk curb ramp locations.
4. Blue pavement markings shall be marked to match shade 15180 of Federal Standards 595a.
5. The FTP-22-06 panel shall be mounted below the FTP-21-06 sign.

**PAVEMENT MARKING FOR PUBLIC SIDEWALK CURB RAMPS IN REST AREAS**

**GENERAL NOTES** (Signalized & Nonsignalized)

1. For entrance to a one-way street, the downstream restriction may be reduced to 20'.
2. Parking shall be allowed within 20' of a crosswalk.
3. All parking lane markings shall be 6' wide.
4. Parking lane lines shall be broken at driveways.
5. Refer to Chapter 316, Pa. Statutes, for laws governing parking spaces.
6. Where curb and gutter is used, the gutter pan width may be included as part of the minimum width at parking lane, but desirably the lane width should be in addition to that of the gutter pan.

**MINIMUM PARKING RESTRICTION FOR SIGNALIZED INTERSECTION**

1. Parking restrictions measured from curb radius point.
2. Restrictions for accessible parking are the same as those applied to nonsignalized intersections.

**MINIMUM PARKING RESTRICTION FOR NONSIGNALIZED INTERSECTION**

1. Distances measured longitudinally along the street from driver location of entering vehicle to end of parking restriction.
2. Distances applicable to intersecting street, major driveways and other driveways to the extent practical.
3. For nonsignalized intersections, the values above shall be compared with the values for signalized intersections and the maximum restrictions implemented. These restrictions apply to both accessible and nonaccessible parking.
"TEE" INTERSECTION WITH SEPARATE RIGHT TURN LANE URBAN TYPICAL SECTION (CURB & GUTTER)

"TEE" INTERSECTION WITH RIGHT TURN DROP LANE URBAN TYPICAL SECTION (CURB & GUTTER)

INTERCHANGE RAMPS RURAL TYPICAL SECTION (PAVED SHOULDER)
CASE I  Type 1 Object Markers shall consist of nine yellow reflectors mounted on a yellow reflective background or consist of a reflective panel the same size with Type III-A, III-B or III-C yellow sheeting.

CASE II  End of Road Markers shall consist of nine red reflectors mounted on a red reflective background or consist of a reflective panel of the same size with Type III-A, III-B or III-C red sheeting.

NOTES
1. This index applicable to residential and minor streets only. Major streets to be evaluated on a case by case basis.
2. "T"-Intersection—Two-Way arrows and reflectors are optional. The need should be based on a review of each location.
3. For additional details on aluminum round post, steel flanged channel post, sign panel materials and bolts, nuts and washers see Index Nos. 11860 and 11865.
4. Case I Installation—The arrow panels and object markers shall be located approximately 20 ft., but not less than 12 ft from the edge of the travel lane.
5. Dead end sign shall be posted a sufficient advance distance to permit the vehicle operator to avoid the dead end by turning off, if possible, at the nearest intersecting street.
6. For pavement marking see index no. 17346
7. No guardrails required unless special field conditions require their use.

Case I Installation—The arrow panels and object markers shall be located approximately 20 ft., but not less than 12 ft from the edge of the travel lane.

Dead end sign shall be posted a sufficient advance distance to permit the vehicle operator to avoid the dead end by turning off, if possible, at the nearest intersecting street.

For pavement marking see index no. 17346

No guardrails required unless special field conditions require their use.
** Note:
Two assemblies are required: one for each side of the ramp, showing those services in each particular direction from the ramp terminal.
Ramp mounted signs shall be installed to avoid conflict with existing signs and in no case should they be placed within 100' of another sign.

One Post Service Signs See Detail "D"

Proposed Guide Sign
See Detail "B" Or "C"

Proposed Supplemental Guide Sign
See Detail "A"

** Note:
Two assemblies are required: one for each side of the ramp, showing those services in each particular direction from the ramp terminal.
Ramp mounted signs shall be installed to avoid conflict with existing signs and in no case should they be placed within 100' of another sign.

One Post Service Signs See Detail "D"

Proposed Guide Sign
See Detail "B" Or "C"

Proposed Supplemental Guide Sign
See Detail "A"

GENERAL NOTES
1. Only those services meeting criteria established by the Department and approved by the State Traffic Operations Engineer for each interchange shall be shown. Symbol signs for motorist services shall always appear in the following order reading from left to right and top to bottom: Gas, Food, Lodging, Phone, Hospital, Camping.
2. Symbols shall appear consecutively on the sign with no positions left blank or reserved for intermediate symbols not currently approved for a particular interchange.
3. All motorist service signs to have White Legend and Border with Blue Background.
4. For mounting details see Index 11200 for Type "B" breakaway or Index 11660 for Type "C" Frangibility.

NOTE
When approved for attachment to the advance guide signs, up to 3 services may be used for an exit. The symbol signs shall be suspended from the guide sign panel or existing wind beams. Symbol signs are not to be connected to existing sign posts. The mounting height of the advance guide sign shall be increased, where necessary, to provide 8' between the level of the pavement edge and the bottom of the guide sign, prior to mounting the supplementary panel.
Sign No. FTP-10-06

Sign No. FTP-11-06

Sign No. FTP-12-06

Sign No. FTP-13-06

Note: Sign FTP-14-06 shall be used as a supplemental/guide sign at interchanges which have a Tourist Information Center approved for such signing (locate half-way between normal guide signs)

Notes:
1. Signs and sign structures shall be erected in accordance with the details shown on Index No. 11200.
2. Sign FTP-11-06 shall be located on the Welcome Center grounds in proximity to the building and as far from the main line roadway as possible (2 signs back to back).
3. Sign FTP-10-06, 11-06, 12-06 shall be located as limited access highways only.
4. All legend to be Series E.
5. See Index No. 17355 for sign details.

For Limited Access Highways

2008 FDOT Design Standards

WELCOME CENTER SIGNING
STATE OF FLORIDA
WELCOME CENTER
1 MILE

STATE OF FLORIDA
OFFICIAL
WELCOME CENTER

MILE

NOTES:
1. Signs and sign structures shall be erected in accordance with the details shown on Index 11200.
2. Sign FTP-12-06 shall be located on the Welcome Center grounds in proximity to the building and as far from the Main Line Roadway as possible (2 signs back to back).
3. All legend to be Series E.
4. One sign FTP-15A-06 or FTP-06 should be used depending on speed, roadside development & geometric conditions.

FOR PRIMARY HIGHWAYS
1. Reflective Pavement Markers shall be spaced at 40' on all skip lane lines and skip center lines. This spacing may be reduced to 20' if specifically called for in the plans.

2. The spacing on solid lines and solid/skip combination lines shall be 40'.

3. RPM's shall be offset 1" from solid lines.

4. These spacings may be reduced for sharp curves if required.

5. RPM's shall be class "B".
NOTE
Raised pavement markers shall be set 2" from line.

RPM PLACEMENT FOR TRAFFIC CHANNELIZATION AT GORE (TRAFFIC FLOWS IN SAME DIRECTION)

NOTE
Raised pavement markers (Bidirectional White/Red) should be used in all gores of this type.

RPM PLACEMENT FOR TRAFFIC SEPARATION (TRAFFIC FLOWS IN OPPOSITE DIRECTION)

PLACEMENT OF RPM'S ON SHOULDER MARKINGS

For Left Side Of Roadway The Plan Is Opposite Hand And Markings Shall Be Yellow.
For Placement Of RPM's On Ramps See Index 17345.

PLACEMENT OF RPM'S AT INTERSECTIONS

Reflective Pavement Markers To Be Bidirectional Yellow.
### 3 or 4 DIGITS

**INDEPENDENT USE OTHER THAN FREEWAY**

<table>
<thead>
<tr>
<th>DIGITS</th>
<th>NUMERAL SIZE</th>
<th>SERIES PANEL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>10&quot;</td>
<td>D 24&quot; x 24&quot;</td>
</tr>
<tr>
<td>3-4</td>
<td>8&quot;</td>
<td>D 24&quot; x 24&quot;</td>
</tr>
<tr>
<td>5 &amp; up</td>
<td>6&quot;</td>
<td>C 30&quot; x 24&quot;</td>
</tr>
</tbody>
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Note:
The 24" X 24" panel shall only be used for a 3 or 4 digit route when the panel is to be used on a sign cluster with other 24" X 24" panels.

### 3 OR MORE DIGITS

**GUIDE SIGN USE**

1. Florida marker shall have Black Legend with White Background.
2. Stroke width of State outline to be 1" for independent use and 2¼" for Guide Sign.
3. Numbers are series D.

**FLORIDA ROUTE MARKER**

**FTP-17-06**

### 4 DIGIT POST MOUNTED

<table>
<thead>
<tr>
<th>DIGITS</th>
<th>POST MOUNTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>8 10&quot; 4&quot; 7&quot;</td>
</tr>
<tr>
<td>4 Digit</td>
<td>8 10&quot; 4&quot; 7&quot;</td>
</tr>
</tbody>
</table>

### 2 DIGIT OVERHEAD

<table>
<thead>
<tr>
<th>DIGITS</th>
<th>OVERHEAD</th>
</tr>
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<tbody>
<tr>
<td>1-2</td>
<td>8 10&quot; 4&quot; 7&quot;</td>
</tr>
<tr>
<td>3 Digit</td>
<td>8 10&quot; 4&quot; 7&quot;</td>
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### 3 DIGIT OVERHEAD

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</tr>
<tr>
<td>4 Digit</td>
<td>8 10&quot; 4&quot; 7&quot;</td>
</tr>
</tbody>
</table>

**MI-6 COUNTY ROUTE MARKER DETAIL**

**FTP-18-06**
TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE

1. Bottom edge of signs shall be approximately at the same elevation.
2. Span wire installations that support only signs should be provided with a minimum panel weight of 7 PSF.
3. Type B & C attachments with one hanger shall have wind beams for signs wider than 3½'. The beams shall extend to within 6" of the sign edge.
4. Type B & C attachments for signs 4' and wider shall have 2 hangers. Signs 7' and wider shall have wind beams that extend to within 6" of the sign edge.
5. Type D attachments shall be for signs 3½' wide or less.
6. Sign panels shall meet the requirements of Index 1200.
7. Refer to section 6.14 of the Standard Specifications For Road And Bridge Construction.
8. All bolts, nuts, and washers shall be passivated stainless steel, 410/300 series, commercial grades, type 316.

The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing between bolts of 2".

ADJUSTABLE HANGER FOR SIGN MOUNTING

DETAIL OF OPPOSING SIGNS SPAN WIRE MOUNTED

SPAN WIRE MOUNTED SIGN DETAILS

2006 FDOT Design Standards

3-5' Min. Clearance

10' Min. Clearance

See Index 17356 1 of 2 for pole attachment.
**TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE**

1. **SIGN MOUNTING DETAIL**
   - 1/4" Stainless steel round head bolts with nuts and lock washers. Bolts shall be spaced on 12" centers max.
   - See Index 17727 of 2 for pole attachment.

2. **SIGN MOUNTING DETAIL**
   - 3/8" Stainless steel bolts with nuts and lock washers. Bolts shall be spaced on 12" centers max.
   - In order to ease installation, Sign Face No. 2 should be installed after mounting to span wire.

3. **TYPICAL SPAN WIRE INSTALLATION**
   - The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing between bolts of 2".

4. **ADJUSTABLE HANGER FOR SIGN MOUNTING**
   - 1/4" Stainless steel round head bolts with nuts and lock washers.
   - Adjustable hanger for sign mounting.

**Notes:**
1. Bottom edge of signs shall be approximately at the same elevation.
2. Type B & C attachments with one hanger shall have wind beams for signs wider than 3 1/2'. The beams shall extend to within 6" of the sign edge.
3. Type B & C attachments for signs 4' and wider shall have 2 hangers. Signs 7' and wider shall have wind beams that extend to within 6" of the sign edge.
4. Type D attachments shall be for signs 5 1/2' wide or less.
5. Sign panels shall meet the requirements of Index 11200.
6. Refer to section 634 of the Standard Specifications For Road And Bridge Construction.
7. All bolts, nuts, and washers shall be passivated stainless steel, AISI 300 series, commercial grade, type 316.

**DETAIL OF OPPOSING SIGNS SPAN WIRE MOUNTED**

**ADJUSTABLE HANGER**

**TWO POINT ATTACHMENT**
SIGN LOCATIONS TYPICAL


2. Sign location No. 3 may require some field adjustment.

3. The Cross Road is the last detour to route around the restricted bridge.

4. Sign location No. 2 should be established from the Cross Road the following approximate distances: Interstate=1 Mile Non-Interstate=1/2 Mile.

5. See Index 17355 for sign details.
One-Way Traffic

2-Way Traffic
NOTES:

1. Bridges should be marked as narrow bridges under the following conditions:
   (1) For approach roadways with paved shoulders when the bridge width
       including shoulders is less than the width of the approach roadway
       including paved shoulders.
   (2) For approach roadways without paved shoulders when the bridge
       shoulder width is less than 2'.

2. Roadways with Two-Way Traffic:
   (1) No passing zone should be extended 15' in advance of narrow
       bridge.
   (2) The post mounted delineators shall be installed on both sides of the
       roadway (WHITE on RIGHT / YELLOW on LEFT). If the bridge or the
       approach is on a curve, the post mounted delineators shall be installed
       for a distance of 15' in advance of narrow bridge on the left side of
       the roadway.

3. Delineators on both sides of roadway shall face traffic approaching bridge.

4. Delineators to be placed not less than 2' or not more than 8' outside the
   outer edge of pavement.

5. The OM-3R & OM-3L mounting height shall be 4' above the roadway edge.
   The panels may be post mounted at the bridges.

6. Highway delineators consist of a reflector, or reflective sheeting. Install
   units listed on the Qualified Products List.
1. Use clean free draining sand less than 5" passing No. 200 sieve for base (4").

2. Welded wire fabric shall meet the requirements of ASTM A185.

3. Concrete shall be nonstructural with a minimum strength at 28 days of $f_{c} = 2.5$ ksi.

4. Outside edges of slab shall be cast against formwork.

5. The pull box shown is 1'-3" x 1'-3"; others approved under Section 635 of the Standard Specifications may be used.

6. Slabs to be placed around all poles and pullboxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.

7. Concrete slabs around poles and pullboxes shall be paid for under the contract unit price for Class I Concrete (Miscellaneous); the cost for reinforcing steel fabric shall be included in the price for Class I Concrete (Miscellaneous).

8. The 1/2" thick expansion joint between the pole shaft and slab and the pullbox and slab shall be sealed with a hot poured elastic joint sealer.
NOTES:
1. Use clean free draining sand less than 5% passing No. 200 sieve for base (4").
2. Welded wire fabric shall meet the requirements of ASTM A485.
3. Concrete shall be Nonstructural with a minimum strength of 28 days of f'c=2.5 ksi.
4. Outside edges of slab shall be cast against formwork.
5. The pullbox shown is 1'-3" x 1'-3"; others approved under Section 6.5.6 of the Standard Specifications may be used.
6. Slabs to be placed around poles and pullboxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
7. Concrete slabs around poles and pullboxes shall be paid for under the contract unit price for Class I Concrete (Macadamous); the cost for reinforcing steel fabric shall be included in the price for Class I Concrete (Macadamous).
8. The 1/2" thick expansion joint between the pole shaft and slab and the pullbox and slab shall be sealed with a hot poured elastic joint sealer.

SLAB DETAILS
FOR POLE AND PULL BOX LOCATIONS
1) Any damaged portions of galvanized steel poles and bracket arms shall be pointed in accordance with Section 562 of the Standard Specifications.

2) Poles and bracket arms shall be designed in accordance with the design criteria, as indicated in the plans and in the applicable equations found in the AASHTO 'Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals' and FDOT 501-05A 'Structures Manual. The calculations shall be based on the actual projected area of the luminaire or 3.0 square feet whichever is greater.

3) The luminaire manufacturer shall place a permanent tag on the luminaire housing on which is imprinted the following information: Wattage, ballast type, lamp shown on design plans, lamp setting (location of luminaire), TES light distribution.

4) Conduit shall be exothermically sleeved. This includes conduit sections adequate to take care of vibrations and thermal expansions. All conduit shall be grounded.

5) Neutral wires to have white insulation. Do not use white or green insulated wires for ungrounded conductors.

6) Any exposed or surfaced mounted conduit shall be rigid or intermediate metal. These exposed runs of conduit shall be provided with either expansion joints or flexible metal conduit sections adequate to take care of vibrations and thermal expansions. All metal conduit shall be grounded.

7) The luminaire manufacturer shall provide 2 sets of pullboxes to completely remove connectors to the outside of pullboxes.

8) Pullboxes shall be located at end of conduit running to make connectors accessible for changing fuses and troubleshooting the system.

9) The luminaire manufacturer shall meet the requirements of Section 635 of the 'Standard Specifications For Road And Bridge Construction' and Section 635 of the 'Minimum Specifications For Traffic Control Signals And Devices'.

10) The unit shall withstand a surge current up to 20,000 Amps, and repetitive surges of 200 Amps for a minimum of 20,000 occurrences.

11) The unit shall respond in less than 50 nanoseconds and within this time have a peak clamping voltage better than 1200 Vrms.

12) The maximum allowable voltage that can pass continuously through the hot leg of the protector must be less than 550 Vrms.

13) Surge protector specifications:

   1. The unit shall withstand a surge current up to 20,000 Amps, and repetitive surges of 200 Amps for a minimum of 20,000 occurrences.

   2. The unit shall respond in less than 50 nanoseconds and within this time have a peak clamping voltage better than 1200 Vrms.

   3. The maximum allowable voltage that can pass continuously through the hot leg of the protector must be less than 550 Vrms.

   4. The unit shall be insulated 480 V to ground and rated for 600 V.

   5. The unit shall not allow holdover current or conduct current to ground after the surge ends.

   6. Protection shall achieve for both the 480 V and neutral conductors with the surge being passed to ground and NGT to neutral.

   7. The unit shall not discharge in the protection of the 480 V conductor over the neutral conductor.

   8. Underwriters Laboratory approval not required.
LOWERING SYSTEM SPECIFICATIONS

The lowering system shall consist of the following:
A. Head frame and cover
B. Luminaire ring
C. Cables
D. Winch
E. Portable power unit (1 per project)

The head frame unit shall be attached to the pole at the head frame platform. The platform, with its associated sheaves, etc., shall be covered and rain tight. The head frame structure shall be zinc coated, steel, attached to the pole by means of a steel slip-in, head frame presentable from the ground. The head frame shall encompass six 6" nominal steel cable sleeves grooved to the exact cable diameter, for 300" cable hanging surface. The sheave shall be electroplated to ASTM 164A and dipped in yellow chromate for corrosion resistance. Bearings and cable keepers shall be zinc coated, permanent lubrication. Three (3) stainless steel 7 x 29 aircraft cables of \( \frac{5}{16} \) or greater diameter shall be provided.

The pole cable shall be attached to the luminaire ring with a waterproof connector capable of withstanding the pull of the weight of the pole cable. Where the wire ropes are required to bend over sheaves or over the winch drum, the maximum working stress in the outer fibers of the wire rope shall not exceed 20% of the wire rope manufacturer's rated ultimate stress.

Drum design shall cause wind velocity at wire rope. The power cord shall travel on sheave(s) or a combination of rollers providing a radius for the cord of 6" or larger. Each end of the sheave(s) or rollers shall have a keeper to prevent the cable from jamming out of the roller track.

The head frame shall also include three (3) latching devices to support the luminaire ring assembly when the lowering device is not in operation. The latches shall be actuated by alternate raising and lowering of the hoisting cables. Locking of luminaire ring shall be provided from the circuit breaker assembly. The receptacle on the pigtail shaft be of dead front construction. The receptacle shall have a push fitter. Head frame shall rigidly mate the top away from the ends of the drum for spooling. The drum shall have a wire guard to prevent the cable from coming off.

The winch shall be mounted in such a way that the cable terminator and the riser cable connector may be reached and worked on by a person with an arm through the handhole.

Roller contact spring-loaded centering arms shall be provided to center the luminaire ring while descending or descending the pole. The rollers for the centering arm shall be made of a water resistant non-marking composition material. \( \frac{5}{32} \) shafts for arms and rollers shall be 304 stainless steel. The rollers shall be in contact with the pole at all times. The centering arms shall be interconnected and loaded with stainless steel springs to uniformly apply equal centering force from the arms.

The winch shall be a reversible worm gear self-locking type with an integral friction drag brake to prevent freespooling. The winch shall be designated for hand operation or for operation by means of a 1/2" heavy duty reversing electric actuator, remote controlled to enable the operator to stand 25' from the pole, Stainless Steel 7 x 29 aircraft cables of \( \frac{1}{2} \) or greater diameter equal to MQ-WR3420C shall be supplied on the winch. The winch shall provide winching with keepers above the drum to rigidly mate the top away from the ends of the drum for spooling. The drum shall have a wire guard to prevent the cable from coming off.

The winch shall be actuated by alternate raising and lowering of the winch drum, the maximum working stress in the outer fibers of the wire rope shall not exceed 20% of the wire rope manufacturer's rated ultimate stress.

Drum design shall cause wind velocity at wire rope. The power cord shall travel on sheave(s) or a combination of rollers providing a radius for the cord of 6" or larger. Each end of the sheave(s) or rollers shall have a keeper to prevent the cable from jamming out of the roller track.

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Each luminaire shall contain an integral auto-regulator type ballast connected for 480 volts input + 6% and a power factor of more than 90%. The luminaire ballast shall be enclosed in an aluminum housing which tightly attaches to the luminaire bracket entry and lamp support assembly. It shall be readily removable without removing the luminaire from the bracket arm.

The luminaire shall be attached to the bracket arm by means of a bracket entry and lamp support assembly. The assembly shall include a size entry slipfitter designated for 2" pipe with provision for 3" adjustment for leveling the luminaire. An enclosed terminal block shall be included such that all electrical connections shall be made waterproof or be made inside a weather tight terminal block. The terminal block shall be 45V/ IES light distribution as indicated in plans. Each luminaire shall be labeled with a permanent label which states the type of lamp, voltage input, current, power factor, ballast type, socket position, ANSI/IES light distribution, and other such catalog information that a complete replacement can be readily ordered.

The contractor's attention is directed to those plan sheets detailing the mounting of luminaires on the pole top. Particular attention is directed to alignment of luminaire light distributions. Special attention must be exercised in the physical alignment of the luminaires to ensure that the approved photometric layout is physically produced at each lighting standard in the field. A marking shall be placed on the external face of the refractor to allow visual inspection of alignment. This marking shall correspond to the 0° axis of the refractor.

LUMINAIRE SPECIFICATIONS

The reflector with its aluminum cover shall be firmly attached to a cast iron. The ring shall have keyhole slots in its upper surface such that the reflector/refractor assembly may be readily attached to, or detached from, the luminaire bracket entry and lamp support assembly without completely removing the support bolts.

Each luminaire shall contain an integral auto-regulator type ballast connected for 480 volts input + 6% and a power factor of more than 90%. The luminaire ballast shall be enclosed in an aluminum housing which tightly attaches to the luminaire bracket entry and lamp support assembly. It shall be readily removable without removing the luminaire from the bracket arm.

The luminaire shall be attached to the bracket arm by means of a bracket entry and lamp support assembly. The assembly shall include a size entry slipfitter designated for 2" pipe with provision for 3" adjustment for leveling the luminaire. An enclosed terminal block shall include such that all electrical connections shall be made waterproof or be made inside a weather tight terminal block. The terminal block shall be 45V/ IES light distribution as indicated in plans. Each luminaire shall be labeled with a permanent label which states the type of lamp, voltage input, current, power factor, ballast type, socket position, ANSI/IES light distribution, and other such catalog information that a complete replacement can be readily ordered.

The contractor's attention is directed to those plan sheets detailing the mounting of luminaires on the pole top. Particular attention is directed to alignment of luminaire light distributions. Special attention must be exercised in the physical alignment of the luminaires to ensure that the approved photometric layout is physically produced at each lighting standard in the field. A marking shall be placed on the external face of the refractor to allow visual inspection of alignment. This marking shall correspond to the 0° axis of the refractor.

LOWERING SYSTEM AND LUMINAIRE SPECIFICATIONS

LOWERING SYSTEM AND LUMINAIRE SPECIFICATIONS
See legend for number of luminaires, lamp wattage and light distribution.

Luminaire support ring

Luminaire support

Lift cable sheaves

Lift cable terminator

Lift cables (3/16" stainless steel aircraft cable) 3 minimum

Lift Cable Terminator

600 Volt rated Pole Cable with AWG Stranded Copper Conductors. Size of conductors to be determined by luminare load.

3/8" hex drive 5/8" round shaft

3/8" heavy duty reversible drill

Portable drill

Spring supported centering arms provided to center the luminare ring.

Covered receptacle to power luminaires when in the lowered position with Male Inlet.

Covered receptacle for supply cable. (see schematic)

25' minimum remote control cable same as Pole Cable.

Remote control switch

Remote control switch

All hardware for mounting heavy duty drill to pole shall be Stainless Steel.

Luminaire support ring

2" slip fitter assy. (equally spaced around ring)

Centering guide pins (3 minimum)

Positive drive reversible winch.

Winch cable (3/4" stainless steel/aircraft cable)

Winch

Hand holes

Lock nuts

Base plate

2008 FOOT Design Standards

1.5 KVA dry type transformer mounted in N.E.M.A. 3R portable enclosure, provide 120V. grounded receptacle for electric drill & receptacle for supply cable. (see schematic)

250 FOOT Design Standards

Remote control switch

Portable drill

600 Volt rated Pole Cable with AWG Stranded Copper Conductors. Size of conductors to be determined by luminare load.

A surge protector shall be located in the pole with the circuit breaker. The surge protector shall be mounted at the front near hand hole for easy access.
HIGHMAST LIGHTING NOTES:

1) High mast materials:
   a. Poles: ASTM A304 with Grade 50, 55, 60 or 65 ksi (less than 
       1/2" or ASTM A572 Grade 50, 55, 60, or 65 ksi (over) or 
       ASTM A595 Grade 4 (55 ksi yield) or Grade III (60 ksi yield).
   b. Steel Plates: ASTM A709 Grade 36 or ASTM A36.
   c. Weld Metal: E70XX.
   d. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563, Grade 4, 
       heavy hex nuts and ASTM F436 Type I washers.
   e. Caps: ASTM A709 Grade 36 or ASTM A36 Frame with ASTM A36 cover.
   g. Stainless Steel Screws: AISI Type 316.
   h. Reinforcing steel: ASTM A615, Grade 60.

2) Concrete:
   a. Class IV (Drilled Shaft) with a minimum 4,000 psi compressive strength 
      at 28 days for all environmental classifications.
   b. Grout: minimum 5,000 psi compressive strength at 28 days and meeting the requirements of Section 934.

3) Hole diameters for anchor bolts: not greater than the bolt diameter plus 0.5".

4) Poles are designed to support the following:
   a. 1 (cylindrical) head assembly with a maximum effective projected area of 6 Sq. ft (100 lbs Max).
   b. 8 cylindrical luminaires with a maximum effective projected area of 3.0 Sq. ft (60 lbs Max).

5) Foundation design based upon the following soil criteria:
   Classification: Cohesionless (Fine Sand)
   Friction Angle: 30 Degrees
   Unit Weight: 50 lbs/cu. ft (assumed saturated)
   Only in cases where the Designer considers the soil types at the specific site location to be of lesser 
   strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be used as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

6) Foundation applies only to slopes of 1:4 or flatter. Provide a minimum 24" shaft projection on the high side.

7) Poles are designed for 6 mil galvanization thickness.

8) Wire cloth screen vertically between the base plate and top of foundation, wrap horizontally around the base plate with a 3" min. lap. Use standard grade, plain weave, 2x2 mesh, galvanized steel wire cloth with 0.063" dia. wire. Attach the screen to the base plate with stainless steel self-tapping 1/4" screws with stainless steel washers spaced at 9" centers.

9) Manufacturers seeking approval of a Highmast Lighting assembly for inclusion on the Qualified Products List must submit a QPL Production Evaluation Application along with drawings showing the product meets all specified requirements of this Index.

DESIGN CRITERIA:

1) Designed in accordance with the FGDT Structures Manual.

2) Poles are designed to support the following:
   a. 1 (cylindrical) head assembly with a maximum effective projected area of 6 Sq. ft (100 lbs Max).
   b. 8 cylindrical luminaires with a maximum effective projected area at 3.0 Sq. ft (60 lbs Max).

3) Foundation design based upon the following soil criteria:
   Classification: Cohesionless (Fine Sand)
   Friction Angle: 30 Degrees
   Unit Weight: 50 lbs/cu. ft (assumed saturated)
   Only in cases where the Designer considers the soil types at the specific site location to be of lesser 
   strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be used as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

4) Foundation applies only to slopes of 1:4 or flatter. Provide a minimum 24" shaft projection on the high side.

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6) Foundation applies only to slopes of 1:4 or flatter. Provide a minimum 24" shaft projection on the high side.

7) Poles are designed for 6 mil galvanization thickness.
### Pole Design Table

<table>
<thead>
<tr>
<th>Design Wind Speed</th>
<th>Pole Overall Height</th>
<th>Minimum Thrust</th>
<th>Wall Dia.</th>
<th>Base Dia.</th>
<th>Length</th>
<th>Min. Thrust</th>
<th>Wall Dia.</th>
<th>Base Dia.</th>
<th>Length</th>
<th>Min. Thrust</th>
<th>Wall Dia.</th>
<th>Base Dia.</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 mph</td>
<td>42'-6&quot;</td>
<td>0.250</td>
<td>2'-0&quot;</td>
<td>5.313&quot;</td>
<td>11.219&quot;</td>
<td>10'-0&quot;</td>
<td>0.250</td>
<td>2'-0&quot;</td>
<td>8.188&quot;</td>
<td>14.781&quot;</td>
<td>40'-0&quot;</td>
<td>0.250</td>
<td>16.000&quot;</td>
</tr>
<tr>
<td>120 mph</td>
<td>44'-9&quot;</td>
<td>0.250</td>
<td>2'-0&quot;</td>
<td>6.250&quot;</td>
<td>12.531&quot;</td>
<td>10'-0&quot;</td>
<td>0.250</td>
<td>2'-0&quot;</td>
<td>11.688&quot;</td>
<td>17.315&quot;</td>
<td>40'-0&quot;</td>
<td>0.313</td>
<td>16.375&quot;</td>
</tr>
<tr>
<td>130 mph</td>
<td>47'-3&quot;</td>
<td>0.250</td>
<td>2'-3&quot;</td>
<td>5.281&quot;</td>
<td>11.188&quot;</td>
<td>10'-0&quot;</td>
<td>0.313</td>
<td>2'-0&quot;</td>
<td>7.656&quot;</td>
<td>15.281&quot;</td>
<td>40'-0&quot;</td>
<td>0.313</td>
<td>14.375&quot;</td>
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<tr>
<td>150 mph</td>
<td>49'-8&quot;</td>
<td>0.250</td>
<td>3'-0&quot;</td>
<td>3.125&quot;</td>
<td>8.625&quot;</td>
<td>18.625&quot;</td>
<td>40'-0&quot;</td>
<td>0.313</td>
<td>2'-0&quot;</td>
<td>15.781&quot;</td>
<td>26.406&quot;</td>
<td>40'-0&quot;</td>
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* Diameter Measured Flat to Flat

### Base Plate and Bolts Design Table

<table>
<thead>
<tr>
<th>Design Wind Speed</th>
<th>Pole Overall Height</th>
<th>Base Plate Diameter</th>
<th>Base Plate Thickness</th>
<th>&quot;Fw&quot;</th>
<th>&quot;Ww&quot;</th>
<th>Bolt Circles</th>
<th>No. Bolts</th>
<th>Bolt Diameter</th>
<th>Bolt Embedment</th>
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<tbody>
<tr>
<td>110 mph</td>
<td>42'-6&quot;</td>
<td>2.000&quot;</td>
<td>0.375&quot;</td>
<td>188&quot;</td>
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<td>58&quot;</td>
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<td>120 mph</td>
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<td>2.375&quot;</td>
<td>0.375&quot;</td>
<td>188&quot;</td>
<td>26.5&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
<td>4</td>
<td>45&quot;</td>
</tr>
<tr>
<td>130 mph</td>
<td>47'-3&quot;</td>
<td>2.625&quot;</td>
<td>0.375&quot;</td>
<td>250&quot;</td>
<td>29.6&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
<td>4</td>
<td>50&quot;</td>
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<tr>
<td>150 mph</td>
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<td>3.000&quot;</td>
<td>0.375&quot;</td>
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<td>33.0&quot;</td>
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<td>2.00&quot;</td>
<td>4</td>
<td>53&quot;</td>
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### Shaft Design Table

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<tr>
<th>Design Wind Speed</th>
<th>Pole Overall Height</th>
<th>Shaft Diameter</th>
<th>Shaft Length</th>
<th>Longitudinal Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 mph</td>
<td>42'-6&quot;</td>
<td>4'-0&quot;</td>
<td>15'-0&quot;</td>
<td>16 - 10</td>
</tr>
<tr>
<td>120 mph</td>
<td>44'-9&quot;</td>
<td>4'-0&quot;</td>
<td>15'-0&quot;</td>
<td>16 - 10</td>
</tr>
<tr>
<td>130 mph</td>
<td>47'-3&quot;</td>
<td>4'-0&quot;</td>
<td>15'-0&quot;</td>
<td>16 - 10</td>
</tr>
<tr>
<td>150 mph</td>
<td>49'-8&quot;</td>
<td>4'-0&quot;</td>
<td>15'-0&quot;</td>
<td>16 - 10</td>
</tr>
</tbody>
</table>

### POLE DESIGN TABLES
Center of Drilled Shaft, Base Plate, and Pole --++-__

Anchor Bolts Equally Spaced (See Table)

Bolt Circle

Handhole Diameter

Base Diameter (Pole)

(T = Wall Thickness)

Base Diameter

Handhole Diameter

Drilled Shaft

Grout Pad

Finished Grade 1:4 Max Slope

Drilled Shaft

Double Nuts (Typ.)

Sparking 1-2' Min.

6" Clear

1-2" Lap (Min.)

5 Tie Bars

$\frac{1}{2}$ x 6" Ring

Full Pen.

Foundation Plan
(Anchor Bolts and Conduits Not Shown)

Longitudinal Reinforcement Eq. Spaced
(See Table For Reinforcements)

3" Anchor Bolt

$\frac{1}{4}$" Min.

$\frac{3}{4}$" Dia. Weep hole per Pole, placed between bolts or $\frac{3}{4}$" al-cotton scan cord wick attached to interior of pole, extended beyond grout pad, and installed prior to grouting.

SECTION A-A

BASE PLATE AND ANCHORAGE ELEVATION
(Conduits Not Shown)

SECTION B-B

(Conduits Not Shown)

SECTION C-C

POLE FOUNDATION

2006 FDOT Design Standards

HIGHMAST LIGHTING

Last Revision 01/01/07

Sheet No. 01/01/07 17502

Index No.
Schedule 80 PVC conduit with 4/0 cu bare ground wire.

Interrod distances must be a minimum of 10'.

Minimum of (6) 1/2" x 20' approved ground rods.

NOTES:

1. At all pullboxes and pole bases, ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications For Road And Bridge Construction.

2. Slabs to be placed around all poles and pullboxes.

3. For Pullboxes between Poles refer to Index 17500.
NOTES:
1. Use clean free draining sand less than 5" passing No. 200 sieve for base (4")
2. Welded wire fabric shall meet the requirements of ASTM A495.
3. Concrete shall be Nonstructural with a minimum strength at 28 days of f'c=2.5 ksi.
4. Outside edges of slab shall be cast against formwork.
5. The pull box shown is 1'-3" x 1'-3" others approved under Section 635 of the Standard Specifications may be used.
6. Slabs to be placed around all Poles and Pull Boxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
7. Concrete slabs around poles and pull boxes shall be paid for under the contract unit price for Class I Concrete (Non-Structural) the cost for reinforcing steel fabric shall be included in the price for Class I Concrete (Non-Structural).
8. The 1/2" thick expansion joint between the pole shaft and slab and the pull box and slab shall be sealed with a hot poured elastic joint sealer.
Foundations apply only to slopes of 1:4 or flatter.

Class II Foundation
Concrete

#6 AWG Bare Bond
May Be Cast In Base
Or Run Through 1/2" PVC Elbow
1" Diameter

#4 Bars # 12" On Centers
With Top & Bottom # 6" On Center

#8-#176 Reinforcing Cage
No Welding Permitted On Reinforcing Cage.
Reinforcing Steel To Be Grade 60

12" Bed Of Pearrock Or
Crushed Stone For Drainage

#6 AWG Insulated (TW Green) Stranded CU Bond Wire Connecting All Poles, And Insulated (THW or
THWNj Stranded Copper Circuit Conductors In
Schedule 40 PVC Conduit. Circuit Conductors And
Conduit Sizes As Shown In Plans. (Typical)

NOTE
Foundation design based upon the following conservative soil criteria which covers the great majority of soil types found in Florida:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Friction Angle</th>
<th>Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohesive (Fine Sand)</td>
<td>30 degrees (30°)</td>
<td>50 lbs./cu. ft. (assumed saturated)</td>
</tr>
</tbody>
</table>

Only in cases where the Designer considers the soil types at the specific site location to be of lesser strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be utilized as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties. In any event, only the soil identification is required.
It shall be the contractors responsibility to provide a complete service assembly as per the plans and service specifications. The service installation shall meet the requirements of the national electric code and applicable local codes. Shop drawings are not required for service equipment, unless noted in the plans.

Service Conductors Shall Be Stranded Copper Single Conductor Cable Type THW & Minimum Length Of 10' Shall Be Provided From The Weatherhead For

Concrete Pole, Prestressed Type N-II, 36' Long.

Service Conductors Shall Be Stranded Copper Single Conductor Cable Type RHW & Minimum Length Of 10' Shall Be Provided From The Weatherhead For

CONDUCTOR WEATHERHEAD HEIGHT AS REQUIRED BY POWER COMPANY.

PULL BOX (See Detail Index 17503.)

Concrete Pole, Prestressed Type N-II, 12' Long.

DETAIL A

AERIAL FEED

Concrete Pole, Prestressed Type N-II, 36' Long.

DETAIL B

UNDERGROUND FEED

U.L. Approved Ground Rod, 1½" Dia. 40' Long Copper Clad. (All Service Points).

P.E. Controller as required

PHOTO ELECTRIC CONTROLLER DETAIL

Cut a 2" hole in the bottom of the Main Disconnect for the operation and mounting of the P.E. controller. Use plexiglass and a clear silicone sealant to cover hole, install P.E. Controller.

DETAIL A

SERVICE SPECIFICATIONS

1. The main disconnect shall be NEMA JR, pole mounted.

2. The enclosure door shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a minimum of three hinges and be latchable. No screws to be used to attach door.

3. 480 Volt minimum rating bolt-in type breakers shall be used.

4. Busbar to be copper coated and have a minimum rating of 100 amps. When main breaker exceeds 100 amp busbar to match breaker amperage.

5. Locate Contactor, Transformer, P.E. Controller, and H.O.A. Switch inside enclosure. The enclosure to be sized to accommodate as many breakers as called for and all other service equipment.

6. The enclosure to be rigidly attached to the pole face.

7. A 600 Volt lightning protector shall be wired inside the enclosure.

8. A main breaker is required in all service panels with 2 or more feeder breakers.

9. All service equipment shall be U.L approved.
SIGN LIGHTING INSTALLATION

Roadway Lighting included in contract:
The power for the sign lighting shall be provided from the roadway lighting circuit. The lighting plans shall indicate the sign location and a pull box location for connection to the sign lights. The lighting contractor shall install pull box and loop 2' of lighting circuit conductors in the pull box for connection by the lighting contractor.

The lighting contractor shall furnish and install luminaires, Nema 3R enclosure, 30 amp breaker, conduit, conductors and all other electrical equipment necessary for connection to the lighting circuit.

Roadway Lighting not included in contract:
The lighting plans shall include pay item numbers to furnish and install conduit, conductors, ground rods, pull boxes and service point equipment.

The lighting contractor shall indicate the location of the service point equipment and circuit runs.

The lighting contractor shall provide all electrical equipment necessary for connection of the sign lights.

**Placement of Sign Lights**

1. Luminaires shall be mounted so the lamp center is 4' in front of the sign face.
2. Luminaires shall be mounted so the back of the fixture is placed below the bottom edge of the sign face.
3. Luminaires from manufacturers who recommended their fixture be tilted shall be mounted on a bracket which provides this recommended tilt.
4. Photometric data for mercury vapor luminaire proposed for sign lighting shall be submitted for approval to the District Lighting Engineer, Florida Department of Transportation.

Use 1/2" Liquid Tight Flexible Conduit from Junction Box To Ballast and From Junction Box To See In Luminare Bracket. Conduit Shall Be Of Sufficient Length To Allow Rotation Of Luminare Bracket 90° In Either Direction.

Balast Shall Be Mounted To Sign Chord With Stainless Steel Bracket. Bracket For Balast To Be Fabricated From Galvanized Steel Plate For Steel Sign Structures And Aluminum Plate For Aluminum Sign Structures. (Submit Material Data Required)

U.L. Approved Ground Rod 3/8" x 20' Copper Clad With Approved Ground Connection To Be Placed In Pull Box For Inspection Purposes. Splices To Be Made With Compression Sleeves Then Properly Insulated & Waterproofed

**Plan**

**Overhead Power Supply**


**Diagram**

- Sign Face
- Luminare
- Conduit To Extend Up Column And Along Lower Sign Cord To Junction Boxes (See Other Details This Sheet)
- Luminare Housing & Ballast Compartment Will Be Provided With Drain Plugs. Drain Plugs Will Be Removed And Screened Against Insects Upon Installation.
- 1" Conduct To Weatherhead Height As Required By Power Company
- Ground Lug Attached To Metal Sign Structure
- Ground Lug Attached To Metal Sign Structure
- U.L. Approved Ground Rod 3/8" x 20' Copper Clad With Approved Ground Connection To Be Placed In Pull Box For Inspection Purposes. Splices To Be Made With Compression Sleeves Then Properly Insulated & Waterproofed
Typical 4X313X3.58 Hanger

See Enlarged Detail "A" Of Pipe Support For Luminaire

SECTION THROUGH SIGN SUPPORT AT LUMINAIRE

SECTION AA

SECTION BB

NOTES

1. Dimension "A" to be established by type and make of luminaire to be purchased and used on the project.

2. The center lines of both flange plates and the luminaire support arm are to be set parallel to the roadway before the set screw is seated.

3. Minor adjustments in the horizontal location of the luminaire support arm along the bottom chord of the truss will be allowed so that the flange plates will clear the truss web members.

4. All steel pipe shall meet the strength requirements of ASTM Specification A53 Grade "A" or Grade "B". Steel plates shall meet the requirements of A36 and bolts, nuts and washers shall meet the requirements of ASTM A307.

5. All items shall be hot dip galvanized after fabrication in accordance with the requirements of ASTM A53 and/or A553.

6. Luminaire support arm shall be free to rotate in a clockwise or counter clockwise direction. When service or maintenance is required for sign face or vertical face of truss, support arm shall be capable of being locked in a position 90° from parallel to the roadway for unobstructed working clearance.
ROADWAY ALUMINUM LIGHTING POLE NOTES


2. Tables were developed assuming the following Luminare properties: effective projected area of 1.55 ft² includes wind drag coefficient and 70 pounds max.


4. See Standard Index No. 17500 for grounding and wiring details.

5. Foundation Materials:
   a. Reinforcing Steel: ASTM A615 Grade 60.
   b. Concrete: Class II, 3,000 psi (fc) minimum Compressive Strength of 28-days for all environmental classifications.
   c. Anchor Bolt: ASTM F1554 Grade 55 with ASTM A563 Grade DH nuts and ASTM F436 Type 1 washers (aluminized in accordance with ASTM F2329-05).

6. Light Pole Specifications:
   c. Finishes: for pole and arms 50 grit satin rubbed finish.
   h. Weld Metal: E71T-G.
   i. Pole Base Connection: ASTM A522 Grade 55 with ASTM A563 Grade DH nuts and ASTM F436 Type 1 washers (aluminized in accordance with ASTM F2329-05).
   j. Stainless Steel Fasteners and Hardware: ASTM F593 Grade 304.
   k. Aluminum alloy 6063-T4 condition and heat treated in accordance with ASTM B557 to T6.

7. Pole Notes:
   a. Tapered as required to provide a top outside diameter (O.D.) of 6" with a base O.D. of 10". Portions of the shaft near the base shoe and at the arm connections may be held constant at 10" and 6" respectively to simplify fabrication.
   b. Transverse welds are allowed only at the base.
   c. Poles constructed out of two or more sections with overlapping splices are not permitted.
   d. Equip poles with a damping device if the pole location is within 5 miles of the coastline.

8. Finish each pole with a 2-1/4" inside diameter identification tag. Include the pole identification tag. Approved manufacturers of poles and pole bases are required to submit a copy of the identification tag with the pole and pole base for approval. Secure to Transformer Base with 0.125" stainless steel rivets or screws. Locate Identification Tag on the inside of base and visible from the door opening. Include the following information: Manufacturer's Name, Certification number, and Pole Pay Item number.

9. Manufacturers seeking approval of a Standard Roadway Aluminum Lighting Pole Assembly for inclusion on the Qualified Products List must submit a GDL Product Evaluation Application along with design documentation and drawings showing the product meets all specified requirements of this Index.
   a. For Clamp and Frangible Transformer Base Design, provide design calculation and/or test results indicating that the components are capable of providing the required capacity. Certify that the frangible Transformer Base conforms to the current FDOT Frangibility Requirements as defined in the 2001 AASHTO Frangibility Requirements, tested under NCHRP Report 350 Guidelines.
   b. Include damping device information, details and performance data with the GDL application.
   c. For Alternative Foundation: include design calculations and drawings showing that the product meets the requirements of this index, FDOT Structures Manual and Specification T70.

NOTE:
STANDARD ROADWAY ALUMINUM LIGHTING NOT TO BE USED ON BRIDGES OR WALLS.
At the pole connections, provide arm tube extrusions with dimensions as shown in the ARM SECTION and as tabulated in the ARM DATA Tables. Uniformly transition elliptical section to a cylindrical section at the arm connection.

The manufacturer may substitute elliptical cross sections other than those tabulated, provided the section properties about the vertical axis and the area of the section exceed that of the required section, and provided the wall thickness is a minimum of 1/8" nominal and within the Aluminum Association Tolerances.

The outside diameter about the minor axis should be held at 2-3/8" at the upper and lower arms.

ARM TABLE

<table>
<thead>
<tr>
<th>SPEED (MPH)</th>
<th>LENGTH (FT)</th>
<th>LOWER ARM</th>
<th>LOWER ARM WELD</th>
<th>LOWER ARM WELD</th>
</tr>
</thead>
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<tr>
<td>10</td>
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<td>2.120</td>
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<tr>
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<td>4.630</td>
</tr>
</tbody>
</table>

* Increase member wall thickness as necessary to meet minimum requirements of the Welding Code for the various connections shown in the Arm and Pole Tables.
**FOUNDATION NOTES:**

The foundations for Standard Roadway Aluminum Lighting Poles are pre-designed and are based upon the following conservatively designed criteria which covers the great majority of soil types found in Florida:

- **Soil Classification:** Cohesionless (Loose Sand)
- **Friction Angle:** 30 Degrees (30°)
- **Unit Weight:** 50 lbs./cu. ft. (assumed saturated)

Only in cases where the Designer considers the soil types at the specific site location to be of lesser strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be utilized as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations.

Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

### POLE TABLE

<table>
<thead>
<tr>
<th>WIND SPEED (MPH)</th>
<th>ARM LENGTH (FT)</th>
<th>DESIGN MOUNTING HEIGHT (FT)</th>
<th>POLE WALL (IN)</th>
<th>UPPER WELD (IN)</th>
<th>LOWER WELD (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>6, 10, 12, 15</td>
<td>40 &amp; 45</td>
<td>0.156</td>
<td>0.156</td>
<td>0.156</td>
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<td>120</td>
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<td>40 &amp; 45</td>
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<td>45 &amp; 50</td>
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</table>

**NOTE:**
Pole wall thicknesses shown in the POLE TABLE are nominal and shall be within the Aluminum Association tolerances. Thicker walls are permitted and varied walls may be used provided the minimum Aluminum Association tolerances are not violated.

### FOUNDATION TABLE

<table>
<thead>
<tr>
<th>WIND SPEED (MPH)</th>
<th>DESIGN MOUNTING HEIGHT (FT)</th>
<th>TOTAL DEPTH (FT)</th>
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<tr>
<td>110</td>
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<td>8</td>
</tr>
<tr>
<td>150</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:** Decks shown in table are for grades flatter than 1:4, for grades up to 1:2 and 2:6 to foundation depths shown in table.

---

### BASE DETAILS

- **2008 FOOT Design Standards**
- **STANDARD ROADWAY ALUMINUM LIGHTING**
- **Sheet No.: 3 of 3**
- **Revision: 01/01/07**
- **Stamp: 17515**

---

*As the option of the Contractor, 1/4 Spiral Wire @ 6" Pitch, Three Flat Turn Top and one Flat Turn Bottom may be utilized in lieu of specified.
TYPICAL MOTORIST AID CALL BOX TERMINAL

- 3" Aluminum Pole
- 3" Rod Beveled
- 3/8" Dia.
- No Sharp Edges
- 16" Wide Wrap of White Type B Reflectors
- Sheet Metal Applied to the Pole
- Above the Sign
- and 24" Below the Sign on all Roadside Terminals as Incidental to Bid Items Provided.

CALL BOX
MILE XXX

See Sheet 3 of 3 for Concrete Pad Details.

CALL BOX
MILE XXX.X

See Index 17355 for Sign Details and Index 11860 for Type "B" Sign Bracket Details.
EXISTING PAVEMENT INSTALLATION
Remove existing pavement minimum 1" depth throughout transition
and maneuvering area, replace with misc asphalt.

NEW CONSTRUCTION
Hand work final shoulder pavement lift to plan dimensions.
WHEEL CHAIR STOP DETAIL

- 3" x 1" x 1/2" Galv. Angle And 3-1/2" x 50" Galvanized Steel Expansion Anchor Bolt With 3" Min. Embedment

GENERAL NOTES


2. Concrete: Concrete strength shall be Class II (f'c = 3,400 psi).

3. Reinforcing Steel: Reinforcing Steel shall conform to ASTM A615, Grade 60.

4. Payment: Motorist Aid Call Box Concrete Pads shall be paid for under the contract unit price for Class II Concrete (Miscellaneous, c.y.) and shall include all labor, materials, and installation of embedded breakaway device sleeves, and miscellaneous galvanized steel for wheelchair stop and attachments.

5. Breakaway Device shall be paid for under Call Box Assembly.
FOR USE IN AREAS NOT EXPOSED TO VEHICULAR TRAFFIC AND UNDER DRIVEWAYS

FIGURE A

FOR USE IN ASPHALT ROADWAY ADJACENT TO GUTTER WHEN PLACEMENT OUTSIDE OF THE PAVEMENT IS NOT FEASIBLE

Note:
1. Trench not to be open more than 250' at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asphalt to be sawcut and removed to leave neat lines on both sides of the 12" pavement cut.
3. See note 3 Figure C.

FIGURE B

FOR USE IN INSTALLING CONDUIT UNDER EXISTING ASPHALT PAVEMENT NOT ADJACENT TO GUTTER WHEN JACKING IS NOT FEASIBLE

Note:
1. Rigid conduit must be used when jacking under existing pavement at 36" minimum depth.
2. Asphalt to be sawcut at the edges of the trench.
3. The removal and replacement of the additional pavement width (6") will not be required when the trench can be constructed without disturbing the asphalt surface on either side.

FIGURE C

FOR USE INSTALLING CONDUIT UNDER A NEW ROADWAY PRIOR TO INSTALLATION OF CURBS, BASE AND PAVEMENT

FIGURE D

FOR USE IN INSTALLING CONDUIT UNDER SIDEWALK

Note:
1. Sidewalk patches to match existing joints.
2. Entire sidewalk slab must be replaced when specified in the plans.
3. Backfill and tamp with material from trench except at driveways.
   At driveways, backfill a length of trench within the driveway entirely with Flowable Fill.

FIGURE E

CONDUIT INSTALLATION DETAILS
Conduit depth to be at RR requirement but not less 4'. After jacking, leave rigid conduit as a sleeve extending to RR right of way limits.

Note: One run of conduit (between pullboxes) shall not contain more than 360° of bend including pullbox bends.
2) Perform all welding in accordance with the American Welding Society Structural Welding Code (Aluminum) AWS D1.2 (current edition). No Field welding is permitted on any part of the pole.
3) See Standard Index No. 17707 for grounding and span wire details.
4) Foundation Materials:
   a. Replacing Steel: ASTM A416 Grade 60.
   b. Concrete: Class II, (DStandard Shell) 4,000 psi minimum Compressive Strength at 28-days for all environmental classifications.
   c. Anchor Bolt: ASTM F2554 Grade 55 with ASTM A325 Grade A heavy hex nuts and ASTM F436 Type 1 washers (galvanized in accordance with ASTM F2329-05).
   d. Grout: 5,000 psi compressive strength at 28-days and meeting the requirements of Section 934.
5) Steel Pole Specifications:
   a. Plates: ASTM A412 Grade 50, 55, 60 or 65 (less than 6F1") or ASTM A373 Grade 50, 60, or 65 (1/2" and over) or ASTM A395 Grade 4 (155 ksi yield) or Grade 3 (50 ksi yield).
   b. Structural Steel: ASTM A490.
   d. Bolts: ASTM A325, Type 1.
   e. Base Plate: Hole Diameter: Anchor Bolt Diameter plus 1/4".
   f. Handhole: Promal ASTM A709 Grade 36 or ASTM A490, Cover: ASTM A412 Grade 50, 55, 60 or 65.
   g. Aluminum Caps and Covers: ASTM B26 (319-FJ.
   h. Stainless Steel Screws: AISI Type 316.
6) Pole Notes:
   a. See the Signalization Plans for clamp spacing, cable sizes and forces, signal and sign mounting locations and details.
   b. Tapered with the diameter changing at a rate of 0.14 inch per foot.
   c. Transverse walls are allowed only at the base.
   d. Poles constructed out of two or more sections with overlapping splices are not permitted.
   e. Locate the handhole 180 degrees from a single wire entrance pipe.
   f. Furnish each pole with a 2"x4" (max) aluminum identification tag. Submit details for approval.
   g. Secure to pole with 0.125" stainless steel screws or screws. Locate Identification Tag on the inside of pole and visible from handhole. Include the following information: Financial Project ID, Pole Type, Pole Height, Manufacturer's Name & Certification number. Pay Item number.
7) If a grout pad is not installed, place wire cloth screen vertically between the base plate and top of foundation, wrap horizontally around the base plate with a 3" min lap. Use standard grade plain woven, 2x3 mesh, galvanized steel wire cloth with 0.063" dia wire. Attach the screen to the base plate with stainless steel ss-316 tapping 1/4" screws and washers (spaced at 9" centers).
8) Manufacturers seeking approval of a steel strain pole assembly for inclusion on the Qualified Products List must submit a GQI Product Evaluation Application along with drawings showing the product meets all specified requirements of this Standard.
### DEFINITIONS

- **BC Dia. Anchor Bolt**: Tapped 8" min. each end.
- **Base Plate Dia. Anchor Bolt**: Tapped 8" min. each end.
- **Double Nuts (Typ.)**: See Notes on Sheet 1 of 3.
- **Aluminum Nut Cover**: Not shown.

### TABLE OF STRAIN POLE VARIABLES

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>MAXIMUM ALLOWABLE MOMENT (Kips-ft)</th>
<th>K (1/100)</th>
<th>No. of BA</th>
<th>BR (in.)</th>
<th>BC (in.)</th>
<th>BD (in.)</th>
<th>BE (in.)</th>
<th>DA (in.)</th>
<th>DB (in.)</th>
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<td>PS-I</td>
<td>45.4</td>
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<td>1.0</td>
<td>0.75</td>
<td>0.6</td>
<td>0.5</td>
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<td>10</td>
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<td>PS-III</td>
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<td>0.75</td>
<td>0.6</td>
<td>0.5</td>
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<td>PS-IV</td>
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<td>16</td>
<td>12</td>
<td>25.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.75</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>PS-V</td>
<td>37.2</td>
<td>16</td>
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<td>16.5</td>
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<td>0.75</td>
<td>0.6</td>
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<td>0.75</td>
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<td>0.75</td>
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<td>0.5</td>
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<td>0.5</td>
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<td>1.0</td>
<td>0.75</td>
<td>0.6</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### POLE SECTION

- **Shear Wall**: 0.25 x Inside radius.
- **Inside radius measured center to flat**.

### FOUNDATION NOTES

The foundations for Steel Strain Poles are designed based upon the following conservative soil criteria which covers the great majority of subtypes found in Florida.

- **Classification**: Cohesionless (Fine Sand)
- **Friction Angle**: 30 degrees (30°)
- **Unit Weight**: 50 lbs./cu. ft. (assumed saturated)

Only in cases where the Designer considers the soil types at the specific site location to be of lesser strength properties should an analysis be required. Boreings, SPT borings or GPT soundings may be utilized as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

### BASE AND FOUNDATION DETAILS AND TABLE OF VARIABLES
A properly sized Service Head (Weather Head) shall be installed and fastened securely on to the standard pipe for each pole location. All locations other than service entrance, the service head face is to be left closed to outside atmosphere. Service entrance installation per Index No. 17723.

2 - 1/4" Ø Holes for 2 - 5/8" x 2" Steel Passivated Clapper Pipe

Steel Clamp, ASTM A709 Grade 50, see Table for thickness

Hand Hole Cover

NOTE: Clamps have been sized for Design Cable Loads shown in the Table, and a Maximum Pole Diameter at the Clamp location of 2'-1".

**WIRE ENTRANCE DETAILS**

- Pole Cap Plate
- Pole Wall
- Hand Hole Frame
- Hand Hole Cover

**SECTION D-D** (thru Hand Hole)

<table>
<thead>
<tr>
<th>Cable Diameter (in.)</th>
<th>Minimum Breaking Strength (kip)</th>
<th>Plate Thickness (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>25</td>
<td>1/8</td>
</tr>
</tbody>
</table>

**POLE TOP CUT-AWAY**

- Cast Aluminum Pole top cap 1/4" min. thick held in place with 3 stainless steel screws

**POLE TOP NOTE**

Any combination of the above two options may be used, provided both lifting and wiring is accommodated.

**ATTACHMENT DETAILS**
<table>
<thead>
<tr>
<th>TYPE OF POLE</th>
<th>DIA AT TOP (T)</th>
<th>SHEAR REINFORCING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type P-II</td>
<td>6&quot; x 6&quot;</td>
<td>2 Gauge Spiral 6&quot;</td>
</tr>
<tr>
<td>Type P-III</td>
<td>6&quot; x 6&quot;</td>
<td>6 Gauge Spiral 6&quot;</td>
</tr>
<tr>
<td>Type P-IV</td>
<td>8&quot; x 8&quot;</td>
<td>6 Gauge Spiral 6&quot;</td>
</tr>
<tr>
<td>Type P-V</td>
<td>10&quot; x 10&quot;</td>
<td>5 Gauge Spiral 6&quot;</td>
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<td>Type P-VI</td>
<td>12&quot; x 12&quot;</td>
<td>5 Gauge Spiral 6&quot;</td>
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<tr>
<td>Type P-VII</td>
<td>14&quot; x 14&quot;</td>
<td>5 Gauge Spiral 6&quot;</td>
</tr>
<tr>
<td>Type P-VIII</td>
<td>16&quot; x 16&quot;</td>
<td>5 Gauge Spiral 6&quot;</td>
</tr>
</tbody>
</table>

** Round poles require some taper and top diameter not less than 1.4 T width of square poles.

To Roadway
Plug Top of Pole with a minimum of 3" of concrete

Plug Top of Pole with a minimum of 3" of concrete

Plug of Pole with a minimum of 3" of concrete

Service Poles - Type P-II

For Installation, refer to Roadway and Traffic Design Standard, Index No. 17504

Do not use these items to Type P-III. Establish bolt hole locations, ground wire location and conduit location as shown in the plans.

Ref. Index 17900 and Sec. 7.44 for modifications to Type P-III poles used at traffic monitoring sites.

** Last Revision 01/01/07

Sheet No. 1 of 2

Index No. 17725
NOTES:


Attach span wire assemblies (consisting of the catenary wire, the messenger wire, and the tether wire) to the concrete poles in accordance with Section 634.

Field supply ground wire at the locations indicated in the plans. Use cover plates made of non-corrosive materials and attached to the pole using lead anchors or threaded inserts embedded in the pole and round head chrome plated screws.

Concrete shall be Class V Special with strength of 6 ksi minimum at 28 days and 4 ksi minimum at transfer of the Prestressing force.

Prestressed Strands shall be A416 Grade 270 stress relieved. Provide a minimum cover of 1-1/2" or low relaxation.

One turn required for spiral splices and two turns required at the top and bottom of poles. Spiral shall be manufactured from cold-drawn steel wire meeting the requirements of ASTM A82.

TABLE I

<table>
<thead>
<tr>
<th>D (feet)</th>
<th>P-IV (k-ft)</th>
<th>P-V (k-ft)</th>
<th>P-VII (k-ft)</th>
<th>P-VIII (k-ft)</th>
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</table>

TABLE I shall be used for checking allowable stress in concrete for Dead Load. MS = MOH, where MOH = moment due to dead load only.

TABLE II

<table>
<thead>
<tr>
<th>D (feet)</th>
<th>P-IV (k-ft)</th>
<th>P-V (k-ft)</th>
<th>P-VII (k-ft)</th>
<th>P-VIII (k-ft)</th>
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<tbody>
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<td>50</td>
<td>95</td>
<td>239</td>
<td>328</td>
<td>430</td>
</tr>
</tbody>
</table>

TABLE II shall be used for checking ultimate moment strength under factored loading combinations of dead load plus wind load, and is the Nominal Moment Strength (Ms) multiplied by Strength Reduction Factor (1 - 0.9).

MS = MOH + 1.3(MWL+4MWL), where MOH = moment due to dead load, and MWL, 4MWL moment due to wind load.
Note: Clamp location shall be adjusted to compensate for reduced sag and vertical clearance to bottom of signal head.

1. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the pole.

2. Lashing wire should normally be used for distances of 120° or greater.

3. All hardware for signal attachment shall be Stainless Steel.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.

RETROFIT INSTALLATION

1/8" Oval Eye bolt

No. 6 copper ground wire民 of 4' (bare pigtail)

To reduce sag, a 1/4" diameter copper wire shall be used for distances of 120° or greater.

AUTOMATIC COMPRESSION TIE LOCKING CABLE

The vertical clearance to the bottom of a vertical or horizontal vehicular signal head shall not be less than 17' - 6" and the maximum height shall be in accordance with the MUTCD.

PRESTRESSED CONCRETE POLE

NEW CONSTRUCTION

AUTOMATIC COMPRESSION TYPE CLAMP (Feed Through Dead End)

ADAPTER WITH DUAL SET SCREWS FOR LOCKING.

DETAIL A OR B

Bolted or threaded

No. 6 copper ground wire民 of 4' (bare pigtail)

The load face of pole shall be perpendicular to load.

Tethcr wire (if required)

DETAIL A OR B

NEW CONSTRUCTION

DETAIL A OR B

Bottom Hub

Tri-Stud or Threaded Adapter

DETAIL A OR B

Disconnect Box

DETAIL A

Bottom Hub

Tri-Stud with hardware

DETAIL B

Bottom Hub

W1/2 NPSM Threads

DETAIL A

Stainless Steel Pipe

W1/2 NPSM Threads

DETAIL A

Female Threaded Tri-Stud Adapter

DETAIL A OR B

Tether Clamp

DETAIL A OR B

Balancer

Tri-Stud or Threaded Adapter

DETAIL A OR B

Disconnect Box

DETAIL A

Bottom Hub

Tri-Stud with hardware

DETAIL B

Bottom Hub

W1/2 NPSM Threads

DETAIL A

Stainless Steel Pipe

W1/2 NPSM Threads

DETAIL A

Female Threaded Tri-Stud Adapter with Dual Set Screws for Locking.

DETAIL B

Tri-Stud Adapter with Dual Set Screws for Locking.

DETAIL A

Tri-Stud or NPSM Female Threaded Tri-Stud Adapter with Dual Set Screws for Locking.

DETAIL A

Chase nipple

Tether clamp Aluminum alloy with Tri-Stud adapter and hardware.

For long pipe hangers a wire entrance head may be substituted for balancer and the drop pipe installed above the disconnect box.

SINGLE POINT ATTACHMENT
Notes:

1. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90°, but not less than 45° to the face of the pole.

2. Locking wire should normally be used for distances of 12" or greater.

3. The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing of 2" between bolts.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.
Notes:

1. The messenger wire of the interconnect cables shall be grounded to the copper ground wire of the pole or to the external wire extending down the pole.

2. When utilizing the external ground wire to the pole, a piece of ¥1/2" conduit shall extend up the pole externally to a point 8' above finish grade to protect the ground wire connecting the messenger wire to the ground rod.

3. Locking cable ties or lashing wire when used shall be placed no further than 12" apart except at the point of cable drop or terminations where one (1) shall be placed at the point where the cables separate from the messenger wire and another placed 4" from that point. When using figure "B" interconnect cable only the locking cable ties shall be used.

4. If accessible the internal ground wire of the support pole may be used to ground the messenger wire.

5. Lashing wire should normally be used for distances of 12' or greater.

6. Meet all grounding requirements of Section 620 of the Standard Specifications.
NOTES:

1. The lightning arrester can be located on the side or bottom of the main disconnect enclosure at the Contractor's Option.

2. Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.

3. Bond all elements together to form an Intersection Grounding Network in accordance with Section 620 of the Department's current Standard Specifications for Road and Bridge Construction. The bond wire shall be run in conduit with the Electrical Service Wire or Signal Cable.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.
### POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>D1</th>
<th>D3</th>
<th>D5</th>
<th>D6</th>
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### POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE

<table>
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<tr>
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<th>D1 - D1</th>
<th>D3 - D3</th>
<th>D5 - D5</th>
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### ARM DESIGN TABLE - ALL CASES

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>Arm Length</th>
<th>Mast Arm</th>
<th>Arm Extension</th>
<th>Arm Connection &amp; Welds</th>
</tr>
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<tbody>
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### POLE CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>Upright Base Connection</th>
<th>Connection Plate Data</th>
<th>Drilled Shaft Data</th>
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</thead>
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### LUMINAIRE AND LUMINAIRE CONNECTION

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</tbody>
</table>

**NOTES:**
1. Work this Index with Index No. 17745.
2. Standard Mast Arm "D" Assemblies are designed to Loading Trees as indicated in Plans Preparation Manual.
3. Design Speed = 150 mph with Signal Backplates.
### POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>E1 - E2</th>
<th>E3 - E4</th>
<th>E5 - E6</th>
<th>E7 - E8</th>
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</thead>
<tbody>
<tr>
<td>Pole Type</td>
<td>T1 &amp; T2 Lum</td>
<td>T2 &amp; T3 Lum</td>
<td>T3 &amp; T4 Lum</td>
<td>T4 &amp; T24 Lum</td>
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<tr>
<td>1. Standard Mast Arm</td>
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### 2. Design Speed

- 110 mph with Signal Backplates
- 130 mph without Signal Backplates

### POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
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### ARM DESIGN TABLE - ALL CASES

<table>
<thead>
<tr>
<th>ARM TYPE</th>
<th>ARM LENGTH</th>
<th>MAST ARM</th>
<th>ARM EXTENSION</th>
<th>ARM CONNECTION &amp; WELDS</th>
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<tr>
<td>E1</td>
<td>36°-5°</td>
<td>36.0 5.96</td>
<td>0.184</td>
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<tr>
<td>E2</td>
<td>36°-5°</td>
<td>36.0 5.96</td>
<td>0.184</td>
<td>-</td>
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<tr>
<td>E3</td>
<td>40°-7°</td>
<td>36.5 6.95</td>
<td>0.184</td>
<td>13 30 2.5 0.187 0.313</td>
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<td>T4</td>
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<td>36.5 6.95</td>
<td>0.184</td>
<td>13 30 2.5 0.25 0.375</td>
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<tr>
<td>E5</td>
<td>40°-7°</td>
<td>36.0 5.96</td>
<td>0.184</td>
<td>26 30 2.5 0.313 0.5</td>
</tr>
<tr>
<td>E6</td>
<td>30°-6°</td>
<td>39.4 6.32</td>
<td>0.184</td>
<td>26 30 2.5 0.313 0.63</td>
</tr>
<tr>
<td>E7</td>
<td>30°-6°</td>
<td>40.0 7.47</td>
<td>13 32</td>
<td>26 30 2.5 0.375 0.63</td>
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### POLE, CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM

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### LUMINAIRE AND LUMINAIRE CONNECTION

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### NOTES:

1. Work this Index with Index No. 17745.
2. Standard Mast Arm "E" Assemblies are designed to Loading Trees as indicated in Plans Preparation Manual.
3. Design Speed - 150 mph with Signal Backplates or 150 mph without Signal Backplates
### POLE SELECTION TABLE - SINGLE ARM - WITH & WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>F1 - F1</th>
<th>F3 - F3</th>
<th>F5 - F5</th>
<th>F7 - F7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Type</td>
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<td>W2 &amp; W3 Lum</td>
<td>W3 &amp; W23 Lum</td>
<td>W4 &amp; W24 Lum</td>
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</tbody>
</table>

### POLE SELECTION TABLE - DOUBLE ARM - WITHOUT LUMINAIRE

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>F1 - F1</th>
<th>F3 - F3</th>
<th>F5 - F5</th>
<th>F6 - F6</th>
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</thead>
<tbody>
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<td>Pole Type</td>
<td>W1</td>
<td>W2</td>
<td>W3</td>
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### ARM DESIGN TABLE - ALL CASES

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>Arm Length</th>
<th>Mast Arm</th>
<th>Arm Extension</th>
<th>Arm Connection &amp; Welds</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>36 - 0</td>
<td>36 3.94</td>
<td>36 2.25 20</td>
<td>36 1.5 0.313 0.25</td>
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<tr>
<td>F3</td>
<td>48 - 0</td>
<td>36 3.94</td>
<td>36 2.25 20</td>
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</tr>
<tr>
<td>F5</td>
<td>60 - 0</td>
<td>36 3.94</td>
<td>36 2.25 20</td>
<td>36 1.5 0.313 0.25</td>
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<td>39.4 0.25 20</td>
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<td>F7</td>
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<td>47.4</td>
<td>47.4 0.25 20</td>
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### POLE CONNECTION AND SHAFT DESIGN TABLE - SINGLE & DOUBLE ARM

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>Width</th>
<th>Length</th>
<th>Height</th>
<th>Upright Base Connection</th>
<th>Connection Plate Data</th>
<th>Drilled Shaft Data</th>
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<tbody>
<tr>
<td>W1</td>
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<td>0.313 0.188 0.313 0.25</td>
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<td>W7</td>
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### LUMINAIRE AND LUMINAIRE CONNECTION

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<th>Base</th>
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<th>Vertical</th>
<th>Horizontal</th>
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<th>Connection</th>
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### NOTES:
1. Work this Index with Index No. 17745.
3. Design Speed = 110 mph with Signal Backplates.
Mast Arm Assemblies General Notes

1. Signal Structure Materials shall be as follows:
   - Poles & Mast Arms: ASTM A501 Grade 50, 55, 60 or 65 (less than 54") or ASTM A527 Grade 50, 55, 60 or 65 (54" and over) or ASTM A599 Grade A (55 ksi yield) or Grade B (60 ksi yield)
   - Steel Plates: ASTM A36
   - Weld Metal: ASTM A704
   - Bolts (except Anchor Bolts): ASTM A325 Type 1
   - Anchor Bolts: ASTM F436 Type 1
   - Washers for Anchor Bolts: ASTM A579
   - Nuts: ASTM A490 Grade 60
   - Nut Covers: ASTM A563 Grade 4 Heavy Hex
   - Stainless Steel Screws: ASTM A595 Grade A (55 ksi yield) or Grade B
   - Stainless Steel Rivets or screws: ASTM A527

2. Reinforcing Steel shall be ASTM A615 Grade 60 ksi.

3. Concrete shall be Class D (Drilled Shaft) with a minimum 28-day compressive strength of 4,000 psi for all environment classifications.

4. Grout shall have a minimum 28-day compressive strength of 5,000 psi and shall meet the requirements of Section 934.

5. All welding shall conform to American Welding Society Structural Welding Code (Steel AISI/SFASH).01 (current edition).

6. Alkali Resistant Items shall be galvanized as follows:
   - Alkali Resistant Items: ASTM A259
   - Threaded Bars/Shields: ASTM A36 or ASTM A507

7. Locate handholes 180° from arm on single arm poles or 180° from first arm of double arm poles or see special instructions on Mast Arm Tabulation Sheet.

8. Except for Anchor Bolts, all bolt hole diameters shall be equal to the bolt diameter plus 0.06", prior to galvanizing. Hole diameters for Anchor Bolts shall exceed the bolt diameter plus 0.06".

9. Sign Panels and Signals attached to the Mast Arm shall be centered in elevation on the arm. Sign Panels shall be aluminum. Wire access holes shall not exceed 1/2" in diameter.

10. Mast Arms and Poles shall be tapered with the diameter changing at a rate of 0.14 inch per foot.

11. The Pole shall be installed vertically. Camber shall be accounted for in the Mast Arm connection as specified.

12. If a Mast Arm damping device is required by the Engineer, it shall be installed within eight feet of the Mast Arm tip.


14. Provide "J" Hook at top of poles for signal cable support.

15. First and Second Arm: Camber Angle = 2°.

16. Details for the Ground Rod, Signal and Sign Locations, Signal Head attachment, Sign Attachment, Pedestrian Head Attachment, and Foundation Conduit are not shown for clarity.

17. Manufacturers seeking approval of a steel mast arm assembly for inclusion on the Qualified Product List must submit a QPL Product Evaluation Application along with design documentation and drawings showing the products meet all specified requirements of this Index and Index 17743.

18. If a mast pad is not installed, vertically place a wire cloth screen between the baseplate and the top of the foundation, wrap horizontally around the baseplate with a 3" min lap. The wire cloth shall be galvanized and standard grade plate weave 2x2 mesh 0.063" dia. Wire. The screen shall be attached to the baseplate with stainless steel self-tapping 1/4" screws with stainless steel washers spaced on 3" centers.

TYPICAL ELEVATION AND NOTES

2008 FDOT Design Standards

Mast Arm Assemblies

2008 FDOT Design Standards

Mast Arm Assemblies
Center of Drilled Shaft, Base Plate, and Pole

Drilled Shaft

Double Nuts (Typ)

Center of Drilled Shaft, Base Plate, and Pole

'SC Anchor Bolts Equally Spaced

Section A-A

Section C-C

Alternate Detail (8 Anchor Bolts)

Section D-D

Typical Foundation and Base Plate Details

2008 FDOT Design Standards

2 of 8

mast arm assemblies

Index No.
17745
The "Slip Joint" splice shall be a tight fit with no change in the Mast Arm slope due to the splice.

NOTE: Longitudinal seam welds within six inches of circumferential welds shall be complete penetration welds. Longitudinal seam welds at telescopic field splices shall be complete penetration welds for the splice length plus six inches. For tubes greater than 70" in circumference, two longitudinal seam welds are allowed.

NOTE: The details shown on this sheet are for 12-sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.

2. Mast Arm and Connection Plates shall be marked to ensure proper assembly.
NOTE: 1. Details shown on this sheet are for 12 sided pole sections. However, sections with more than 12 sides and round sections are permitted provided outside diameter and wall thickness are not reduced.

2. Most Arm and Connection Plates shall be match marked to ensure proper assembly.

TYPICAL DOUBLE ARM CONNECTION DETAILS
1. Luminaire type and Luminaire to Arm Connection Details can be found elsewhere.

2. Align Luminaire Arm with single Most Arm or first Arm of Double Most Arm.

PipeHandhole, see Details for

Pipe Hand Hole Frame

Pipe Hand Hole Cover

TOP VIEW

POLE TOP CUT-AWAY

POLE TOP DETAILS

NOTE: Any combination of the above two options may be used, provided lifting and wiring is accommodated.

NOTES:

1. Luminaire type and Luminaire to Arm Connection Details can be found elsewhere.

2. Align Luminaire Arm with single Most Arm or first Arm of Double Most Arm unless indicated otherwise in plans.
FREE-SWINGING, INTERNALLY-ILLUMINATED STREET SIGN ASSEMBLIES

NOTES:
1. Free-swinging, internally-illuminated street signs shall be installed on sign structures only at one of the optional locations shown on this drawing, unless a special design is completed for the support structure.

2. Free-swinging, internally-illuminated street signs shall meet the requirements of Section 699 of the Standard Specifications for Road and Bridge Construction.

3. Pole attachments and cantilever arm (or truss) assemblies may be accepted by Contractor certification provided the signs being supported meet the weight and area limitations included in Section 699 for "Acceptance by Certification."

4. Pole attachments and cantilever arm (or truss) assemblies supporting signs not meeting the weight or area limitations included in Section 699 for "Acceptance by Certification" require the submission of structural calculations and Shop Drawings that have been prepared by and sealed by the Specialty Engineer.
1. Damper Tube 8" ID, 10" long before fabrication, 2" OD, ASTM A513, Type 1
2. Tube Cap Cap Assembly, 1/2" Steel plate, ASTM A36
3. Internal Weight 4" OD, 15 lb, cylindrical steel weight, ASTM A36
4. Damper Spring Century Spring Spring Stock #147, Stiffness = 0.69 lb/in, length = 0.895", OD = 1.062"
5. Hex Nut 1/4" - 20 steel hex nut (zinc plated)
6. Eye Bolt 1/4" x 2" Steel Eye Bolt (zinc plated)
7. Eye Bolt 1/4" x 2" Steel Eye Bolt (zinc plated)
8. Cap Screw #8 2" -8" x 1/2" Stainless Steel Machine Screws (Flat Head Phillips)
9. U Bolt 5/8" x 9" ASTM A307 with washers and 4 self locking nuts (size to fit Mast Arm)
10. 1/4" Plate 1/4" x 2" ASTM A36
11. 1/4" Plate 1/4" x 2" ASTM A36 (Weld to Part 1 and Part 10)

NOTES:
1. Part 4 (Damper Spring) is shown schematically and not to scale.
2. Choose the appropriate diameter U-Bolt (Part 9) based on the structure's pipe arm diameter.
3. To scribe tube for taper, wrap template around tube such that points are 2" - 3" from top of tube.
4. Verify clearances, tolerances and dimensions before fabrication.
5. After welding, hot dip galvanize all steel items except screws, bolts, and nuts noted to be stainless steel or zinc plated, and the spring (Part 4). Galvanize bolts, nuts and washers in accordance with ASTM A153. Galvanize all other items in accordance with ASTM A123.
6. Install spring with 2" separation from bottom of pipe to weights at rest.
Adaptor, post top center mount, 2 ports

4" steel pedestal

Grade

Bushing

4" steel pedestal

Top bolt for grounding

FIGURE A

Pedestrian signal assembly

4" Steel Pedestal

Transformer base

Ground wire

Concrete pedestal

Steel Pedestal

Transformer base

FIGURE B

Ground wire

2008 FOOT DESIGN STANDARDS

PEDESTRIAN CONTROL SIGNAL INSTALLATION DETAILS

FIGURE C

3/8" x 20" grounding electrode

Pedestrian signal assembly, two-way adjustable

Notes:
1. As an option, the contractor will be allowed to install pedestrian signals on concrete poles and pedestals with the use of lead anchors (two bolts same size per hub) in lieu of the stranded steel bands.

2. Holes drilled or punched in metal poles or pedestals shall be thoroughly reamed, cleaned of all burrs and covered with two (2) coats of zinc rich paint as specified in the standard specifications for road and bridge construction. Grommets or bushings shall be installed in holes.

3. Meet all grounding requirements of Section 620 of the Standard Specifications.

FIGURE D

Metal strain pole

1/2" arm assembly

Pedestrian signal assembly, two-way adjustable

Wood pole

FIGURE E

Pre-stressed concrete strain pole

Notes:
1. As an option, the contractor will be allowed to install pedestrian signals on concrete poles and pedestals with the use of lead anchors (two bolts same size per hub) in lieu of the stranded steel bands.

2. Holes drilled or punched in metal poles or pedestals shall be thoroughly reamed, cleaned of all burrs and covered with two (2) coats of zinc rich paint as specified in the standard specifications for road and bridge construction. Grommets or bushings shall be installed in holes.

3. Meet all grounding requirements of Section 620 of the Standard Specifications.
**GENERAL NOTES**

1. If the loop lead-in is 75' or less from the edge of the loop detector to control cabinet, continue the twisted pair to the cabinet. If the loop lead-in is greater than 75' continue the twisted pair to the specified pullbox, splice to shielded lead-in wire and continue to the controller cabinet.

2. The width of all saw cuts should be sufficient to allow unforced placement of loop wires or lead-in cables into the saw cut. The depth of all saw cuts, except across expansion joints, should be 3" standard with a maximum of 4".

3. On resurfacing or new roadway construction projects, the loop wires and lead-in cables may be installed in the asphalt structural course prior to the placement of the final asphalt wearing course. The loop wires and lead-in cables shall be placed in a saw cut in the structural course. The depth of the cables below the top of the final surface shall comply with note 2.

4. A nonmetallic hold down material shall be used to secure loop wires and lead-ins to the bottom of saw cuts. Hold down material shall be placed at approximately 12" intervals around loops and 24" intervals on lead-ins.

5. The minimum distance between the twisted pairs of loop lead-in wire is 6" from the loop to 12" from the pavement edge or curb.

6. Splice Connections in pullboxes with UL listed, watertight, insulated enclosures. Place one enclosure over the end of each conductor and place a third enclosure over the exposed end of the shielded cable.

7. As an alternate, a larger diameter enclosure that will accommodate both the splices of the conductors and the exposed end of the shielded cable may be used.

8. The maximum area of asphalt to be disturbed shall be 6' x 6'. This area shall be restored as directed by the Engineer.
Notes:

1. The "number of turns" indicated at the specified point on the loop refers to the number of passes of loop wires which are placed in the saw-cut forming the complete loop.

2. Loop types or details not drawn to scale.

3. Loop Types are centered in a single lane except Type E which is centered on two lanes.

4. The number of individual loops in the Type G loop may vary up to a maximum of four (4).

5. Lead-in may be connected to either end of the loop.

6. The leading edge of loop Types A, C, D, & F may extend past the stop line a maximum of 10". The length of these loops may be extended to a maximum of 60". Each intersection should be individually designed and if the modifications noted above is required it must be noted or detailed in the plans.

7. Loop lead-in wires should not be installed in the same pullbox with signal power cable.
Notes:

1. Signs shall be mounted above detectors, explaining their purpose and use.

2. The positioning of pedestrian push button should clearly indicate which crosswalk signal is actuated by each push button.

3. Push buttons and signs are to be mounted in accordance with Standard Specifications, section 665.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.

Note To Designers:

The designer should ensure the 10" distance in Figure A & B is maintained. This distance can vary depending on post or pedestal type or whether a frangible base is used and sidewalk configuration.
NOTE:
1. Refer to the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES Figure 28-18 Pedestrian Signs. The STANDARD HIGHWAY SIGNS MANUAL (English) Sign RJ0-3e, for Text Size, Spacing and Symbol size. Also see DESIGN STANDARDS Index 17.5.5 for details of FTP signs.
POLE MOUNTED CABINET

Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.

Notes:

1. The number, size and orientation of conduit sweep will vary according to site conditions or locations. Two spare 2” PVC conduits shall be provided in all bases. The spores shall exit in the direction of the center rear of the cabinet base, into a pullbox and capped with a weathertight fitting. If obstructions prevent the spare conduit from exiting to the rear, or the rear of the cabinet is located on the R/W line, a side exit of the spare conduits will have to be approved by the project engineer. All spare conduit sweeps shall be capped with a weatherproof fitting.

2. Meet all grounding requirements of Section 620 of the Standard Specifications.

3. New Controller Cabinet installation shall meet the requirements of Section A676-1 of the Minimum Specifications for Traffic Control Signal Devices (MSTCSO).

Existing controller cabinets to be retrofitted shall meet the requirements of Section A678-16 of the Minimum Specifications for Traffic Control Signal Devices (MSTCSO).


INTERCONNECT JUNCTION BOX

Notes:

1. Service Slop (Slope ½” to 1” For Drainage) Not Required In Sidewalk Or Pavement Areas Or Where R/W Is Restricted.

2. Pull Box

3. Conduit

4. Grade Line Or Grade

5. 4” Min.

6. 1” Diameter

7. 24”

8. 6” Min.

9. Ground Electrode

10. Cabinet Or Junction Box

PEDESTAL MOUNTED
SIGNALIZED INTERSECTION
Vehicle movements & signal head number assignments are not directionally oriented but shall maintain their relative orientation about the intersection (i.e., movements 7 and 4 are always to the right of movements 1 and 6 etc.).

LEGEND
- Vehicle Movement Number
- Pedestrian Movement Number
- Timing Function Number
- Phase Number
- Green Arrow (Left or Right)
- Red Arrow
- Yellow Arrow

SIGNAL CLEARANCE TABLE
(Blank Indicates No Clearance Required)

<table>
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<tr>
<th>From</th>
<th>To</th>
<th>R</th>
<th>Y</th>
<th>WALK</th>
<th>DON'T WALK</th>
<th>SIGNAL INDICATIONS</th>
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<td>G</td>
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SIGNAL OPERATING PLANS

STANDARD SIGNAL OPERATING PLANS

2008 FDOT Design Standards

Sheet No. 1 of 2
Signal Heads Not Active In Passive State

4" Aluminum Pipe (0.188" Wall Thickness)

Folding Sign Control System

Stationary Background To Form A Portion Of "STOP AHEAD" Sign In Open Mode.

Folding Sign Control System (Closed)

Slip Fit Collar

Two 8" Signal Heads (Yellow Lens)

Sign No. W1G-1 (36")

4" Aluminum Pipe

Weathertight Cap

Grade At Edge Of Travel Way

Shoulder

2" Str. 2 Min.

Passive State
(Train Circuit Not Actuated)

Active State
(Train Circuit Actuated)

NOTE: 1. "Stop Ahead" is standard and preferred sign message. Another message may be approved when appropriate for specific situations.

NOTE: Conduit and cable from the normally closed relay of RR controller cabinet to the junction box shall be furnished & installed by RR.

ADVANCE WARNING FOR R.R. CROSSING

LOCATION OF THE ADVANCE WARNING SIGN

The Distance Is Measured Along Right Edge Of Pavement From RR Stop Bar To Sign Advance Warning Sign.

Advance Warning Sign

Power Service

Pull Boxes

RR Control Cabinet
To Contain Normally Closed Relay. (Furnished By RR)

Pull Boxes 200 Nominal Spacing

Power Service

TYPICAL PLAN

FUNCTIONAL BLOCK DIAGRAM

2008 FDOT Design Standards

Last Revision 07/01/05

Sheet No. 1 of 1

Index No. 17881
SIGNAL PLACEMENT AT RAILROAD CROSSING
(2-LANE DESIGN)

SIGNAL PLACEMENT AT RAILROAD CROSSING
(4-LANE DESIGN)

Note:
1. No guardrail is proposed for signals; however, some form of impact attenuation device may be specified for certain locations.
2. Advance flasher to be installed when and if called for in plans or specifications.
3. Top of foundation shall be no higher than 4' above finished shoulder grade.
4. Type of traffic control device
   I  Flashing signals
   II  Flashing signals with cantilever
   III Flashing signals with gate
   IV  Flashing signals with cantilever & gate
   V  Gate
5. Class of traffic control devices
   I  Flashing signals — one track
   II  Flashing signals — multiple tracks
   III Flashing signals and gates — one track
   IV  Flashing signals and gates — multiple tracks

* When 20' is deemed impractical, the control device can be located as close as 8' from the edge of a paved shoulder but not less than 6' from the edge of the near traffic lane.

General Notes

Note: Two separate foundations may be required (one for signals, one for gate), depending on type of equipment used.

FIGURE 1
Gate Length Requirements
See Note 5 Sheet 3
GENERAL NOTES

1. The location of flashing signals and stop lines shall be established based on future or present installation of gate with appropriate track clearances.

2. Where plans call for railroad traffic control devices to be installed in curbed medians, the minimum median width shall be 10'-6".

3. Location of railroad traffic control device is based on the distance available between face of curb & sidewalk. 0'-6" - Locate device outside sidewalk. Over 6'- Locate device between face of curb and sidewalk.

4. Stop line to be perpendicular to edge of roadway, approx. 15' from nearest rail or 8' from parallel to gate when present.

Gong Type
Highway Crossing
Bell
Minimum
Per Crossing

As & Minimum, Position
One Flasher Unit Over
Lane Separation Lines
(More Than One Flasher
Unit If There Are More
Than 2 Approach Lanes).

Flasher Units
Back-To-Back
Back-To-Back
Flasher Units

Number Of Tracks
Sign In The Option
Of The Installing Agency
When Automatic Gates
Are Used.

 TYPE I

 TYPE II

 TYPE III

 TYPE IV

 TYPE V

 See Figure No. 1, Sheet 1
RAILROAD CROSSING AT TWO (2)-LANE ROADWAY

Stop Bar Perpendicular to Edge Of Travel Way Or 8' From & Parallel To Gate When Present.

Stop Bar Perpendicular to Edge Of Travel Way Or 8' From & Parallel To Gate When Present.

RAILROAD CROSSING AT MULTILANE ROADWAY

Stop Bar Perpendicular to Edge Of Travel Way Or 8' From & Parallel To Gate When Present.

Stop Bar Perpendicular to Edge Of Travel Way Or 8' From & Parallel To Gate When Present.

NOTES:

1. When computing pavement message, quantities do not include traverse lines.

2. Placement of sign W10-1 in a residential or business district, where low speeds are prevalent, the W10-1 sign may be placed a minimum distance of 100' from the crossing. Where street intersections occur between the RR pavement message and the tracks an additional W10-1 sign and additional pavement message should be used.

3. A portion of the pavement markings symbol should be directly opposite the W10-1 sign.

4. Recommended location for FTP-61-06 or FTP-62-06 signs, 100' urban and 300' rural. See Index 17355 for sign details.

5. Gate Length Requirements:
   - For Two-way undivided sections:
     The gate should extend to within 1' of the center line. On multiple approaches the maximum gate length may not reach to within 1' of the center line. For those cases, the distance from the gate to the center line shall be a maximum of 4'.

   - For One-way or divided sections:
     The gate shall be of sufficient length such that the distance from the gate lip to the inside edge of pavement is a maximum of 6'.

<table>
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<td>URBAN</td>
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RAILROAD GATE ARM LIGHT SPACING

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MEDIAN SIGNAL GATES FOR
MULTILANE UNDIVIDED URBAN SECTIONS

(THREE OR MORE DRIVING LANES IN ONE DIRECTION, 45 MPH OR LESS)

NOTE
For additional information see the "Manual On Uniform Traffic Control Devices", Part 8; The "Traffic Control Handbook", Part VIII; and AASHTO "A Policy On Geometric Design Of Streets And Highways".
NOTES:

1. A bypass switch shall be installed to override each timing interval in case of a malfunction.

2. "STOP HERE ON RED" is omitted in Type I operation and "TRAFFIC SIGNALS" are omitted in Type II operation.

3. The time between the beginning of flashing yellow on "Drawbridge Ahead" sign and the clearance of traffic signal to red, or beginning of flashing red should not be less than the travel time of a passenger car, from the sign location to the stop line, traveling at the 85th percentile approach speed.

4. Time of gate lowering and raising is dependent upon gate type.

5. Time of bridge opening is determined by the bridge tender.

6. Each gate shall be operated by a separate switch.

7. On each approach (Type II), all four red signals shall be on the same two circuit flashers, with the two top signals on one circuit, and the two bottom signals on the other circuit.

8. "Drawbridge Ahead" sign shall be added to the sign when physical conditions prevent a driver traveling at the 85th percentile approach speed from having continuous view of at least one signalization for approximately 10 seconds.

9. Requirements on gate installation are contained in Section 41 of the "Manual Uniform Traffic Control Devices".

10. In accordance with Traffic Engineering Manual Topic Number 750-OSD-005A Section 2.1 "SLIPPERY WHEN WET SIGNS" shall be placed in advance of all MOVABLE and NONMOVABLE STEEL DECK BRIDGES."
BLACK OPAQUE LEGEND AND BORDERS ON REFLECTORIZED YELLOW BACKGROUND
TO BE USED WITH TYPE I OPERATION, AS SHOWN ON PREVIOUS SHEET
MONOTUBE SUPPORT MOUNTING

NOTES:
1. 12 volt flashing red lights shall be mounted on gate arm and shall operate in the flashing mode only when gate arm is in the lower position or in the process of being lowered. The number of lights shall vary accordingly to length of the gate arm.
2. 16" alternate diagonal fully reflectorized red and white stripes.

TYPICAL LAMP PLACEMENT
Equipment Cable, 5 ft. long, furnished separately (ref. sheet no. 4)

JJ receptacle with a mounting bracket for lanes 1 to 4

Cabinet cable

Surge suppressors (furnished separately)

Adjustable shelf

Speed/Classification Unit and Modem furnished separately

Battery terminal

Solar terminal

Solar power surge suppression

Modern

12 volt storage battery

10 in.
1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf.
   B. Two backplane assemblies (equipped as shown).
   C. Two J1 receptacles with mount brackets.
   D. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strip.
   B. One vehicle sensor terminal strip.
   C. One battery terminal strip.
   D. One solar panel terminal strip.

# The contractor shall be responsible for contacting the FDOT planning office for lane number information and verification.
To 12 receptacle

Terminal strip contacts are on 3/8" inch centers (Cinch 142 Series or equal)
Use insulated fork wire terminations

The contractor shall be responsible for contacting the FDOT planning office for lane number information and verification.

Ref. sheet no. 1 or 2, note 2
for items to be included with backplane

Surge suppressor
Loop leads from lanes 1 & 2
Loop leads from lanes 3 & 4

Solar power suppressor
Solar power input
Red (+)

Earth ground
Inductive loop lead-in and vehicle sensor leads from roadway

R in. x 24 in. x 0.125 in.
Thick aluminum backplane

24 in.
3 3/8" 4 3/4" 3 3/8"

TRAFFIC MONITORING SITE

CABINET BACKPLANE DETAIL

2006 FDOT Design Standards

17900

Last Revision Sheet No. 07/10/2007

Index No. 17900
NOTE:
The equipment cable can accommodate up to four lanes of inductive loop and vehicle sensor inputs. (Ref. Sheet No. 1 for cabinet layout)

For more than four lanes and up to eight lanes of inputs, the following options are available:

1. A second Vehicle Speed/Classification Unit and separate equipment cable connecting to a second J1 receptacle, or
2. A single Vehicle Speed/Classification Unit capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles. (Ref. Sheet 2 detail)

Numbers in parenthesis in the pinout chart identify lane numbers when a second backplane for lanes 5 through 8 is required.

NOTE:
The contractor shall be responsible for contacting the FDOT planning office for lane number information and verification.
SPEED/CLASSIFICATION LOOP ASSEMBLY WITH AXLE SENSORS PLACEMENT DETAIL

SAWOUT THE SENSOR SLOT LONG ENOUGH TO INCLUDE THE SENSOR CABLE CONNECTION.

THE CONNECTION WILL BE ENGAGED IN THE BONDING AGENT WITH THE SENSOR ELEMENT.

END OF SENSOR MOUNTS EVEN WITH INSIDE EDGE OF STRIPE.

Note:
16 ft. Loop slots are 6 ft x 6 ft and centered in the lane.

Note: These are typical dimensions, actual dimensions, element cross-sections and standoffs may vary depending on manufacturer and model.

1.25-inch to 2-inch dia opening drilled to loop depth (smooth, no rough edges)

Note: Loop slots shall be 0.25 inches wide (max.) by 1.5 inches to 2 inches deep. Four turns of #12 AWG type XHHW stranded copper wire shall be placed in the slot. Backer rod shall be used to hold the loop wire in the bottom of the slot. Loop leads shall be twisted at the rate of 10 to 12 twists per foot. The twisted pair shall extend to the pull box with three feet of spare length coiled in the pull box.

The contractor shall be responsible for contacting the FHOT office for lane number information and verification. All leads shall be labeled with permanent marker to indicate their lane number and position. For example: The leading loop in lane 1 is marked as "L1". The trailing loop (if present) is marked as "L2". The axle sensor (if present) is marked as "A1". And so on for all lanes.

TYPICAL UNENCAPSULATED CLASS II VEHICLE SENSOR

Note: These are typical dimensions, actual dimensions, element cross-sections and standoffs may vary depending on manufacturer and model.

LOOP WIRE / HOMERUN CABLE SPLICES

LEADS MUST BE TOTALLY ENCAPSULATED BY THE SPLICE MIXTURE INCLUDING OUTER INSULATION.

3M Part No. 3570G (or equal) Scotchcast Insulating Resin Electrical Splice Kit Pouch

3M Part No. E-II (or equal) Closed End Electrical Crimp Sleeve

Loop Leads (Twisted Pair)
From roadway

Shielded Homerun Cable To Cabinet

LOOP AND PIEZOELECTRIC VEHICLE SENSOR DETAIL

TRAFFIC MONITORING SITE

2006 FHOT Design Standards

Traffic Monitoring Site

Sheet No.

Index No. 17900
The unit must be capable of detecting up to eight lanes of traffic (in either or both directions) when mounted perpendicular to the roadway.

Coverage area of the unit is affected by the roadway geometry: distance from the travel lanes, median type and width, barrier walls, etc.

Mounting height of the unit and offset from the roadway must be determined on a site-by-site basis, in accordance with the manufacturer's recommended guidelines and existing clear zone requirements.

Drill a 5/8" to 3/4" inch dia. hole in the pole for sensor lead access. Pull leads through pole cavity and into the cabinet.
Lightning rod (0.5 in. x 36 in.)

No. 4 awg stranded bare copper wire (cast in pole) bonded to lightning rod and ground rod.

Wire for Solar Panel/Array installations shall be #10 AWG stranded copper. Red insulation is TWAW or TWAW for positive 12 volts wiring. Black insulation is TWAW or TWAW for negative, 12 volts wiring. Green insulation is TWAW or TWAW for ground bonding of the solar panel frame to the pole and earth.

Cabinet and pole will be 10 ft. apart unless otherwise specified in the plans.

Pole placement shall be in accordance with section 125.4 and 125.8.2.

Note: Cabinet installed per Index 17941 except cabinet center will be 4 feet above grade.
GENERAL NOTES:

1. For location where pole foundation is lower than roadway, mount CCTV cabinet on pole. Clear zone shall be measured to the edge of drilled shaft if drilled shaft is more than 4" above adjacent grade.

2. Distance must be in accordance with project design documents and greater than or equal to minimum clear zone requirements.

![Diagram of CCTV Pole Placement]

- **TYPE A**
  - 12' Travel Lane
  - Cabinet
  - Existing Grade

- **TYPE B**
  - 12' Travel Lane
  - Cabinet
  - Shoulder 4' Min.
  - Guardrail

---

See Note 2
For Ground Mounted Cabinet (See Index 18107)

Dome Type CCTV Camera

For Camera With Lowering Device (See Indexes 18110 and 18111). For Camera Mounted On Fixed Arm (See Index 18110).

For Ground Mounted Cabinet (See Index 18107)

Dome Type CCTV Camera

For Camera With Lowering Device (See Indexes 18110 and 18113). For Camera Mounted On Fixed Arm (See Indexes 18110 and 18113).

For Grounding and Lightning Protection (See Index 18102)

CCTV Cabinet

Concrete

STEEL POLE

For Camera With Lowering Device (See Index 18107)

Dome Type CCTV Camera

For Camera Mounted On Fixed Arm (See Index 18110)

For Ground Mounted Cabinet (See Index 18107)

CCTV Cabinet

Concrete

CONCRETE POLE

Not To Scale
Dome Type CCTV Camera

Finished Grade

Grout Pad
Optional
Concrete

CCTV Cabinet
As Required Per Plans

2-1/2" ETP Alloy 110 Copper
Air Terminal (Class II)

Band #2 AWG Tin-Plated Bare Solid
Copper Ground Wire To The Air Terminal
By An Exothermic Weld Method.
A Steel Pole May Be Used As A Grounding Conductor
If It Has Sufficient Cross-Sectional Area To Equal
The Conductivity Of Main Lightning Conductors Per
NFPA 780 And A Minimum Wall Thickness of 1/8" Or Greater.

Band #4 AWG Tin-Plated Bare Solid Copper
Wire To Camera Support Base With An Aluminum-
To-Copper #2 - 4 AWG Lug Attach To Camera
Base Using A Stainless Steel Self-Tapping Screw.
Remove Point Or Protective Coating Where
Attaching Lug, Band #4 Wire To #2 Ground Wire.

#2 AWG Tin-Plated Bare Solid Copper
Wire. Clamp To Concrete Pole @ 3-Intervals.
Band To Air Terminal And Ground Rod With
Exothermic Weld.

1/2" X 10' PVC Conduit Sleeve Shall
Be Provided To Protect Any External
Ground Wire From Mechanical Damage.
Ensure Conduits Are Sealed To
Prevent Water Intrusion.

#2 Wire May Be Routed
Internally Or Externally
According To Project
Requirements

STEEL POLE

CONCRETE POLE

CCTV POLE GROUNDING
GENERAL NOTES:

1. Distance must be in accordance with project design documents and greater than or equal to minimum clear zone requirements.

2. Exothermically weld all connections to ground rods.

3. Install marker tape directly above all grounding electrodes and conductors at a depth of 6".

4. All data, coaxial and power cables to the camera shall be completely concealed.

5. All air terminals must meet UL-96A.

6. Ground rod A is required. Ground rods B, C and D will be required as necessary to meet the ground resistance requirements in the contract documents.

7. Place ground system within right of way.

8. Route all camera cables inside arm of mounting bracket.

9. Main ground rod to be placed immediately adjacent to pole.
GENERAL NOTES:

1. Cabinet layout is for pole or base mounted installations.
2. All dimensions and scale are approximate.
3. The minimum CCTV cabinet dimensions shall be 36" H x 24" W x 22" D.
4. Conduit entrances are in bottom of cabinet.
5. There shall be front and rear doors. Both doors shall have the hinged side next to the pole when pole mounted.
6. Cabinet layout represents preferred placement of typical devices. Project-specific designs may not include all components illustrated here.
CCTV Camera

TVSS Protection
For Equipment Power

Optional Power Supplies

Composite Video

TVSS

Video Encoder

Ethernet Switch

Local Management Port RS-232

Optional Power Supply

Power Distribution Assembly

AC Service

Ethernet 10/100 Base TX/RX

GFI
Convenience Outlet
For Portable Tools

From Electric Utility

Ethernet 100/1000 Base FX
Single Mode Fiber Optic

Cabinet

Maintenance Access

May Be One Or More Devices

Video Data

RS-232/422/485 Serial Data

Maintenance Access

Local Management Port RS-232

Ethernet 10/100

Terminal Server

LEGEND

Data

Ethernet

Power

TVSS

Transient Voltage Surge Suppressor

2006 FDOT Design Standards

Sheet No. 07101107 1 of 1

CCTV BLOCK DIAGRAM

Index No. 18105
GENERAL NOTES:

1. Contractor shall splice fiber optic cables in cabinet to preterminated patch panel.

2. Furnish and install TVSS protection on all video, data, and power cabling in cabinet.

3. Ensure that all electronic equipment power is protected and conditioned with TVSS devices.

4. Sizes and types of conduits and innerducts for network communications between the pull box and cabinet are stated in the contract documents.

5. See Index 18102 for grounding requirements.

6. All network communications conduits and ducts shall be sealed with approved waterproof duct plugs and seals.
GENERAL NOTES:

1. Contractor shall splice fiber optic cables in cabinet to preterminoted patch panel.

2. Furnish and install TVSS protection on all cabling in cabinet.

3. Furnish and install secondary TVSS protection on outlets for equipment in cabinet.

4. Sizes and types of conduits and innerducts for network communications between the pull box and cabinet are stated in the contract documents.

5. Ensure that equipment cabinet is bonded to CCTV pole grounding system.

6. All network communications conduits and ducts shall be sealed with approved waterproof duct plugs and seals.

7. Pole mounted cabinets shall be mounted with hinges next to the pole.
GENERAL NOTES:

1. Lowering device to be shipped ready for pole attachment to include 100 ft. of composite power and signal cable prewired to lowering device at the factory.

2. The lowering device manufacturer shall supply both a portable lowering tool with a manual hand crank and a portable electric drill motor with custom clutch adapter. One lowering tool per every 10 lowering devices is required.

3. The lowering device manufacturer shall provide an on-site installation inspection and operator instruction and certification. This ensures the product is assembled correctly and, more importantly, that all necessary persons are trained in the proper, safe operation of the system. Before erecting the first pole the contractor must contact the lowering device supplier and schedule a representative to be on-site.

4. Lowering device connection to top of pole shall be capable of service tension and shear of 1 kilo minimum. The contractor shall provide product cut sheet capacity data for the engineer’s review and approval prior to installation.

5. Camera to be mounted to camera junction box and stabilizing weight via ⅜” Standard NPT Pipe Thread.

6. Use air terminal extension when the pole top junction box is wider than top of pole.
GENERAL NOTES:

1. Verify the pole type, the dimensions of the pole at the point of installation of the camera mount, and angle with respect to the roadway before manufacturing camera mount assembly.

2. The design of the camera mounting bracket shall conform to the Plans Preparation Manual, Volume I, Chapter 29, and shall allow for the additional weight of the CCTV dome camera system.

3. No field welding shall be permitted.

4. Mounting bracket arm shall be level after installation.

5. The contractor shall submit shop drawings for the proposed fixed mounting arm, signed and sealed by a Professional Engineer registered in the State of Florida, to the Engineer for review and approval.

6. See Index 18113 for concrete pole details.

7. Galvanized pipe connections and conduit entry points shall be sealed in accordance with Section 6360 of the Standard Specifications.
GENERAL NOTES:

1. Design Criteria—Poles shall be designed in accordance with the 2001 AASHTO Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals.

The structure shall not exceed 1" deflection in a 30 mph (nongust) wind.

All footings and foundation designs shall be based on site boring data, and submitted to the Engineer for review and approval. All designs, drawings, and calculations submitted must be signed and sealed by a Professional Engineer licensed in the State of Florida.

2. Pole Shaft: The pole shaft shall be round or 16 sided with a 4" corner radius, have a constant linear taper of 0.14in./ft and contain only one longitudinal seam weld for the poles. Circumferential welded tube butt splices and laminated tubes are not permitted. Longitudinal-seam welds within 6" of complete penetration pole to base plate welds shall be complete penetration welds.

3. Handholes: See Detail 1.

4. Cable Supports: Electrical Cable Guides and Eyebolts: Top and bottom electrical cable guides shall be located within the pole aligned with each other. One cable guide shall be positioned 2" below the handhole, and the other shall be positioned 1" directly below the top of the tenon. An eyebolt shall be positioned 2½" below the top of the handhole.

5. CCTV Structure shall be as follows:

   Poles
   → ASTM A595 Grade 4
   Steel Plates & Pole Cap
   → ASTM A709 Grade 36
   Weld Metal
   → E70XX
   Bolts (Except Anchor Bolts)
   → ASTM A325, Type 1
   Anchor Bolts
   → ASTM F1554 Grade 55 (6 Min.)
   Washers For Anchor Bolts
   → ASTM A683 Grade A Heavy Hex
   Handhole Frame
   → ASTM A709 Grade 36
   Handhole Cover
   → ASTM A657 Grade 50, 55, or 60
   Stainless Steel Screws
   → ANSI Type 316

6. All Nuts, Bolts and Washers
   → ASTM A193 Class C or D
   (Depending on Size)
   All Other Steel Items
   → ASTM A193

7. Reinforcing steel shall be ASTM A615-96, Grade 60.

8. Concrete foundations shall be Class IV (drilled shaft) with a minimum 28-day compressive strength of 4 ksi for all environmental classifications.

9. Grout shall have a minimum 28-day compressive strength of 5 ksi and shall meet the requirements of Section 934 of the Standard Specifications. Grout after pole is set and properly plumbed. Grout pad is optional.

10. All welding shall conform to American Welding Society Structural Welding Code (Steel) AWS/D1.1 (Current Edition).

11. Shop drawings must be submitted to the Engineer for review and approval. Fabrication shall not begin until shop drawings have been approved.

12. The foundation for the CCTV structure shall be constructed in accordance with Section 455 of the Specifications. Payment for the foundation and any other incidental items to furnish for installation complete CCTV structure shall be included in the pay item for the complete CCTV structure.

13. Except for anchor bolts, all bolt hole diameters shall be equal to the bolt diameter plus 7/32", prior to galvanizing. Hole diameters for anchor bolts shall not exceed the bolt diameter plus 1/4".

14. When the structure is fully loaded it shall be plumb.

15. The structure shall not be erected until the foundation concrete has been allowed to cure for a minimum of seven days.

LOWERING DEVICE NOTES:

1. Pole Top Tenon: A tenon shall be bolted to the pole top with mounting holes and slot as required for the mounting of the lowering device. The tenon shall be of dimensions necessary to facilitate lowering device component installation. Each slot shall be parallel to the pole centerline for mounting the lowering device.

2. All cables shall be secured in a manner that prevents them from interfering with or being damaged by the lowering cable that moves within the pole.

3. Lowering arm shall be mounted perpendicular to the roadway or as directed by the Engineer. The CCTV pole shall be positioned so that the camera can be safely lowered without requiring lane closures.

4. Pole shall include lowering device which includes top J-box, mounting hardware, lowering cable, contact block, waterproof electrical connectors, camera J-box, housing and steel pole.
ORIENTATION VIEW

Air Terminal (See Index 18102)

Handhole Shall Be Sized To Accommodate Lowering Device Equipment

Optional Grout Pad

DETAIL 1

Top Of Grade

Drilled Shaft

Double Nuts (Typ.)

WITH LOWERING DEVICE ELEVATION

WITHOUT LOWERING DEVICE ELEVATION

For Lowering Device Details (See Index 18110)

Cap Plate

Top Of Grade

See Index 18108 For Conduit

Steel CCTV Pole

07/31/07

18111
TENON DETAIL

Air Terminal (See Index 18102)

Tenon Bolted To Pole So The Rectangular Openings Are 30" From The Handhole Boxes

1" Lifting Hole

Plag Top Of Pole With Concrete A Minimum Depth Of 3"

WITH LOWERING DEVICE

Galv. Steel Handhole Box & Coverplate

2 - 2" Couplings With Caps Ø 180° To Handhole Box

Galv. Steel Handhole Box & Coverplate

1/2" Insert In Ctr. At Bottom Of Handhole Box - Pullout Strength 300 lbs.

1/2" Grd. Lug Grounded To Reinf. Cage

2 - 3" X 12" Conduit Entry Holes

Concrete

Varies Plugged Butt 1/2" Drain Hole

WITHOUT LOWERING DEVICE

Galv. Steel Handhole Box & Coverplate

2 - 2" Couplings With Caps Ø 180° To Handhole Box

Galv. Steel Handhole Box & Coverplate

1/2" Insert In Ctr. At Bottom Of Handhole Box - Pullout Strength 300 lbs.

1/2" Grd. Lug Grounded To Reinf. Cage

2 - 3" X 12" Conduit Entry Holes

Concrete

Varies Plugged Butt 1/2" Drain Hole

Not To Scale

CONCRETE CCTV POLE

2006 FDOT Design Standards

Image No. 07/01/07

Sheet No. 1 of 2
**SPECIFICATIONS:**

- **Pole Top:** 8½ Dia.
- **Pole Butt:** 10.18 X 1/4
- **Pole Topper:** 0.10 in./ft.
- **Pole Length:** "L" See Chart
- **Pole Weight:** "W" See Chart
- **Def/Spec:** 1' Max. In 30 mph (Non gust)
- **Max. Camera Dia.:** 5.68 Sq Ft. Total
- **Max. Camera Wgt.:** 240 lbs. Total

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<th>W&quot;</th>
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<tr>
<td>90</td>
<td>J</td>
<td>13,276 lbs.</td>
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</table>

**GENERAL NOTES:**

1. All cables shall be run in conduit to prevent them from interfering with or being damaged by the lowering cable that moves within the pole.

2. Lowering arm shall be mounted perpendicular to the roadway or as directed by the Engineer. The CCTV pole shall be positioned so that the dome enclosure can be safely lowered without requiring lane closures.

3. Pole shall include lowering device which includes top J-box, mounting hardware, lowering cable, contact block, waterproof electrical connectors, camera J-box, housing and concrete pole.


5. The contractor shall submit shop drawings and capacity calculations for the design of proposed poles, signed and sealed by a Professional Engineer licensed in the State of Florida, to the Engineer for review and approval.

6. Burial depth "D" and concrete foundation by engineering design. All designs, drawings, and calculations submitted must be signed and sealed by a Professional Engineer licensed in the State of Florida.
SECTION AA

GENERAL NOTES:

1. The contractor, with approval from the Engineer, may adjust the final burial depth of the conduit(s) in order to transverse nonmovable object conflicts.

2. Backfill with excavated material and compact the soil until firm and unyielding. Remove rock and debris from backfill material.

3. Where conduits are to be installed over existing underground structures (e.g., drain pipes or utility lines) which are less than 30" deep, the contractor shall encase the conduit in 2500 PSI Class I concrete for the entire length of conduit that is installed at a depth of less than 30".

4. If the amount of cover over the encasement is less than 6", the contractor shall install the conduit to pass below the underground structures (e.g., drain pipes).

5. Size and type of fiber optic conduits shall be shown on plans.

CONDUIT INSTALLATION DETAILS ACROSS EXISTING DRAIN PIPES OR UTILITIES

CONDUIT INSTALLATION TYPICAL DETAIL

Not To Scale
Concrete Apron

---

Fiber Conduit (As Shown In Plans)

Ground Rod (As Shown In Plans)

Secondary Fiber Conduit (As Req'd.)

Fiber Optic Boxes shall not be installed in roadways or driveways.

The fiber optic box shall be one of the products included on the Approved Product List. The legend "FDOT Fiber Optic Cable" shall be stamped on all covers.

Fiber optic boxes shall be installed flush with the finished grade surface.

Fiber optic box length (long side) shall be parallel to the roadway.

A pull wire shall be installed in the empty conduits for future use.

All splice boxes shall be provided with cable hanger racks designed to support cables and splice enclosures. Cost of racks to be included in cost of splice box.

Refer to Section 783 of the Standard Specifications for splice requirements.

8. Fiber optic boxes shall not contain electrical conduit or conductor. Electrical conduit and conductors shall be installed in separate boxes from each other.

9. Conduit center line shall be aligned to top edge of box to facilitate cable pulling.

10. All fiber optic boxes shall have 1'-0" wide (min.) x 6"

11. Fiber optic boxes shall meet FM 5-539 test procedure.

12. Refer to Section 783 of the Standard Specifications for box requirements.

13. All splices shall be properly weatherproofed.

14. The size and type of fiber optic communications conduit shall be shown on plans.

15. The use of ground rods shall be shown in the plans.
GENERAL NOTES:
1. AC wired cabinet shall be equipped with a surge protector with an alarm feature.
2. Equipment cabinet shall be located on DMS sign structure.
**Cabinet Layout**

1. Cabinet layout is for pole or base mounted installations.
2. All dimensions are approximate.
3. The minimum DMS cabinet dimensions shall be 36" H x 24" W x 22" D.
4. Conduit entrances are at bottom of cabinet.
5. Minimum number of duplex outlets is two: 1 TVSS protected and 1 GFI protected.
6. Either an access controller or local access panel shall be provided to provide full access to DMS sign for control, programming and troubleshooting.
7. Load center shall be rated for at least 100 amps 120/240 VAC, and with at least one main disconnect and 3 circuit breakers.

**General Notes**

- Power Distribution Assembly Service Entrance, Breakers, Primary 4C Filter, Terminal Blocks, Ground Bussbar TVSS Surge Protection
- Load Center Must Include Power Distribution Assembly Service Entrance, Power Filter, Main Breaker, Separate Circuit Breakers For Equipment Power And Convenience Outlets, Ground Blocks, Ground Bussbar And Terminal Blocks For Direct Connection To Protected Power Outlets
- 19" EIA Rack With Tapped 10-32 Threaded Holes

**Dimensions**

- Area To Remain Clear For Full Width And Depth
- Area Reserved For Access Controller Or Local Interface Panel
- Ethernet Switch And Terminal Server
- Preterminated Fiber Optic Patch Panel
- Power Strip
- Dual Fans
- Air Vent
- TVSS Protected Outlets For Communications Hardware

**Not To Scale**
GENERAL NOTES:

1. If no guardrail or barrier wall exists, structure shall be outside clear zone. Clear zone shall be measured to edge of drilled shaft if drilled shaft is more than 4" above adjacent grade.

2. Catwalk shall extend to outer edge of paved shoulder.

3. Clear zone distance and setbacks from edge of travel lane shall be in accordance with Plans Preparation Manual Volume I, Chapters 2 and 4.

TYPICAL PLAN VIEW
DMS CANTILEVER STRUCTURE

TYPICAL PLAN VIEW
DMS TRUSS STRUCTURE

TYPICAL ELEVATION VIEW
DMS WITH CANTILEVER STRUCTURE

TYPICAL ELEVATION VIEW
DMS WITH TRUSS STRUCTURE
GENERAL NOTES:

1. Cabinet may be pole or base mounted as shown on plans.

2. Fiber optic conduit size to be shown on plans.

Not To Scale
GENERAL NOTES:

1. Conductors for grounding shall be connected to steel framework that have been cleaned to base metal by use of bonding plates having contact area of not less than 8 square inches or by welding or brazing. Drilling and tapping the steel structure to accept a threaded connector is also an acceptable method.

2. If steel framework is to be drilled and tapped to accept threaded connector, the threaded connector shall have at least 5 threads fully engaged and secured with a jam nut to the steel framework.

3. Bends in the conduit with DMS communications cable (6-count single mode fiber optic cable) shall not be less than the manufacturer's minimum bending radius for the fiber optic cable.

4. No bend of lightning conductor shall form an included angle of less than 90 degrees, nor shall it have a radius of bend less than 8 inches.

5. Catwalk and handrail design and installation shall comply with AISC, AASHTO, and OSHA requirements as applicable.

6. All data, coaxial and power cable for the DMS shall be completely concealed.

7. Structural attachment of DMS sign to structure is responsibility of contractor.

8. Columns shall project above the top of the DMS sign. Lightning protection shall conform to NFPA 780.
Minimum Tin-Plated Bore Solid Copper Wire To Ground Rods B, C, and D As Required.

3 AWG Tin-Plated Bare Solid Copper Ground Wire Bond To All Air Terminals And Ground Rod With Exothermic Weld In 3/4" RGS Conduit.

6 AWG Tin-Plated Bare Solid Copper Ground Wire To Electrical Service Grounding Conduit (1/2" PVC)

See Index 18305

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Not To Scale

2008 FOOT Design Standards

DMS GROUNDING DETAILS

Index No. 18305
GENERAL NOTES:

1. All grounding materials shall meet the requirements of Section A620 of the current Minimum Specifications for Traffic Control Signal Devices (MSTCSDL), except as noted.

2. All ground rod resistance readings shall be performed as per Standard Specification 785-2.3.4. Submit data sheets to the Engineer.

3. Exothermically weld all connections to ground rods.

4. The contractor may, upon approval of the Engineer, install a 30-foot sectional ground rod for instances when conditions will not allow for the installation of the 3 auxiliary ground rods.

5. Install marker tape directly above all grounding electrodes and conductors.

6. All RS232 coaxial and power cable to the DMS shall be completely concealed.

7. Copper flat surfaces shall be bolted, welded, or brazed securely to framework to maintain electrical continuity.

8. All air terminals must meet UL-964.

9. Grounding system shall be placed within right of way.

10. See Index 18102 for ground rod placement detail.
**BEAM NOTES**

1. Allow dimensions are out-to-out.
2. Place one (1) Bar 4K or 5K or 52 at each location as detailed alternating the direction of the ends for each beam.
3. Bars 4L shall be bent prior to the beam leaving the prestressing yard. Bars 4L shall parallel to the ends of the beams.
4. Caution should be used with bars 4L in the ends of exterior beams to assure the bent portion of the bar is properly oriented so that the bar will be imbedded in the diaphragm concrete.
5. Strands shall either ASTM 4145, Grade 200 or Grade 270, seven-wire strands 3/8" or larger, stressed to 10,000 lbs. each.
6. Unless otherwise noted, the minimum concrete cover for reinforcing steel shall be 2".
7. At option of the Contractor, deformed deformed wire fabricated may be used in lieu of Bars 3D, 4K, 5K, 4L, and 52 except as noted below provided the wire have the same sizes and spacing match those shown on the Standard Beam Details sheet for these bars. In this event, Bars 4K or 5K may be fabricated with the omission of the lower outstanding tag provided the lower outstanding tag is placed welded at the lower end of the beam. The higher (lower) wires shall be located one from the end of Bars 4K or 5K and 52 and the second wire 2 minimum from the first wire, but no less than 14 of the beam depth from mid-depth of the beam. In addition, Bars 52 may consist of pairs of bars with the outer one equal to or greater than the single bar. Welded deformed wire sheet conform to ASTM A497.
8. Inserts: Safety Sleeves, 100 - from ends of beam and spaced on 8" - 0" (Max.) centers. SMA Bars 4K or 5K locally to allow placement. Safety Sleeves shall be: 2 25/64" NPS x 5/8" SCH. 80 PVC Pipe with Cap for Type III, IV, VI, TTF72 and TTF78 Beams: 1 3/4" NPS x 5/8" SCH. 40 PVC Pipe with Cap for Type V, VI Beams.
9. Holes shall be free of debris and water prior to casting deck.
10. Bars 4M, 4M2 and 4M3 are applicable to AASHTO Beam Types V and VI and Florida Bulb-Ts.

**INSTRUCTIONS TO DESIGNER**

To limit bursting forces the maximum prestress force at the beam ends from fully bonded strands must be limited to the following:

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<thead>
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<th>Beam Type</th>
<th>Max Bonded Prestress Force</th>
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<tbody>
<tr>
<td>AASHTO Type II</td>
<td>975 Kips</td>
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<tr>
<td>AASHTO Type III</td>
<td>1100 Kips</td>
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<td>AASHTO Type IV</td>
<td>1470 Kips</td>
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<td>AASHTO Type V</td>
<td>1630 Kips</td>
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<td>Florida Bulb-T T2</td>
<td>1700 Kips</td>
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**INSERT NOTES**

1. Insert shall be 1 1/16" primary deformed, ferrule wing nut, UNC threads, 1/2" minimum gage wire, not more than 4" in depth and shall have a minimum ultimate tensile strength of 14,400 lbs. in 4,000 psi concrete.
2. Inserts are not required across beam webs, an assembly as long as the weakness of the beam web, consisting of two (2) Ferrule inserts attached by two (2) more or more may be utilized. The connecting struts shall have a minimum ultimate tensile strength of 14,400 lbs.
3. Inserts for diaphragm reinforcing are required at each end of each intermediate diaphragm shown on the Beam Framing Plan. See Superstructure and Beam Framing Plans for longitudinal location of inserts for each face of beam.

**SECTION THRU BEAM WEB AT INSERT FOR DIAPHRAGM REINFORCING**

(When Intermediate Diaphragms are Required by Design)

**2006 FDOT Design Standards**

**Typical AASHTO and BULB-T Beam Details and Notes**

**Sheet No.**

20110

07/15/05

1 of 1
BENDING DIAGRAMS (See Note 1)

BARS 3D1 & 3D2 BARS 4K & 5Z

NOTES:
Mark this Index with Index No. 20130 - Typical AASHTO and Bulb-T Beam Details and Notes and the AASHTO Type III Beam - Table of Beam Variables in Structures Plans.

For referenced notes, see Index No. 20110.

For Dimensions L, R, V1 thru V4 and number of spaces S1 thru S4, see AASHTO Type III Beam - Table of Beam Variables.
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)

- Bars 5Y (Bundled with Bars 5K & 5Z)
- Bars 4L (Typ.)
- Bars 3D (Typ.)
- Bars 5K (Typ.)
- Bars 5A & Strands N

END VIEW

SECTION A-A
(Showing Bars 5K, 5Y & 5Z Only)

BAR S 5K & 5Z

BARS 3D & 3D2

BARS 5K & 5Z

END 1

ELEVATION

AASHTO TYPE VI BEAM - STANDARD DETAILS

BILL OF REINFORCING STEEL
FOR ONE BEAM ONLY

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BENDING DIAGRAMS (See Note 1)

NOTES:

- Work this Index with Index No. 20110 - Typical AASHTO and Bulb-T Beam Details and Notes
- the AASHTO Type VI Beam - Table of Beam Variables in Structures Plans
- For referenced notes, see Index No. 20110.
- For Dimensions L, R, VI thru V4 and number of spaces S1 thru S4, see AASHTO Type VI Beam - Table of Beam Variables.
BEAM CAMBER AND BUILD-UP NOTES:
The build-up values given in the table are based on theoretical beam cambers. The Contractor shall monitor beam cambers for the purpose of predicting camber values at the time of the deck pour. If the predicted cambers based on field measurements differ more than \( \pm \frac{1}{4}'' \) from the theoretical "Net Beam Camber @ 20 Days" shown in the table, modify the build-up dimensions as required. When the measured beam cambers create a conflict with the bottom mat of deck steel, notify the Engineer a minimum of 21 days prior to casting.

DIM "A" includes the weight of the Stay-In-Place Formwork.

INSTRUCTIONS TO DESIGNER:
Although not shown here in the Diagrams or Notes, the effect of Horizontal Curvature, when present, needs to be considered for the Build-up Calculations.

NOTE:
Work this Index with the Build-up and Deflection Data Tables for AASHTO and Bulb-T Beams in Structures Plans.
DIM. B is 1'-6" for Florida U 48 and 54 Beams and 2'-0" for Florida U 63 and 72 Beams. (P = 0.0)

**CONDITION 1**

Concrete face may be sloped with a maximum 1/24 draft to facilitate formwork removal.

**CONDITION 2**

Showing Vertical Bevel of Beam End

**CONDITION 3**

SCHEMATIC END ELEVATIONS OF BEAMS

---

**SCHEMATIC PLAN VIEWS AT BEAM ENDS**

CASE 1

CASE 2

CASE 3

**NOTE:**

Work this Index with Florida U Beam - Table of Beam Variables in Structures Plans.
**Beam Notes**

1. All bar dimensions are out-to-out.

2. Strands N (Dormont Strands) shall be either ASTM A416, Grade 250 or Grade 270, seven-wire strands 5/32" or larger, stressed to 10,000 lbs, each.

3. Unless otherwise noted in Structures Plans, the minimum concrete cover for reinforcing steel shall be 2"

4. At option of the Contractor and with the Engineer’s approval, deformed welded wire fabric may be used in lieu of Bars 6A, 4A2, 5B, 4C, 3D, 5E, 4F, 4G, 4H, 5K, 5L and 4M, provided the wire sizes and spacing match those shown on the Standard Beam Detail sheets for these bars. Welded wire fabric shall conform to ASTM A497.

5. Place 2" x 5/8" PVC Sch. 40 Safety Sleeve with cap in both top flanges spaced on 8'-0" (Max. centers). Holes shall be free of debris and water prior to casting deck.

6. For Beams with vertically beveled end conditions when "DIM. P" exceeds 1", Bars 5E and the first Bars 4F and 5K shall be placed parallel to the end of the beam. The remaining Bars 4F and 5K within the limits of "DIM. P" shall be fanned at equal spaces.

7. Welded deformed wire fabric shall not be used for the end reinforcement (Bars 5B, 4C, 30, 5E, 4F, 5K, and 5L) for beams with skewed end conditions or vertically beveled end conditions when "DIM. P" exceeds 1".

8. Bars 5K shall be placed and tied to the fully bonded strands in the bottom row (see "strand Pattern" in Structures Plans).

9. Strand Protection at beam ends shall consist of a 2" deep recess formed around all strands (including dormant) or strand groups. Extend recess to face of web and bottom of flange for bottom row of strands. After detensioning, cut strands from recessed surface and fill recess with a Type F-2 Epoxy Compound in accordance with Section 926 of the Specifications.

10. The Contractor shall evaluate the need for temporary blocking between U Beams, based on the selected deck forming system and concrete placement sequence. In addition, timber blocking shall be placed beneath the exterior face of the webs at the beam ends of all beams, prior to deck casting. Blocking shall be left in place for at least 4 days after deck casting and afterwards removed at the Contractor’s convenience.

11. For referenced Dimensions, Angles and Case Numbers see Table of Beam Variables in Structures Plans.

12. The Contractor shall use Size No. 67 maximum sized aggregate.

13. Stay-in-Place metal deck forms shall be used inside the beams.

**Instructions to Designer**

To limit Bursting Forces, the maximum prestress force at beam ends from fully bonded strands must be limited to the following:

<table>
<thead>
<tr>
<th>Beam Type</th>
<th>Max. Bonded Prestress Force</th>
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<tr>
<td>Florida U48 &amp; U54</td>
<td>2740 Kips</td>
</tr>
<tr>
<td>Florida U63 &amp; U72</td>
<td>3070 Kips</td>
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</table>

No losses shall be applied when calculating the Bonded Prestress Force. The reinforcing in the ends of the beams must not be modified without the approval of the State Structures Design Engineer.

**Note:** Work this Index with Florida U Beam – Table of Beam Variables in Structures Plans.
1. Drains shall be placed adjacent to each web of each beam and (four drains per beam). Drain Pipe shall be 2" Nominal Pipe Size, Schedule 80 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Plug to be removed from the inside after casting. Galvanized screen wire shall cover the inside of the pipe and bend down around the sides of the pipe, a minimum of 1" and secured prior to casting.

2. Concrete face may be sloped with a maximum 1:24 draft to facilitate formwork removal.

SPACING BARS 5E (Along 1/2" Chamfer)
(Bars 4F and 4M are Pared with Bars 5K as shown)

END VIEW AT END DIAPHRAGM
(Bar 3D2 Not Shown For Clarity)
**TOP VIEW OF INTERMEDIATE DIAPHRAGM**

**SECTION AT INTERMEDIATE DIAPHRAGM**

**NOTES:**
1. Drains shall be placed adjacent to each web at each intermediate diaphragm. Two drains per intermediate diaphragm. Drain pipes shall be 2" nominal pipe size. Schedule 80 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting.  
   Plugs to be removed from the inside after casting.
2. Concrete face may be sloped with a maximum 12" c.g. draft to facilitate formwork removal.
3. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing beam from casting bed.
### TYPICAL SECTION

- **Beam**: Spacing Bars 3K (Typ.) 5K
- **Strand N**: Spacing Bars 4M (Typ.)
- **Bars 3K** (Typ.)
- **Bars 4K** (Typ.)
- **Bars 5K** (Typ.)
- **Bars 4A2** (Typ.)
- **Bars 4C** (Typ.)
- **Bars 6A1** (Typ.)
- **Bars 6A2** (Typ.)
- **Bars 5L**

### Notes:
- Work this Index with Index No. 20220 - Typical Florida U Beam Details and Notes and the Florida U Beam - Table of Beam Variables in Structures Plans.
- For referenced notes see Index No. 20220.

### ELEVATION AT END OF BEAM

- **Bars 4M** (Typ.)
- **Bars 5K** (Typ.)
- **Bars 6A1** (Typ.)
- **Bars 6A2** (Typ.)
- **Bars 5L**

### Reinforcing steel is symmetrical about Beam for Half Sections A-A and B-B.

### Intermediate Diaphragms are provided:
1. At mid-span.
2. At 20' 0" max. from mid-span when beam length (L) exceeds 60 ft.

### Design Standards

**FLORIDA U 54 BEAM - STANDARD DETAILS**

**ELEVATION**

<table>
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<th>Notes</th>
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</tr>
<tr>
<td>B</td>
<td>Bars 4K (Typ.)</td>
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</tbody>
</table>

**ELEVATION AT END OF BEAM**

**Standard Details**

- **Bars 6A1**, 4A2, and Strand N are not shown for Bars 5K.

**Beam**: Spacing Bars 3K - Bars 4M had to Bars 5K, not shown.

**Symmetrical about & top of beam**

**End Face**

**Direction of Stationing**

**Bars 5K (Typ.)**

**Intermediate Diaphragm**

**Symmetrical about & top of beam**

**Spacing Intermediate Diaphragm**

**Symmetrical about & top of beam**

**Begin or end Bars 4M** (see "ELEVATION AT END OF BEAM" above)
END VIEW AT END DIAPHRAGM

SECTION C-C

NOTES:
1. Drains shall be placed adjacent to each web at each beam end (four drains per beam). Drain Pipe shall be 2" NPS Schedule 40 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Plugs to be removed from the inside after casting. Galvanized screen wire shall cover the end of the pipe and bent down around the sides of the pipe, a minimum of 1" and secured prior to casting.
2. Concrete face may be sloped with a maximum 1/24 draft to facilitate formwork removal.

TOP VIEW OF SKewed END DIAPHRAGM
AND STIRRUP TRANSITION ZONE
(Bars 3D1 and 3D2 Not Shown For Clarity)
NOTES:
1. Drains shall be placed adjacent to each web at each intermediate diaphragm (two drains per intermediate diaphragm). Drain pipe shall be 2" Nominal Pipe Size, Schedule 80 PVC. Provide removable plug plugs to prevent concrete entrance during beam casting. Plugs to be removed from the inside after casting.
2. Concrete face may be sloped with a maximum 1/24 draft to facilitate formwork removal.
3. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing beam from casting bed.

SEC AT INTERMEDIATE DIAPHRAGM

BILL OF REINFORCING STEEL FOR ONE BEAM ONLY

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SEC D-D

FLORIDA U 54 BEAM - STANDARD DETAILS

Revision 07/01/05
Sheet No. 3 of 3

2006 FDOT Design Standards

FLS 20254
TYPICAL SECTION

**NOTES:**

- Work this Index with Index No. 20240 - Typical Florida U Beam Details and Notes and the Florida U Beam - Table of Beam Variables in Structures Plans.
- For referenced notes see Index No. 20200.

**ELEVATION AT END OF BEAM**

1. **End Face (Typ.)**
   - Bars 301 and 302 - 16 sp. @ 6" sp. with Bars 5K as shown
   - Bars 442 - 17 sp. @ 6" sp. @ 3"
   - Strand Blockout (See Note 5)
   - Drain Pipe
   - Bars 5K
   - Bars 4A2

2. **Intermediate Diaphragms**
   - Bars 301 and 302 - 16 sp. @ 6" sp. with Bars 5K as shown
   - Strand Blockout (See Note 5)

**BEAM**

- **Spacing Bars 5K (In Pairs) 20210**
- **Spacing Bars 4M (In Pairs)**
- **Spacing Bars 4F 20210**
- **Spacing Bars 4A 20210**
- **Spacing Bars 3Dl and 3D2 20210**
- **Spacing Bars 6Al**

**ELEVATION**

- **Spacing Bars 5K (In Pairs) 20210**
- **Spacing Bars 4M (In Pairs)**
- **Spacing Bars 4F 20210**
- **Spacing Bars 4A 20210**
- **Spacing Bars 3Dl and 3D2 20210**
- **Spacing Bars 6Al**
NOTES:
1. Drains shall be placed adjacent to each web at each beam end (four drains per beam). Drain Pipe shall be 2" Nominal Pipe Size, Schedule 80 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Provide removable pipe plugs to be removed from the inside after casting. Galvanized screen wire shall cover the end of the pipe and bent down around the sides of the pipe, a minimum of 1" and secured prior to casting.
2. Concrete face may be sloped with a maximum 1:24 draft to facilitate formwork removal.

END VIEW AT END DIAPHRAGM

SECTION C-C

END VIEW OF SKEWED END DIAPHRAGM AND STIRRUP TRANSITION ZONE
(Bars 3D2 Not Shown For Clarity)
**NOTES:**

1. Drains shall be placed adjacent to each web at each intermediate diaphragm (two drains per intermediate diaphragm). Drain Pipe shall be 2" Nominal/Pipe Size, Schedule 80 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Plugs to be removed from the inside after casting.

2. Concrete face may be sloped with a maximum [2/4 draft to facilitate formwork removal.

3. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing beam from casting bed.

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**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

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| K    | 5    | See Table 3'-11"
| L    | 5    | 26               |
| M    | 4    | See Table 3'-11"
| N    | 5/8" & Strand 2 | 2                |

See Table 4'-6" (Min. Lap Splice = 2'-7"

See Table 4'-6" (Min. Lap Splice = 1'-4"

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See Table 4'-6" (Min. Lap Splice = 1'-4"
**TOP VIEW OF INTERMEDIATE DIAPHRAGM**

- Bars 4G
- Bars 5K
- Bars 4M

**SECTION AT INTERMEDIATE DIAPHRAGM**

- Bars 4G
- Bars 5K
- Bars 4M

**NOTES:**

1. Drains shall be placed adjacent to each web at each intermediate diaphragm. (Two drains per intermediate diaphragm). (See Table 2.1) Three drains shall be placed adjacent to each web at each intermediate diaphragm. Schedule 40 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Drains to be removed from the inside after casting.

2. Concrete face may be sloped with a maximum 2:14 draft to facilitate formwork removal.

3. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing beam from casting bed.

**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

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**SECTION D-D**

- Bars 5B
- Bars 5E
- Bars 6AI, 44A2 and 302

**FLORIDA U 72 BEAM - STANDARD DETAILS**

**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

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**SECTION D-D**

- Bars 5B
- Bars 5E
- Bars 6AI, 44A2 and 302

**NOTES:**

1. Drains shall be placed adjacent to each web at each intermediate diaphragm. (Two drains per intermediate diaphragm). (See Table 2.1) Three drains shall be placed adjacent to each web at each intermediate diaphragm. Schedule 40 PVC. Provide removable pipe plugs to prevent concrete entrance during beam casting. Drains to be removed from the inside after casting.

2. Concrete face may be sloped with a maximum 2:14 draft to facilitate formwork removal.

3. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing beam from casting bed.
BUILD-UP DIAGRAM FOR TANGENT SPANS (ALONG FLANGE) (CASE 1)

BUILD-UP DIAGRAM FOR SAG VERTICAL CURVE SPANS (ALONG FLANGE) (CASE 2)

BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS - CONTROL AT SPAN (ALONG FLANGE) (CASE 3)

BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS - CONTROL AT BEGIN OR END SPAN (ALONG FLANGE) (CASE 4)

NOTE: Work this Index with the Build-up and Deflection Data Table for Florida U Beams in Structures Plans.

INSTRUCTIONS TO DESIGNER:

Although not shown here in the Diagrams or Notes, the effect of Horizontal Camber, when present, needs to be considered for the Build-up Calculations.

BUILD-UP OVER BEAMS (LOOKING AHEAD STATION)

dead Load Deflection Diagram (Along & Beam)

BEAM CAMBER AND BUILD-UP NOTES:

The build-up values given in the table are based on theoretical beam cambers. The Contractor shall monitor beam cambers for the purpose of predicting camber values at the time of the deck pour. If the predicted cambers based on field measurements differ more than +/- 1/2" from the theoretical "Net Beam Camber @ 120 Days" shown in the table, modify the build-up dimensions as required. When the measured camber and cambers create a conflict with the bottom mat of deck steel notify the Engineer a minimum of 21 days prior to casting.

DIM "A" includes the weight of the Stay-In-Place Formwork.

The build-up values given in the table are based on theoretical beam cambers. The Contractor shall monitor beam cambers for the purpose of predicting camber values at the time of the deck pour. If the predicted cambers based on field measurements differ more than +/- 1/2" from the theoretical "Net Beam Camber @ 120 Days" shown in the table, modify the build-up dimensions as required. When the measured camber and cambers create a conflict with the bottom mat of deck steel notify the Engineer a minimum of 21 days prior to casting.

DIM "A" includes the weight of the Stay-In-Place Formwork.

INSTRUCTIONS TO DESIGNER:

Although not shown here in the Diagrams or Notes, the effect of Horizontal Camber, when present, needs to be considered for the Build-up Calculations.
BEAM NOTES

1. Allbar dimensions are out-to-out.
2. Place two (2) Bars 5D at each end, and then one (1) Bar 4K each location as detailed alternating the direction of the ends for each bar (see ELEVATION AT END OF BEAM).
3. Bars 4L shall be bent prior to the beam leaving the prestressing yard. Bars 4L shall be bent parallel to the ends of the beams.
4. Caution should be used with Bars 4L in the ends of exterior beams to assure the bent portion of the bar is properly oriented so that the bar will be embedded in the diaphragm concrete.
5. Strand fi shall be either ASTM A416 Grade 250 or Grade 270, seven wire strands 3½” or larger, stressed to 20,000 lbs.
6. Unless otherwise noted, the minimum concrete cover for reinforcing shall be 2”.
7. At option of the Contractor, welded deformed wire fabric may be used in lieu of Bars 3D, 4K and 4L except as noted below for skewed end conditions. The wire sizes and spacing shall match those shown on the Standard Beam Details sheet for these bars. In this event, Bars 4K may be fabricated with the omission of the lower outstanding leg provided that two longitudinal wires are placed (welded) at the lower end of the bar. The first (lower) wire shall be located 1” from the end of Bar 4K and the second wire 2” minimum from the first wire, but no less than 3½” of the beam depth from mid-depth of the beam. Welded wire fabric shall conform to ASTM A497 when welded deformed wire fabric is used, and Bars 52 shall remain conventional reinforcing.
8. For beams with skewed end conditions, welded deformed wire fabric shall be used in the ends of beams within the limits of Bars 3D. The end reinforcement, defined as Bars 3D2, 3D, 4K, and 52 placed within the limits of the spacing for Bars 3D (approximately 1½ times the overall beam depth) in ELEVATION AT END OF BEAM, shall be placed parallel to the skewed end of the beam. Bars 4K located beyond the limits of Bars 3D shall be placed perpendicular to the longitudinal axis of the beam. Placement of Bars 3D2 and 3D correspond to Dimensions 1 and 3 respectively, as shown in the beam ELEVATION. For Bars 3D and 3D2, Dimension 8 and the overall length shall be adjusted to fit the width of the beam flanges measured parallel to the skew.
9. Bars 4K and 52 shall be placed and tied to the fully bonded strands (see STRAND PATTERNS).
10. Bars 3D shall be bent around a 1” diameter pin.
11. For framing and Paneling Details, see Structures Plans.
12. For Camber and Build-Up Details, see Structures Plans.
13. For referenced Dimensions, Angles and Case Numbers see Inverted-T Beam - Table of Beam Variables in Structures Plans.
14. For thickened decks (see Traffic Railing and Parapets, Inc) provide the deck thickness shown in the Structures Plans.

INSTRUCTIONS TO DESIGNER:

To limit Bending Forces, the maximum prestress force at beam ends from fully bonded strands is limited to 350 Kips. No losses shall be applied when calculating the Bonded Prestress Force.

The reinforcing in the ends of the beams must not be modified without the approval of the State Structures Design Engineer.
**INSTRUCTION TO DESIGNER:**
The bottom of the "X" dimension shall be 1'-8" below the mud line.

The tip elevation of Concrete Sheet Piles shall be determined by the Geotechnical Engineer.

**SHEET PILE DESIGN CRITERIA AND NOTES**

**DESCRIPTION:**
Design Standards Index Series No. 20400 include details for three types of piles with two thicknesses. Types "B" and "C" piles (corner piles) are of reinforced concrete construction, and Type "A" is of prestressed concrete construction. The piles shall be manufactured, cured, and installed in accordance with the requirements of the contract documents.

**MATERIALS:** (for materials not listed refer to the Specifications)

**CONCRETE**
- Class: V (Special) for slightly and moderately aggressive environments
- Unit weight: 150 psi
- Modulus of Elasticity: Based on the use of Florida limerock concrete

**REINFORCING STEEL**
- Grade: ASTM A615

**PRESTRESSING STEEL**
- Grade: 270,000 psi (Low-Relaxation Strand)

**DESIGN PARAMETERS**

Type "A" Concrete Compressive Strength at release of prestressing:
- 4000 psi minimum
- Uniform compression after prestressing:
- 1000 psi minimum
- Pick-up, Storage and Transportation:
- 0.0 psi tension with 1.5 times pile self weight

Types "B" & "C" Pick-up, Storage and Transportation:
- Minimum compressive strength required.

**ENVIRONMENT**
The pile designs are applicable to all environments.

**PLASTIC FILTER FABRIC**
The plastic filter fabric shall extend to the bottom of the "X" dimension.

**PILE PICK-UP AND HANDLING**
Type "A" Pick-up of pile may be either a single point pick-up or a two point pick-up as shown below.
- Types "B" & "C": Two point pick-up for lifting out of forms & two point support for storage & transportation. Single point pick-up for installation only.

**PILE FIT-UP**
The 2'-6" Sheet Pile dimension is nominal. This dimension may be shortened by the Manufacturer to 2'-5½" to allow for Sheet Pile fit-up in its final position. Minimum Sheet Pile width is 2'-5½". No changes shall be made to the tongues or grooves.
1. Work this Standard with Index No. 20400.
2. Intermediate Prestress Strands not shown in Elevations and Sections.
3. All bar dimensions are out-to-out.
4. Bars A are #5 and Bars S are #4.
5. At the Contractor's option Bars S may be fabricated as a two piece bar as shown in the Bar Bending Diagram.
6. The Contractor may use Deformed Welded Wire Reinforcement conforming to specification ASTM A497 in lieu of Bars A and Bars S if the wire size and spacing provide the same area of reinforcing steel per foot as the Bars shown.
7. For Dimensions L and X see Sheet Pile Data Table in Structures Plans.
TYPICAL PILE

SPACED at 1'-0" Maximum
6 spa. @ 4" 3/4" Spacing for Bars S

STARTER PILE

SPACED at 1'-0" Maximum
6 spa. @ 4" 3/4" Spacing for Bars S

<table>
<thead>
<tr>
<th>STRAND DIA. (in.)</th>
<th>MAXIMUM (in.)</th>
<th>n</th>
<th>TOTAL # OF STRANDS</th>
<th>SECTION MODULUS (ksi.)</th>
<th># STRESS (ksi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>31'-0&quot;</td>
<td>7</td>
<td>16</td>
<td>T20</td>
<td>1160</td>
</tr>
<tr>
<td>0.6</td>
<td>50'-0&quot;</td>
<td>5</td>
<td>4</td>
<td>T20</td>
<td>1160</td>
</tr>
</tbody>
</table>

* Unit Prestress after losses.

NOTES:
1. Work this Standard with Index No. 204420.
2. Intermediate Prestress Strands not shown in Elevations and Sections.
3. All dimensions are cut-to-out.
4. Bars 4 are #5 and Bars 5 are #4.
5. At the Contractor's option Bars S may be fabricated as a two piece bar as shown in the Bar Bending Diagram.
6. The Contractor may use Deformed Welded Wire Reinforcement conforming to specification ASTM A497 in lieu of Bars A and Bars S if the wire size and spacing provide the same area of reinforcing steel per foot as the Bars shown.
7. For Dimensions L and X see Sheet Pile Data Table in Structures Plans.
BEARING PAD NOTES:

Neoprene in all bearing pads shall have Grade 50 durometer hardness.

Steel Plates in bearing pods shall conform to ASTM A36 Grade 36. Type J.

Variations in pad dimensions will be allowed provided the revised pads meet the Specifications, meet the requirements of this index, and are approved by the Engineer.

For beam grades less than or equal to 2/3, finish the Beam Seat parallel to the bottom of the beam. For beam grades greater than 2/3, finish the Beam Seat level and provide Beveled Bearing Plates.

See Bid Item Notes for quantities of Type A and/or B Bearing Pods.

Work this sheet with Index No. 20501 – Beveled Bearing Plate Details when beveled bearing plates are required. See TABLE OF BEAM VARIABLES on Beam Sheets for locations where bearing plates are required.
PLAN VIEW OF TYPICAL SINGLE BEARING

$0^\circ \leq \text{Skew} \leq 15^\circ$ shown, $\text{Skew} = 0^\circ$ Similar

PLAN VIEW OF TYPICAL DOUBLE BEARING

$0^\circ < \text{Skew} \leq 15^\circ$ shown, $\text{Skew} = 0^\circ$ Similar

NOTES:

1. Work this sheet with the BEVELED BEARING PLATE DATA TABLE in the plans.
2. Beveled Bearing Plates A with Embedded Bearing Plates B are required for beams only as scheduled in the TABLE OF BEAM VARIABLES on Beam Sheets.
3. Hot-dip galvanized Bearing Plates A & B other than fabrication except Galvanized Caps may be welded in place after hot-dip galvanizing. Unibearing Plates A and B are also an assembled unit, the Bearing Plate A only. DR&D void holes perpendicular to bottom of Plates A and prior to plates being galvanized (ASTM A 449).
4. Provide Electro-galvanized Countersunk Head Screws in accordance with ASTM A 123. Type I. Provide screws long enough to maintain a $\frac{2}{7}$ minimum embedment into Embedded Bearing Plate A and Galvanized Caps. Provide Galvanized Caps with $\frac{1}{2}$ min. to $\frac{2}{7}$ max. height and nominal $\frac{1}{2}$ inside diameter.
5. Include the cost of Beveled Bearing Plates in the pay item for Prestressed Beams (Florida U-Beams).
6. For Dimensions C and D, see BEVELED BEARING PLATE DATA TABLE in the Structures Plans. For Dimensions J, K and K1, see "TABLE OF BEAM VARIABLES" on Beam Sheets.
7. All details and dimensions shown are along $\text{Beam}$ for single bearings or $\text{Plate}$ for double bearings, except for dimensions to $\frac{1}{2}$dia. Screws and $\frac{1}{2}$diala. Anchor Studs, which are along $\text{Beam}$ for single bearings or $\text{Plate}$ for double bearings, except for dimensions to $\frac{1}{2}$dia. Screws and $\frac{1}{2}$diala. Anchor Studs. Positive Slope shown, Negative Slope similar.
8. When Skew = 0, dimensions for Embedded Bearing Plate A are $D \times C \times 55^\circ$ and for Beveled Bearing Plate B are $D \times C \times 55^\circ$. Min.

DETAIL "A"
NOTES AND DETAILS FOR SQUARE PRESTRESSED CONCRETE PILES

TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS

<table>
<thead>
<tr>
<th>D (Square Pile Size)</th>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>14</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
<tr>
<td>16</td>
<td>2, 3, or 4 point</td>
<td>3 Point</td>
</tr>
<tr>
<td>18</td>
<td>2, 3, or 4 point</td>
<td>3 Point</td>
</tr>
<tr>
<td>20</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
<tr>
<td>22</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
<tr>
<td>24</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
<tr>
<td>26</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
<tr>
<td>28</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
<tr>
<td>30</td>
<td>2, 3, or 4 point</td>
<td>4 Point</td>
</tr>
</tbody>
</table>

NOTES:
- Pick-up Points shall be marked at the pick-up points to indicate proper points for attaching handling lines.
- Reinforcing steel shall be Grade 60, except that spiral ties shall be manufactured from cold-drawn steel wire meeting the requirements of ASTM A82.
- Prestressing steel shall be 7-wire strand, Grade 270 or 250 as noted.
- SR = Stress Relieved Strand
- LRS = Low-Relaxation Strand

DESIGN SPECIFICATIONS:

DESIGN PARAMETERS:
- Square Prestressed Concrete Section: Designed for 1,000 psi uniform compression after prestress losses without loads.
- Pick-up, Storage, and Transportation: 0.0 psi tension using a factor of 1.5 times pile self weight.

SPIRAL TIES:
- Each wrap of spirals shall be tied to at least two corner strands. One turn required for spiral splices.

CONCRETE CLASS:
- Concrete for square piles shall be Class V (Special) except designated High Capacity Piles shall be Class VI.
- Concrete for the High Capacity Collar Splice shall be Class V (Special).

CONCRETE STRENGTH:
- The pile cylinder strength shall be 6,000 psi minimum at 28 days and 4,000 psi minimum at time of transfer of the Prestressing Force. The cylinder strength for designated High Capacity Piles shall be 8,500 psi minimum at 28 days and 6,500 psi minimum at time of transfer of the Prestressing Force.

SPICE BONDING MATERIAL:
- The material to fill dowel holes and form the joint between pile sections shall be a Type B Epoxy Compound in accordance with Section 926 of the Specifications and shall be contained on the Qualified Products List (QPL). Use Epoxy Bonding Compound or Epoxy Mortar as recommended by the Manufacturer. For Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.

PRESTRESSED CONCRETE PILE NOTES:
- Prestressed Concrete Pile Details can be found in the Structures Plans for any specific locations where the use of Silica Fume is required.
1. For Sections D-D, E-E, F-F see Index Nos. 20612, 20614, 20618, 20620, 20624 or 20630; for applicable concrete pile size.

2. Prestressing strands, spirals and/or reinforcement are not shown for clarity.

3. In cases where pile splices are desired due to length limitations in shipping and/or handling, the "Drivable Preplanned Prestressed Precast Splice Detail" shall be used. Mechanical/Pre Splices contained on the Qualified Products List (QPL) may also be used.

4. When preformed dowels holes are utilized, the 18" spiral pitch shall be continued to 4'-0" below the head of the pile, and the preforming material shall be removed. See Index Nos. 20618, 20620 & 20624.

NOTE S: Square Prestressed concrete pilesplice detail.
Tip of Pile

Prestressing Strands (Strand pattern varies)

Provide one (1) 3/8" vent hole (near Pile) on two (2) opposite faces of pile.

Antenna (centered over Top Gauge)

Antenna (centered over Top Gauge)

ELEVATION

Attach Tip Gauge extension cable to underside of strand one down from top corner strand using nylon wire ties every 6 ft. maximum.

SECTION A-A
(Strand Pattern with odd number of strands per face)

Tip Gauge

Tip Gauge

18" @ Void
(30" Pile only)

3" Cover
(Typ.)

D/2

Antenna

Tip Gauge

Top Gauge

30" Pile only

I

Antenna

Tip Gauge

Top Gauge

30" Pile only

I

SECTION B-B
(30" Pile only)

18" @ Void

3" Cover
(Typ.)

D/2

ANTENNA TOP VIEW

DataPort Interface Cable (to radio module assembly)

Bottom surfaces of enclosure to be epoxy coated just prior to concrete casting per manufacturer's installation procedures.

ANTENNA SIDE VIEW

ANTENNA END VIEW

Work this sheet with Index No. 20628 for 18" square piles,
Index No. 20624 for 24" square piles,
Index No. 20630 for 30" square piles.

3008 FOOT Design Standards
**ALTERNATE STRAND PATTERNS**

- 4 ~ 0.6" Ø, Grade 270 LRS, at 44 kips
- 8 ~ 0.5" Ø, Grade 270 LRS, at 23.3 kips
- 4 ~ 0.6" Ø, Grade 250 SR, at 24.4 kips
- 12 ~ 0.5" Ø, Grade 270 LRS, at 17.2 kips
- 12 ~ 0.5" Ø, Grade 270 SR, at 15.6 kips

**NOTE**

Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:

- Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
- The total strand pattern shall be concentric with the nominal concrete section of the pile.

**PILE SPlice REINFORCEMENT DETAILS**

- Work this Index with Index No. 20600 – Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 – Square Prestressed Concrete Pile Splice.
5 Turns @ 1" Pitch
16 Turns @ 3" Pitch
6" Pitch
16 Turns @ 3" Pitch
3" Pitch
Spacing

3" x 3" Chamfer (Typ.)

3" Cover

W3.4 Spiral Ties

ELEVATION

ALTERNATE STRAND PATTERNS

8 ~ 0.6" Ø, Grade 270 LRS, at 35.2 kips
8 ~ ½" Ø, Grade 270 (Spec) LRS, at 31.6 kips
8 ~ ½" Ø, Grade 270 (Spec) SR, at 31.6 kips
8 ~ ½" Ø, Grade 270 LRS, at 31.0 kips
12 ~ ½" Ø, Grade 270 SR, at 21.2 kips
12 ~ ½" Ø, Grade 250 SR, at 22.6 kips
16 ~ ½" Ø, Grade 270 SR, at 16.1 kips

NOTE:

Any of the given Alternate Strand Patterns may be utilized.
The strands shall be located as follows:
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
The total strand pattern shall be concentric with the nominal concrete section of the pile.

SECTION D-D

(See Nondrivable Unforeseen Reinforced Precast Splice Details)

SECTION E-E

(See Drivable Unforeseen Prestressed Precast Splice Details)

PILE SPLICE REINFORCEMENT DETAILS

NOTE:

Work this Index with Index No. 20600 = Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 = Square Prestressed Concrete Pile Splices.
36" x 3" Chamber (Typ.)

**ELEVATION**

**** See Note No. 4 on Index No. 20601

---

**ALTERNATE STRAND PATTERNS**

12 ~ 0.6" @, Grade 270 LHS, at 58.1 kips
12 ~ 0.6" @, Grade 270 Spec LHS, at 54.0 kips
12 ~ 0.5" @, Grade 270 SK, at 35.2 kips
16 ~ 0.6" @, Grade 270 SK, at 26.8 kips
20 ~ 0.6" @, Grade 270 SK, at 21.8 kips
20 ~ 0.5" @, Grade 270 LHS, at 21.1 kips
24 ~ 0.5" @, Grade 270 LHS, at 17.3 kips

**NOTE:**

Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:

Place one strand at each corner and place the remaining strands equally spaced between the corner strands.

The total strand pattern shall be concentric with the nominal concrete section of the pile.

**NOTE:**

Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.

---

**PILE SPLICE REINFORCEMENT DETAILS**

---
### ALTERNATE STRAND PATTERNS

12 - 0.6" Ø, Grade 270 LHS, at 44 kips
16 - 0.75" Ø, Grade 270 LHS, at 52.0 kips
16 - 0.75" Ø, Grade 270 (Spec) SR, at 54.0 kips
20 - 0.75" Ø, Grade 270 SR, at 26.5 kips
24 - 0.875" Ø, Grade 270 LRS, at 21.7 kips

**NOTE:** Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:
- Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
- The total strand pattern shall be concentric with the nominal concrete section of the pile.

**NOTE:** Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
**ELEVATION**

**ALTERNATE STRAND PATTERNS**

16 ~ 0.6" Ø, Grade 270 LRS, at 44 kips
20 ~ 1/4" Ø, Grade 270 (Spec) LRS, at 34.0 kips
20 ~ 1/4" Ø, Grade 270 SR, at 36.0 kips
20 ~ 1/4" Ø, Grade 270 (Spec) SR, at 37.1 kips
24 ~ 3/16" Ø, Grade 270 LRS, at 31.0 kips
24 ~ 3/16" Ø, Grade 270 (Spec) SR, at 31.6 kips

NOTE: Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.

The total strand pattern shall be concentric with the nominal concrete section of the pile.

NOTE: Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
ALTERNATE STRAND PATTERNS

<table>
<thead>
<tr>
<th>Section No.</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B</td>
<td>Alternate Strand Patterns</td>
<td>(See Pile Splice Reinforcement Details)</td>
</tr>
<tr>
<td>C-C</td>
<td>Alternate Strand Patterns</td>
<td>(See Pile Splice Reinforcement Details)</td>
</tr>
</tbody>
</table>

NOTE:
- Work this Index with Index No. 20600 = Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 = Square Prestressed Concrete Pile Splices.
- Prestressing Strands, see Alternate Strand Patterns.
- 20 - 5/8" Grade 270 (Spec) LR5, at 39.7 kips
- 3" Ø hole
- 4" x 1" Chamber or 2 1/4" x 1 1/4" Chamber
- 4" Spiral Ties
- 8 No. Bars (10-2" long)
- W4.0 Spiral Ties
- 3" Cover
- 2" x 3" Chamfer

NOTES:
1. Venting shall be provided by the use of a 1" PVC conduit through a substructure cap or column. Voids between segments of spliced pile shall be connected by 2" holes (holes).
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:

   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.

3. CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" void and the 2" Ø vent hole. In this event, the Contractor shall submit calculations for approval of a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the Diagonal Ties, to maintain the position of the 4 = No. 8 Bars, may be approved by the Engineer.
Notes:
1. Venting shall be provided by the use of a 2" PVC conduit through a substructure cap or column. Voids between segments of spliced piles shall be connected by 2" holes.
2. After the pile is driven and cut to grade, the top 8'-0" of the 18" 0 Void shall be filled with concrete. Prior to filling the top 8'-0" of the 18" 0 Void with concrete, strip the cardboard form material from the void. A stay-in-place corrugated thin wall/steel pipe may be used to form the void in lieu of the cardboard form material. The concrete fill material shall be of the same type and strength as called for in the pile cap and paid for as substructure concrete.
3. Color concrete shall reach a strength of 6,000 psi before pile driving is resumed.
4. Work this index with Index No. 206500 - Notes and Details for Square Prestressed Concrete Piles.

SECTION THROUGH PILE AT PILE CAP  W4.0 DIAGONAL TIE DETAIL

No. 6 Bars (Typ.)
W4.0 Spiral Ties (1/4 pitch)
1/4" Hole
Concrete
Gasket
Plug Form
Form to retain epoxy compound

SECTION D-D

SECTION THRU PILE COLLAR

2008 FOOT Design Standards

HIGH MOMENT CAPACITY 30" SQUARE
PRESTRESSED CONCRETE PILE

PRESTRESSED CONCRETE PILE
**NOTES**

**DESIGN SPECIFICATIONS:**

**DESIGN PARAMETERS:**
Pre-stressed Cylinder Concrete Section: 1,000 psi minimum uniform compressive stress after prestress losses without loads. Pick-up, Storage, and Transportation: 0.5 psi tension x 1.5 times pile self weight.

**SPIRAL TIES:**
One full wrap of spirals is required at both the head and tip of pile. One half turn required for spiral splices.

**CONCRETE CLASS:**
Concrete for all piles shall be Class V (Spec.). Concrete for pile splices shall be Class IV. See “GENERAL NOTES” in Structures Plans for any specific locations where the use of Silica Fume is required.

**CONCRETE STRENGTH:**
The cylinder strength shall be 6,000 psi at the time of transfer of the Prestressing Force.

**SPICE BONDING MATERIAL:**
The material to form the joint between pile sections shall be a Type B Epoxy Compound in accordance with Section 926 of the Specifications. The bonding agent used on the interfacial surface shall be a Type A Epoxy Compound in accordance with Section 926 of the Specifications. Epoxy Compounds used shall be contained on the Qualified Products List (QPL). Use Epoxy Bonding Compound or Epoxy Mortar as recommended by the Manufacturer. For Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.

**PICK-UP POINTS:**
Piles shall be marked at the pick-up points to indicate proper points for attaching handling lines.

**REINFORCING STEEL:**
Reinforcing steel shall be Grade 60, except that smooth steel wire (W2 spirals and longitudinal spacers) shall be manufactured from cold drawn steel wire meeting the requirements of ASTM A82.

**PRESTRESSING STEEL:**
Prestressing tendons shall be made up of two seven-wire strands. Prestressing strands shall be Grade 270 low relaxation, at 33.8 kips.

**PILE DRIVING AFTER SPLICING:**
Pile splices shall reach a minimum strength of 550 psi before driving is resumed.

**ELEVATION**

**TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS**

<table>
<thead>
<tr>
<th>Maximum Pile Length (Feet)</th>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>170</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
</tbody>
</table>

---

**PILE PICK-UP DETAILS**

**2-POINT SUPPORT**

**3-POINT SUPPORT**

**4-POINT SUPPORT**

**STORAGE AND TRANSPORTATION SUPPORT DETAILS**
1-0" Ø Void, open top and bottom to allow through venting of sections

Nourthen inside surface of 54" Ø Pile to 5/8" amplitude for Spliced Pile Section

Closed No. 4 Bars or W20 Wire Ties @ 1-0" Z (Typ.)

5/8" Full Epoxy Compound Joint around cylinder pile wall only (See Detail "A")

24 ~ No. 11 Bars

Clean inside surface of 54" Ø Pile with a high pressure water blast (3000 psi/min.) and apply bonding agent for Driven Prestressed Pile

Concrete Seal

24 ~ 1/8" Ø Formed Holes for Tendons @ Equal Spacing

1/8" Ø Formed Hole (1 tendon per hole; 2 ~ 1/8" Ø Spec. strands per tendon shown as (•) Grout per Specification 938)

Inside Pile Wall

Temporary Blocking Form to retain epoxy compound

Gasket

Epoxy compound

Outside Pile Wall

DETAIL "A"
**PICK-UP POINTS**

- **Spiral Tie**: Head or Tip
- **Concrete**: 0.21L, 0.58L, 0.21L

*The 45° Void in the pile shall be positively vented to water or air after the final cut-off section, then venting shall be provided by the use of a 1” PVC conduit through the substructure cap or column.*

**PILE DETAILS STORAGE AND TRANSPORTATION**

- **Pile Length Required**: 122, 174
- **Concrete Class**: 1,000 psi minimum uniform compression after prestress losses without loads.
- **Concrete Strength**: Pile shall be manufactured to Grade 60, except that smooth steel wire (1W1 spirals and 9W10 ties) shall be manufactured from cold drawn steel wire meeting the requirements of ASTM A617.
- **Prestressing Steel**: Prestressing steel shall be 0.60” 7-wire strand, Grade 270 low relaxation, at 44 kips.
- **Pile Driving After Splicing**: Pile splices shall reach a minimum of 5500 psi before driving is resumed.

**TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS**

<table>
<thead>
<tr>
<th>Maximum Pile Length (Feet)</th>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>174</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
</tbody>
</table>
DRIVABLE UNFORESEEN FIELD SPLICE DETAIL
(Cast in Place Plug)

Roughen inside surface of 60" Ø Pile to 0.5" amplitude for Spliced Pile Section

Closed No. 4 Bars or W20 Wire Ties @ 1'-0" ± (Typ.)

1/8" Full Epoxy Compound Joint around cylinder pile wall only (See Detail "A")

24 ~ No. 11 Bars

Clean inside surface of 60" Ø Pile with a high pressure water blast (3000 psi/min) and apply bonding agent for Driven Prestressed Pile

Concrete Seal

2'-0"
3" Min. Cover (Typ.)

36 ~ 0.6" Ø Strands @ Equal Spaces

SECTION A-A

SECTION B-B

Gasket

Temporary Blocking Form to retain epoxy compound

Form to retain epoxy compound

Inside Pile Wall

Outside Pile Wall

DETAIL "A"

1'-0" Ø Void

1'-0" Min. Lap Splice

1'-0" Ø Void

W11 Wire
Spiral Ties

W11 Wire
Spiral Ties

W11 Wire
Spiral Ties

W20 Wire Ties

W20 Wire Ties

No. 4 Bars or W20 Wire Ties

No. 4 Bars or W20 Wire Ties

36 ~ 0.6" Ø Strands @ Equal Spaces

36 ~ 0.6" Ø Strands @ Equal Spaces

2" Min. Cover (Typ.)

3" Min. Cover (Typ.)

3'-0"

36 ~ 0.6" Ø Strands @ Equal Spaces

1'-0" Min. Lap Splice

1'-0" Ø Void

Void, open to allow through venting of sections

Roughen inside surface of 60" Ø Pile to 0.5" amplitude for Spliced Pile Section
GENERAL NOTES

1. SURFACE TREATMENT: As an option to Class 4 Floor Finish (Bridge Floor Grooving) per Section 400 a hand tined or heavy broomed finish may be permitted on the concrete portion of the riding surface. Sidewalk areas shall receive a broomed finish. The top surface of the concrete beneath the asphalt overlay shall be raked.

2. UTILITIES: If required, see Structures Plans, Utility. Consult Detail Sheets for details.

3. When a longitudinal construction joint is necessary or allowed by the Engineer, the transverse steel shall be extended as shown in the Longitudinal Construction Joint Detail.

4. The plan view for CASE 1 applies when the skew angle $\theta > 0^\circ$. Relevant details also apply to CASE 2.

5. The plan view for CASE 2 applies where the skew angle $\theta > 0^\circ$. The slab shown represents a skew to the right for an approach slab at begin bridge: approach slab at the end of bridge or a left skew shall be treated similarly.

6. Potholes, parapets and traffic separators shall be provided as shown in Structures Plans. Payment for these items shall be included in the pay item for the required item. Raised sidewalks shall be provided as shown in the Structures Plans. Payment shall be included in the pay items for approach slab concrete and reinforcement. Welded Wire Reinforcement for the edge of Approach Slabs on retaining walls not included in the estimated quantity for reinforcing steel and is considered incidental to the work. Welded Wire Reinforcement shall conform to ASTM A172.

7. ASPHALT OVERLAY: Payment for asphalt overlay items is included in the Items for the required items. Raise the asphalt overlay in the Structures Plans. Payment shall be provided as shown in Sections 1-3, 5, 6, 7, and 8 of the Structures Plans. Payment shall be included in the pay items for reinforcing steel and is considered incidental to the work. Welded Wire Reinforcement shall conform to ASTM A172.

8. Approach slabs shown in Plan VIEW CASE 1 and 2 represent a typical approach slab with edge barriers and no sidewalks. See additional approach slab sheets for sidewalk and other pertinent details.

CONCRETE: Provide Class II (Bridge Deck) concrete for approach slabs.

CROSS REFERENCES:

For Section B-9, Longitudinal Construction Joint Detail and Approach Slab Details see Sheet 2.

For Estimated Quantities see Structures Plans.

INSTRUCTIONS TO DESIGNER:

These Indexes shall be supplemented in Structures Plans with additional sheets showing as a minimum a Plan View with geometry and pertinent information not covered by these Indexes e.g. Survey Lines, PSI, Direction of Stationing, Phase Construction Joints, Raised Sidewalks and other information necessary to completely detail the Approach Slabs. Approach Slab Finish Grade Elevation shall be included with the Bridge Finish Grade Elevations in the Structures Plans.

All Reinforcing bars are to be shown in the Reinforcing Steel List as straight bars. Types 2 and 3. Bars SC are 5/8" long.

SECTION A-A
Co;~

---*Bars 5C1

--- ---

---*Bars 5C1

1. Furnish Strip Seal Expansion Joint Systems in accordance with ASTM D5973 and the AASHTO LRFD Bridge Design Specifications and that are listed on the Qualified Products List. Furnish joint systems consisting of watertight steel Edge Rails, Elastomeric Strips, Sidewalk Cover Plates as required and miscellaneous components.

2. Furnish solid steel Edge Rails in accordance with ASTM A709, Grade 36, 50 or 50W that are extruded, hot rolled or cold formed. Furnish solid steel Anchor Studs, minimum length of 2" with mass of 0.2 lb/in. section thickness of 0.10 and a maximum top surface (riding surface) width of 2.5". Edge Rail shapes are representative, minor variations depending on manufacturer are permitted. Edge Rails manufactured from bent plate or built up pieces are not acceptable.

3. Furnish Anchor Studs in accordance with ASTM F593 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

4. Do not use diamond plate or applied slip resistant coatings. New, metallic coatings or other similar materials. Furnish flat head Stainless Steel Sleeve Anchors in accordance with ASTM F563 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

5. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

6. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

GENERAL FABRICATION NOTES:

1. Furnish Anchor Studs in accordance with ASTM A302. Furnish Anchor Studs with complete fusion. Anchor Studs may be placed back to achieve required length.

2. Furnish continuous heavy duty bridge deck Elastomeric Seals sized to perform satisfactorily for the opening range shown in accordance with manufacturer’s recommendations. Minimum movement classification is 4". Seal shall be supplied by the manufacturer of the Edge Rails. Field vulcanization is permitted only on horizontal turns on skewed bridges at upturn ends where the horizontal turn angle is greater than 35°.

3. Furnish all new materials that are slip-resistant by Underwriters Laboratories. Do not use diamond plate or applied slip resistant coatings. New, metallic coatings or other similar materials.

4. Furnish solid steel Edge Rails in accordance with ASTM A709, Grade 36, 50 or 50W that are extruded, hot rolled or cold formed. Furnish solid steel Anchor Studs, minimum length of 2" with mass of 0.2 lb/in. section thickness of 0.10 and a maximum top surface (riding surface) width of 2.5". Edge Rail shapes are representative, minor variations depending on manufacturer are permitted. Edge Rails manufactured from bent plate or built up pieces are not acceptable.

5. Furnish all new materials that are slip-resistant by Underwriters Laboratories. Do not use diamond plate or applied slip resistant coatings. New, metallic coatings or other similar materials.

6. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

INSTALLATION NOTES:

1. Install the Edge Rail Assemblies at proper grade and alignment before or after deck paving following the manufacturer’s instructions. When installed after deck paving, install the Edge Rail Assemblies in the backouts on a profile tangent between the ends of the deck and/or approach slab to within a + 0" and - 0" variation. When installed before deck paving, install the Edge Rail Assemblies ± 0" plus or minus 1" below the top surface of the deck or approach slab to compensate for concrete removal during paving.

2. Bolt, weld or clamp Edge Rail Assemblies in position using temporary or sacrificial brackets as required. For phased construction, install Edge Rail Assemblies in a given subsequent phase so as to align with those installed in an adjacent prior phase after casting, removing or rotation due to deck casting or adjoining sections occurred.

3. For installation temperatures other than 70°F ± adjust the opening of the joint (Dim. 1) by the amount of the adjustment per 5°F shown in Structures Plans Expansion Joint Data Table. For temperatures above 70°F decrease the opening, for temperatures below 70°F increase the opening.

4. Do not weld to, or within 2" of, Edge Rail surfaces that will be exposed in the completed structure. Do not weld expansion joint components to pre-cast concrete without a by-pass weld of 1" from the joint to prevent concrete intrusion during deck pour and finishing.

5. Locate any temporary or sacrificial support brackets, bolts, clamps, etc. that span across the joint after initial set of concrete, but not later than two hours after conclusion of concrete placement.

6. Furnish Anchor Studs in accordance with ASTM F593 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

7. Follow all shop drawings showing expansion joint materials and project specific details and dimensions. Include name of manufacturer, estimate number, expansion joint number and the assigned Qualified Products List Number.

8. Furnish Strip Seal Expansion Joint Systems in accordance with ASTM D5973 and the AASHTO LRFD Bridge Design Specifications and that are listed on the Qualified Products List. Furnish joint systems consisting of watertight steel Edge Rails, Elastomeric Strips, Sidewalk Cover Plates as required and miscellaneous components.

9. Furnish solid steel Edge Rails in accordance with ASTM A709, Grade 36, 50 or 50W that are extruded, hot rolled or cold formed. Furnish solid steel Anchor Studs, minimum length of 2" with mass of 0.2 lb/in. section thickness of 0.10 and a maximum top surface (riding surface) width of 2.5". Edge Rail shapes are representative, minor variations depending on manufacturer are permitted. Edge Rails manufactured from bent plate or built up pieces are not acceptable.

10. Furnish Anchor Studs in accordance with ASTM F593 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

11. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

12. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

13. Furnish Anchor Studs in accordance with ASTM F593 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

14. Furnish solid steel Edge Rails in accordance with ASTM A709, Grade 36, 50 or 50W that are extruded, hot rolled or cold formed. Furnish solid steel Anchor Studs, minimum length of 2" with mass of 0.2 lb/in. section thickness of 0.10 and a maximum top surface (riding surface) width of 2.5". Edge Rail shapes are representative, minor variations depending on manufacturer are permitted. Edge Rails manufactured from bent plate or built up pieces are not acceptable.

15. Furnish Anchor Studs in accordance with ASTM F593 Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturer’s recommendations.

16. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.

INSTRUCTIONS TO DESIGNER:

1. Complete the Expansion Joint Data Table in Structures Plans with project specific information.

2. Furnish temporary or sacrificial support brackets, bolts, clamps, etc. that are capable of resisting shipping, handling and construction forces to the Edge Rail Assemblies or galvanized coating and are adjustable to account for variable temperature settings. Do not use temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without blackouts.
**PARTIAL PLAN VIEW OF SKEWED JOINTS**

- Match Slope of Sidewalk
- Front Face of Traffic Railing or Post
- Traffic Railing
- Front Face of Traffic Railing
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck

**PARTIAL PLAN VIEW OF NONSKEWED JOINTS**

- Match Slope of Sidewalk
- Front Face of Traffic Railing or Post
- Traffic Railing
- Front Face of Traffic Railing
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck

**PARTIAL SECTION ALONG A-JOINT**

- Sleeve Anchors (Typ.)
- Match Slope of Deck
- Traffic Railing or Post
- Traffic Railing
- Front Face of Traffic Railing
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck

**RAISED SIDEWALK DETAIL**

- Match Slope of Deck
- Front Face of Parapet
- Traffic Railing
- Front Face of Traffic Railing
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck

**FLUSH SIDEWALK DETAIL**

- Match Slope of Deck
- Front Face of Parapet
- Traffic Railing
- Front Face of Traffic Railing
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck

**SECTION A-A**

- 1-3" Down Grade
- 3/8" 0 x 2 1/2" Long Sleeve Anchor
- Sleeves Anchors (Typ.)
- Field Butt Joint
- Gutter Line
- Match Slope of Deck
- Match Slope of Deck
GENERAL AND FABRICATION NOTES:

1. Furnish Poured Joint With Backer Rod Expansion Joint Systems in accordance with Specification Section 932 and that are listed on the Qualified Products List. Furnish joint systems consisting of Poured Joint Material, Foam, Backer Rods, Sidewalk Cover Plates (as required) and all associated miscellaneous components. Poured Joint Material shall be an ultra-low modulus, self-leveling silicone formulation, cold-applied, rapid-cure, used to seal expansion joints that experience both thermal and/or vertical movement. The Poured Joint Material must cure by chemical reaction and not by evaporation of solvent or mixing of harder particles. Tailing of the Poured Joint Material shall not be required. Poured Joint Material shall meet the following requirements:

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<thead>
<tr>
<th>Property or Characteristic</th>
<th>Test Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrusion rate</td>
<td>MIL S 8802</td>
<td>3.3 - 9.2 g/s</td>
</tr>
<tr>
<td>Take-time at 77 ± 3° F and 45 to 65% Relative Humidity</td>
<td>MIL S 8802</td>
<td>30 - 60 minutes</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>ASTM D 792, Test Method A</td>
<td>1.25 to 1.30</td>
</tr>
<tr>
<td>Elongation (cured seven days at 77 ± 3° F and 50 ± 5% Relative Humidity)</td>
<td>ASTM D 412, Test Method C</td>
<td>500 ± 50% minimum</td>
</tr>
<tr>
<td>Movement Capability</td>
<td>ASTM C 729</td>
<td>No adhesive or cohesive failure and adherence, 10 cycles at ±20°F/±30°F/ (points 2&quot; wide)</td>
</tr>
</tbody>
</table>

2. Furnish 1/8" thick slip resistant steel Sidewalk Cover Plates in accordance with ASTM A479, Grade 36 or 50, with a minimum coefficient of friction after galvanizing of 0.6 on the top surface of 0.6 in a dry condition as determined by ASTM F1677 or F1679 and 0.68 or 0.52 in a wet condition as determined by ASTM F1677 or ASTM F1679, respectively, that incorporate an anti-slip steel surface consisting of a random pattern of grooves or other suitable patterns and that are listed as slip-resistant by Underwriters' Laboratories. Do not use diamond plate or surface applied slip resistant tapes, films, nonmetallic coatings or other similar materials. Furnish flat head Stainless Steel Sleeve Anchors in accordance with ASTM F1993, Group I, Way 304, for attaching Sidewalk Cover Plates in accordance with manufacturer's recommendations.

3. Use Type B galvanize Sidewalk Cover Plates and all associated miscellaneous components. Manufacturer's recommendations shall be followed for shop fabrication in accordance with Section 4.2 of the Specifications and manufacturer's recommendations.

4. Submit shop drawings for Sidewalk Cover Plates (as required) showing all materials and project specific details and dimensions.

5. Manufacturers seeking approval of Poured Joint with Backer Rod Expansion Joint Systems for inclusion on the Qualified Products List as pre-approved designs must submit application along with design documentation showing the expansion joint meets the specification, geometric and material requirements specified herein.

CONSTRUCTION AND INSTALLATION NOTES:

1. When casting the Bridge Deck, Approach Slab or Raised Sidewalk adjacent to the joint at temperatures other than 70° F, adjust Dim. "A" at 70° F by the amount of the adjustment per 10°F shown in the Structures Plans, Poured Expansion Joint Data Table. For temperatures above 70° F, decrease the opening, for temperatures below 70° F increase the opening.

2. Install Poured Joint with Backer Rod in accordance with manufacturer's recommendations, when the joint opening is between 1/8" and 2/8", and after deck profiling and grooving operations are completed. Place Poured Joint Material only when the ambient temperature is between 55° F and 85° F and is expected to rise for the next three hours minimum to provide for adequate joint opening and compression of the Poured Joint Material during curing.

INSTRUCTIONS TO DESIGNER:

- Allow for a minimum (fully closed) opening of 50% of Dimension "A" and a maximum opening of 3" (measured in the direction of travel).

TYPICAL SECTION THRU JOINT

PARTIAL SECTION ALONG & JOINT TREATMENT AT TRAFFIC SEPARATOR

PARTIAL SECTION ALONG & JOINT TREATMENT AT HIGH SIDE OF DECK WITH SLOPES 2% OR LESS

PARTIAL SECTION ALONG & JOINT TREATMENT AT LOW SIDE OF DECK OR HIGH SIDE OF DECK WITH SLOPES < 2%
In order to minimize vibration of Light Poles due to traffic, locate pilasters near substructure supports. Locate Pilaster minimum 3'-10" away from Traffic Railing Spacer Joint and edge of End Bent Wingwall. 

Design of the additional Bridge Deck Reinforcement is based on the minimum transverse top slab reinforcing required by Structures Design Guidelines.

Light Pole Pilaster Notes

1. Concrete and Reinforcing Steel required for the construction of the Pilaster shall meet the same requirements as the Traffic Railing or Pedestrian/Bicycle Railing the Pilaster is attached to. Grout shall comply with Specification Section 9.3.4.

2. Light Pole Pilaster may be used with the following:
   - Index No. 430 = Traffic Railing (32" F Shape)
   - Index No. 422 = Traffic Railing (42" Vertical Shape)
   - Index No. 423 = Traffic Railing (52" Vertical Shape)
   - Index No. 424 = Traffic Railing (Cornor Shape)
   - Index No. 425 = Traffic Railing (42" F Shape)
   - Index No. 820 = Pedestrian/Bicycle Railing
   - Index No. 821 = Aluminum Pedestrian/Bicycle Bullet Railing for Traffic Railing (13" F Shape), or
   - Index No. 5210 = Traffic Railing (Sound Barrier) (Bridge).

   Unless otherwise noted, Traffic Railing (13" F Shape) is shown in all Views and Sections on Sheet 1 of 2. The Pilaster details for other Traffic Railings or Pedestrian/Bicycle Railing are similar.

3. The Pilaster and Deck are designed to resist the following Working Loads from the Light Pole applied at the top of the Pilaster:
   - Axial Dead Load = 1,560 Kip
   - Wind Load Moment about Transverse Axis = 40.60 Kip-ft
   - Wind Load Moment about Longitudinal Axis = 28.30 Kip-ft
   - Deadload Moment about Longitudinal Axis = 1,690 Kip-ft
   - Maximum Shear = 1,380 Kip
   - Torsion about Pole Axis = 1,560 Kip-ft

   The Contractor is responsible for providing Anchor Bolts, Nuts, Washers and Anchor Plates that effectively transmit the Light Pole Loads to the Pilaster and the Reinforcing cage. Submit calculations for Anchor Bolt Design and Embedment Depths, Signed and Sealed by a Professional Engineer registered in the State of Florida to the Engineer for Review and Approval prior to Construction.

For Conduit, Pull Box, Expansion/Deflection Fitting and adjacent Reinforcing Steel Details, see Utility Conduit Detail Sheets.

Anchor Bolts must be installed plumb.

7. PAYMENT: The cost of Anchor Bolts, Nuts, Washers and Anchor Plates shall be included in the Bid Price for Light Poles. The cost of all Labor, Concrete and Reinforcing Steel required for the Construction of the Pilasters, Grout Pads, Pull Boxes, and Miscellaneous Hardware required for the completion of the Electrical System, shall be included in the Bid Price for the Traffic Railing or Pedestrian/Bicycle Railing the Pilaster is attached to.

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

<table>
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<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Per Pilaster Thickness</td>
<td>CY/2Yd</td>
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<tr>
<td>Reinf Steel</td>
<td>Lb</td>
<td>244.16 (231.19)</td>
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</tbody>
</table>

(The Reinforcing Steel quantity shown in parenthesis is for a Pilaster attached to Pedestrian/Bicycle Railing - Index No. 820 with Bridge Deck or Approach Slab thinner than 1'-2 1/2")

INSTRUCTIONS TO DESIGNER:

In order to minimize vibration of Light Poles due to traffic, locate pilasters near substructure supports. Locate Pilaster minimum 3'-10" away from Traffic Railing Spacer Joint and edge of End Bent Wingwall.

Design of the additional Bridge Deck Reinforcement is based on the minimum transverse top slab reinforcing required by Structures Design Guidelines.

DETAIL "A"
UTILITY CONDUIT GENERAL NOTES:

1. Furnish and install approved Conduits and Fittings in accordance with the Specifications, this Standard, the National Electric Code (NEC) and as directed by the Engineer.

2. Furnish Schedule 80 PVC rigid Nonmetallic Conduits in accordance with NEC TC-2 and UL Standard 655 and Fittings in accordance with NEC TC-3 and UL Standard 544. Furnish conduit and fittings with UL label on each conduit — stamped or molded on each fitting. Connect Conduit and Fittings using solvent cement in accordance with manufacturer’s recommendations.

3. Furnish and install NECA Type 4X non-metallic or galvanized steel PullBoxes sized in accordance with NEC requirements and the maximum lengths shown. Provide gasketed weatherproof covers for the PullBoxes. Permanently label the covers of the PullBoxes to indicate if the utility contained within the cover is powered off and may be opened or removed. Insert PullBoxes adjacent to and End Bridges, Begin and End Retaining Walls and at additional locations as required. Unit PullBoxes at Begin or End Retaining Walls adjacent to bridges. Position PullBox openings as shown, do not allow PullBox openings on the traffic face of Traffic Railings.

4. Furnish and install Expansion Fittings at locations shown in the Plans. Certify that Expansion Fittings placed at a given location are rated to accommodate the anticipated movement at that location along bridge decks — see Structures Plans, Expansion Joint Data Table along retaining walls and other unspecified locations = 2" minimum.

5. Furnish and install Expansion / Deflection Fittings at locations shown in the Plans. Certified that Expansion / Deflection Fittings used at a given location are rated to accommodate a minimum rotation of 3.0 degrees and the anticipated movement at that location along bridge decks = see Structures Plans, Expansion Joint Data Table along retaining walls and other unspecified locations = 0.7" minimum.

6. Stub out and cap conduits and drive steel PullBoxes to permanently locate ends as shown unless otherwise shown in Plans.

7. SHP vertical railing reinforcement symmetrically to provide 2" clearance to PullBoxes. Specify return to vertical railing reinforcement at 3 centers or reinforcement to provide 2" clearance to PullBoxes and provide supplemental reinforcement as shown. Shift a maximum of 1" but do not cut rail reinforcement to facilitate conduit, Expansion Fitting and Expansion / Deflection Fitting placement. Do not bundle conduits or conduits and horizontal reinforcement.

8. Unless otherwise shown in the Plans, include the cost of furnishing and installing conduit, PullBoxes, Expansion and Expansion / Deflection Fittings and all associated hardware required to complete the installation in the cost for the Traffic Railing or Pedestrian Railing (Parapet) that the conduit is installed in.

INSTRUCTIONS TO DESIGNER:

Verify the applicability of this Standard for a given project. Coordinate with the District Utility Coordinator to determine the present and future utility requirements at the project location.

Provide appendices, notes, details, wire diagrams and wire specifications in the Plans as required to complement this Standard.

Specify in the Structures Plans the type of PullBoxes required (PullBox “A” = multiple raceways; PullBox “B” = single raceway). Generally, multiple raceway PullBoxes can be used where utilities contained within individual raceways (conduits) can share a common PullBox. Single raceway PullBoxes should be used where it is desirable or required that utilities contained within individual raceways (conduits) be isolated from each other.

Specify the type of joints required on Expansion Joint locations on bridges: Expansion Fittings or Expansion / Deflection Fittings. Generally, Expansion Fittings can be typically used for bridges on tangent or large radius curved alignments where little or no transverse movement is expected at Expansion Joints. Expansion / Deflection Fittings are typically required for bridges on curved alignments or combined curved and tangent alignments where transverse movement is expected at Expansion Joints.

For electrical service, specify the use of THWN or SHPX conductors only.
NAVIGATION LIGHT SYSTEM SCHEMATIC FOR SINGLE BRIDGE WITH FENDERS

NAVIGATION LIGHT SYSTEM SCHEMATIC FOR DUAL BRIDGES WITH FENDERS

NAVIGATION LIGHT SYSTEM SCHEMATIC FOR SINGLE BRIDGE WITHOUT FENDERS

NAVIGATION LIGHT SYSTEM SCHEMATIC FOR DUAL BRIDGES WITHOUT FENDERS

INSTRUCTIONS TO DESIGNER:

1. Provide Navigation Light System in compliance with Specifications Section 510.

2. Provide design of CGL locations, configurations and its supporting structures.

3. Provide design of RFL locations and configurations in Fender System drawings if applicable.

4. If actual conditions differ from the typical configurations shown on this sheet, design Navigation Light System to comply with Code of Federal Regulations Title 33, Chapter I, Part 118.

5. Provide automatic lock positions for service and operating.

6. Specify Service Chain mounting location.

- Use RFL when Pier is at Channel Edge and see CFR, Title 33, part 118 for Mounting Height restrictions. Use RCL otherwise.
- **M**ounted only on the Pier that defines CM, otherwise does not apply.
- *RFL to be located at mid length of straight portion of fender.*

POWER CONDUCTORS

<table>
<thead>
<tr>
<th>DISTANCE (feet)</th>
<th>VOLTS</th>
<th>CONDUCTOR</th>
<th>TRANSFORMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 75</td>
<td>120</td>
<td>#12 AWG</td>
<td>N/A</td>
</tr>
<tr>
<td>75 - 500</td>
<td>120 or 240</td>
<td>#10 AWG</td>
<td>N/A</td>
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<tr>
<td>500 - 2000</td>
<td>120</td>
<td>#8 AWG</td>
<td>2 KVA</td>
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<tr>
<td>2000 - 5000</td>
<td>240</td>
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<td>2 KVA</td>
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<tr>
<td>5000 - 20000</td>
<td>240</td>
<td>#4 AWG</td>
<td>2 KVA</td>
</tr>
<tr>
<td>over 20000</td>
<td>240</td>
<td>#4 AWG</td>
<td>2 KVA</td>
</tr>
</tbody>
</table>

LEGEND

- **LC** Lighting Contactor
- **PC** Photocell Control
- **Xmer** Transformer (if Required)
- **RFL** Red Pier/Fender Light
- **RCL** Red Channel/Margin Light
- **GCL** Green Center Channel Light
- **CGL** Clearance Gauge Light
- **CM** Channel Margin or Pier inner surface whichever defines Channel Edge.
GCL OR RCL MOUNTING DETAILS (SCHEMATIC)
VIEW A-A
(Traffic Railing - 32" F Shape shown, other railings similar)
* Supplied by Light Fixture Manufacturer

GCL OR RCL MOUNTING DETAILS (SCHEMATIC)
ELEVATION VIEW
(Traffic Railing (32" F Shape) shown, other railings similar)

CROSS REFERENCES:
1. For Navigation Light System notes and legend, see Sheet 1.
2. See Utility Conduit Details sheets for pull box dimensions & locations.
BOX GIRDER MAINTENANCE LIGHTING NOTES:

1. Submit shop drawings to the Engineer detailing the layout of the maintenance lighting system for the entire structure.
2. Ensure installation meets all requirements of the latest edition of the National Electrical Code (NEC) and local ordinances.
3. Furnish all labor, equipment, materials, and incidental work for the complete system.
4. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.
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30. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.
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32. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.
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48. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.
49. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.
50. Furnish all necessary conduit and anchor bolts for installation of the maintenance lighting system.

INSTRUCTIONS TO DESIGNER:

1. This Standard does not show all structure elements and is not intended to show the exact location of conduit runs. Coordinate these with the other trades to avoid conflicts.
2. Tabulate in the plans and include in the BID LIST for bid purposes, the pay items for the maintenance lighting system, such as conductors, conduit, electrical work, etc.
3. Include the cost of the maintenance lighting system in the individual pay items.
4. Furnish and install surface mounted, Notional Electric Manufacturers Association (NEMA) Type 4X (non-metallic) surface mounted boxes sized in accordance with the National Electrical Code (NEC) and local ordinances.
5. Furnish and install copper conductors, Type XHHW. Do not use any conductor larger than #4 AWG.
6. Furnish and install lighting contactors to switch the minipower centers.
7. Furnish and install six hour reset timers for each circuit to turn off the lighting system automatically.
8. Furnish power distribution at 480V AC, 1 phase, with step down transformers at regular intervals. Furnish 7.5 KVA mini-power center with eight 20A breakers as the step down transformer, feeding a maximum of 20 lamps and 20 receptacles. Each minipower center will provide power to no more than 200°F of bridge, preferably 500'on each side of the minipower center. 480V top feed, 120V bottom feed to maintain separation.
9. Furnish and install lighting contactors to switch the 480V AC feeding the minipower centers.
10. Furnish and install lighting contactors to switch the 480V AC feeding the minipower centers.
11. Furnish and install lighting contactors to switch the 480V AC feeding the minipower centers.
12. Furnish and install lighting contactors to switch the 480V AC feeding the minipower centers.
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50. Furnish and install lighting contactors to switch the 480V AC feeding the minipower centers.

CROSS REFERENCES:
1. For Maintenance Light Details, see Sheet 2.
2. For structure section, see Structures Plans.
GENERAL NOTES:
Mark this Standard with Index Nos. 21610, 21620 and 21630.

STRUCTURAL STEEL:
Steel Plates and Rolled Sections shall be ASTM A 709 Grade 36.
Pipe shall be ASTM A 252 Grade 2, Fy = 35 ksi.

BOLTS, LAG SCREWS AND THREADED BOLT STOCK:
Furnish high strength bolts in accordance with ASTM A325. Furnish Threaded Stock in accordance with ASTM A36. Furnish Lag Screws in accordance with ASTM A577.

STORAGE FACILITY:
Steel: Select the pile type considering the driving capacity requirements of the production piles. Specify Distributing beams for of/span lengths. Details presented assume use of Bent detail sheet. Details are not required for bent piles. Design the foundations according to current AASHTO LRFD Bridge Design Specifications.

EXPANSION JOINT SETTINGS:
Install the expansion joint considering the total continuous bridge length, location of fixed bearings and ambient temperature at the time of installation, assume a 1 expansion joint opening at 70 degrees F.

INSTRUCTIONS TO DESIGNER:
Establish temporary bridge length to accommodate project geometric needs, environmental permits, drainage requirements, etc., using the following span length and arrangement criteria. Details presented in this Standard are for a Double Single configuration and incorporating the Double Wide Light Truss as shown in the "Acrow Panel Bridging Technical Handbook".

SPECIFY DISTRIBUTING BEAMS:
For all span lengths, details presented assume use of continuous spans.

TEMPORARY DETOUR BRIDGE GENERAL NOTES AND DETAILS
TYPICAL PLAN VIEW OF DETOUR BRIDGE
(TIMBER PILE SHOWN, STEEL H PILES AND STEEL PIPE PILES SIMILAR)
TYPICAL SECTION THRU DETOUR BRIDGE AT INTERIOR BENTS (TYPICAL SECTION AT END BENTS SIMILAR WITHOUT DISTRIBUTING BEAMS) (TIMBER PILE SHOWN, STEEL H PILES AND STEEL PIPE PILE SIMILAR)
DETAILS FOR FOOT SUPPLIED FIXED BEARINGS

PLAN VIEW

VIEW A-A

VIEW B-B
**Partial Plan View**

- HP 14 (Bent Cap)
- Expansion Bearing Assembly shown dashed
- Expansion Bearing Keeper Bar (Typ.)
- To bear on face of 8½" x 10" Bearing Plate

**Partial Elevation View**

- HP 14 (Bent Cap)
- Expansion Bearing Keeper Bar (Typ.)
- To bear on face of 1'-0" x 2'-2" Bearing Plate

**Fixed Bearing Keeper Bar Detail**

- Typical both legs
- 4½" x 6½" Fixed Bearing Keeper Bar (Typ.)

**Expansion Bearing Details**

- Temporary Detour Bridge Details
- Steel H-Pile Foundations

**Fixed Bearing Details**

- Expansion Bearing Keeper Bar Detail
- Typical both legs
- 4½" x 6½" Expansion Bearing Keeper Bar (Typ.)
Note:
Use Shim Plates as required to provide equal bearing seat elevations across the bent. Vary thickness of Shim Plates across the pile cap plate to provide a level bearing area in the transverse direction.
Expansion Bearing Assembly shown dashed

Note:
Use Shim Plates as required to provide equal bearing seat elevations across the bent. Vary thickness of Shim Plate across the pile cap plate to provide a level bearing area in the transverse direction.

ABUTMENT AND INTERMEDIATE EXPANSION BEARING DETAILS
General Notes:

1. The details shown on Indices No. 21801, 21802, and 21803 depict the final condition of the post-tensioning system. The standards assume certain methods to obtain the required final condition. The Contractor may elect to modify these methods with the approval of the Engineer of Record provided the post-tensioning system is protected from contamination during all intermediate steps and the final condition conforms with the requirements of the Contract Documents.

2. See Specifications for grouting procedures, and post-tensioning systems.


4. See Specifications for surface preparation and other details of the elastomeric coating (Elastomeric Coating System).

5. See Specifications for surface preparation and other details of the Magnesium Ammonium Phosphate Concrete (Magnesium Ammonium Phosphate Concrete) (MAPC).

6. If deviations from these standard methods are proposed, the Contractor shall demonstrate through a mock-up or other methods that his proposed grouting plan adequately fulfills the requirement of fully grouted tendons.

7. The Contractor shall attach pressure gauges to all grout inlets during the grouting operation. Locations of all pressure gauges shall be noted on the grouting operations plan.

8. The grout outlets shown shall be adjusted to accommodate the true high point of the tendon in the completed structure.

9. All grout inlets / outlets are to be sealed using threaded plugs with the exception of inlets / outlets exiting to a vertical face or exiting from the bottom of the bottom soffit.

10. All grout inlets / outlets existing on vertical surfaces shall be directed toward the inside face of exterior girders or toward the interior of cellular boxes.

11. See Index No. 21802 for “POST-TENSIONING ANCHORAGE PROTECTION”.

12. See Index No. 21803 for “POST-TENSIONING ANCHORAGE AND GROUTING DETAILS”.

Legend:
- Strand Tendon
- End Anchor with Grout Inlet
- Optional Grout Outlet
- Drain / Grout Inlet
- Direction of Grout Flow
- Grout Inlet
- Grout Outlet
- Inspection Location
Post-Tensioning Vertical Profiles for Staged Grouting

(Simultaneous Low Point Grouting through a Manifold is not Permitted)

NOTES: Grouting Procedures
1. Take into account longitudinal grade, if any, and establish direction of grouting.
2. Orient and anchor so that grout outlet is at the high point.
3. Provide grout outlets at all anchors.
4. Provide grout inlet at low point of all tendon profiles.
5. For tendons longer than 150 feet, additional grout outlets are required.
6. Incorporate the information on these drawings into the grouting operations plan.
7. In the grouting plan, show:
   a. Direction of grouting
   b. Locations of grout inlets & outlets
   c. Staged grouting operations
   d. Sequence of opening & closing vents
   e. Procedures for time delayed grout phasing of the tendons.
8. After grouting, inspect all anchors and high points for voids.
9. Vacuum grout voids and seal post-tensioning system in accordance with the specifications.

Legend:
- Strand Tendon
- End Anchor with Grout Outlet
- Optional Grout Outlet
- Drain / Optional Grout Inlet
- Grout Inlet
- Direction of Grout Flow
- Inspect Location
**Typical Alternate Pour-Back Treatments for Anchor Protection on Exposed Surfaces and Expansion Joints**

*Type JA*
- Continuous Elastomeric Coating - Extend 12\" from edge of blackout or edge of pour back
- Epoxy Grout Pour-back (Typ.)
- Permanent Grout Cap (Typ.)

*Type JB*
- TYPICAL ALTERNATE POUR-BACK TREATMENTS FOR Methyl Methacrylate Post-Tensioning Grout Pour-back (Epoxy Grout Option)
- Permanent Grout Cap (2\" Cover (Min.))

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*Type 2*
- TIP INSPECTED ANCHOR PROTECTION

---

*Type 3*
- ANCHOR PROTECTION FOR INTERIOR ANCHORS IN CELLULAR BOXES ON BLISTERS OR PIER SEGMENTS (NOT FOR USE IN EXPANSION JOINTS)

---

*Type 4A*
- ANCHOR PROTECTION FOR POST-TENSIONED I-GIRDERS & BULB-T's

---

*Type 4B*
- ANCHOR PROTECTION FOR PT BARS

---

*Type 5*
- ANCHOR PROTECTION FOR PT BARS

---

*Type 6*
- ANCHOR PROTECTION FOR PT BARS

---

*Type 7*
- ANCHOR PROTECTION FOR PT BARS

---

*Type 8*
- FLAT SLAB ANCHOR PROTECTION

---

*Type 9*
- TRANSVERSE TENDON ANCHOR PROTECTION

---

Note:
1. Traffic or Pedestrian/Bicycle Railing Not Shown for Clarity.
2. Where Pour-back is not Protected by Traffic or Pedestrian/Bicycle Railing, Coat Pour-back with Methyl Methacrylate.

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2008 FDOT Design Standards

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Index No. 21802

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POST-TENSIONING ANCHORAGE PROTECTION
1. Grout Outlet Connection to Tendon
2. Filling Pocket
3. Pocket Preparation

**Installation & Shipping**

1. Remove Rigid Grout Pipe.
2. Inspect Tendon for Voids as Necessary.
4. Clean Threads and Retread as Required.
5. Install Grout Plug into Outlet to Form a Tight Fit.
7. Fill Pocket with Epoxy Grout.

**Grouting**

1. Install Threaded Grout Plug after Inspection of Voids.

**Injection**

1. Inspect Anchor for Voids and Install Threaded Grout Plug as Per Detail.

**Protection**

1. Round Pocket Former - Gravity Fed Placement of Grout Acceptable
3. Square Pocket Former - Vacuum Grouting Required
**Post-Tensioning Anchorage and Grouting Details**

**High Point Inspection**
Location at Grout Outlet

1. Remove Rigid Pipe Grout Outlet, Clean, and Epoxy Grout as Per Detail D (Typ.) unless otherwise noted.
2. Dashed Line only Applicable if Top two (2) Tendons Stressed after Deck Pour.
3. Web Reinforcing not shown for clarity.

**Tendons at 3’ to 6’ from High Points (Grout Outlet)**

Details H, I, J Shown for I-Beams/Bulb-Ts - Details for C.I.P. Boxes with Internal Tendons Similar

**Pocket Preparation**
Vertical Surfaces

1. Remove Rigid Pipe Grout Outlet, Clean, and Epoxy Grout as Per Detail D (Typ.) unless otherwise noted.
2. Dashed Line only Applicable if Top two (2) Tendons Stressed after Deck Pour.
3. Web Reinforcing not shown for clarity.

**Pocket Preparation**

**Grout Outlet Connection to Tendon**

**Filling Pocket**

1. Remove Rigid Grout Pipe or Drill Grout in Flexible Pipe.
2. Inspect Tendon for Voids as Necessary.
3. Vacuum Grout as Required and Allow Grout to Cure for 24 hr. (min.).
4. Plug Recess with Threaded Cap on Inside Surfaces of Box Sections and Inside (non-fascia) Surfaces on I-Girders. For other Surfaces, Plug Recess with both Threaded Cap and Epoxy Grout.

**Vertically Drained Profile**

Drain Water Prior to Grouting and Inject Grout from the Lowest Point.
Pressure Gaug

Provide Threaded Plug after Grouting
(Typical)

ELEVATION OF GROUT INLET

SECTION

GROUTING FOR SPAN BY SPAN CONSTRUCTION

NOTES:
Place Tapered Blocks Under Each Tendon to be Grouted to Raise Duct off Tendon Strands. Center Strands within Duct before Grouting. Blocks Shall be Removed after Grout has Set. Blocks Shall Not Damage or Permanently Deform Duct.

Drain Hole

Stainless Steel Power Seated Band Clamp

Neoprene Sleeve (Shrink-Wrap Sleeve and Steel Pipe to Concrete Interface after Installation)

Steel Pipe

Plastic Pipe

"V"-Groove

Use Approved Duct Couplers with Post-Tensioned System

DETAIL OF DRIP LEDGE AT ABUTMENTS AND EXPANSION JOINTS FOR SEGMENTAL AND CAST-IN-PLACE BOX CONSTRUCTION

Notes: Temporary Access Holes

1. Temporary access holes to facilitate access for erection, jacking and grouting operations inside the box during construction are allowed. The access holes shall be limited to a maximum size of 42" wide x 30" long and shall be limited to (1) per span.

2. Slab block-outs for temporary / permanent longitudinal post-tensioning bars are not allowed. Temporary / permanent PT bars in the top slab shall be placed in oversized ducts in the slab to accommodate both the bar and coupler.

3. In lieu of (1) 42" x 30" temporary access hole, a maximum of 2 top slab blockouts (12" x 12") (max.) between the webs is allowed for construction per span. Blockouts shall be a minimum of 12" from the nearest duct or anchor and shall be located as to prevent direct drip onto bottom slab anchors.

Notes: Repair of Temporary Access Holes, Blockouts, and Lifting Holes

1. Form all large blockouts with tapered sides.

2. Immediately before casting the concrete, mechanical cleaning of the mating concrete surfaces to remove any laitance and to expose small aggregate.

3. Repair all holes and blockouts with Magnesium Ammonium Phosphate Concrete within 24 hours of cleaning concrete.

4. After completion of the deck grooving, coat the repaired and surrounding concrete surfaces with Methyl Methacrylate.

5. Alternatively, epoxy grout may be used to repair holes. Methyl Methacrylate is not required with epoxy grout.
GENERAL NOTES:

Work this Standard with Index Nos. 21900, 21920 and 21930.

U.S. COAST GUARD NOTIFICATION: Notify the local office of the U.S. Coast Guard at least 30 days prior to beginning of construction of the Fender System.

16" DIAMETER COMPOSITE PLASTIC PILES - INDEX NOS. 21910 AND 21920 ONLY: Provide 16" Diameter Composite Plastic Piles in accordance with Specifications Section 975. Provide piles of sufficient length to achieve a minimum embedment of 24" into soil having a blow count greater than 6 N > 60. Pile splices and build-ups are not permitted. Installation shall be in accordance with manufacturer's recommendations.

14" SQUARE PRESTRESSED CONCRETE PILES - INDEX NO. 21930 ONLY: Provide 14" Square Prestressed Concrete Piles of sufficient length to achieve a minimum embedment of 20" into soil having a blow count greater than 6 N > 60. Pile splices and build-ups are not permitted. Use only 14" Square Prestressed Concrete Piles with θ = 30° diameter. Low Relaxation Strands fabricated in accordance with Index No. 20614.

PLASTIC LUMBER AND STRUCTURAL COMPOSITE LUMBER WALES: Provide Plastic Lumber and Structural Composite Lumber Wales in accordance with Specifications Section 975. Wales shall be continuous and spliced only at locations shown on the plans.

PLASTIC LUMBER DECKING FOR CATWALKS: Provide Plastic Lumber decking for catwalks when called for in the Plans in accordance with Specifications Section 973.

Install Plastic Lumber Decking according to manufacturer's recommendations using stainless steel #10 x 3" (minimum) deck screws.

FIBERGLASS OPEN GRATING FOR CATWALKS: Provide Fiberglass Open Grating for catwalks when called for in the Plans. Fiberglass Open Grating shall be a heavy-duty design suitable for exterior installations. Maximum gap opening on the walkway surface shall be 1/2". Design live loads and deflections shall be a 50 lb uniformly distributed load with a maximum deflection of 1/160 or 1/120 at the center of a simple span or a 2" - 5" maximum spacing so as to resist pedestrian live loads and uplift forces from wind, buoyancy and wave action.

CLEANANCE GAUGE AND LIGHT: Clearance Gauge to be furnished by the FDOT and erected by the Contractor. Clearance Gauge width and numeral height is dependent on visibility distance. The required visibility distance shall be determined by the United States Coast Guard District Commander. Provide and install Clearance Gauge Light in accordance with Specifications Section 510 and Index No. 21220.

NAVIGATION LIGHTS: Provide and install Navigation Lights in accordance with Specifications Section 520, Index No. 21220 and for project specific details. Provide and maintain Temporary Navigation Lights during construction until permanent Navigation Lights are operational.

5/8" THREADED BOLTS, NUTS, SCREWS AND WASHERS: Furnish stainless steel bolts in accordance with ASTM F593 Type 304. Furnish stainless steel threaded bars in accordance with ASTM A416 Grade 80. Furnish stainless steel nuts in accordance with ASTM F594 Type 304. Furnish stainless steel screws in accordance with ASTM F593 Type 304. Furnish stainless steel washers compatible with bolts, threaded rods and nuts under heads and nuts. Torque nuts on 1" diameter bolts and threaded rods to 150 lb-ft. Keep threads on bolts, threaded bars and nuts free from dirt, coarse grime and sand to prevent galling and seizing during tightening.

SPACER PLATES: Furnish Spacer Plates in accordance with ASTM A420 Type 304.

WIRE ROPE - INDEX NO. 21930 ONLY: Furnish Wire Rope in accordance with Specification Section 936.

INSTRUCTIONS TO DESIGNER:

Design Standards Index Series 21900 includes designs and details for Heavy, Medium and Light Duty Fender Systems. Refer to Florida Department of Transportation (FDOT) "Structural Design Guidelines", current edition, for Fender System design criteria and the selection of the appropriate standard Fender System for use at a given site. Design project specific Fender Systems for sites that do not, as a minimum, satisfy the design criteria which was used to develop these standards. Utilize standardized details and components as appropriate for project specific designs.

Complete the "Fender System Table of Variables", the "Estimated Bill of Materials" and the "Estimated Quantities" table and include them in the Plans.

Designate in the Plans the type of decking material to be used for catwalks: 1/2" x 12" Plastic Lumber or Fiberglass Open Grating. Catwalk decking material shall be determined by the District.

Prepare and include in the Plans supplemental project specific designs and details for the following items:

- Electrical/electronic for navigation lights including conduit path from bridge to fender system and identification of service point. Coordinate design with Index No. 21220 and Specification Section 510.
- Access ladders and catwalks from bridge to fender system are optional and may be included at the discretion of the District.
Plastic Lumber 4" Post

Plastic Support Mark H

Clearance Gauge

Plastic Lumber 6" Post

Plastic Lumber 2" x 6" Post Mark D

Plastic Lumber 2" x 6" Clearance Gauge Support Mark F

SC 80 PVC Electrical Conduit

Plastic Lumber 2" x 6" Hand Rail Mark C

Plastic Lumber 2" x 12" Decking Mark E shown, Fiberglass Open Grating similar 16" Min. width at turns, placed with 4" Min. 3/4" Max. gap between adjacent boards

16" ø Composite Piles (Typ.)

Composite Lumber 10" x 10" Wales Mark A

1 1/2" x 1/2" Stainless Steel Lag Screw (Recess head flush with top of Spacer Block)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

SPLICE PLATE DETAIL

1/4" Stainless Steel Plate

1/4" x 12" Stainless Steel Lag Screw (Recess head flush with top of Spacer Block)

Plastic Lumber 10" x 10" Wales Mark A

Plastic Lumber 8" x 8" Spacer Blocks Mark B (Typ.)

Plastic Lumber 8" x 8" Spacer Blocks Mark B (Typ.)

VIEW F-F

SCH 80 PVC Electrical Conduit

Navigation Light

Provide oversized hole to accept nut & washer

Recess Threaded Bar 1/2" from front face of Wale as shown

View F-F (SHOWING FENDER END; DECKING, HANDRAIL AND CLEARANCE GAUGE NOT SHOWN FOR CLARITY)

2'-9"

11"

8"

11"

35"

10" ø Holes (Typ.)

1/4" Stainless Steel Plate

SECTION E-E

TYPICAL STRAIGHT SECTION

Sea Plate top and bottom of Wale, center plate about splice and E. Wale (Typ. at each Wale splice location, except along top Wale)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1 1/2" x 1/2" Stainless Steel Lag Screw (Recess head flush with top of Spacer Block)

Plastic Lumber 8" x 8" Spacer Blocks Mark B (Typ.)

Splice Plate top and bottom of Wale, center plate about splice and E. Wale (Typ. at each Wale splice location, except along top Wale)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

SC 80 PVC Electrical Conduit

Navigation Light

Provide oversized hole to accept nut & washer

Recess Threaded Bar 1/2" from front face of Wale as shown

View F-F (SHOWING FENDER END; DECKING, HANDRAIL AND CLEARANCE GAUGE NOT SHOWN FOR CLARITY)

2'-9"

11"

8"

11"

35"

1/4" Stainless Steel Plate

SECTION E-E

TYPICAL STRAIGHT SECTION

Sea Plate top and bottom of Wale, center plate about splice and E. Wale (Typ. at each Wale splice location, except along top Wale)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

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1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

SC 80 PVC Electrical Conduit

Navigation Light

Provide oversized hole to accept nut & washer

Recess Threaded Bar 1/2" from front face of Wale as shown

View F-F (SHOWING FENDER END; DECKING, HANDRAIL AND CLEARANCE GAUGE NOT SHOWN FOR CLARITY)

2'-9"

11"

8"

11"

35"

1/4" Stainless Steel Plate

SECTION E-E

TYPICAL STRAIGHT SECTION

Sea Plate top and bottom of Wale, center plate about splice and E. Wale (Typ. at each Wale splice location, except along top Wale)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

Composite Lumber 10" x 10" Wales Mark A (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)

1" ø Stainless Steel Threaded Bars, Locking Nuts and Washers (Typ.)
### Structural Composite Lumber Bill of Materials

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE (NOMINAL)</th>
<th>DIMENSIONS</th>
<th>BOARD FT. PER EACH</th>
<th>NO. REGO.</th>
<th>QUANTITY</th>
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</thead>
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<tr>
<td>A1</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
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<tr>
<td>A2</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
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<tr>
<td>A3</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
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</tr>
<tr>
<td>A4</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
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<td>16'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*All Plastic Lumber and Composite Lumber Dimensions and Quantities shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.

**Provide Fiberglass Open Grating in lieu of 2" x 12" Plastic Lumber when called for in the Plans. Mounting Hardware shall be Stainless Steel, as per Manufacturer's recommendations. See Index No. 21900 and Structures Plans for Notes and Details.

### Plastic Lumber Bill of Materials

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE (NOMINAL)</th>
<th>DIMENSIONS</th>
<th>BOARD FT. PER EACH</th>
<th>NO. REGO.</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>6&quot; x 6&quot; PLASTIC LUMBER</td>
<td>8&quot; (STRAIGHT)</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2&quot; x 6&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>4&quot; x 6&quot; PLASTIC LUMBER</td>
<td>4'-0&quot; (STRAIGHT)</td>
<td>8.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>2&quot; x 12&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>160.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
<td>159.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
<td>79.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
<td>78.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
<td>78.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>12'-0&quot;</td>
<td>79.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>8&quot; x 8&quot; PLASTIC LUMBER</td>
<td>2'-3&quot; (STRAIGHT)</td>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>8&quot; x 8&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>10.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>4&quot; x 6&quot; PLASTIC LUMBER</td>
<td>PILE CUT-OFF ELEV. MINUS MLW OR MLW ELEV PLUS 3'-0&quot; (STRAIGHT)</td>
<td>1.0 PER LF EACH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>3&quot; x 6&quot; PLASTIC LUMBER</td>
<td>1'-0&quot; (STRAIGHT)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CROSS REFERENCES:
For Sections A-A and B-B see Sheet 2.
For View F-F see Sheet 3.

NOTE:
Plastic Lumber and Composite Lumber Dimensions shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.

Example:
- Plastic Lumber 2" x 12" decking, Mark E shown, Fiberglass Open Grating similar (Typ. Lumber)
- Composite Lumber 4" x 6" Deck Support Mark D (Typ.)

**Partial Plan View (Typical Flare)**
(FLARE AT CONTROL POINT B SHOWN, CONTROL POINTS A, C & D SIMILAR)
(HANDRAIL NOT SHOWN FOR CLARITY)

**Expanded Partial Elevation View**

**Fender System - Medium Duty**
### Structural Composite Lumber Bill of Materials

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE (NOMINAL)</th>
<th>DIMENSIONS</th>
<th>BOARD FT. PER EACH</th>
<th>NO. REQD.</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>10&quot; x 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* All Plastic Lumber and Composite Lumber Dimensions and Quantities shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.

** Provide Fiberglass Open Grating in lieu of 2" x 12" Plastic Lumber when called for in the Plans. Mounting hardware shall be Stainless Steel, install per Manufacturer's recommendations. See Index No. 21900 and Structures Plans for Notes and Details.

### Plastic Lumber Bill of Materials

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<thead>
<tr>
<th>MARK</th>
<th>SIZE (NOMINAL)</th>
<th>DIMENSIONS</th>
<th>BOARD FT. PER EACH</th>
<th>NO. REQD.</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>6&quot; x 6&quot; PLASTIC LUMBER</td>
<td>8&quot; (STRAIGHT)</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2&quot; x 6&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>4&quot; x 6&quot; PLASTIC LUMBER</td>
<td>4'-0&quot; (STRAIGHT)</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>2&quot; x 10&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>8&quot; x 10&quot; PLASTIC LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>159.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>6&quot; x 8&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>79.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>8&quot; x 10&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>78.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>78.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>6&quot; x 10&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>79.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>8&quot; x 8&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>12.0</td>
<td></td>
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</tr>
<tr>
<td>G2</td>
<td>8&quot; x 6&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>10.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>2&quot; x 6&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
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<td></td>
</tr>
<tr>
<td>H2</td>
<td>2&quot; x 6&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>1.0</td>
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<td></td>
</tr>
<tr>
<td>MARK</td>
<td>SIZE (Nominal)</td>
<td>DIMENSIONS</td>
<td>BOARD FT. PER EACH</td>
<td>NO. REQD.</td>
<td>QUANTITY</td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
<td>------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>A1</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>266.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>10&quot; X 10&quot; COMPOSITE LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
<td>133.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* All Plastic Lumber and Composite Lumber Dimensions and Quantities shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.

# Provide Fiber Glass Open Grating in lieu of 2" X 12" Plastic Lumber when called for in the Plans. Mounting hardware shall be Stainless Steel, install per Manufacturer’s recommendations. See Index No. 21900 and Structures Plans for Notes and Details.

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<th>MARK</th>
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</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>8&quot; X 8&quot; PLASTIC LUMBER</td>
<td>8&quot; (STRAIGHT)</td>
<td>3.6</td>
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<td></td>
</tr>
<tr>
<td>C</td>
<td>2&quot; X 8&quot; PLASTIC LUMBER</td>
<td>10'-0&quot; (STRAIGHT)</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>4&quot; X 8&quot; PLASTIC LUMBER</td>
<td>14'-6&quot; (STRAIGHT)</td>
<td>8.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>3&quot; X 12&quot; PLASTIC LUMBER</td>
<td>2'-6&quot; (STRAIGHT)</td>
<td>5.0</td>
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<tr>
<td>F1</td>
<td>3&quot; X 10&quot; PLASTIC LUMBER</td>
<td>32'-0&quot; (STRAIGHT)</td>
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</tr>
<tr>
<td>F2</td>
<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
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<td>F3</td>
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<td>79.6</td>
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<tr>
<td>F4</td>
<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
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</tr>
<tr>
<td>F5</td>
<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
<td>15'-0&quot;</td>
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<td>F6</td>
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<td>15'-0&quot;</td>
<td>79.5</td>
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<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
<td>3'-0&quot; (STRAIGHT)</td>
<td>19.3</td>
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<td></td>
</tr>
<tr>
<td>G2</td>
<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
<td>4'-0&quot; (STRAIGHT)</td>
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<td>8&quot; X 6&quot; PLASTIC LUMBER</td>
<td>2'-0&quot; (STRAIGHT)</td>
<td>1.2</td>
<td></td>
<td></td>
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* See Estimated Structural Composite and Plastic Lumber Bill of Materials Table in Structures Plans.