DESIGN STANDARDS
FOR DESIGN, CONSTRUCTION, MAINTENANCE AND UTILITY OPERATIONS ON THE STATE HIGHWAY SYSTEM
2010
TOPIC NO. 625-010-003
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.

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The use of any design, method, process, material or device either expressed or implied by these standards that are covered by patent, copyright, or proprietary privilege is the sole responsibility of the user. Any infringement on the rights of the inventor, patentee, assignee or licensee shall be the sole responsibility of the user. For additional information refer to Subsection 7-3 of the FDOT Standard Specifications for Road and Bridge Construction.

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CERTIFICATION STATEMENT

I hereby certify that this Design Standard Book was compiled under my responsible charge 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.

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State Structures Design Engineer
Robert V. Robertson, Jr.
P.E. No. 36160

Sig: ____________________________
Date: __________________________

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State Roadway Design Engineer
David C. O'Hagan
P.E. No. 33713

Sig: ____________________________
Date: __________________________

As To Planning
Design Standard No. 17900
Manager, Traffic Data Section
Transportation Statistics Office
Richard L. Reel, Jr.
P.E. No. 22400

Sig: ____________________________
Date: __________________________

As To ITS
Design Standard Nos. 18100-18305
Deputy State Traffic
Operations Engineer
Mark C. Wilson
P.E. No. 46780

Sig: ____________________________
Date: __________________________

As To Landscape
Architecture
Design Standard No. 544
State Transportation
Landscape Architect
Jeff H. Caster
LA0001592

Sig: ____________________________
Date: __________________________
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21900 Fender System General Notes And Layout (2 Sheets)
21910 Fender System Heavy Duty (5 Sheets)
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001 1 thru 3  Added the following standard abbreviations:
  Base Line, Base Line Control
  Flow Line
  Geosynthetic Research Institute
  HDP High Density Polyethylene
  IPS NPS Nominal Pipe Size
  Deleted the following standard abbreviations:
  NY B.C. Fiber Reinforced Concrete Pipe
  Fiber Reinforced Pipe
  PS For Side
  002 2 of 3  Deleted Hand Drafting Symbols
  003 2 of 3  NOTES FOR SYNTHETIC BALES OR BALE TYPE BARRIER, Note 2, deleted the text "trenched 3" to 4" out" from the first sentence.
  004 2 of 2  RURAL DIVIDED detail, changed "5 Shoulder Pavement" to "5 Shoulder Pavement".
  005 1 of 1  TREATMENT: Criteria for using Treatment I, replaced text of the last bullet with the following: "Resurfacing built-up is less than 3/4"."
  200 1 of 5  TOP SLAB PAVING DIAGRAM (ALTERANTIVE 3) to the notes 1) Additional Bars @ 8 3/4" C.C. 2) Additional Bars @ 8 3/4" C.C. 3) Double Size @ 6" Max. D.E. Each Side Of Opening”, added “Minimum #4 Bars”, 2 of 5  Note 9, Delete second sentence and substitute, “Additional bars to restrain hole formers for precast structures with grooved pipe connections, may be left with the top surface.”
  4 of 5  SLAB AND WALL DESIGN TABLE NOTES, added the notes to the end of the last 10.53 (See Index No. 201, Sheet 4 for allowable bar spacing adjustments when larger areas of reinforcing are substituted.)
  4 of 5  "Revised list of notes to "NOTES FOR PRECAST OPTIONS AND EQUIPMENT REINFORCEMENT SUBSTITUTION" and added the following to Note 4.4. When an increased area of reinforcing is provided, then the maximum bar spacing may be increased by the squared ratio of the larger area, but not to exceed 12 inches."
  201 1 of 1  Changed maximum size of allowed PVC pipe to .36".
  2 of 6  ROUND PIPE DIMENSIONS, deleted the column, "Wall Thickness (In.) Class II" and column "INCH" and heading "SNCP". Also deleted the # note at the bottom of the table.
  3 of 6  NOTES: deleted note 4, table "PIPE SIZES: R120, R240, R360, R480, R600, R720, R840, R960, R1080, R1200, R1320, R1440". Referenced notes and changed reference to "Referenced specifications and maximum weight of FPLDF, "Steel Thickness in Inches (Gage)”, 0121.01 added referenced measurements.
  210 1 of 1  Delete General Note 4, and substitute the following: "For precast units the rear wall of a unit may be prestressed as a separate piece from the top slab. Provide a minimum of 7 to 8" down in accordance with Index No. 203.05 "PREFABRICATED CONCRETE JOINTS"."
  211 1 thru 5  Revised index completely. 3 sheets added, Reinforcing configuration and C.P. details reviewed, precast and WW details added. Changed Note 4 to 4.00. Table rounded risers.
  213 1 of 1  In PLAIN view changed "1/2" Exp. Joint (Typ) to "1/2" Preformed Joint Riser (Typ).
  218 2 of 2  "STEEL GRADE", "TOP VIEW", for the overall dimension of the left side of the grade, inserted "1.0". For the overall dimension at the upper left corner of the grade, inserted "1.50".
  219 1 of 2  In PLAIN view and Section AA view changed "Expansion Joint (Typ)" to "Expansion Joint Material Joint to "1/2" Preformed Joint Riser (Typ).
  220 1 of 3  "GUTTER INLET TYPE S", "SECTION BB", Changed the vertical dimension between the top of the joint and the grade elevation from "35/6" to "45/6".
  221 1 of 1  "SECTION AA", at the top right corner, for precast thickness changed "6" to "3" (same as left side).
  223 1 thru 2  "SECTION BB", at the top, changed "3-1/2" Precast to "4-3/2" Precast. "PLAN", at the top, changed "4-3/2" Precast to "4-3/2" Precast.
  230 1 of 2  In PLAIN view changed "1/2" Exp. Joint (Typ) to "1/2" Preformed Joint Riser (Typ), Section E-E, Changed 4219.1 shape to build up section (3.5 x 3.5 x 3.5) with "3.5 x 3.5 x 3.5" for grating.
  231 1 of 3  "GUTTER Bottom INLET TYPE B", "SECTION BB", upper left side, deleted the dimension "2-6" (Min.) and replaced with "3-10" (Min.).
  232 1 thru 7  Index was expanded due to font size change.
  233 1 thru 2  Index was expanded due to font size change.
  234 1 thru 2  Index was expanded due to font size change.
  250 1 thru 2  Under Movement & Sodding detail changed "1/2" Exp. Joint to "1/2" Preformed Joint Riser.
  235 1 of 2  "GENERAL NOTES", Note 3, deleted "Alternate II" replaced with "Notes 300". Note 8 Changed "Section 850" to "Section 850.01". Note 9 Changed "Structural Concrete" to "Section 850.02" to "Section 850.010".
  245 1 of 1  "GENERAL NOTES", Note 2, deleted and replaced with the following: "Concrete shalbe Class I (Structural), except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications. Box shalbe reinforced with No. 3 bars (Grade 60) on 8" centers with both sides, sides and bottom sides."
  250 1 thru 2  "GENERAL NOTES", Note 5, deleted and replaced with the following: "Concrete shalbe Class I (Structural), except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications."
  251 1 thru 2  "GENERAL NOTES", Note 4, deleted and replaced with the following: "Concrete shalbe Class II, except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications."
  252 1 thru 2  "GENERAL NOTES", Note 4, deleted and replaced with the following: "Concrete shalbe Class II, except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications."
  253 1 thru 2  "GENERAL NOTES", Note 4, deleted and replaced with the following: "Concrete shalbe Class II, except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications."
  255 1 thru 2  "GENERAL NOTES", Note 4, deleted and replaced with the following: "Concrete shalbe Class II, except ASTM C479 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications."
  260 1 thru 1  "GENERAL NOTES", Note 3 changed "Section 850.02" to "Section 850.010".
  261 1 thru 1  "GENERAL NOTES", Note 2 changed "Section 850.01" to "Section 850.010".
  262 1 thru 1  "GENERAL NOTES", Note 4 changed "Section 850.02" to "Section 850.010".
  264 1 thru 1  "INDEX", Note 8, deleted. "Class I concrete and substituted "Class III concrete".
  266 1 thru 1  "INDEX", Note 4 changed "Class III concrete" to "Class NS concrete".
  267 1 thru 1  "INDEX", Note 7, changed "Class III concrete" to "Class NS concrete".
  268 1 thru 3  "INDEX", Note 3, changed "Class II concrete" and substituted "Class III concrete".
  269 1 thru 3  "INDEX", Note 3, changed "Class III concrete" to "Class NS concrete".
  270 1 thru 3  "INDEX", Note 4, changed "Class II concrete" and substituted "Class III concrete".
  271 1 thru 3  "INDEX", Note 5, changed "Class II concrete" and substituted "Class III concrete".
  273 1 thru 3  "INDEX", Note 5, changed "Class III concrete" to "Class NS concrete".
  274 1 thru 3  "INDEX", Note 7, changed "Class III concrete" to "Class NS concrete".
  275 1 thru 3  "INDEX", Note 4, changed "Class II concrete" and substituted "Class III concrete".
  276 1 thru 3  "INDEX", Note 4, changed "Class III concrete" to "Class NS concrete".
  277 1 thru 3  "INDEX", Note 5, changed "Class II concrete" and substituted "Class III concrete".
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<td>&quot;GENERAL NOTES&quot; Note 2 changed “Specification Section 962” to “Specification Section 975”.</td>
<td>421</td>
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<td>Changed REFLECTIVE RAILING MARKERS note. “Reflective Railing Markers shall meet Specification Section 993. Install markers on top of the Traffic Railings along the centerline of the table shown in the table above. Reflectors color (white or yellow) shall match the color of the near edgeline. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railings.”</td>
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<td>1 thru 2</td>
<td>Index was expanded due to change in font.</td>
<td>422</td>
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<td>Added the following to the NAME, DATE and BRIDGE NUMBER note: “The name shall be as shown in the General Notes in the Structures Plans.” Changed REFLECTIVE RAILING MARKERS note.</td>
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<td>304</td>
<td>6 of 6</td>
<td>Added alternate location of detectable warnings on linear ramps. Added note “On curb ramps, landings and threshold transitions perpendicular to the curb line, rows of domes shall be placed with the centerline of the ramp. (See Pictorial View A) at top of sheet. Added RoadRail Crossing PLAN view.</td>
<td>423</td>
<td>1 of 3</td>
<td>Added the following to the NAME, DATE and BRIDGE NUMBER note. “The name shall be as shown in the General Notes in the Structures Plans.” Bicycle Railings to “Special Weight Bicycle Railings” 2010 Edition.</td>
</tr>
<tr>
<td>305</td>
<td>1 &amp; 4</td>
<td>Deleted bar spacing table and revised notes (Sheet 2). Changed width of outside lanes (Sheet 4).</td>
<td>424</td>
<td>1 of 3</td>
<td>Changed the following: “TRAFFIC RAILING (1½” VERTICAL SHAPE)”, deleted the “TRAFFIC RAILING (1½” HORIZONTAL SHAPE)” note and substituted the following: “Traffic Railing Markers shall meet Specification Section 993. Install markers on top of the Traffic Railings 2” from the face on the traffic side at the spacing shown in the table above. Reflectors color (white or yellow) shall match the color of the near edgeline. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railings.”</td>
</tr>
<tr>
<td>400</td>
<td>1 thru 6</td>
<td>Index expanded by one sheet due to font size change and added new sheet 2, “APPROACH END CONNECTORS (STRAIN TIES)”. Index reordered.</td>
<td>425</td>
<td>1 of 3</td>
<td>Changed the following: “TRAFFIC RAILING (1½” VERTICAL SHAPE)”, deleted the “TRAFFIC RAILING (1½” HORIZONTAL SHAPE)” note and substituted the following: “Traffic Railing Markers shall meet Specification Section 993. Install markers on top of the Traffic Railings 2” from the face on the traffic side at the spacing shown in the table above. Reflectors color (white or yellow) shall match the color of the near edgeline. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railings.”</td>
</tr>
<tr>
<td>401</td>
<td>2 of 6</td>
<td>New sheet added showing limits of pay for guardrail, details of shoulder treatment and miscellaneous asphalt for guardrail approach and treatments.</td>
<td>426</td>
<td>1 of 7</td>
<td>Added the following to the NAME, DATE and BRIDGE NUMBER note: “The name shall be as shown in the General Notes in the Structures Plans.” Bicycle Railings to “Special Weight Bicycle Railings” 2010 Edition.</td>
</tr>
<tr>
<td>402</td>
<td>15 of 26</td>
<td>LOCATIONS ON FRONT SLOPES”, deleted the details for guardrail on slope and rubrail termination and the chart for lateral placement on slopes.</td>
<td>427</td>
<td>1 of 7</td>
<td>Changed Field testing proof loads to the AGGLOMERATE BRIDGES ANCHORS and HOLES notes: “TRAFFIC RAILING (1½” VERTICAL SHAPE)”. General Notes &amp; Details 5, deleted the “Bridge Name Plate” note and substituted the following: “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 Railings (Three Beam System) will obscure the bridge name, number and or date, then replace the information that has been removed or obscured, with 3½” black on white non-reflective sheeting applied to the top of the adhesion. The information must be clearly visible on the right side of the bridge name or number. The sheeting and adhesive backing shall comply with Specification Section 994 and may comprise of individual decals in letters and numbers.”</td>
</tr>
<tr>
<td>403</td>
<td>10</td>
<td>Added PTFE tape option to anchor bolt details.</td>
<td>428</td>
<td>1 of 7</td>
<td>Added the following note: “NEOPRENE RADS: Neoprene pads must be plain pads with a diameter tolerance of ±0.1% and meet the requirements of Specification Section 932, except that testing of the finished pad will not be required.”</td>
</tr>
<tr>
<td>404</td>
<td>10</td>
<td>NOTES FOR WALL END SHEELING”, Note 1 changed the second sentence for “ Except where the relief designate a particular type crash cushion for a specific location, the contractor shall construct any of the re-entrant crash cushions listed on the Qualified Products List, subject to the use and limitations described on their respective drawings.”</td>
<td>429</td>
<td>1 of 7</td>
<td>Changed offset of 1½” to 2½” from back edge of base plate in SECTION 6-B.</td>
</tr>
<tr>
<td>405</td>
<td>1 of 3</td>
<td>Changed REFLECTIVE RAILING MARKERS note. “Reflective Railing Markers shall meet Specification Section 993. Install markers on top of the Traffic Railings 2” from the face on the traffic side at the spacing shown in the table above. Reflectors color (white or yellow) shall match the color of the near edgeline. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railings.”</td>
<td>430</td>
<td>2 of 4</td>
<td>“SECTION 6-A” and “SECTION 6-B”, changed “Porous Pad” to “Neoprene Pad.”</td>
</tr>
<tr>
<td>406</td>
<td>2 of 4</td>
<td>“SECTION 6-A” and “SECTION 6-B”, changed “Porous Pad” to “Neoprene Pad.”</td>
<td>431</td>
<td>2 of 4</td>
<td>“SECTION 6-A” and “SECTION 6-B”, changed “Porous Pad” to “Neoprene Pad.”</td>
</tr>
<tr>
<td>407</td>
<td>3 of 4</td>
<td>“SECTION 6-C”, changed “Porous Pad” to “Neoprene Pad.”</td>
<td>432</td>
<td>3 of 4</td>
<td>“SECTION 6-C”, changed “Porous Pad” to “Neoprene Pad.”</td>
</tr>
<tr>
<td>Index Number</td>
<td>Sheet Number</td>
<td>Description</td>
<td>Index Number</td>
<td>Sheet Number</td>
<td>Description</td>
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<td>-------------</td>
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</tr>
<tr>
<td>475</td>
<td>2 of 4</td>
<td>&quot;SECTION A-4-1&quot; and &quot;SECTION B-8&quot;, changed &quot;Residential Pad&quot; to &quot;Neoprene Pad&quot;.</td>
<td>600</td>
<td>3 of 11</td>
<td>&quot;LANE WIDTHS&quot;, in the second sentence, change the word &quot;expected&quot; to &quot;expected&quot;.</td>
</tr>
<tr>
<td>476</td>
<td>2 of 4</td>
<td>&quot;SECTION A-4&quot; and &quot;SECTION B-8&quot;, changed &quot;Residential Pad&quot; to &quot;Neoprene Pad&quot;.</td>
<td>5 of 11</td>
<td>Changed note under &quot;SIGN COVERING AND INTERMITTENT WORK STAGEAGE SIGNING&quot; added information for the use of the new &quot;PROJECT INFORMATION SIGN&quot;.</td>
<td></td>
</tr>
<tr>
<td>480</td>
<td>1 of 2</td>
<td>&quot;TRAFFIC RAILING (VERTICAL FACE RETROFIT) GENERAL NOTES &amp; DETAILS&quot;, added the following to the &quot;ASME/IEEE-60-1996 ANCHORS AND SOWELS&quot; note, &quot;The field testing proof loads required by Specification Section 420 shall be 2,000 lbs for SteelBars 50 on the inside face (traffic sides) of the railing (1-0&quot; embedment) and 18,000 lbs for SteelBars 60 on the outside face of the traffic railing (5 min. embedment).&quot; Added NON-ELEVATING RAIL wall.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 500         | 2 of 2       | "SHEET-LESS" detail, deleted "Storm Sewer Main" replaced with "Storm Drain Trunk Lines". | 6 of 11      | GENERAL NOTES, deleted note 1, substituted the following: "4". Aligs shall be post-mounted when work operations exceed one day except for: Road closure sign mounted in accordance with the vendor drawing for the Type III Barricade shown on the QPL. 5. Pedestrian advanced warning or regulatory signs mounted on sign supports shown on the QPL. "2 POST SIGN SUPPORT MOUNTING DETAILS", added text to include a tolerance between sign supports: "Insert "4-4" after "1-6-6" and insert "4-1" after "2-6-6". "POST AND FOUNDATION TABLE FOR WORK ZONE SIGNS", expanded Note 2 by adding: "unless otherwise specified in the vendor drawing on the QPL."
| 501         | 3 of 9       | Changed the REQUIRED TEST METHOD for Burst Strength, Soil-Geosynthetic Fitting, Creep Reduction Factor & Joint Overlap to ASTM D 6706. |
| 502         | 4 of 9       | Updated values for COMPAC 70.70 Deleted AMICO 2006, 2016 & 2044. Added GDOT SPEC 1557, 1562.4.4, 1562, 4.6.4, 4.6.4 and 4.6.4.4 welded geogrids. |
| 503         | 5 of 9       | Changed Joint Strength Overlap value to 1.2 for all MarVic products. |
| 504         | 6 of 9       | Deletet Application Usage 3 & 4 for SYNTENF 51 & 52. |
| 505         | 7 of 9       | Added Forin 20. |
| 506         | 8 of 9       | Changed Creep Resistance and Creep Reduction Factors for TEMEX 1120, 1X 1200, 1X 1220 & 1X 1500. |
| 507         | 9 of 9       | Updated values for TEMAX 220 & TEMAX 330, added Cambria 30/30, Securig 20/20 & 30/30 extruded geogrids. |
| 508         | 1-4 of 4     | Sheet 3 is new. Renumbered other sheets. |
| 509         | 5 of 7       | In second symbolized note changed "Section 102-8" to "Section 102-8". |
| 510         | 6 of 7       | "PAVEMENT STRUCTURE FOR TURNOUTS AND AUXILIARY LANE TABLES" (Table 510-1), "NOTES", Note 5, Deleted "Class I concrete" substituted "Class NS concrete". |
| 511         | 7 of 3       | Revised width of rigid pavement outside travel lane and changed location of rumble strip. |
| 512         | 8 of 1       | "GENERAL NOTES", Note 7, Deleted "Class I Concrete (Rehabilitating Walks)" and substituted "Class NS Concrete". |
| 513         | 1 of 6       | Added detail "PLATE", "PICTORIAL" and #4, Index Sheets reordered. |
| 514         | 5 of 6       | Under "NOTES FOR 4-LANE DIVIDED ROADWAY"; Note 1, changed reference from "Sheet 6" to "Sheet 2". |
| 515         | 6 of 13      | OVERHEAD WORK, deleted "OPTION 4 - 5 - 4" and substituted the following: OPTION 4 "OVERHEAD WORK MAINTAINING TRAFFIC WITHOUT ENCROACHMENT BELOW THE OVERHEAD WORK AREA". Tabular shall be detoured, shifted, diverted or passed as to not encroach in the area directly below the overhead work operations in accordance with the appropriate standard index drawing or detailed in the plans. This action applies to, but not limited to, the following construction activities: all storm, sewer and segment placement. |
| 516         | 2 of 6       | Deck form placement and removal. |
| 517         | 3 of 6       | Concrete deck placement. |
| 518         | 4 of 6       | Rolling construction located at edge of deck. |
| 519         | 5 of 6       | Structure demolition. |
| 520         | 6 of 6       | CLEAR ZONE WIDTHS FOR WORK ZONES, deleted the text "travel" in the first sentence and substituted "traffic". |
| 521         | 7 of 6       | Replaced chart "CLEAR ZONE WIDTHS FOR WORK ZONES".
<table>
<thead>
<tr>
<th>Index Number</th>
<th>Sheet Number</th>
<th>Description</th>
<th>Index Number</th>
<th>Sheet Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>851</td>
<td>1 of 2</td>
<td>Changed Pedestrian and Bicycle Railing designation.</td>
<td>5204</td>
<td>1 of 1</td>
<td>Changed “Ribbed” to “Slotted” in PLUS DETAILS.</td>
</tr>
<tr>
<td>2 of 2</td>
<td></td>
<td>Added requirement for set screw to be set flush against outside face of roll and 18-8 Alloy option in DETAIL “B”. Changed field splice joint tolerance to 1/4&quot; in DETAIL “B”.</td>
<td>5205</td>
<td>1, 3, 4, &amp; 6</td>
<td>Added note in Elevation Views to “Extend post 2' above high side wall where post caps are shown in the plans”.</td>
</tr>
<tr>
<td>860</td>
<td>1 of 5</td>
<td>Changed “Pedestrian/Bicycle Railing” to “Pedestrian/Bicycle Railing” and “Bicycle Railing” to “SpecialWeight Bicycle Railing”. Added anchor bolt requirements to CNMP DRAWINGS note. Added filler metal.</td>
<td>5206</td>
<td>1 of 1</td>
<td>Added “POST LENGTH WITH CAP” column, DAPS D, P5 thru P8 to table and border details for corner posts.</td>
</tr>
<tr>
<td>2 of 5</td>
<td></td>
<td>Added DETAIL FOR NON-CONTINUOUS RAILING AT CORNER detol Changed Pedestrian and Bicycle Railing designation maximum ramp length for slopes less than 6.25% and minimum clear picket opening at post to 3 1/2&quot;.</td>
<td>5207</td>
<td>1 of 1</td>
<td>New Index added “PRECAST SOUND BARRIERS-PRECAST PILLAR CAPITAL”.</td>
</tr>
<tr>
<td>3 of 5</td>
<td></td>
<td>Changed Pedestrian and Bicycle Railing designation.</td>
<td>5210</td>
<td>2 of 5</td>
<td>Changed NAME, DATE AND BRIDGE NUMBER note, and “Ribbed” to “Slotted” in NEOPRENE DIAPHRAGM PLUS DETAILS. Added REFLECTING MARKET MATERIAL note and REFLECTIVE RAILING MARKET SPACING table.</td>
</tr>
<tr>
<td>4 of 5</td>
<td></td>
<td>Added requirement for set screw to be set flush against outside face of roll and 18-8 Alloy option in DETAIL “B”, “D”, “E”, and “F”; joint tolerance in DETAIL “D”, “D”, “E” and “F”; Type II (Nonmetallic) connection details.</td>
<td>5211</td>
<td>3 of 5</td>
<td>Changed “Ribbed” to “Slotted” in NEOPRENE DIAPHRAGM PLUS DETAIL. Corrected Anchor Bolt dimeter in FIRE HOSE ACCESS DETAIL.</td>
</tr>
<tr>
<td>5 of 5</td>
<td></td>
<td>Added DETAIL “F” and note (4) to ANCHOR BOLT DETAIL Changed Pedestrian and Bicycle Railing designation. Corrected height dimension on steps to top of railing.</td>
<td>5212</td>
<td>2 of 2</td>
<td>Added note for “Full Depth Structural Asphalt” above junction slab and changed coping dimension to 6&quot; Min.</td>
</tr>
<tr>
<td>870</td>
<td>1 of 5</td>
<td>Deleted Pedestrian and Bicycle destinations from DESIGN LIVE LOADS and ALTERNATE DESIGN notes.</td>
<td>5300</td>
<td>3 of 19</td>
<td>Increased max gap at back of precast coping and added amber blocking.</td>
</tr>
<tr>
<td>2 of 5</td>
<td></td>
<td>Deleted 4-6” Bicycle Railing option and “<em>x</em>” note. Changed maximum ramp length for slopes less than 6.25%.</td>
<td>6 of 19</td>
<td></td>
<td>Added note for “Full Depth Structural Asphalt” above junction slab and increased max gap at back of precast coping.</td>
</tr>
<tr>
<td>3 of 5</td>
<td></td>
<td>Deleted 4-6” Bicycle Railing option.</td>
<td>7 of 19</td>
<td></td>
<td>Changed “Full Depth Structural Asphalt” above junction slab.</td>
</tr>
<tr>
<td>4 of 5</td>
<td></td>
<td>Added requirement for set screw to be set flush against outside face of roll and 18-8 Alloy option in DETAIL “B”, “D”, “E”, and “F”; joint tolerance in DETAIL “D”, “D”, “E” and “F”; Type II (Nonmetallic) connection details.</td>
<td>12. &amp; 15</td>
<td>Increased max gap at back of precast coping. Corrected size of Bar SUL in SUL REFLECTING TABLE.</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td></td>
<td>Revised and rearranged notes, sheet renumbered to 1 of 2.</td>
<td>2 of 2</td>
<td></td>
<td>Revised sheet 3 of 2, sheets 2 and 2 revised and rearranged notes. Deleted “Class I Special Concrete” replaced with “Class II Concrete”.</td>
</tr>
<tr>
<td>880</td>
<td>1 of 5</td>
<td>Deleted Pedestrian and Bicycle destinations from DESIGN LIVE LOADS and ALTERNATE DESIGN notes.</td>
<td>1300</td>
<td>1 of 1</td>
<td>Changed table values revised, connection bolt size revised, and height for horizontal splice changed to 10&quot;. Added AS 4102 to Typical Detail Sheet. Sign &amp; Transom Note.</td>
</tr>
<tr>
<td>2 of 5</td>
<td></td>
<td>Deleted 4-6” Bicycle Railing option and “<em>x</em>” note. Changed maximum ramp length for slopes less than 6.25%.</td>
<td>1310</td>
<td>5 of 5</td>
<td>Deleted 4-6” bolts and Plate (Note 4a). Changed foundation concrete (Note 7). Changed to 1/2” mesh (Note 9). Deleted grout pad and notes (former Notes 7c &amp; 9). Added C5L tube note (Note 14).</td>
</tr>
<tr>
<td>3 of 5</td>
<td></td>
<td>Deleted 4-6” Bicycle Railing option.</td>
<td>2 of 5</td>
<td></td>
<td>Changed foundation standdoff distance and changed drilled shank detail. Deleted grout pad and added wire screen. Added C5L tubes. Changed PC &amp; SI, reinforcing.</td>
</tr>
<tr>
<td>4 of 5</td>
<td></td>
<td>Added requirement for set screw to be set flush against outside face of roll and 18-8 Alloy option in DETAIL “B”, “D”, “E”, and “F”; joint tolerance in DETAIL “D”, “D”, “E” and “F”; Type II (Nonmetallic) connection details.</td>
<td>5 of 5</td>
<td></td>
<td>Changed bolt spacing connection details.</td>
</tr>
<tr>
<td>5 of 5</td>
<td></td>
<td>Deleted Intermediate Posts from DETAIL “B”, “E”, “F”, and “C”.</td>
<td>1310</td>
<td>1 of 2</td>
<td>Deleted 4-6” bolts and Plate (Note 4a). Changed foundation concrete (Note 7). Changed to 1/2” mesh (Note 9). Deleted grout pad and notes (former Notes 7c &amp; 9). Added C5L tube note (Note 14).</td>
</tr>
<tr>
<td>1500</td>
<td>2 of 2</td>
<td>Changed to plastic sleeve expansion joint and “Preformed Expansion Material” to “Preformed Joint Filler”. Changed weld and expansion joint key.</td>
<td>2 of 5</td>
<td></td>
<td>Changed foundation standoff distance. Deleted grout pad and added wire screen.</td>
</tr>
<tr>
<td>5200</td>
<td>1 of 1</td>
<td>Texture Type 1 (Cut Core/Block) added.</td>
<td>5 of 5</td>
<td></td>
<td>Changed drilled shank detail. Added C5L tubes.</td>
</tr>
<tr>
<td>5202</td>
<td>1 of 4</td>
<td>Changed precast post caps. Changed clearance tolerance on stepped panel and Neoprene Pad options.</td>
<td>1105</td>
<td>1 of 8</td>
<td>Changed SINGLE COLUMN GROUND SPAN NOTE, Notes 11 and 20 and GUIDE TO USE THIS STANDARD, note 4 and example. Modified concrete classification. Modified “ALUMINUM COLUMN (POST) SELECTION TABLE”.</td>
</tr>
<tr>
<td>3 of 4</td>
<td></td>
<td>Changed #4 Bar Mark to Mars P5 &amp; P6 for Post/Options A, B, &amp; E changed Texture Thickness to 0.04&quot; Max.</td>
<td>2 of 6</td>
<td></td>
<td>Changed max limits of sin gap area and width in NOTE.</td>
</tr>
<tr>
<td>5203</td>
<td>1 of 5</td>
<td>Added precast post caps. Changed clearance tolerance on stepped panel and Neoprene Pad options.</td>
<td>3 of 6</td>
<td></td>
<td>Added Aluminum: Note details and Notes Changed Post and Foundation Table depth values.</td>
</tr>
<tr>
<td>3 of 5</td>
<td></td>
<td>Changed #4 Bar Mark to Mars P5 &amp; P6 for Post/Options A, B, &amp; E, and changed texture dimension to 0.04&quot; Max.</td>
<td>4 of 6</td>
<td></td>
<td>Modified &quot;ALUMINUM COLUMN (POST) SELECTION TABLE&quot;.</td>
</tr>
<tr>
<td>4 of 5</td>
<td></td>
<td>New sheet added for 45 degree corner post.</td>
<td>6 of 5</td>
<td></td>
<td>Deleted &quot;Signs at 90&quot; note. Added “For” note. Changed number of E-brackets for 100&quot; and RECTANGULAR sign, changed &quot;1/2’ Min. to 1/4’ Min. and sign panel edge distance in VIEW A-A, Modified &quot;1/2’ Min. Sign panel edge distance in VIEW A-A&quot;.</td>
</tr>
</tbody>
</table>
| 5 of 5       |             | Recumbered from Sheet 4 of 4 | 7 of 5        |             | Modified "UPRIGHT POST DETAIL. IN CONCRETE."

| 1700         | 1 of 1      | CASE II and CASE VIII dimensions and notes reviewed. |
|              |             | Weigh Station and combination Weigh Station and Inspection Station signing details separated. |
### index 17344
- **Sheet Number:** 2, 3, 4 & 6
- **Description:** School Signs and Markings, on each sheet in the distance table at the bottom of the sheet, deleted the "4" column. Also deleted the "41" dimension from the detail drawings.

### index 17345
- **Sheet Number:** 2 of 4
- **Description:** Normal Tapered Entrance With Added Lake, note in lower left corner, arrow now points to the effective markers on the left side of the ramp.

### index 17346
- **Sheet Number:** 4 of 4
- **Description:** Deleted note 2.

### index 17347
- **Sheet Number:** 1-4 of 14
- **Description:** Completely revised and renumbered.

### index 17348
- **Sheet Number:** 1-7 of 4
- **Description:** New Index Bicycle Markings added.

### index 17349
- **Sheet Number:** 1 of 1
- **Description:** Case I and Case II revised 18" x 18" marker detail revised notes at bottom right revised.

### index 17355
- **Sheet Number:** 1 of 11
- **Description:** Revised signs FTP-914-06 & FTP-921-06 and notes.

### index 17356
- **Sheet Number:** 1 of 1
- **Description:** Removed sign NIDP from detail. Single point attachment details deleted from Index (Deleted sheet 1).

### index 17359
- **Sheet Number:** 1 of 2
- **Description:** Changed delineators to object markers revised reference notes sign W-13 made optional.

### index 17500
- **Sheet Number:** 1 of 3
- **Description:** Deleted concrete pole detail, added METAL POLE DETAIL AND WRITING DIAGRAM.

### index 17501
- **Sheet Number:** 1 of 1
- **Description:** Deleted note 28.

### index 17502
- **Sheet Number:** 3 of 7

### index 17505
- **Sheet Number:** 1 of 8
- **Description:** Added median barrier mounted light poles. Moved notes to sheet 2.

### index 17506
- **Sheet Number:** 1 of 1
- **Description:** Dimensions 5-6" added for height of meter base. Pole type changed from type "N" to type "P".

### index 17507
- **Sheet Number:** 1 of 2
- **Description:** Mercury Vapor Luminaires changed to Induction Luminaires. Luminaire chart deleted. dimensions revised on spacing detail and added to structure detail.

### index 17510
- **Sheet Number:** 1 of 8
- **Description:** Added median barrier mounted light poles. Moved notes to sheet 2.

### index 17523
- **Sheet Number:** 1 of 3
- **Description:** Changed Note 5, 6, and 7. Added Note 8. Deleted grout pad notes (former Notes 4d & 71). Added CSL tube note (Note 9).

### index 17723
- **Sheet Number:** 1 of 3
- **Description:** Changed "Methyl Methacrylate" to "High Molecular Weight Methacrylate".
STANDARD SYMBOLS FOR KEY MAP

Free Ferry
Tail Ferry
Canal Or Drainage Ditch
Intracoastal Waterway
Narrow Stream
Wide Stream
Dam
Dam Or Spillway With Lock
Dam With Road
Flood Control Structure
Lake, Reservoir Or Pond
Intermittent Pond
Meandered Lake
Marsh Or Swamp
Mangroves
Levee Or Dike
Levee Or Dike With Road
Highway Bridge
Small Bridges Closely Spaced
Drawbridge
Highway Grade Separation
Tunnel
State Boundary Line
County Boundary Line
Civil Township Boundary
Extended Township Line
Land Grant Line
Land Section Line
State Survey Section Line
Survey By Others
Location Of Internal Boundary Within Map
Military Reservation Boundary
College Or University Boundary
Corporate Limits
Delimited Area, Population Est.
Reservation, Forest Or Park Boundary
Wildlife Refuge Boundary

Residential Area Under Development
Lighthouse
State Capitol
County Seat
Other City Or Village
Seneca Indian Village
Welcome Station
Wayside Park Or Small Park
Park With Boat Ramp
Boat Ramp
Museum
Recreational Area Or Historic Site
Scenic Site
Post Office
School
Church
Cemetery
Church And Cemetery
Hospital, Health Center Or Rest Home
Toll House, Port Of Entry Or Weight Station
Fair Grounds, Race Course Or Rodeo Arena
Mine Or Strip Mine
Governmental/Research Station

Agricultural Inspection Station
Farmers Market
Game Preserve
Game Checking Station
Bird Sanctuary
Fire Control Headquarters
Lookout Tower
Fire Station
Patrol Or Police Station
Correctional Institution Or Road Camp
Department Of Transportation Facility
Coast Guard Station
Artery
Junkyard
Sanitary Fill
Sewage Disposal Plant
Incinerator
Power Plant
Power Substation
Communications Facility
Locked Gate Or Fence
Triangulation Station

GENERAL NOTE

1. Symbols on this Index are intended for use on all Highway, 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.
STANDARD SYMBOLS FOR PLAN SHEETS

TRAFFIC SIGNALS SYMBOLS

EXISTING PROPOSED

Traffic Signal Head (Span Wire Mounted)
Traffic Signal Head (Pedestal Mounted)
Traffic Signal Head (Most Arm Mounted)
Traffic Signal Pole (Concrete, Wood, Metal)
Vehicle Detector (Loop)
Signal Cable (10k Messenger Wire)
Conduit

EXISTING PROPOSED

Vehicle Detector (Points)
Pedestrian Detector
Pedestrian Signal Head (Pole Or Pedestal Mounted)
Controller Cabinet (Base Mounted)
Controller Cabinet (Pole Mounted)

W - D W
Walk - Don't Walk

FDW
Flashing Don't Walk

Pole Number

Signal Lens

Programmed Signal Head

Messenger Wire

Pole Tabulation Cross Reference
Pole Tabulation Cross Reference (Joint Use Pole)

Lighting Symbols

EXISTING PROPOSED

Pole & Luminaire

Existing Pole & Luminaire To Be Removed

Final Position Of Relocated Or Adjusted Pole & Luminaire

High Mast Lighting Tower

City Or Utility Owned Luminaire & Pole

PVC (Polyvinyl Chloride) Lighting Conduit And Conductors

Rigid Galvanized Lighting Conduit And Conductors

Lighting Pull Box

Light Distribution Point

Joint Use Pole

Pier Cap Underdeck Luminaire

Pendant Hung Underdeck Luminaire

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

F00-03
Sign Item Number

Traffic Flow Arrow

See General Note, Sheet 1 of 3
**Temporary Slope Drain and Sod Flume**

**Note:**
Slope drain pipe to be sized for as Slope Drain (Temporary) L.P., based on linear feet of pipe or conduit installed. Payment to be made for one installation per side, 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 Drain**
- *Ground Line*
- *Temporary Slope Drains (Estimated at 400')*
  - Spacing: 18' or greater, final spacing.
  - Direction: To be as directed by the engineer.
  - Slope Drains to be replaced by permanent overburden after final shoulder grade is established.

**Sod Flume (Sodding Overlapped)**
- *25% Lap*
- *200' Std.*
- *Sodding Overlapped (To be installed for fixed construction; progresses as directed by the engineer).*

**Section AA**
- *Temporary Berm*
- *Slope Example*

**Section BB**
- *15" Metal Or Plastic Corrugated Pipe Or Plastic Fabric Conduit With Adapters For Staking Or Centers (Max.) On Drain Slope And With Flume Or Flashing For Securing Intake At Sump Wall*
- *Anchor For Corrugated Pipe As Directed By The Engineer*
- *Sandbag Cutoff Wall Or Impervious Curtain (To Be Removed With Stub And Elbow Or Conduit Relocation)*
- *Bag Height Sufficient To Contain Pipe Discharge At Ditch Locations*
- *Slope Varieties*

**Section AA**
- *Slope Flow Application*
- *Roadbed Under Construction*
- *Earth Berm*
- *Sump*
- *Sandbags To Be Located Downstream*
- *Sandbags To Be Located Downstream*
TRASH RETAINER AND SEDIMENT BASIN

GENERAL CONSTRUCTION NOTES

1. Fence materials shall be aluminum or concrete only.
2. Aluminum posts shall be 3" diameter minimum. Aluminum railbraces shall be in accordance with Index No. 802. All posts and railbraces shall be in accordance with Index No. 802. All posts to be set in concrete.
3. Fabric shall be installed to make of posts and railbraces, 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 14 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 until acceptance at project by the Engineer.

DESIGN NOTES

1. Basins should be as deep as practical 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 web shall be located as far from the endwall as practical. On steep ditch grades two or more tiers may be required. Intermediate tiers shall be constructed without stilted 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 countertops, fencing, batteries, 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. Cleanouts as called for in the plans shall be paid for under the contract unit price for Sediment Basin Cleanouts, CD.
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
PROTECTION AROUND INLETS OR SIMILAR STRUCTURES

SECTION AA

Note: Where the slope length exceeds 25 feet, construct one row of bale barriers at 02 longitudinal grade midway up the slope. Construct two rows of bale barriers where the slope length exceeds 50 feet.

ALONG FILL SLOPE

50' On Centers (Typ.)

DEVELOPMENT CHECKLIST

STANDARD INDEX NO. 102, SHEET 2 OF 3

SYNTHETIC BALES OR BALE TYPE BARRIERS FOR PAVED DITCHES

Woven Filter Fabric In Absence Of Established Grass (Approx. 12'-12'). Secure Bales By drivelines And Extend Under Bases And Bales. Fabric Shall Meet The Requirements Of Section 995 Of The Standard Specifications.

Anchor Top Bales To Lower Bales With 2' Stakes Per Bole.

SYNTHETIC BALES OR BALE TYPE BARRIERS FOR UNPAVED DITCHES

NOTES FOR SYNTHETIC BALES OR BALE TYPE BARRIERS

1. Type I and II. Synthetic Barrier should be spaced in accordance with Chart 1, Sheet 1.

2. Bales shall be anchored with 2" x 2" or 3" x 4" wood stakes. Stakes of other material or shape providing equivalent strength may be used if approved by the Engineer. Stakes other than wood shall be removed upon completion of the project.

3. Rails and posts shall be 2" x 4" wood. Other materials providing equivalent strength may be used if approved by the Engineer.

4. Adjacent bales shall be butted firmly together.

5. Where used in conjunction with a fence, bales shall be placed on the upstream side of the fence.

6. Bales to be paid for under the contract unit price for Synthetic Bales, LF. The unit price shall include the cost of filter fabric for Type I and II Barriers. Sandbags shall be paid for under the unit price for Sandbags, CY. Rock bags to be paid for under the unit price for Rock Bags, EA.
**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 1, Sheet 1.

2. **Type IV Silt Fence** to be used where large sediment loads are anticipated. Suggested use is where fill slope is 1:2 or steeper and length of slope exceeds 25 feet. Avoid use where the detached 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).

---

**PLAN VIEW**

**JOINING TWO SILT FENCES**

- Rotate both posts at least 180 degrees in a clockwise direction to create a tight seal with the fabric material.
- Drive both posts into the ground and bury flap.
- Place the end post of one fence behind the end post of the other fence as shown.
**TURBIDITY BARRIERS**

**FLOATING TURBIDITY BARRIERS**

**LEGEND**
- **Pile Locations**
- **Dredge Or Fill Area**
- **Mooring Buoy 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.

**TURBIDITY BARRIER APPLICATIONS**

**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.

**REVISION LOG**
- Added: "D"=5' Std. to "D1"=5' Std. and "D2"=5' Std.
- Deleted: XXX

**DEVELOPMENT CHECKLIST**
- STANDARD INDEX NO. XXXXX, SHEET X OF X
- 07/01/07
- 1 of 1
- 2010 FDOT Design Standards Revision 103

**STAKED TURBIDITY BARRIER**

**POST (Options: 2.5"x4" Or 3.0"x5.0")**
- Wood: Steel 1.53 lbs./ft. Min.
- Wood: Steel 1.8 lbs./ft. Min.

**SHEET No. 1 of 1**
DIVIDED NARROW MEDIAN WITH OR WITHOUT CURBED MEDIAN

DIVIDED WIDE MEDIAN WITH OR WITHOUT CURBED MEDIAN

Concrete Sidewalk

UNDIVIDED FLUSH SHOULDER

UNDIVIDED CURBED

DIVIDED CURBED

WILDFLOWER SEEDING RATES

<table>
<thead>
<tr>
<th>Common Name (Botanical Name)</th>
<th>Rate (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-Eyed Susan (Rudbeckia hirta)</td>
<td>2</td>
</tr>
<tr>
<td>Lance-Leaf Tickseed (Coreopsis lanceolata)</td>
<td>10</td>
</tr>
<tr>
<td>Golden Tickseed (Coreopsis auriculata)</td>
<td>10</td>
</tr>
<tr>
<td>Leavenworth's Tickseed (Coreopsis leavenworthii)</td>
<td>10</td>
</tr>
<tr>
<td>Firewheel (Gaillardia pulchella)</td>
<td>10</td>
</tr>
<tr>
<td>Silky Coreflower (Rudbeckia mollis)</td>
<td>2</td>
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<tr>
<td>Crimson Clover (Trifolium incarnatum)</td>
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**#2 Group**

<table>
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<tr>
<th>Common Name (Botanical Name)</th>
<th>Rate (lbs/acre)</th>
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</thead>
<tbody>
<tr>
<td>Annual Phlox (Phlox drummondii)</td>
<td>10</td>
</tr>
<tr>
<td>Moss Verbena (Verbena hederacea)</td>
<td>5</td>
</tr>
<tr>
<td>Leavenworth's Tickseed (Coreopsis leavenworthii)</td>
<td>10</td>
</tr>
<tr>
<td>Firewheel (Gaillardia pulchella)</td>
<td>10</td>
</tr>
<tr>
<td>Crimson Clover (Trifolium incarnatum)</td>
<td>15</td>
</tr>
</tbody>
</table>

Note: Wildflower seeding rates are for restoring impacted wildflower areas.

**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.

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

SEEDING ZONES
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>
<th>Degree Of Curve</th>
<th>Note</th>
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</thead>
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<tr>
<td>30</td>
<td>7° or Greater</td>
<td>Shoulder Pavement is required on all curves meeting the criteria tabulated. For curves not meeting the criteria, shoulders are to be paved where erosion of the shoulder is evident or anticipated.</td>
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<tr>
<td>40</td>
<td>6° or Greater</td>
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<tr>
<td>50</td>
<td>5° or Greater</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>4° or Greater</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>3° or Greater</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>2° or Greater</td>
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NOTES

1. These treatments are applicable to new construction, reconstruction and RSRB 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 hardwires, see Index No. 281.

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

2010 FDOT Design Standards

PERMANENT EROSION CONTROL
**GENERAL NOTES**

1. **Treatment I**
   - A. If trenching under sod 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 flushing along the edge of sod. Excess material to be uniformly distributed over the shoulder.
   - B. Payment for sod, excavation of turf and topsoil and for base course if this material under Treatment I is to be included in the contract unit price for Performance Turf, SY.

2. **Treatment II**
   - A. All 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 "Filled SoilLayer". There will be no additional payment for subsoiling borrow for excavated turf and topsoil.
   - C. When existing turf and topsoil do not meet the requirements of Section 162 "Filled 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 will be under Finished SoilLayer. Sod and other materials for turf establishment shall be paid for as Performance Turf, SY.

3. Special attention 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 shall require coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction Activity from 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 on Table on Index 104.
   - B. All turf establishment shall be performed meeting the requirements of Section 570 of the Standard Specifications.

**SHOULDER SODDING AND TURF ON EXISTING FACILITIES**

**SHOULDER OPTION 1**

**SHOULDER OPTION 2**

**REVISION LOG**

**CHECKED BY**

**APPROVED BY**

**DATE DESCRIPTION**

04/14/06  Original Release Date

**NOTE:** The page contains diagrams and text related to shoulder sodding and turf standards. The diagrams illustrate different treatment options for shoulder areas, including criteria for using each type of treatment. The text details requirements for sodding, turfing, and payment calculations. Special attention is given to erosion control and wildflower reestablishment. The page is part of the 2010 FDOT Design Standards for shoulder construction on existing facilities.
1. A Soil Tracking Prevention Device (STPD) shall be constructed at locations designated by the Engineer for points of egress from unstabilized areas of the project to public roads where off-site tracking at such points 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 FDOT size 4. 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 should provide a retention volume of 3600 cubic feet/acre of surface 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' = 750 ft³
   - 30' x 50' = 1500 ft³
   - 45' x 50' = 2250 ft³
   - 60' x 50' = 3000 ft³
   - 75' x 50' = 3750 ft³
   As an option to the sediment pit, the width of the side bump can be increased to obtain the volume. When the sediment pit or swale volume has been reduced to one half, it shall be cleaned. When a swale is used, synthetic silt or silt fence shall be placed along the entire length.

6. The swale ditch draining the STPD shall have a 0.025% minimum and a 1.0% maximum grade along the STPD and to the sediment pit.

7. Filtered and 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 raked daily when 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 (STPD). The unit price shall constitute full compensation for construction, maintenance, replacement of materials, removal, and restoration of the area utilized for the STPD including but not limited to excavation, grading, temporary pipe (including MES), if required, filter fabric, aggregate, paved areas (including asphalt and base construction), ditch stabilization, approach route stabilization, sediment removal and disposal, water, rinsing and cleaning of the STPD, and cleaning of public roads, gravel shoulders, and sod. Synthetic silt or silt Type (Type B) barriers shall be paid for under the contract unit price for Synthetic Silt Fence, LF. Silt fence shall be paid 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 warrant, a 30' width STPD may be used. Provisions for 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>TYPE</th>
<th>APPLICATION DESCRIPTION</th>
<th>DRAINAGE ID</th>
<th>MIN. COMBINED TENSILE STRENGTH</th>
<th>MIN. SHEAR STRENGTH</th>
<th>MIN. PUNCTURE</th>
<th>MIN. PROXIMAL TEAM</th>
<th>MIN. WIDE WIDTH TENSILE STRENGTH km/m</th>
<th>UV RESISTANCE (Min. Allowed)</th>
<th>COMMENTS</th>
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<tr>
<td>D-1</td>
<td>Revetment (Special)</td>
<td>(See D-2)</td>
<td>(See D-2)</td>
<td>1.40</td>
<td>1.26</td>
<td>0.50</td>
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<td>Woven Monofilament Geotextile only</td>
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<td>D-2</td>
<td>Revetment (Standard)</td>
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<td>D-3</td>
<td>Articulating Block</td>
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<td>45%</td>
<td>40</td>
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<td>Gabions</td>
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<td>45%</td>
<td>40</td>
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<td>Rock, Pumice, Broken Concrete</td>
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<td>D-3</td>
<td>Underdrain</td>
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<td></td>
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<td></td>
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<td>No woven silt fabric allowed. ***For cohesive soils with a plasticity index &gt; 17, maximum average rate value for AOS is number 50 sieve. ***Required Trapped silt for woven monofilament is 250. ***See Index No. 286 for the permeability and AOS values of the internal filter fabric of Type V Underdrain.</td>
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<td>French Drain</td>
<td>No. 200 SIEVE</td>
<td>No. 200 SIEVE</td>
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<td>Filter Fabric Jacket (Overt)</td>
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<td>Sope Placement (Soil-Cement)</td>
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<td>Silt Fence</td>
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<td>Wind Screen</td>
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<td>Plastic Erosion Mat (Type 1)</td>
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<td>Use where design shear stress is 200 Pa</td>
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<td>Use where design shear stress is 240 Pa</td>
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</tbody>
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### 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. All values except AOS are MAXIMUM AVERAGE RDL values in the weakest principal direction. Values for AOS are MAXIMUM AVERAGE RDL values.
3. Test silt or filter layer adjacent to the geotextile for gradation to select values for permeability and AOS.
4. Unless specifically restricted in COMMENTS column, any type of material meeting specification 985 may be used.

### DESIGN NOTES

1. The Designer shall review this criteria and adjust the values as necessary to satisfy project requirements. These adjustments shall be calculated for in the plans or contained in the project specifications.
2. UV Resistance: The value represents the percent minimum tensile strength retained (ASTM D-4863) after weathering per ASTM D-4863 for the last period (hours).
3. Shear stress limits for plastic erosion mats determined by 30 minutes sustained flow in unweighted state 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>
<thead>
<tr>
<th>Test</th>
<th>Unit</th>
<th>Test Method</th>
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<tr>
<td>AOS</td>
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<td>Maximum Design Velocity</td>
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<td>ASTM D-4863</td>
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<tr>
<td>Utraviolet Resistance</td>
<td>% Retained</td>
<td>ASTM D-4863</td>
</tr>
<tr>
<td>Filtration Efficiency</td>
<td></td>
<td>ASTM D-4863</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>l/min</td>
<td>ASTM D-4863</td>
</tr>
</tbody>
</table>
TOP SLAB REINFORCING STEEL DIAGRAM (ALTERNATE A)

NOTE: Not applicable for Type A, B, C, D & E block bottom joints or Type S & Y gutter joints. See Index Nos. 220, 221, 230, 231 & 232.

SQUARE OPENING WITH CORNER FILETS

TOP SLAB REINFORCING STEEL DIAGRAM (ALTERNATE B)

ROUND RISER OPENING

SECTION C-C
SPECIAL TOP SLAB*

TYPICAL SLAB TO WALL DETAILS FOR PRECAST STRUCTURES

DEVELOPMENT CHECKLIST
STANDARD INDEX NO. 200, SHEET 1 OF 3

2-5-04

2010 FDOT Design Standards

INDEX NO. 200

STRUCTURES BOTTOMS TYPE J AND P
**GENERAL NOTES**

1. Standard structure bottoms 4-6" diameter and smaller (Alt A) and 3-6" square (Alt B) are designated Type P. 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.

2. Walls of circular structures (Alt A) constructed in place may be of brick or reinforced concrete. Precast and rectangular structures (Alt B) shall be constructed at reinforced concrete only.

3. Wall thickness and reinforcement are for either reinforced cast-in-place or precast concrete units except that circular units may be furnished with walls in accordance with ASTM C476 (see modified wall thicknesses in Table 1).

4. Top and bottom slab thickness and reinforcement are 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 C476 (4000 psi) may be used in lieu of Class II concrete for precast items manufactured in accordance with Specifications Section 449.

5. Reinforcement shown is ASTM A615/A615M Grade 60 steel, deburred bar. Equivalent area Grade 40 steel or equivalent area ASTM A 416 (smooth) or ASTM A497 (deformed) welded wire fabric may be substituted according to Index No. 20, unless otherwise noted.

6. Alt A or Alt B structure bottoms may be used in conjunction with curb inlets. Types 1, 2, 3, 4, 5, 6, 8, and 10, and any manhole or junction box unless otherwise shown in the plans or other standard drawings. Alt B structure bottoms may be used in conjunction with curb inlet Types 3 & 6, or any pitch basin inlet unless otherwise shown in the plans or other standard drawings.

7. Rectangular structures may be selected as directed by the Engineer in order to facilitate connections between the structure walls and storm sewer pipes.

8. Except when A2201, 4000 psi is specifically required, reinforcement in top and bottom slabs shall be placed straight embedment.

9. All reinforcement must have 2" minimum cover except for 3-6" diameter precast circular units manufactured under ASTM C476, keyed connection joints, and pipe openings must all have 1/2" minimum cover, unless otherwise shown. All reinforcement used to restrain pipe connections, may be left flush with the top surface. Cut or bend reinforcement at clear openings and grouted joints must be removed to 1" below the concrete surface and sealed with a Type P epoxy in accordance with Specification Section 926. Horizontal steel in rectangular structures shall be rebated a minimum of 30 bar diameters or by standard breaks at corners.

10. The corner fillets shown are necessary for rectangular structures used with circular risers and inset throats, and when used on skew with rectangular risers, inset and inset throats. Fillets are required in the top slab of the Alt A structure bottoms when used with the Alt B risers. Each fillet shall be reinforced with two #5 bars.

11. Inlet walls, throats, risers or manhole tops shall be secured to structures as shown in Index No. 201 (Sheet 3 of 5) Optional 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 increase the severity of utility conflicts. 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 5' - 6" wall height when possible, for maintenance access.
### Table 3: Minimum Structure Sizes for Single Pipe Connection Per Side

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>Single Pipe Number</th>
<th>Single Pipe</th>
<th>2 to 4 Pipes</th>
<th>5 to 8 Pipes</th>
<th>9 to 12 Pipes</th>
<th>13 to 16 Pipes</th>
<th>17 to 20 Pipes</th>
<th>21 or More Pipes</th>
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### Table 5: Maximum Pipe Skew for Precast Round Openings

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<td>2°</td>
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<td>2°</td>
</tr>
<tr>
<td>4&quot;</td>
<td>4°</td>
<td>4°</td>
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### Table 4: Minimum Sizes for Multiple Parallel Pipe Connections for Rectangular Structure Bottoms

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<tr>
<th>PIPE SIZE</th>
<th>MIN PIPE SPACING</th>
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<th>WALL LENGTH FOR 4 PARALLEL PIPES</th>
<th>WALL LENGTH FOR 5 PARALLEL PIPES</th>
<th>WALL LENGTH FOR 6 PARALLEL PIPES</th>
<th>WALL LENGTH FOR 7 PARALLEL PIPES</th>
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<td>23&quot;</td>
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</table>

### Table 5 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.

### Structure Sizes for Pipe Connections

- Minimum wall lengths based on precast structures, using concrete pipe with maximum skew angles per Table 5.
- Wall lengths exceeding 20'-0" require special designs.
<table>
<thead>
<tr>
<th>SLAB DESIGNS - SQUARE AND RECTANGULAR STRUCTURES (TABLE 6)</th>
<th>SLAB DESIGNS - ROUND STRUCTURES (TABLE 7)</th>
</tr>
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<tbody>
<tr>
<td><strong>SHORT-WAY</strong></td>
<td><strong>LONG-WAY</strong></td>
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<tr>
<td>SLAB DEPTH (Bars A)</td>
<td>SLAB DEPTH (Bars A)</td>
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<td>SIZE: 3&quot; x 6&quot; x UNLIMITED</td>
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<tr>
<td>SLAB DEPTH (Bars B)</td>
<td>SLAB DEPTH (Bars B)</td>
</tr>
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</tr>
<tr>
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<td>SLAB DEPTH (Bars A)</td>
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<td>SIZE: 6&quot; x 6&quot;</td>
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<td>SLAB DEPTH (Bars B)</td>
<td>SLAB DEPTH (Bars B)</td>
</tr>
<tr>
<td><strong>LONG-WAY</strong></td>
<td><strong>LONG-WAY</strong></td>
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<td>SLAB DEPTH (Bars A)</td>
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<tr>
<td>SLAB DEPTH (Bars B)</td>
<td>SLAB DEPTH (Bars B)</td>
</tr>
<tr>
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<td><strong>LONG-WAY</strong></td>
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<td>SLAB DEPTH (Bars B)</td>
</tr>
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<td>SLAB DEPTH (Bars B)</td>
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</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 slabs for prestress 3"-6" x 3"-6" rectangular structures at 15 depth or less, may be 6" thick.
4. Slab depth is measured from finished grade to top of slab.
5. Wall depth is measured to the top of the bottom slab for boxes and to the top of the intermediate slab for riders.
6. Wall height is the distance between top of lower slab to bottom of upper slab. Maximum wall height is 22" for wall lengths exceeding 5", or 10" for wall lengths exceeding 12".
7. Wall lengths exceeding 6"-0" require two layers of reinforcing (See Table 8) with 2" of cover from the horizontal bars to the inside and outside faces for each layer.
8. Wall lengths exceeding the dimensions or depths shown in Table 6, or 12"-0" diameter require 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 B2D may not be substituted for Schedule B2E (See Index 20), Sheet 4, for allowable bar spacing adjustments when larger areas of reinforcing are substituted.
### WALL DESIGNS - RECTANGULAR STRUCTURES (TABLE 8)

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<th>HORIZONTAL REINFORCING SCHEDULE</th>
<th>WALL DEPTH</th>
<th>VERTICAL REINFORCING SCHEDULE</th>
<th>HORIZONTAL REINFORCING SCHEDULE</th>
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<td>0.7</td>
<td>G12</td>
<td>0.12</td>
<td>0.25</td>
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<td>SIZE: 3&quot;-6&quot; &amp; RISERS</td>
<td>0.7</td>
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</table>

### REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>GRADE</th>
<th>AREA (in.²/ft)</th>
<th>MAXIMUM SPACING</th>
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<tbody>
<tr>
<td>65</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>70</td>
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<td>80</td>
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</tbody>
</table>

### WALL REINFORCING SPICE DETAILS (ALTERNATE B)

- Option 1: Lap Splice at Quarter Point (30 Dia Vertical, 10 Dia Horizontal)
- Option 2: Lap Splice with Standard 90° Hook at Corners (6 in Dia Vertical, 12 in Dia Horizontal)
- Option 3: Lap Splice Corner Spliced Bar (30 Dia, Not Less Than Two Vertical Wire Spacing Plus 2 in for WWF)

### STRUCTURE BOTTOMS TYPE J AND P

- Structure Wall
- Double Layer Wall Reinforcing
- Single Layer Wall Reinforcing
- 2" Clear (Typical)
- 3" Clear (Typical)
2010 FDOT Design Standards

SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS

WEIGHT OF CASTINGS

<table>
<thead>
<tr>
<th>Frame Type</th>
<th>2-OPT Opening</th>
<th>3-OPT Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2&quot; Opening</td>
<td>3&quot; Opening</td>
</tr>
<tr>
<td></td>
<td>Frame Cover</td>
<td>Inside</td>
</tr>
<tr>
<td>I</td>
<td>155 lbs.</td>
<td>220 lbs.</td>
</tr>
<tr>
<td>II</td>
<td>145 lbs.</td>
<td>255 lbs.</td>
</tr>
<tr>
<td>III</td>
<td>90 lbs.</td>
<td>150 lbs.</td>
</tr>
</tbody>
</table>

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.
**EYEOBOLT AND CHAIN REQUIREMENTS**

<table>
<thead>
<tr>
<th>Index</th>
<th>Inset</th>
<th>Type</th>
<th>Length</th>
<th>Handling &amp; Remarks</th>
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<tbody>
<tr>
<td>217</td>
<td>1</td>
<td>D</td>
<td>5'-0&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>218</td>
<td>1</td>
<td>E</td>
<td>3'-8&quot;</td>
<td>Side Up &amp; Slide &amp; Spin</td>
</tr>
<tr>
<td>219</td>
<td>1</td>
<td>F</td>
<td>2'-6&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>220</td>
<td>1</td>
<td>G</td>
<td>2'-6&quot;</td>
<td>Side &amp; Spin</td>
</tr>
<tr>
<td>221</td>
<td>1</td>
<td>H</td>
<td>2'-5&quot;</td>
<td>Flip Side &amp; Spin</td>
</tr>
<tr>
<td>222</td>
<td>1</td>
<td>I</td>
<td>6'-0&quot;</td>
<td>Slide</td>
</tr>
<tr>
<td>223</td>
<td>1</td>
<td>J</td>
<td>4'-0&quot;</td>
<td>Slide &amp; Spin</td>
</tr>
</tbody>
</table>

**NOTES (TOPS)**

1. Manhole top Type 7 slabs shall be of Class II concrete. Concrete as specified in ASTM C476 may be used for precast units see General Note No. 5.

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

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

4. Manhole slabs shall be supported by timbers by optional construction joints as shown on Sheet 3 of 4.

5. Frames can be adjusted a maximum 2" height with brick or precast ASTM C476 grade rings.

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

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

**DESIGN NOTES**

1. Manhole top Type 8 should be specified in the plans when depths shown above are to be maintained.

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

- Bituminous Coating On Face Of Concrete And Around Pipe
- Filter Fabric Wrap
- Masonry Seal Or Precast Opening

**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

- **BRICK OR CONCRETE PRECAST CONCENTRIC CONE TYPE 7**
- **PRECAST ECCENTRIC CONE TYPE 8**
- **SECTION**
  - Note: See Slab Design No. 200.
  - **BRICK**
  - **CONCRETE**
  - **6" Block**
  - **See Note 3.**
  - 2" Dia. (1-Piece Cover) 3" Dia. (2-Piece Cover)

**SUMP BOTTOM**

- **5" Per Ft.**
- **GROUT (13 Sand-Cement Mixure or Any Class Concrete)**
- **DRAINAGE STRUCTURE INVERT**
- **56'-0"**
- **Mortar Per Specification Section 425**
- **Brick Masonry or Any Class Concrete Required For Gaps Greater Than 25""
TOP SLABS TO WALLS

WALL JOINTS

BOTTOM SLABS TO WALLS

1. One or more types of joints may be used in a single structure, except brick wall structure. Brick wall construction is permitted on circular units only.

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

3. Keyways are to be a minimum of 3/8" deep.

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

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

6. Joints between wall segments and between wall segments and top or bottom slabs may be sealed either by preformed plastic gasket material using the procedures given in Section 450-7.3.1 or the Specifications or by non-shrink grout, in accordance with Section 934 of the Specifications.

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

OPTIONAL CONSTRUCTION JOINTS
### EQUIVALENT STEEL AREA TABLE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>REINFORCING BAR SIZE &amp; SPACING</th>
<th>EQUIVALENT REINFORCING BAR SIZE &amp; SPACING</th>
<th>MIN. STEEL AREA</th>
<th>MIN. STEEL AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 4/6 Ctrs. or 1 2 1/2 Crts.</td>
<td>1 4/6 Ctrs. or 1 2 1/2 Crts.</td>
<td>0.20</td>
<td>0.30</td>
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<tr>
<td></td>
<td>1 4/8 Ctrs. or 1 1 1/4 Ctrs.</td>
<td>1 4/8 Ctrs. or 1 1 1/4 Ctrs.</td>
<td>0.24</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>1 5/8 Ctrs. or 1 3 1/4 Ctrs.</td>
<td>1 5/8 Ctrs. or 1 3 1/4 Ctrs.</td>
<td>0.267</td>
<td>0.40</td>
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<tr>
<td></td>
<td>1 5/10 Ctrs.</td>
<td>1 5/10 Ctrs.</td>
<td>0.37</td>
<td>0.555</td>
</tr>
<tr>
<td></td>
<td>1 6/8 Ctrs. or 1 3 1/2 Ctrs.</td>
<td>1 6/8 Ctrs. or 1 3 1/2 Ctrs.</td>
<td>0.53</td>
<td>0.795</td>
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<tr>
<td></td>
<td>1 7/8 Ctrs. or 1 5 1/2 Ctrs.</td>
<td>1 7/8 Ctrs. or 1 5 1/2 Ctrs.</td>
<td>0.73</td>
<td>1.095</td>
</tr>
<tr>
<td></td>
<td>1 7/10 Ctrs.</td>
<td>1 7/10 Ctrs.</td>
<td>1.06</td>
<td>1.59</td>
</tr>
<tr>
<td></td>
<td>1 8/10 Ctrs.</td>
<td>1 8/10 Ctrs.</td>
<td>1.24</td>
<td>1.86</td>
</tr>
<tr>
<td></td>
<td>1 9/10 Ctrs.</td>
<td>1 9/10 Ctrs.</td>
<td>1.46</td>
<td>2.19</td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

1. For square or rectangular precast drainage structures, either deformed or smooth welded wire reinforcement may be used provided:
   a. The smooth welded wire reinforcement shall comply with ASTM A490 and deformed welded wire reinforcement shall comply with ASTM A407.
   b. Width and length of the unit is four times the spacing of the cross wires.
   c. Wire reinforcement shall be continuous around the box and tapped in accordance with Opinion 1 or 2 as shown in the Wall Reinforcement Details.

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

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

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

5. Concrete as specified in ASTM C475, L4000 top will be used in lieu of Class 2 concrete in precast items manufactured in plants which meet the requirements of Section 419 of the Specifications.

6. Precast opening for pipe shall be the pipe OD plus 6" (7 2" tolerance). Mortar used to seal pipe into the opening shall be such a mix that shrinkage will not cause leakage into or out of the structure. Dry-pack mortar may be used in lieu of brick and mortar construction to seal openings less than 256" wide.

7. For 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 manhole lid, (b) the grade elevation or the theoretical gutter grade elevation of an inlet, or (c) the outside top elevation of a junction box less the flow line elevation of the lowest pipe or to top of sump floor.

**NOTES FOR PRECAST OPTIONS & EQUIVALENT REINFORCEMENT SUBSTITUTION**

1. Details for optional precast box construction up to depths of 10' as shown on the inlet indexes.

2. When precast units are used in conjunction with Art. 8 Structure Bottoms, Index No. 200, the interior dimensions of an Art. 8 Bottom can be adjusted to reflect these new interior dimensions.

3. Concrete which meets the requirements of ASTM C475 or Class IV must be used for precast structures constructed with 6" wall or slab thickness.

4. Reinforcement can be either deformed bar reinforcement or welded wire reinforcement. Bar reinforcement other than 60 ksi may be used, however only two grades are recognized: Grade 40 and Grade 60. Smooth welded wire reinforcement shall be recognized as having a design strength of 65 ksi and deformed welded wire reinforcement will be recognized as having a design strength of 70 ksi. The area reinforcement required may be adjusted in accordance with the Equivalent Steel Area Table provided. For bars and spacers not given, the steel area required can be determined by the following equations:

   - \[ S_{steel} = A_{40} + \frac{A_{60} \times 2}{S} \]
   - \[ S_{welded wire reinforcement} = A_{40} + \frac{A_{60}}{S} \]
   - \[ A_{deformed wire reinforcement} = A_{70} + \frac{A_{60} \times 2}{S} \]

5. When a reduced area of reinforcement is provided, any maximum bar spacing shown must also be reduced as determined by the following equations, unless otherwise stated:

   - Max. Grade 40 Bar Spacing = \[ \frac{S_{40}}{2} \]
   - Max. Smooth Welded Wire Spacing = \[ \frac{S_{wire}}{2} \]
   - Max. Deformed Welded Wire Spacing = \[ \frac{S_{wire}}{2} \]

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

   - Max. Bar Spacing = \[ \frac{S_{steel}}{2} \]

   In no case will a drain unit reinforced with bars smaller than 3/8 or 1/2, or spacings greater than 8" be permitted. Bar reinforcement shall be the minimum yield designation grade mark or either the number 60 or one (1) grade mark line to be acceptable at the higher value. Maximum bar spacing shall not be greater than two (2) times the slab thickness with a maximum spacing of 12" or three (3) times the wall thickness, with a maximum spacing of 18" for vertical bars and 12" for horizontal bars.
RECTANGULAR SEGMENT WITH PIPE OPENING AT CORNER

PICTORIAL VIEW

NOTE: 1. h_y may be less than 1'-0" when approved by the Engineer or when a minimum 1'-0" deep segment, 8" slab or curb inlet is provided above the corner opening.
   2. For inlet segments at finish grade elevation substitute a #8 Bar for the top corner bar when h_y is less than 2'-0".
   3. Rectangular structures with corner openings must be approved by the Engineer.

DETAILS FOR SKewed PIPES IN RECTANGULAR STRUCTURES
RIGID PAVEMENT

Pipe Type/Size & Shape

<table>
<thead>
<tr>
<th>Pipe Type/Size &amp; Shape</th>
<th>Minimum Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (See Note 6)</td>
<td>7&quot;</td>
</tr>
<tr>
<td>Corrugated Steel</td>
<td>9&quot;</td>
</tr>
<tr>
<td>Corrugated Aluminum</td>
<td>9&quot;</td>
</tr>
<tr>
<td>Corrugated Polyethylene</td>
<td>9&quot;</td>
</tr>
<tr>
<td>Polyvinyl Chloride</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>

FLEXIBLE PAVEMENT

Pipe Type/Size & Shape

<table>
<thead>
<tr>
<th>Pipe Type/Size &amp; Shape</th>
<th>Minimum Cover</th>
</tr>
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<tbody>
<tr>
<td>Concrete (See Note 6)</td>
<td>7&quot;</td>
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<tr>
<td>Corrugated Steel</td>
<td>9&quot;</td>
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<td>9&quot;</td>
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<tr>
<td>Corrugated Polyethylene</td>
<td>9&quot;</td>
</tr>
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</table>

UNPAVED

Pipe Type/Size & Shape

<table>
<thead>
<tr>
<th>Pipe Type/Size &amp; Shape</th>
<th>Minimum Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (See Note 6)</td>
<td>7&quot;</td>
</tr>
<tr>
<td>Corrugated Steel</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>

MINIMUM COVER FOR CONCRETE, STEEL, ALUMINUM, POLYETHYLENE AND POLYVINYL CHLORIDE PIPE

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 Sections 901-7 or 901-3 respectively. The gradation shall be Section 901-7 or 901-3, Grades 4, 487, 5, 58, or 57 unless restricted in the plans. The filter fabric shall be Type D-3 (See Index No. 109). The cost of furnishing and installing the coarse aggregate and filter fabric shall be included in the cost of the culvert.

ASPHALTIC CONCRETE BASE

Note: Extra materials required when cross culverts are located on facilities subject to high speed traffic (255 mph) or high traffic volumes (1600 AUT or more) and the cover is less than 12 inches for concrete pipe, 15 inches for corrugated steel, 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 3" x 1" corrugations which must be specified to utilize the lesser cover.

4. The tabulated values in the brackets [ ] apply to Type 1-7 (Polyethylene) 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 S 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.

2010 FDOT Design Standards
### Round Pipe Installations

<table>
<thead>
<tr>
<th>Inner Diameter (In.)</th>
<th>Class S</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
<th>Class V</th>
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<tbody>
<tr>
<td>12 1/2&quot;-30&quot;</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>24</td>
<td>36</td>
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<td>11</td>
<td>15</td>
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<td>33</td>
<td>51</td>
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<td>6</td>
<td>10</td>
<td>14</td>
<td>20</td>
<td>32</td>
<td>49</td>
</tr>
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</table>

### Elliptical Pipe Installations (All Sizes)

Note: All options 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.

### Pipe Dimensions Concrete Pipe

<table>
<thead>
<tr>
<th>Diameter (In.)</th>
<th>Height of Maximum Fill (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 1/2&quot;-30&quot;</td>
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</tbody>
</table>

### Polyethylene Pipe

<table>
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<th>Diameter (In.)</th>
<th>Height of Maximum Fill (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 1/2&quot;-30&quot;</td>
<td>17</td>
</tr>
</tbody>
</table>

### Polyvinyl Chloride Pipe

<table>
<thead>
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<th>Diameter (In.)</th>
<th>Height of Maximum Fill (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 1/2&quot;-30&quot;</td>
<td>17</td>
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</tbody>
</table>

### Maximum Cover for Plastic Pipe

<table>
<thead>
<tr>
<th>Diameter (In.)</th>
<th>Height of Maximum Fill (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 1/2&quot;-30&quot;</td>
<td>17</td>
</tr>
</tbody>
</table>
### ROUND PIPE - 3" x 3/4" CORRUGATION

<table>
<thead>
<tr>
<th>D (in.)</th>
<th>Area (ft^2)</th>
<th>Maximum Height (ft)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.75</td>
<td>0.048</td>
<td>0.004</td>
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<tr>
<td>15</td>
<td>1.25</td>
<td>0.126</td>
<td>0.012</td>
</tr>
<tr>
<td>18</td>
<td>1.75</td>
<td>0.204</td>
<td>0.020</td>
</tr>
<tr>
<td>21</td>
<td>2.25</td>
<td>0.282</td>
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</tr>
<tr>
<td>24</td>
<td>2.75</td>
<td>0.360</td>
<td>0.036</td>
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<tr>
<td>30</td>
<td>4.00</td>
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<td>0.048</td>
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<td>7.22</td>
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<td>42</td>
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<tr>
<td>48</td>
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<td>54</td>
<td>15.46</td>
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<td>65</td>
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<tr>
<td>84</td>
<td>30.16</td>
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<td>0.297</td>
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</tbody>
</table>

### ROUND PIPE - 5" x 3/4" CORRUGATION

<table>
<thead>
<tr>
<th>D (in.)</th>
<th>Area (ft^2)</th>
<th>Maximum Height (ft)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.75</td>
<td>0.048</td>
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<tr>
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<td>15.46</td>
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<td>20.62</td>
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<td>23.78</td>
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<td>0.233</td>
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<tr>
<td>84</td>
<td>30.16</td>
<td>2.976</td>
<td>0.297</td>
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</tbody>
</table>

### PIPE ARCH - 3" x 1" x 3/4" CORRUGATION

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>Rise (in.)</th>
<th>Equivalent Round Pipe Area (ft^2)</th>
<th>Minimum Sheet Thickness Required (in.)(Gauge)</th>
<th>Maximum Height (ft)</th>
<th>Min. Cover (ft)</th>
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<td>12</td>
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<td>0.064</td>
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### RIB SPACING - SPIRAL RIB

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<th>Sheet Thickness in Inches</th>
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### ROUND PIPE - 5" x 1/2" CORRUGATION

<table>
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<th>D (in.)</th>
<th>Area (ft^2)</th>
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<th>Min. Cover (ft)</th>
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<tr>
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<td>84</td>
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<td>0.297</td>
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</table>

Notes:
- Increase the minimum cover values shown on Sheet 3 of 6 by 62.5 gage and size combinations below the heavy lines.
- Height of fill maximum cover is measured from top of finished grade to outside of pipe.
- Recorrupted and not available. May be considered for cross drain and side drain applications only.
- Not Suitable (For Highway H-20 or H-20 Loadings)

1. Limited availability of this product. Check availability before specifying (generally limited to 3" x 1" corrugation pipe arch fabricated from 80% and smaller diameter round pipe in 12 gauge and thicker material).
2. 360° perforated pipe (French drain pipe) is not recommended. Do not specify without checking suitability and availability.
3. 9" x 1" corrugated pipe is currently not manufactured for the Florida market. Check availability before specifying.
## 2010 FDOT Design Standards

### Cover Height

**Maximum Cover for Corrugated Aluminum Alloy Round Pipe and Pipe Arch**

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Corrugation</th>
<th>Cover (In.)</th>
</tr>
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<tr>
<td>Pipe</td>
<td>Round</td>
<td>9.64</td>
</tr>
<tr>
<td>Pipe</td>
<td>Spiral</td>
<td>9.64</td>
</tr>
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</table>

**Notes:**
- NA = Not Available
- NS = Not Suitable (for Highway H-20 or HS-20 Loadings)
- For Design Review is recommended for each specific application. The review should identify any special handling, installation, backfill procedures, and construction load restrictions which may be required.

### Special Considerations

- Limited availability of this product. Check availability before specifying.
- 36" perforated pipe (fringe drain pipe) is not recommended in the pipe arch shape. Do not specify without checking both for suitability and availability.
- This size and gage combination must be strutted during installation per manufacturer's recommendations. Extra core will be required during handling and installation.
- Use of this size and gage combination must be approved by the State Drainage Engineer.

---

### Table

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Area (SF)</th>
<th>Maximum Height of Fill (Ft.)</th>
<th>Minimum Cover (Ft.)</th>
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<tr>
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<tr>
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<td>0.14</td>
</tr>
</tbody>
</table>

---

### Diagram

**Pipe Arch - 2½" x ½" Corrugation**

**Pipe Arch - 3" x 1½" Corrugation**

**Pipe Arch - Spiral Rib**

---

**2010 FDOT Design Standards**

**COVER HEIGHT**

---

**Special Installation required Refer to AASHTO Standard Specifications for Highway Bridges and ASTM B780-88 and manufacturer's recommendations.**
## Table of Aluminum Structural Plate Cover Heights

### Minimum Height of Cover (Ft.)

<table>
<thead>
<tr>
<th>Span (Ft.-In.)</th>
<th>Rise (Ft.-In.)</th>
<th>Area (Sq.Ft.)</th>
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</tbody>
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*Number in () below combination indicates maximum cover for the given combination plate thickness, rib type and rib spacing. All maximum cover depths are given in feet. (See Note Number 2 Under Structural Plate Notes Sheet 6 of 6).
### Minimum and Maximum Cover for Aluminum Structural Plate

#### Cover Height

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<th>Span (Ft.-In.)</th>
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<td>0.125-127</td>
</tr>
</tbody>
</table>

#### Design Notes

1. **Aluminum Structural Plate Notes:***
   - Allowable cover (minimum & maximum) measured from the outside valley of crown plates 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 ungraded areas. Minimum cover is measured at the highest R and/or the maximum pavement elevation.
   - To find the minimum material requirements for the aluminum structural plate structure:
     - Select the span in the left-hand column that is equal to or larger than the structure size required.
     - Select the cover in the top row that is equal to or smaller than that required for the site.
     - Intersect appropriate span and cover to find the appropriate plate.
   - Example: Round Pipe, Span = 17'-0", Height of Cover = 2'-7"
   - The table selections show metal thickness, rib type, rib spacing and maximum cover. Example: 0.125-1/18 - 0.125-27 = 0.125-77 thick plate structure with Type II rib at 27° on centers on the crown.

2. **Design Notes:***
   - The plans must call out size, metal thickness, reinforcing rib type and rib spacing.
   - Pipe-arch and underpass shapes will generate high corner bearing pressures against the sides and foundation. The height of cover is directly affected by these bearing pressures. The surrounding soil condition must be checked to ensure that they react against these pressures to avoid inducing excessive strain in plate.

3. **Ach shapes shown are single radius and have a rise-to-span ratio of 0.30 to 0.53. Structures with rise-to-span ratios of less than 0.30 are typically not used because of structural considerations.

4. **Tables based on HS 20 wheel loads.**
TRENCH DRAIN

**GENERAL 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 Type E, F, and drop curbing, and adjacent to traffic separators and standard barrier walls. The width of the channel grate for Type I Trench Drain shall be 1/8" throughout the length of its application. The linear slope or gradient for Type I may be manufactured by varying the depth at the channel neck. Type II is primarily intended for use in inlet gutter across driveway openings and drop curbing. Type I may also be used in those locations. The width of the channel grate for Type II Trench Drain shall be the same as the width of the channel. The linear slope or gradient for Type II may be manufactured by varying the depth of the channel. Trench Drain shall be placed in designated pedestrian paths unless ADA compliant grates are used.

2. Unless shown in the plans, outlet pipes and prefomed channels shall be sloped 0.6% or steeper toward the outlet regardless of the surface slope.

3. Trench drain may be stubbed directly into drainage structures, or outlet pipes may be used to connect trench drain to drainage structures.

4. A cleanout port compatible with the manufactured system shall be provided for Type I drains at the upstream end and at intervals not to exceed 50 feet. The cleanout port shall provide an opening 6" to 10" wide (transverse to the trench drain length) 18" to 24" long. Where cleanouts are placed adjacent to raised curb or separator, the curb or separator shall be formed around the cleanout. The cleanout shall have a removable load resistant cover or grate.

5. Trench excavation must allow for a minimum of 6" of concrete to be placed under and alongside the trench drain channel system. Concrete backfill shall meet the requirements of Section 347 of the Standard Specifications. At the end of all types (Type I or II), the concrete backfill shall extend 6" minimum past the end of the drain opening.

6. Transverse bars for Type I Trench Drain shall be spaced 4" to 6" on center.

7. Whenever the work disturbs existing conditions or work already completed, restore the same to its original condition in every detail. All such repair and replacement shall meet the approval of the Engineer.

8. Payment to be made under the contract unit price for Trench Drain, T.F.

**DESIGN NOTES**

1. Where placed adjacent to reinforced concrete barrier wall or median barrier wall, the designer shall detail in the plans the position of the drain relative to the barrier wall to avoid conflicts with the barrier wall footing. See Index No. 410.

2. The designer shall identify the following in the plans:
   a. The type of drain at each location.
   b. The location of the Trench Drain.
   c. The location of the outlet pipe at the Trench Drain is not stubbed directly into a drainage structure.
   d. The design flow (Q) for the Trench Drain must be shown on the plans.

3. Capture efficiency for Type I Trench Drain may be computed using the equations for siphon drain in FHWA's HEC 12 & 22. Type I and Type II must have at least 30% open area.

4. Round pipe alternate is available in 12, 18, 24, and 36 inch CSP.

5. Type II Prefomed Channel with integral anchoring lugs are applicable.
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
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. For inlets constructed on a curve, refer to the plans to determine the radius, and modify the inlet details accordingly. Bend steel when necessary.

3. Reinforcing steel to be Grade 60 bars with 5/8" minimum cover unless otherwise shown, see Sheet 4 for equivalent area Welded Wire Reinforcement details.

4. Inlet tops shall be either cast-in-place or precast concrete. Precast units shall conform to the dimensions shown or in accordance with approved shop drawing's. Request for shop drawing approval shall be directed to the State Drainage Engineer.

5. Concrete meeting the requirements of ASTM C476 (4000 psi) may be used in lieu of Class II concrete for precast units, manufactured in plants which meet the requirements of Section 449 of the Specifications.

6. Corner fillets are required at inlet opening for precut units or C-4 Fillet units used in conjunction with circular inlet bottoms or skewed rectangular inlet boxes. Finish top of fillets flush with drain throat bottom and match slope.

7. For inlet bottoms see Index No. 200. Inlet tops are to be used with Type P bottoms, or Type J bottoms with 3-6" square (Type B), 3-6" or 4 round (Type A) risers or top slab openings.

8. These inlet tops are designed for use with standard curb and gutter Type E and Type F. Locate inlet outside of pedestrian crosswalks. For Type E curb, transition the slope of the curb over the gutter transition length to match the face of the curb (Type F).


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 grooved in accordance with the grooving detail shown on Sheet 5, in lieu of tack welding.

13. Inlet to be paid for under the contract unit price for Inlets (Curb) (Type J).

SECTION AA

(Curb Inlet Type 6 Symmetrical With Left Half)
GENERAL NOTES

1. This inlet is used in Traffic Separators Types I and II or, in separators constructed with Curves Types A, B and C and side-wall 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. Locate Inlet outside of designated pedestrian travel way.

2. Reinforcing to be Grade 60 bars with 2" min. cover unless otherwise shown. See Index No. 20 to for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe when necessary. Bars to clear pipe by 2½".

3. Recommended maximum pipe sizes are 24" longitudinal and 30" transverse. For larger pipe, Inlets with A, B, and C bottoms, Index No. 20D are recommended.

4. See supplementary details Index No. 20L.

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 7). Each.
1. This inlet is to be used only in Traffic Separators Types IV and V or in separators constructed with Curb 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 Curb Type D (Curb 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. 202 for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe when necessary. Bars to clear pipe by 1/2".

3. Recommended minimum pipe sizes are 24" longitudinal and 30" transverse. For larger pipe, Inlets with At B 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.
TOP VIEW

LONGITUDINAL SECTION

TRANSVERSE SECTION

FRAME AND GRATE

PLAN

SECTION

GRATE DETAIL

TOP SLABS

SECTION AA

(SEE NOTE 5 BELOW)

SECTION BB

(SEE NOTE 5 BELOW)

GENERAL NOTES

1. This inlet is primarily intended for locations with light flows where right of way does not permit the use of standard curb inlets Types 1 through 6. The typical application is for 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. A steel-in-lin slab tops shall have 3/4" 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 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 24". 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 S46-602A, Neenah Foundry R-3056-L, or approved equal. Inlet and grate detail shown is Neenah R-3056-L. Vaned grates with approximately equal openings will be permitted that satisfy 4400TU M5=20 loading. Grates shall be reversible.
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 plan to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.
3. All steel shall have 1½” minimum cover unless otherwise shown. Inlets can be either cast-in-place or precast concrete. Chamfer all exposed edges ½”.
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 flowary flows.
2. Designer must specify Flume Type, "D" dimension, number of barrels and g uardrail requirements in plans.
3. Designer must specify where energy dissipating bricks are required.
SLOPES, DITCH APRON AND ENDWALLS

GUIDERAIL FOR FLUME IN SIDEWALK

STABILITY

The cost of the 4" thick slab and the 6" x 6" W2 5x5.5 Mn. welded wire reinforcement in the middle of slab to be included in the cost of the inlet.

EXISTING GROUND

4 Bricks to Dissipate Energy When Cabled For In Flume, Bricks To Be Included In The Cost Of The Inlet.

SINGLE BARREL FLUME DEPICTED
SECTION BB

SINGLE BARREL FLUME DEPICTED
ELEVATION

See Plans For Guiderail Requirements

Closed Flume Inlet

Sloped Slope

4'-0"

6" Thick Sidewalk Toewall

4'-0"

6" Thick Sidewall Toewall

4'-0"

Varies

6'-0"

Varies

SINGLE BARREL FLUME DEPICTED
PLAN

Existing Ground

The cost of the 4" thick slab and the 6" x 6" W2 5x5.5 Mn. welded wire reinforcement in the middle of slab to be included in the cost of the inlet.

SINGLE BARREL FLUME DEPICTED
ENDWALL

Location Reference

Varies

4" Thick Concrete Slab

Ditch Paving To Be Adjusted When Inlet Present

SECTION AA

Varies

Varies

2'-0"

Varies

2'-0"

Varies

4" Steel Tie Bar

4" Steel Tie Bar

Varies
PICTORIAL VIEW OF INLET COLLAR (TYPES 3, 4, & 5)

TOP VIEW OF INLET COLLAR WITHOUT GRATE

SECTION HH

PRECAST COLLAR REINFORCING DETAILS (TYPES 3, 4, & 5) (C-I-P COLLAR REINFORCING DETAILS SIMILAR)

VIEW KK

VIEW JJ

PICTORIAL VIEW OF INLET COLLAR (TYPES 1 & 2)

TOP VIEW OF INLET COLLAR WITHOUT GRATE

SECTION EE

VIEW FF

PRECAST COLLAR REINFORCING DETAILS (TYPES 1 & 2) (C-I-P COLLAR REINFORCING DETAILS SIMILAR)
1. This inlet is primarily intended for use adjacent to concrete barrier walls on paved shoulders. Use of the inlet adjacent to other wall-type barriers should 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 street 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. Run of pipe parallel to and near anchored wall shall be avoided wherever practical. Special coordination must be exercised during the design and construction of storm water systems within anchored wall systems.

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

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

5. When Grade B grate is specified in the plans, the grate is to be hot-dip galvanized after fabrication. Field installation of the filler bar called for in Insert B will not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting, or, match to structure prior to galvanizing.

6. Reinforcing Grade 60 bars. See Index No. 204 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. 200 and 201.

9. Inlets to be paid for under the contract unit for Inlets (Barrier Wall), Each.
2010 FDOT Design Standards

BARRIER WALL INLET

SECTION CC

SECTION DD

SECTION EE

TRANSVERSE SECTION WITH GRATE & PLATE

BACK VIEW WITHOUT BACK PLATE

TOP VIEW OF INLET WITHOUT GRATE TOP VIEW OF METAL PLATE

PICTORIAL VIEW OF INLET COLLAR

OPTION FOR GROUT STUD

OPTION FOR ANCHOR BOLT

TRANSVERSE SECTIONS THRU BACKWALL PLATE

2. Anchor bolts shall be either ASTM A307 hex head bolts cast-in-place, or ASTM A36 or A1554 (Grade 36) galvanized fully threaded rod, adhesive bonded anchors installed in accordance with Specification Section 410. Bolts or rod shall be 6" long (4" min embedment) with one heavy hex head nut (ASTM 194 or A 490) and one flat washer (ASTM F436) each. All anchor bolts, nuts and washers shall be hot-dip galvanized.

Field Installation (See General Notes): When clearance is warranted, a ¾" dia one-piece round bar shall be added to the ends of the cross bars and end band angles to reduce the clearance (L1 to ½") or less. After welding bar in place, clean bar and damaged grate surface and coat with a coat for pitch variance.
CONCRETE APRON AT TERMINAL INLETS

Apron to be constructed at the most downstream inlet in a run of shoulder gutter.
ALT. A STRUCTURE BOTTOM FOR INLET TYPE S

SECTION AA

SECTION BB

TOP SLAB REINFORCING DIAGRAM

TOP SLAB OPENINGS

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>OPENING SIZE</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-0&quot; to 8'-0&quot;</td>
<td>2'-0&quot; x 4'-0&quot;</td>
<td>3'-0&quot; x 3'-10&quot;</td>
<td></td>
</tr>
</tbody>
</table>

TOP SLAB WITH CENTERED OPENING

<table>
<thead>
<tr>
<th>SLAB DEPTH</th>
<th>SLAB THICKNESS</th>
<th>REINFORCING (2 WAYS)</th>
<th>SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-0&quot;</td>
<td>95%-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>95%-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>95%-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>95%-</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

2-WAY REINFORCEMENT SEE TABLES

4-BAR EACH CORNER (12'-0" MIN. LENGTH)

2-WAY REINFORCEMENT SEE TABLES

5-HOOP BAR (PERIPHERAL/REINFORCEMENT)

CENTERED OPENING - SEE TABLE FOR Dimensions
GENERAL NOTES

1. This inlet is suitable for valley sashes, ditches, or other areas subject to heavy wheel loads, 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. All reinforcing is Grade 60 bars with 2" min cover unless otherwise noted. See Index No. 201 for equivalent area of welded wire fabric. Cut or bend bars out of way of pipe to clear pipe 1½".

4. All exposed edges and corners shall be ¾" chamfered or rounded to ¼" 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), EA.

---

GUTTER INLET TYPE V

---

### 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>4'-0&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 K4 in accordance with Index No. 201 for larger pipe see bottom detail above and Index No. 200.

---

**PLAN**

(Cast-in-Place Inlet Shown Without Grate; Precast Inlet Similar)

---

**SECTION BB**

(Cast-in-Place Inlet Shown Precast Inlet Similar)

---

**SECTION AA**

(Cast-in-Place Inlet)

---

**SECTION AA**

(Pipe Opening Shown)
ALT. A STRUCTURE BOTTOM FOR INLET TYPE V
### TOP SLAB OPENINGS

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>OPENING SIZE MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot; to 8'-0&quot;</td>
<td>2'-0&quot; x 3'-0&quot;</td>
</tr>
</tbody>
</table>

### TOP SLAB REINFORCING DIAGRAM

- **Top Slab With Centered Opening**
- **Round Structure Bottom**
- **See Index No. 200 For Structure Bottom Details and Hole Reinforcement**

### TOP SLAB REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>SIZE 4'-0&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0.14</td>
<td></td>
</tr>
</tbody>
</table>

### DITCH BOTTOM INLET TYPE A

**ALT. A STRUCTURE BOTTOM FOR INLET TYPE A**
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 boxes on existing Inlets Type B and Type X that are in locations
      subject to occasional pedestrian traffic.

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 min. 25" clear from around pipe.

3. All exposed edges and corners shall be 3/8" chamfer or boiled to 1/4" radius.

4. When alternate C grates 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 (DT BDT) Type B, EL, 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 (DT BDT) Type Bi
   (Partial). Unit price and payment shall be 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, grading, supplemental, trenching or repaving
   at the engineers discretion, and any required earthwork for ditch restoration within 30’
   of the inlet 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. Sidewalk shall 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 the plans
   the type of top to be constructed at each individual inlet location.

   On existing inlets, conversion grates shall be constructed at the original grate
   elevation 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 reuse 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.
ALT. A STRUCTURE BOTTOM FOR INLET TYPE B

TOP SLAB OPENINGS

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>OPENING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN.</td>
<td>MAX.</td>
</tr>
<tr>
<td>8'-0&quot; to 8'-0&quot;</td>
<td>3'-0&quot; x 3'-2&quot;</td>
</tr>
</tbody>
</table>

TOP SLAB REINFORCING DIAGRAM

- Centered Inlet
- Structure Bottom
- 4 Bar Each Corner (12'-0" Min Length)
- 2 Way Reinforcement See Tables
- #5 Hoop Bar (Peripheral Reinforcement)

TOP SLAB REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>GRADE 60 (BAR) OR 65 KSI &amp; 70 KSI (FIBER FABRIC) DIA./IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.20</td>
</tr>
<tr>
<td>B</td>
<td>0.24</td>
</tr>
<tr>
<td>C</td>
<td>0.32</td>
</tr>
<tr>
<td>D</td>
<td>0.55</td>
</tr>
<tr>
<td>E</td>
<td>0.71</td>
</tr>
<tr>
<td>F</td>
<td>1.06</td>
</tr>
<tr>
<td>G</td>
<td>1.45</td>
</tr>
</tbody>
</table>

TOP SLAB WITH CENTERED OPENING

<table>
<thead>
<tr>
<th>SLAB DEPTH</th>
<th>REINFORCING (2 WAYS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE 6'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>0.5'-9&quot;</td>
<td>B</td>
</tr>
<tr>
<td>9'-12&quot;</td>
<td>C</td>
</tr>
<tr>
<td>12'-15&quot;</td>
<td>D</td>
</tr>
<tr>
<td>15'-18&quot;</td>
<td>E</td>
</tr>
<tr>
<td>18'-21&quot;</td>
<td>F</td>
</tr>
<tr>
<td>SIZE 8'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>20'-33&quot;</td>
<td>C</td>
</tr>
<tr>
<td>33'-42&quot;</td>
<td>D</td>
</tr>
<tr>
<td>42'-54&quot;</td>
<td>E</td>
</tr>
<tr>
<td>54'-66&quot;</td>
<td>F</td>
</tr>
</tbody>
</table>

SECTION AA

SECTION BB

DITCH BOTTOM INLET TYPE B

2010 FDOT Design Standards

Sheet No. 231
### HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 1)

<table>
<thead>
<tr>
<th>WALL DEPTH</th>
<th>SCHEDULE</th>
<th>AREA (sq. ft.)</th>
<th>MAX. SPACING (BAR)</th>
<th>WWF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-0&quot;</td>
<td>412</td>
<td>0.20</td>
<td>12&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

**TYPE C**

Recommended Maximum Pipe Size:
- 2'-0" Wall = 18" Pipe
- 3'-0" Wall = 24" Pipe (18" where an 18" pipe enters a 2'-0" wall)

### HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 2)

<table>
<thead>
<tr>
<th>WALL DEPTH</th>
<th>SCHEDULE</th>
<th>AREA (sq. ft.)</th>
<th>MAX. SPACING (BAR)</th>
<th>WWF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-0&quot;</td>
<td>412</td>
<td>0.20</td>
<td>12&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>46</td>
<td>0.20</td>
<td>6&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>10'-10&quot;</td>
<td>24</td>
<td>0.20</td>
<td>4&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>10'-15&quot;</td>
<td>35.5</td>
<td>0.24</td>
<td>55&quot;</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

**TYPE D**

Recommended Maximum Pipe Size:
- 3'-0" Wall = 24" Pipe
- 4'-0" Wall = 36" Pipe

### HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 3)

<table>
<thead>
<tr>
<th>WALL DEPTH</th>
<th>SCHEDULE</th>
<th>AREA (sq. ft.)</th>
<th>MAX. SPACING (BAR)</th>
<th>WWF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-0&quot;</td>
<td>412</td>
<td>0.20</td>
<td>12&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>46</td>
<td>0.20</td>
<td>6&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>10'-10&quot;</td>
<td>85.5</td>
<td>0.24</td>
<td>55&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>10'-15&quot;</td>
<td>36.5</td>
<td>0.37</td>
<td>66&quot;</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

**TYPE E**

Recommended Maximum Pipe Size:
- 3'-0" Wall = 24" Pipe
- 4'-0" Wall = 36" Pipe
NOTE: Steel Grates are required on Inlets with traversable slots and on Inlets where bicycle traffic is anticipated.

GENERAL NOTES

1. These inlets are suitable for bicycle traffic and are to be used in ditches, medians, and other areas subject to infrequent traffic loadings but are not to be placed in areas subject to any 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 should be constructed without slots. Where debris is a problem, inlets should be constructed with slots. Slotted inlets located within roadway clear zones and areas subject to bicycles and/or pedestrians shall have traversable slots. The traversable slot modification is not adaptable to inlet Type M. Slots 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 Inlets with non-traversable slots. Subject to the selection described above, when Alternate G grate is specified in the plans, either the steel grate or the 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. Size for other types of pipe must be checked for fit.

5. All exposed edges and corners shall be 90° chamfer or rounded to 1/4" 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 existing Inlets shall be paid for as Inlets partial. For conversion work and method of payment see TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS.
**Concrete Inlet Pavement**

Hand Shape to Neat Lines

---

**SECTION AA**

**SECTION BB**

**SECTION CC**

### TRAVERSABLE SLOTS

<table>
<thead>
<tr>
<th>Inlet</th>
<th>Single Slot</th>
<th>Double Slot</th>
<th>Single Slot</th>
<th>Double Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
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<td>5.77</td>
</tr>
<tr>
<td>D</td>
<td>5.95</td>
<td>5.91</td>
<td>7.70</td>
<td>11.0</td>
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<tr>
<td>E</td>
<td>6.80</td>
<td>6.81</td>
<td>7.37</td>
<td>10.0</td>
</tr>
</tbody>
</table>

---

**APPROVED BY**

**DRAWN BY**

**CHECKED BY**

**CHECKED BY**
SECTION AA
NONTRaversABLE SLOTS

SECTION BB
SODDING AND PAVEMENT FOR INLETS WITHOUT SLOTS AND INLETS WITH NONTRAvERSABLE SLOTS

Pavement and Sodding Quantities for Traversable Slots

<table>
<thead>
<tr>
<th>Inlet</th>
<th>Single Slot</th>
<th>Double Slot</th>
<th>Single Slot</th>
<th>Double Slot</th>
</tr>
</thead>
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<td>C</td>
<td>4.87</td>
<td>8.33</td>
<td>6.05</td>
<td>10.05</td>
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<tr>
<td>D</td>
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<td>8.01</td>
<td>7.75</td>
<td>15.00</td>
</tr>
<tr>
<td>E</td>
<td>5.00</td>
<td>8.00</td>
<td>7.75</td>
<td>15.00</td>
</tr>
</tbody>
</table>

NOTE: For plan view and additional details see Sheet 4 of 7. For paving see General Notes Nos. 6 and 7, Sheet 3 of 7.

TRAVERSABLE SLOTS FOR EXISTING INLETS

Ditch Block for Inlets With or Without Slots

Ditch Bottom

Existing Cast Iron Grates To Be Replaced With Steel Groats. Existing Steel Reticulated Grates To Be Replaced When Called For In The Plans Or As Directed By The Engineer.

Existing Or Proposed Structure Traversable Or Nontraversable (Traversable Shown)
**DESIGN NOTES FOR TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS**

1. The general purpose of these conversions is to remove the hazard of the protruding inlet top, while not creating a hazard by depressing the top too deeply.

2. The corrective procedure depends on the approach ditch grade and hydraulic requirements at the site. The selection of the appropriate case depends on the relationship between inlet top and ditch elevation, and, on the vertical clearance between the top of the uppermost pipe(s) and the grates. The purpose for the Case 1 conversion is to add the traversable slot to an existing inlet, where top removal, change in grate elevation and ditch transitions are not required. Case 2 will normally be applicable to inlets with flatter grades adjoining the inlet. Case 3 will normally be applicable to inlets with steeper grades adjoining the inlet where build up of the existing ditch is acceptable.

3. The designer shall stipulate in the plans which case is to be constructed at each individual inlet location.

   Where the existing inlet top is above the existing ditch (Case 2) but borrow material is required to adjust the ditch (Case 3), and vertical clearance or other conditions do not prevent removal of the inlet top, the designer should call for Case 2. The designer should determine if ditch reconstruction is required more than 35 feet beyond any traversable slot side and shall include separate pay items in the plans to cover the cost for this portion of required ditch reconstruction exceeding the 35 foot limit. The designer shall also determine whether ditch pavement is required for ditch restoration within the 35 foot limit and include that payment under a pay item separate from the inlets partial.

   When the detention ditch concept is to be used with Case 3, the designer shall stipulate "Case 3 (Detention)" in the plans.

   The designer should determine whether ditch or other conditions of each individual inlet indicates the need for underdrain in Case 3 conversions and shall call for Underdrain, Type 1 in the plans.

---

**METHOD OF PAYMENT FOR TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS**

1. Existing inlets converted to traversable slot tops under Cases 1, 2 and 3 shall be paid for as inlet partial, each. Case shall not be included in the pay item description.

2. All ditch reconstruction work within 35 feet of each traversable slot conversion, whether required by these details or as a direct result of the conversion, shall be included as a part of the partial cost. Reconstruction work shall include excavation and removal of surplus materials or borrow materials in place, grading, compaction, shaping and restoration of disturbed turf. Sodding, ditch pavement and underdrain are not included as part of the inlet partial cost and are to be paid for separately.

3. Concrete inlet pavement and sodding shall be in accordance with the sections on this detail and the specifications.

4. Unit price and payment shall be based upon the contract price for the entire project (Case 1-3), each.

   Sodding shall be paid for under the contract unit price for Performance Turf, 5Y.

   Sodding shall not be paid for separately from the inlet by the pavement type (if used) as called for in the plans.
ALT. A STRUCTURE BOTTOM FOR INLETS TYPE C, D AND E

TOP SLAB OPENINGS

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>MIN. OPENING SIZE</th>
<th>MAX. OPENING SIZE</th>
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<tbody>
<tr>
<td>3'</td>
<td>3' x 3'</td>
<td>3' x 3'</td>
</tr>
<tr>
<td>4'</td>
<td>4' x 4'</td>
<td>4' x 4'</td>
</tr>
<tr>
<td>5'</td>
<td>5' x 5'</td>
<td>5' x 5'</td>
</tr>
<tr>
<td>6'</td>
<td>6' x 6'</td>
<td>6' x 6'</td>
</tr>
</tbody>
</table>

SECTION AA

SECTION BB

TOP SLAB REINFORCING DIAGRAM

TOP SLAB REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>SCHEDULE</th>
<th>GRADE 60 (BAR)</th>
<th>TO #52 (BYPE FABRIC)</th>
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<tbody>
<tr>
<td>A</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0.10</td>
<td></td>
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</tbody>
</table>

ALT. B STRUCTURE BOTTOM FOR INLETS TYPE C, D & E

TOP SLAB WITH CENTERED OPENING

<table>
<thead>
<tr>
<th>SLAB WIDTH</th>
<th>SLAB THICKNESS</th>
<th>REINFORCING (2 WAYS)</th>
<th>SCHEDULE</th>
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<tbody>
<tr>
<td>20.5 x 40</td>
<td>950</td>
<td>G</td>
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<tr>
<td>20.5 x 30</td>
<td>950</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>20.5 x 20</td>
<td>950</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>20.5 x 10</td>
<td>950</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>15.7 x 9</td>
<td>950</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>12.6 x 9</td>
<td>950</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>6.0 x 7</td>
<td>950</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>9.5 x 5</td>
<td>950</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>15.7 x 5</td>
<td>950</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>20.5 x 9</td>
<td>950</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>19.5 x 9</td>
<td>950</td>
<td>B</td>
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<td>15.7 x 5</td>
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<td>D</td>
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</tr>
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<td>13.2 x 5</td>
<td>950</td>
<td>D</td>
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<tr>
<td>10.5 x 5</td>
<td>950</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

PIPE OPENING SCHEMATIC

TOP SS structures shown on the plans.

UMBRELLA SHAPED HOLE WITH CENTERED OPENING

2010 FDOT Design Standards

DITCH BOTTOM INLET

TYPES C, D, E & H

INDEX NO.

Sheet No. 7

232
**GENERAL NOTES**

1. These inlets are designed for use in ditches, medians, pavement areas, or other areas subject to heavy vehicle loads, minimal 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. When the inlet is placed in areas subject to bicycle traffic, install filler bar when clearance or gap is greater than 2" as shown in Index 218 Inset B.

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

3. These inlets may be used with Alternate B structure bottoms, Index 200. The inlet and bottom combinations are to be fabricated for the contract unit price for inlets (GT Bat) (Type F for (U) U Bat, Depth). Eo.

4. Exposed edges and corners shall be 3/8" chamfer or beveled to 1/4" radius.

5. For supplemental details, see Index 201.

6. Reinforcing is Grade 60 bars with 2" min. cover unless otherwise noted. Bars to be cut or bent for 15" clearance around pipe opening. Provide one additional bar above and at each side of pipe opening, as shown.

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

---

**RECOMMENDED MAXIMUM PIPE SIZES**

<table>
<thead>
<tr>
<th>INLET INSIDE WIDTH</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4&quot; (Type F)</td>
<td>12&quot;</td>
</tr>
<tr>
<td>4-10&quot; (Type G)</td>
<td>18&quot;</td>
</tr>
<tr>
<td>4-10&quot; / 5-10&quot; (Type G)</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

Note: Recommended ages are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe sizes see Note 3.

---

**PAVEMENT AND SODDING**

**STEEL GRATE**

Steel Grating, Straight Bars 3" x 3/4"

**TYPE F**

---

**PIECE OPENING SCHEMATIC**

**SECTION AA**

**SECTION BB**

**SECTION CC**

**SECTION DD**

**HORIZONTAL WALL REINF. SCHEDULES**

**TYPE F INLET (TABLE 1)**

<table>
<thead>
<tr>
<th>WALL DEPTH</th>
<th>SCHEDULE</th>
<th>AREA (in ft²)</th>
<th>MAX. SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 4</td>
<td>four</td>
<td>0.20</td>
<td>12&quot;</td>
</tr>
<tr>
<td>4 - 7</td>
<td>four</td>
<td>0.20</td>
<td>6&quot;</td>
</tr>
<tr>
<td>7 - 12</td>
<td>eight</td>
<td>0.24</td>
<td>5&quot;</td>
</tr>
<tr>
<td>12 - 28</td>
<td>special</td>
<td>0.28</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

---

**2010 FDOT Design Standards**

**DITCH BOTTOM INLET**

**TYPE F & G**

---
**DEVELOPMENT CHECKLIST**

**STANDARD INDEX NO. 234, SHEET 1 OF 1**

**RECOMMENDED MAXIMUM PIPE SIZES**

<table>
<thead>
<tr>
<th>INLET INSIDE WIDTH</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1/2&quot; or 3-3/8&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>3-1/2&quot; or 4-0&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 Structure Bottom detail above and Index No. 200.

**GENERAL NOTES**

1. This inlet is designed for use in ditches, medians, pavement areas or other areas subject to heavy wheel loads with minimal debris. This inlet is not for use in areas subject to 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. All reinforcing Grade 60 bars with 2" min. cover unless otherwise noted. 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 15/16".

3. All exposed edges and corners shall be 1/4" chamfer or beveled to 45" radius.

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

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

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

7. Cost of ditch paving to be included in cost of inlet. Sodding to be paid for under contract unit price for Performance Tart, 5Y.
Thru DSM 01-01-07 Sodding was changed to Performance Turf. C-I-P-L changed to C-I-P. Note 3 was added about the exposed edges and corners. Box location reference added. Converted to V8
GENERAL NOTES

1. Inlet is to be used at locations having high flow rates, usually where an endwall could not be utilized without hazardous intake.

2. Inlet length (L) shall be set by the designer for the greater of either curve requirement or inlet pool to exceed 12" depth. Structures over 6 feet in depth are to be checked for flotation by the designer of project drainage.

3. This inlet is not intended for use with Index 200 structure bottoms.

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

5. Inlet and anti-vortex wall to be Class II Concrete.

6. Anti-vortex wall is Grade 50 with 2" min. cover unless otherwise noted. See Index No. 20G for equivalent area of welded wire fabric (WWF). Bars to be cut or bent for 1/2" clearance around pipe opening. Bend top and corner bars to clear anchor holes.

7. Fence section C, 5x5" at 14" max. bar spacing may be used as an alternate for the C 4x5.5" channel at 12" bar spacing.

8. Channels and bars for grate shall be ASTM A242/A242M, A572/A572M or A588/A588M Grade 50 steel and galvanized in accordance with Specification Section 970.

9. Fence enclosure shall be Fence Type B (Index No. 802). All posts to be set in concrete. A minimum of 12 posts required. Corner and approach side posts to be 3" nominal diameter.

10. Cost of ditch paving, anti-vortex wall, grate, concrete, reinforcing steel and fence enclosure to be included in the cost of inlet. Inlet to be paid for under the contract unit price for Inlets (OT Biot) (Type K), Each.

11. Anchor bolts shall be ASTM F1554 Grade 36 fully threaded headless bolts, installed in accordance with Specification Sections 416 and 937. Nuts shall be ASTM A563 or A234 and washers shall be ASTM F436 or Type A plain washers. All nuts, bolts and washers shall be galvanized.

INLET LENGTHS (L) LESS THAN OR EQUAL TO 9' (SINGLE LAYER WALL REINFORCING)
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 in stormwater management facilities.
2. The side panels are dimensionally symmetric, therefore they may be used on either side of the structure.
3. Two (2) skimmers may be constructed on one structure provided they are on opposite ends.
4. The width of the front panel (dimension H) shall be the same as the outside dimension across the front of the structure.
5. The front panel, side panels, and flat bars are to be hot dip galvanized after fabrication.
6. The location of the reinforcing steel in these structures must conform to the applicable standards to avoid conflict with the expansion anchors used to attach the skimmer.
7. Gaskets to be used on the inlet unless otherwise specified in the plans.
8. A skimmer consists of two (2) side panels, one front panel, two (2) flat bars, and accessory hardware. The cost of skimmers is to be included in the cost of the inlet.

DESIGN NOTES
1. The designer must specify, in the plans, the skimmer height (dimension H) and the sides where the weir slots and skimmers are located. The skimmer 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'-0".
2. 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 of the structure and the skimmer shall be not less than 1 foot.
3. The configuration of skimmers may be subject to regulatory requirements. The designer should coordinate the outlet control structure details with the permitting agencies.
4. 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.
5. The designer shall evaluate if a grate is needed for safety reasons. Where a grate is not needed for safety reasons and is not desirable for hydraulic or other reasons, the designer may omit the grate by stating so in the outlet control structure details.
6. The designer must show the configuration of the weir slots in the outlet control structure detail.
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.

1. Place neoprene gasket material between the skimmer and the catchbasin at all points of contact. Trim the gasket near enough to extend 1/2 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 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 ‘modly existing structure’.

6. Plastic Skimmers shall contain a minimum of 15% by weight of carbon black for UV protection.

**GENERAL NOTES**

**TYPE I SKIMMER**

**PLAN**

- Lid Details
- TOP VIEW
- TOP VIEW SCHEMATIC
- Lid Hinge
- Latch Hinge
- Latch Pin
- 4 @ 3/8" Bolt, Hex Nut and Washer

**SIDE ELEVATION**

- Neoprene Gasket
- Outlet Opening in Basin Wall
- Weld Angles at All Points of Contact With Skimmer

**SECTION**

- Outlet Pipe
- Cleanout Pipe
- Lid
- Latch Pin
- Lid Hinge
- Latch Hinge

**ANGLE DETAIL**

- Angles on other side of skimmer are mirror image.
- See Angle Detail

**TYPE I SKIMMER DIMENSION TABLE**

<table>
<thead>
<tr>
<th>OUTLET PIPE</th>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>18&quot;</td>
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<td>24&quot;</td>
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<td>48&quot;</td>
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<td>30&quot;</td>
<td>18&quot;</td>
<td>54&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>21&quot;</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

**TYPE II SKIMMER**

**SIDE ELEVATION**

- Note: The cleanout port for the Type II skimmer shall be gasketed, with either a threaded screw-in lid or a lid secured by four stainless steel quick-release latches.

**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 near enough to extend 1/2 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 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 ‘modly existing structure’.

7. Plastic Skimmers shall contain a minimum of 15% 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".
**GENERAL NOTES**

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

2. Front slopes and ditch transitions shall be in accordance with Index No. 280.

3. Endwalls may be cast in place or precast concrete. Reinforcing steel shall be Grade 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 1/4".

5. Concrete shall be Class I, except ASTM C479. (0000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

6. On curvatures with side slopes flatter than 1:10, provide 20 transitions from the endwall to the flatter side slopes, right of way permitting.

7. For saddling around endwalls see Index No. 281.

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**

<table>
<thead>
<tr>
<th>Angle</th>
<th>Payment Factor</th>
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<tr>
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<td>0.50</td>
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<td>0.45</td>
</tr>
<tr>
<td>45° and over</td>
<td>0.40</td>
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</table>

9. Pipe length plan quantities shall be based on the pipe end locations shown in the standard location control/endview, 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 I Concrete (Endwalls), CY.

---

**STANDARD LOCATION CONTROL**

**ENDWALL DIMENSIONS (EXCLUSIVE OF MULTIPLE PIPE SPACING)**

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

**NORMAL PIPE**

**SKEWED PIPE**

**LEGEND**

- Pipe S - Center To Center Pipe Spacing
- X - Centerline To Centerline Dimension At Face Of Endwall

---

2010 FDOT Design Standards
STRAIGHT CONCRETE ENDWALLS
SINGLE AND MULTIPLE PIPE
### Round Concrete and Corrugated Metal Pipe

#### Class I Concrete (CD)

<table>
<thead>
<tr>
<th>Number Of Piping</th>
<th>Dimensions</th>
<th>Single</th>
<th>Double</th>
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<th>Quadruple</th>
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<td>1</td>
<td>1,814</td>
<td>0.759</td>
<td>0.759</td>
<td>0.759</td>
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<tr>
<td>2</td>
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<td>0.759</td>
<td>0.759</td>
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**Notes:**
- Use the guidelines of General Note No. 8 for selecting tabular quantities.
- Data and estimated quantities for one endwall.

### Corrugated Metal Pipe Arc

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### Concrete Elliptical Pipe

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<tr>
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<td>0.759</td>
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<td>0.759</td>
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<td>0.759</td>
<td>0.759</td>
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</tbody>
</table>
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 AASHO 1966. 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.

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

4. Concrete shall be Class II, except ASTM C476 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

5. Chamerl: All exposed edges and corners to be chamfered \( 1/8'' \) 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 blumous coating of 0.04'' 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 Test, 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.
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 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. 220 for opening and grouting details.

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

4. Concrete shall be Class II except ASTM C496 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

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

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

7. Sodding shall be in accordance with Index No. 28 and paid for under the contract unit price for Performance Turf, 5Y.

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 (Ladder), 1/8.
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 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. 202 for opening and growth details.

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

4. Concrete shall be Class II, except ASTM C476 (14000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

5. Chamfer all exposed edges and corners to be chamfered 1/8” 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 coated applied prior to placing of the concrete.

7. Sizing shall be in accordance with Index No. 201 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 in 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

OPTIONAL ENTRANCE
FOR CONCRETE PIPE

TYPICAL SECTION
THRU ENDWALL

HALF ELEVATION
(Showing Bars In Front Face Of Wall)

HALF ELEVATION
(Showing Bars In Back Face Of Wall)

BARS C
NOTE: All bar dimensions are cut to cut

ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>RCP</th>
<th>CMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bars D Concrete</td>
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<td>14.5</td>
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<tr>
<td>Reinforcing Steel</td>
<td>LB</td>
<td>1249</td>
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</tr>
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</table>

SECTION BB

SECTION AA

2010 FDOT Design Standards
STRAIGHT CONCRETE ENDWALLS
SINGLE AND DOUBLE 72" PIPE

REV 253
07/01/09
1 of 2

NOTES FOR DRAWING 253

Last
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. 214 for opening and grooving details.

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

4. Concrete shall be Class II except ASTM C476 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

5. Chamfer: Exposed edges and corners to be chamfered 4", unless otherwise shown.

6. Tect portion of corrugated metapipe 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 the concrete.

7. Sodding shall be in accordance with Index No. 241 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), L/B.
TABLE OF DIMENSIONS AND QUANTITIES FOR ONE ENDWALL

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>H</th>
<th>T</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>P</th>
<th>X</th>
<th>ONE PIPE CULVERTS</th>
<th>TWO PIPE CULVERTS</th>
<th>THREE PIPE CULVERTS</th>
<th>FOUR PIPE CULVERTS</th>
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<td></td>
<td>L</td>
<td>OPTIMAL CY</td>
<td>L</td>
<td>OPTIMAL CY</td>
<td>L</td>
<td>OPTIMAL CY</td>
<td>L</td>
<td>OPTIMAL CY</td>
<td></td>
<td></td>
<td></td>
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<td>CM</td>
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<td>CM</td>
<td>CM</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

GENERAL NOTES

1. Straight sand-cement endwalls are intended for use outside the clear zone.
GENERAL NOTES
1. Batteries to be constructed only when called for in plans.
2. When steel grating is required an endwall see Sheet 3 of 3 for details.
3. All reinforcing No. 4 bars with 2" clearance except as noted.
4. Angles, channels and bars shall be ASTM A325/A325M, A572/A572M or A588/A588M Grade 50 steel. When designated Alternate S in the plans galvanize in accordance with Section 975 and 425-3.2 of the Standard Specifications.
5. Channel section C 3x6 may be substituted for C 4x3.4 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 grading details.
7. Concrete shall be Class I except ASTM C478 (4000 psi) concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.
8. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Performance Turf, S.Y.
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 the plans, steel grating, baffles and accessories. Quantities shown are for estimating purposes only.
MOUNTING FOR STEEL GRATE

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 culvert inlets or outlets. Grates shall not be used unless one or more of the following conditions exist:
   A. Drainage area to culvert consists of median or infill areas or areas where debris and/or drift is negligible.
   B. Runoff to culvert is by sheet flow or in such shallow channels that debris transport is not considered a major problem.
   C. Runoff to culvert is minor except on an infrequent basis (1 in 10 to 15 year frequency) or 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>
<thead>
<tr>
<th>Rate of Slope</th>
<th>Pipe D</th>
<th>G</th>
<th>2 Each Bars @ 3.4 Lbs./L.F.</th>
<th>(x) Channels @ 5.4 Lbs./L.F.</th>
<th>2 Angles @ 3.62 Lbs./L.F.</th>
<th>Total Weight Lbs.</th>
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<td>15°</td>
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<td>9-1/2&quot;</td>
<td>65</td>
<td>8</td>
<td>2-6/16&quot;</td>
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<tr>
<td>1/6</td>
<td>20°</td>
<td>2-1/4&quot;</td>
<td>10-1/2&quot;</td>
<td>94</td>
<td>9</td>
<td>2-6/16&quot;</td>
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<tr>
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<td>24</td>
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</table>

U-TYPE CONCRETE ENDMILLS
Baffles and Grate Optional - 15° to 30° Pipe
GENERAL NOTES

1. U-type concrete endwall energy dissipators are intended for use outside the clear zone.

2. Chamfer all exposed edges $\frac{3}{4}''$.

3. Concrete shall be Class I, except ASTM C498 (P1000) pail concrete may be substituted for precast items manufactured in plants meeting the requirements of Section 449 of the Specifications.

4. Reinforcing steel shall have 2'' min. cover.

5. Endwall to be paid for under the contract unit price for Class I Concrete (Endwalls), CY and Reinforcing Steel (Roadway). Filter riprap to be paid for under the contract unit price for riprap (Sand/Cement) (Roadway), CY. Cost of plastic filter fabric to be included in the contract unit price for riprap.

6. Fencing, when called for in the plans, to be paid for under the contract unit price for Fencing, Type B, LP. See Index No. 802 for details of Type B fencing.

---

| Pipe Size | Q (Max.) (cfs) | W | H | L | a | b | c | d | e | f | g | m | n | o | S | t | k | Concrete | Reinforcing | Sand Cement |
| 30        | 7.07           | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 42        | 9.82           | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 56        | 12.57          | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 72        | 15.90          | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 60        | 15.83          | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 56        | 23.76          | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 72        | 29.27          | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

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2010 FDOT Design Standards

U-TYPE CONCRETE ENDWALLS
ENERGY DISSIPATOR - 30'' TO 72'' PIPE
## TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES
### PIPE CULVERT ENDS WITH U-TYPE WINGS

<table>
<thead>
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<th>Area (ft²)</th>
<th>W</th>
<th>K</th>
<th>F</th>
<th>J</th>
<th>Concrete Pipe</th>
<th>CMI Pipe</th>
<th>CIP Pipe</th>
<th>Steel Tie Bars</th>
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<td>1-3</td>
<td>1-3</td>
<td>2-10</td>
<td>1.10</td>
<td>1.16</td>
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### PIPE CULVERT ENDS WITH 45° WINGS

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### GENERAL NOTES
1. Winged concrete ends are intended for use outside the clear zone.
2. Chamfer all exposed edges ¥°.
3. Concrete shall be of Class I, except 45° C479 (4000 psi) Concrete may be substituted forparagraphs manufactured in plants meeting the requirements of Section 449 of the Specifications.
4. Boring to be paid for under the contract unit price for Class I Concrete.
5. Sinking to be paid in accordance with Index No. 281, and paid for under the contract unit price for Performance Turf, SY.
GENERAL NOTES

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

DETAILS FOR SINGLE METAL PIPE ARCH CULVERTS

NOTE: For multiple metal pipe arch culvert spacing between arch centers = X

DIMENSIONS AND QUANTITIES FOR METAL PIPE ARCH CULVERTS

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DIMENSIONS AND QUANTITIES FOR ROUND PIPE CULVERTS

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Note: For multiple pipe culvert spacing between pipe centers = X
**GENERAL NOTES**

1. Flared and section shapes shall conform to the requirements of ASTM C756 with the exception that dimensions and reinforcement shall be as specified in the table above. Reinforcement may consist of either one cage or two cages of steel. Compressive strength of concrete shall be 4000 psi. Stop drawings for flared and section shapes having dimensions other than above must be submitted for approval to the State Drainage Engineer.

2. Connections between the flared end section and the pipe curvet shall be any of the following types unless otherwise shown on the plans.

   a. Joints meeting the requirements of Section 449 of the Standard Specifications (O-Ring Gasket). Flared and section shapes dimensions and tolerances shall be identical or comparable to those used in the pipe curvet joint. When pipe curvet and flared section manufacturers are different, the compatibility of joint designs shall be verified by the manufacturer of the flared and sections.

   b. Joints sealed with preformed plastic gaskets. The gaskets shall meet the requirements of Section 9/4/1-1 of the Standard Specifications at the minimum size for gaskets shipped as that specified for equivalent sizes of elliptical pipe.

   c. Reinforced concrete jackets, as detailed on this drawing. Cost of the reinforced concrete jacket to be included in the contract unit price for the flared end section. When non-coated corrugated metal pipe is called for in the plans, the pipe shall be bimetallic coated in the jacketed area as specified on Index No. 280. Bimetallic coating to be included in the contract unit price for the pipe curvet. Concrete jacket shall be specified on Index No. 280. Cost of concrete and reinforcement shall be included in the contract unit price for the pipe curvet.

3. Toe walls shall be constructed as shown on the plans or at locations designated by the Engineer. Toe walls are to be cast-in-place Class I Concrete and paid for under the contract unit price for Flared End Section (Concrete), EA. Reinforcing steel shall also be included in the cost of the Flared End Section (Concrete), EA.

4. On skewed pipe curvets the flared and section shapes shall be placed in line with the pipe curvet. Side slopes shall be warped as required to fit the flared and sections.

5. Flared End Section to be paid for under the contract unit price for Flared End Section (Concrete), EA. Saddles shall be in accordance with Index No. 288 and paid for under the contract unit price for Performance Turf, 5'Y.

**DESIGN NOTES**

1. Flared and section shapes are intended for use outside the clear zone on medium drain and cross drain installation, except that flared end sections for pipe sizes 12" and 15" are permitted outside the clear zone. When the slope intersection permits, 12" and 15" flared end sections may be located with the curvet opening as close as 6" beyond the outside edge of the shoulder. Flared end sections are not intended for side drain installations.

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

3. Toe walls shall be used whenever the anticipated velocity of discharge and soil type are such that erosion of the toe section would occur. Toe walls are not required where ditch pavement is provided, except when dislocation would occur if the ditch pavement should fail.
Concrete Slab, 3" or 4½" Thick
Reinforced With WRP 60′-251AW14

SINGLE AND MULTIPLE CORRUGATED METAL PIPE—ARCH

TOP VIEW—SINGLE PIPE

TOP VIEW—MULTIPLE PIPE

NOTE: See Sheet 5 For Details And Notes.
### Quantities for 3" Thick Concrete Slabs (CY)

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### Cross Drain Mitered End Section

[2010 FDOT Design Standards]

**CROSS DRAW MITERED END SECTION**

Sheet No. 5 of 6
GENERAL NOTES

1. Unless otherwise designated in the plans, concrete pipe mitered end sections may be used with any type of cross drain pipe. Corrugated steel pipe mitered and sections may be used with any type of cross drain pipe except aluminum pipe and corrugated aluminum mitered and sections may be used with any type of cross drain pipe except steel pipe. When bituminous coated metal pipe is specified for cross drain pipe, mitered end sections shall be constructed with high pipe or concrete pipe.

2. Mitered end section pipe is dissimilar to the cross drain pipe, a concrete jacket shall be constructed in accordance with Standard Index 260.

3. Mitered ends for pipe sizes 15", 18" and 24" round or equivalent pipe, arch or elliptical pipe are permitted within the clear zone. When the slope intersection permits, the mitered end section may be located with the culvert opening as close as 3' beyond the outside edge of the shoulder.

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

5. The reinforced concrete slab shall be constructed for all sizes of cross drain pipe and cast in place with Class NS concrete. Slabs shall be 5 1/2" thick unless 3" thickness called for in plans.

6. Concrete pipe used in the assembly of mitered ends shall be selective lengths to avoid excessive connections.

7. Corrugated metal pipe galvanizing that is damaged during beveling and perforating for mitered end section shall be repaired.

8. That portion of corrugated metal pipe in direct contact with the concrete slab and extending 12" beyond shall be bituminous coated prior to placing of the concrete.

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 will be constructed either as separate single pipe mitered end sections or collectively as multiple pipe sections as directed by the Engineer. However, mitered end sections will be paid for each based on each independent pipe end.

10. The cost of all pipe, fittings, fasteners, reinforcing connectors, anchors, concrete, sealants, jackets, and coupling bands shall be included in the cost for the mitered end section. Sodding shall be paid for separately under the contract unit price of Performance Turf, S.Y.

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 parts, bolts, nuts and washers to be galvanized steel.

Bolt diameters shall be 3/8" for 15" to 36" pipe and 1/2" for 42" to 72" pipe.

Two connectors per joint located 60" right and left of bottom center of pipe. Unit holes in pipe sheet are to be drilled.

ANCHOR DETAIL

Hex Nuts (2 Req.)
Flat Washer (2 Req.)

Anchors required for CMP only.

Anchor, washer and nuts to be galvanized steel.

Bend anchors where required to center in concrete slab. Damages end of anchors to be spaced a distance equal to four (4) corrugations. Place the anchors in the outside crest of corrugation.

Flat washers to be placed on inside wall of pipe.

Holes in mitered end pipe are to be drilled or punched. Boring not permitted.

SPECIAL DETAILS AND NOTES

2010 FDOT Design Standards

CROSS DRAIN MITERED END SECTION
**Dimensions & Quantities**

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<th>B</th>
<th>C</th>
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<th>F</th>
<th>G</th>
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**Added:**
- Upgraded to V8.

**Deleted:**
- 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.**

---

**Top View - Single Pipe**

- Concrete slab, 3" thick, reinforced with FDOT 6x6-W2.4x2.4.

**Top View - Multiple Pipe**

- Note: See Sections 6 and 7 for details and general notes.

---

**Side Drain Mitered End Section**

- Pipe To Be Included Under Unit Price For Mitered End Section.
**DIMENSIONS & QUANTITIES**

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**SINGLE AND MULTIPLE ELLIPTICAL CONCRETE PIPE**

**SIDE DRAIN MITERED END SECTION**

---

**TOP VIEW—SINGLE PIPE**

**TOP VIEW—MULTIPLE PIPE**

---

**NOTE:** See Sheets 6 and 7 for details and general notes.
**CONCRETE PIPE (ROUND)**

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**ELIPICAL CONCRETE PIPE**

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**Notes:**

1. 3/8" x 3" bolts are standard for all grate fasteners, except when the contractor elects to use the slotted upper holes for intermediate fasteners on multiple drain pipes, which will require the following bolt lengths:

   - Drain size: 20" x 40" Bolt length: 20"
   - Drain size: 30" x 60" Bolt length: 30"
   - Drain size: 40" x 100" Bolt length: 40"

2. To be used only when grates are called for in the plans.

3. 1974 AASHTO Pipe Arch Sizes.

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**DEVELOPMENT CHECKLIST**

STANDARD INDEX NO. XXXXX, SHEET X OF X

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**FOR ALL SIZES OF SINGLE AND MULTIPLE DRAIN PIPE FASTENER UNIT**

**DETAILS FOR CONCRETE & CORRUGATED METAL PIPE**

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**SIDE DRAIN MITERED END SECTION**

**2013 FDOT Design Standards**

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**273**
FOR SINGLE & MULTIPLE DRAIN PIPE

GRADE DETAIL

See General Notes, Sheet 7.

CONCRETE PIPE CONNECTOR DETAIL

DETAILS FOR CONCRETE & CORRUGATED METAL PIPE

2013 FDOT Design Standards

SIDE DRAIN MITERED END SECTION
GENERAL NOTES

1. Unless otherwise designated in the plans, concrete pipe mitered end sections may be used with any type of side drain pipe. Corrugated steel pipe mitered end sections may be used with any type of side drain pipe except aluminum pipe. Corrugated aluminum mitered end sections may be used with any type of side drain pipe except steel pipe. When bituminous coated metal pipe is specified for side drain pipe, mitered end sections shall be constructed with like pipe or concrete pipe. When the mitered end section pipe is dissimilar to the side drain pipe, a concrete jacket shall be constructed in accordance with Index No. 280.

2. Corrugated polyethylene pipe (HDPE) and polyvinyl chloride pipe (PVC) for side drain applications shall be either corrugated metal or concrete mitered end sections (MES). When used in conjunction with corrugated MES, connection shall be by a formed metalband specifically designated to join HDPE or PVC pipe with metalpipe or other coupler approved by the State Drainage Engineer. When used in conjunction with a concrete MES, connection shall be by concrete jackets constructed in accordance with Index No. 280.

3. Concrete pipe used in the assembly of mitered end sections shall be of selective lengths to avoid excessive connections.

4. Corrugated metal pipe galvanizing that is damaged during beveling and perforating for mitered end section shall be repaired.

5. That portion of corrugated metal pipe in direct contact with the concrete slab and extending 12" beyond shall be bituminous coated prior to placing of the concrete.

6. When existing multiple side drain pipes are spaced other than the dimensions shown in this detail, or have nonparallel axes, or have non-structural sections, the reinforced concrete slab shall be constructed either separately as single pipe mitered end sections or collectively as multiple pipe end sections as directed by the Engineer. However, mitered end sections shall be spaced for each, based on each independent pipe end.

7. In addition to the requirements of Section 4.30-4, side drain culverts shall comply with the cover requirements shown on Index No. 205.

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

9. Round pipe size 30" or greater, pipe-arch size 35"x24" or greater and elliptical pipe 19"x30" or greater shall be grouted unless specified in the plans. Smaller sizes of pipe shall be grouted only when called for in plans. The lower grates on trailing downstream ends on divided highways shall be omitted.

10. Grates are to be fabricated from steel ASTM A53, Grade B, pipe. The lower grate on all traffic approaches shall be Schedule 40. Grates subject to salt-free and corrosive free environment may be fabricated from galvanized pipe, with base metal exposed during fabrication galvanized, as specified in Section 563, Standard Specifications on fabricated black pipe and hot-dip galvanized after fabrication in accordance with ASTM A123. Grates subject to salt water or highly corrosive environment shall be hot-dip galvanized after fabrication in accordance with ASTM A123.

11. Ditch transitions shall be used on all grades in excess of 3% as directed by the Engineer.

12. The project engineer shall contact the District Drainage Engineer for possible alternate treatment prior to constructing side drain mitered end sections where a minimum spacing of 30 will not result between the low points of the mitered end sections.

13. The cost of all pipe, grates, fasteners, reinforcing connectors, anchors, concrete, sediments, jackets, and coupling bands shall be included in the cost for the mitered end section. Sedding shall be paid for separately under the contract unit price for Performance Turf, SY.

14. Mitered end sections shall be paid for under the contract unit price for Mitered End Section (50) Epi., based on each independent pipe end.

DESIGN NOTES

1. In critical hydraulic locations, grates shall not be used until potential debris transport has been evaluated by the drainage engineer and appropriate adjustments made. Ditch grades in excess of 3% or pipe with less than 1.5' of cover and grades in excess of 1% will require such an evaluation (General Note 5).

2. The design engineer shall determine highly corrosive locations and specify in the plans when the grates shall be hot-dip galvanized after fabrication (General Note 10).

3. The design engineer shall determine and designate in the plans which alternate types of mitered end sections will not be permitted. The restriction shall be based on corrosive or structural requirements.

NOTES & INFORMATION

2010 FDOT Design Standards

SIDE DRAIN MITERED END SECTION
DETAIL OF BELL & SPIGOT CONCRETE PIPE JOINT USING ROUND OR PROFILE RUBBER GASKET

CONCRETE COLLAR FOR EXTENSION OF EXISTING PIPE CULVERTS

CONCRETE COLLAR FOR JOINING MAINLINE PIPE AND STUB PIPE

DISSIMILAR JOINTS

Miscellaneous Types

Concrete jacket for connecting dissimilar types of pipe and concrete pipes with dissimilar joints

For all pipe types - concrete pipe shown

Filter fabric jacket

Pre-formed plastic joint (before pull-up)

Profile rubber gasket (before pull-up)

Cost of concrete jacket or filter fabric jacket to be included in cost of dissimilar pipe culverts.

Elliptical Concrete Pipe Joints

Isometric View

Pipe sections

Cost of filter fabric jacket to be included in cost of pipe culverts.

For all pipe types - concrete pipe shown

Filter fabric jacket

Elliptical Pipe

Flexible pipe (corrugated steel, corrugated aluminum, corrugated polyethylene, or PVC)

Note: Cost of concrete and bituminous coating to be included in contract unit price for every new pipe or mitered end section.

Alternate connection must be approved by the State Drainage Engineer.

A concrete jacket shall not be used to join:
(a) metal pipe of dissimilar materials
(b) flexible pipe when the minimum cover required in accordance with Index No. 205 cannot be obtained

Concrete Jacket

For connecting dissimilar types of pipe and concrete pipes with dissimilar joints

Concrete jacket for connecting dissimilar types of pipe and concrete pipes with dissimilar joints

Concrete Collar for joining mainline pipe and stub pipe

Cost of concrete and steel to be included in contract unit price for pipe culvert.

Concrete collar for extension of existing pipe culverts

Cost of concrete collar to be included in contract unit price for pipe culvert.

Elliptical joints

Bituminous coating required for CMP (any suitable bituminous coating may be used) applied bituminous coating to extend 12" beyond concrete collar

Note: For reinforcement see elliptical pipe concrete jacket (next pipe section)
CONCRETE GUTTER AND DRAINS AT RETAINING WALLS

Note: PVC pipe, Schedule 40, to be paid for under the contract unit price for Polyvinyl Chloride Pipe Culvert (4") LF.

METHOD FOR SETTING LIMITS OF VARIABLE FRONT SLOPES AT DRAINAGE STRUCTURES

Use Larger Value Of Either:
1. $L = \text{25/4}(\text{No Maximum})$
2. $L = \text{60/4} \times \text{ditch width} (\text{Maximum} \ L = 100')$

NOTE: Filling or excavation of variable slopes to be done during normal grading operations.

SIDE VIEW

VERT BARS & PLATE HOLES
Symmetrical About Each Pipe:
1. For 18" Pipe
2. For 24" & 30" Pipe
3. For 36" Pipe
4. For 42" Pipe

Guard at Pipe Ends

Note: Guards to be constructed only at locations specifically called for in plans. Guard, plates & clips, bolts, nuts and sleeves to be included in the contract unit price for Reinforcing Steel (Miscellaneous).
**SOD QUANTITIES (SY)**

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Note: Sodding quantities for each endwall to be determined by the designer from this detail.

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**U-TYPE ENDWALL**

**INDEX NO. 250**

**STRAIGHT ENDWALL**

**INDEX NO. 261**

**U-TYPE ENDWALL**

**INDEX NO. 266**

**FLARED END SECTION**

**INDEX NO. 270**

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**SODD ENDWALL with Bottoms**

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**GEOTEXTILE PLACEMENT AT CONCRETE STRUCTURE**

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**DITCH PAVEMENT & SODDING**
Notes:
1. Maximum pipe size shall be 24" diameter.
2. Grading back of sidewalk varies and shall be done as directed by the Engineer.
3. Concrete quantities shown are for maximum weights, and shall be basis for estimate and payment.
4. Riprap quantities shown are for estimate purposes only. Cost of riprap to be included in cost of the endwall.
5. Endwalls to be paid for under the contract unit price for Conc. Class I (Endwall), CY. Mandarin to be paid for under the contract unit price for Pipe Mandarin (Material), LF.

SPECIAL CONCRETE ENDWALL
YARD DRAIN ITEM INCLUDES:

1. 15" x 15" x 12" Concrete or PVC Tee 4' long.
2. One (1) Grate-Neenah No R-4030, Phoenix No. P-1058, U.S. Foundry No. 5605 or equivalent.
3. 12" pipe as necessary.
4. 0.04 Cubic yards concrete for slab.

ELEVATION

Notes:
1. Yard drains to be located outside the P/W Drainage area should not exceed 750 SF (gpm flow 0.1 Cfs).
2. Yard drains may be constructed at the option of the property owner as shown on the plans.
3. Cost of plugs and covers to be included in the cost for 15" pipe. For cover and plug details see Index No. 280.
4. Yard drains to be paid for under the contract unit price for Yard Drains, EA.

YARD DRAINS

Notes:
1. To be constructed at locations as directed by the Engineer.
2. Either cast iron pipe or PVC rigid conduit, U.L. listed for direct sunlight exposure, Schedule 40, may be used.
3. Pipe to be paid for under the contract unit price for either Cast Iron Soil Pipe (Standard) (4"), LF or Polyvinyl Chloride Pipe Culvert (4"), LF.

SHALLOW DITCHES
Provide Approximately A Minimum Of 0.20% Grade On Gutter, Slightly Warming The Surface Of The Median Pavement If Necessary, Within Limits Of The Median Curb Or Curb And Gutter. Construct & Drainage Flumes Or Flumes At The Point Of Points Of Low Grade. See Details.

SECTION AA

Prop. Plans
Grade Established
In Detail Plans

Median
Prop. Plan B
New Part

Slope To Approx Match That Of Adjacent Part
(Grade 0.02 Min., 0.05 Max.)

Runoff
臌

Grade To Drain As Shown In
The Plans Or As Adjusted By
The Engineer During Construction

Runoff

Crown Line [Exist Part] Or Lane Line Of
Super-elevated Part [Exist Part Or New
4-Lane Part]

SECTION BB

Min. Slope 0.01% Ydt.

Const. Ditch
To Drain

(May Drain From Any Point Designated In the Plans Or
As Adjusted By The Engineer During Construction)

SECTION CC

FLUME DETAIL

SECTION AA

Match Existing Grade

Provide Smooth Section

Runoff

PUBLIC RD OR CROSSOVER

Runoff

Crown Line [Exist Part] Or Lane Line Of
Super-elevated Part [Exist Part Or New
4-Lane Part]

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 super-elevated sections of new 4-lane divided highways. Layout above is illustration only. Cost of flumes to be included in the contract price for Curb Or Curb and Gutter. Soo to be paid for under the contract unit price for Performance Turf, SY.

2. Flumes to be located in low point of lanes and at other points as designated in the plans. The locations may be adjusted by the Engineer during construction.
1. Spillway to be paid for as Shoulder Gutter, L.F.
2. If spillway empties into an unpoased 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 shall be any of the asphalt types permitted in Section 44.3 of the Specifications unless otherwise restricted in the plans. Dissimilar types of pipe will not be permitted in a continuous run of pipe.

2. Concrete pipe shall be placed with the slots positioned on sides.

3. Alignment joints are standard (gaskets not required). Recirculation of metapipe ends not required.

4. The contractor may submit other methods of providing slots having equal or greater area of opening for approval by the Engineer.

5. Filter fabric shall be Type 0-3 meeting the requirements of Section 985. Filter fabric joints shall be a minimum of one (1) foot.

6. The standard cross section shall be constructed unless otherwise section(s) described or detailed in the plans.

7. For supplemental details see Index No. 280.

8. The contractor shall take the necessary precautions to prevent contamination of the trench with sand, silt and foreign materials.

9. French drains following the typical cross section shall be paid for under the contract unit price for French Drains, LF. The unit price shall include the cost of pipe, pipe plugs, pipe fittings, coarse aggregate and filter fabric in place, and the cost for trench excavation, backfill and compaction. The unit price shall also include the cost for disposal of surplus excavated materials and cost for restoration of pavement removed or damaged by trench drain construction, but shall not include payments for items paid for elsewhere.

French drains with a significantly different cross section shall be paid for under the contract unit prices for separate items as follows:

(a) Slotted Or Perforated Pipe Culvert, LF. Unit price shall include cost for pipe, pipe plugs and fittings in place.

(b) Blast-Rock (French Drain Aggregate), CY. Unit price shall include cost for coarse aggregate in place, and cost for trench excavation, backfill and compaction. The unit price shall also include the cost for disposal of surplus excavated materials and cost for restoration of pavement removed or damaged by trench drain construction, but shall not include payment for items paid for elsewhere.

(c) Plastic Filter Fabric (Subsurface), SY. Unit price shall be cost of fabric in place. Quantity shall be determined by plan notes dimensions of the fabric envelope.

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.
ELLiptical Pipe

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SloTted Pipe Options

Option A - Round Pipe

Option B - Round Or Elliptical Pipe
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 special provisions of this standard, pipe with a corrugated interior wall may be provided based on the following size equivalencies.

   - 4" smooth interior equivalent to 5" corrugated interior
   - 5" smooth interior equivalent to 6" corrugated interior
   - 6" smooth interior equivalent to 8" corrugated interior
   - 8" smooth interior equivalent to 10" corrugated interior

2. Fine aggregate shall be quite and meeting the requirements of Sections 902-4 of the Standard Specifications.

3. Coarse aggregate shall be gravel or stone meeting the requirements of Sections 901-2 or 901-3. The gradation shall meet Section 901, Grades 4, 467, 5, 56 or 57 stone unless otherwise shown restricted in the plans.

4. Underdrain Type I, II, and III shall be in accordance with Section 440.

5. Filter fabric shall be Type D-3 (See Index No. 199). The internal filter fabric of Type V underdrain shall have a permeability of 0.7 cubic and an AOS of 40 above.

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

7. See Index No. 500 for the standard location of Type I, II, and III underdrain. The location of Type V underdrain and nonstandard locations of Type I, II, and III underdrain will be as detailed in the plans.

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

9. Underdrain outlet pipes shall be perforated and all bends shall be made using V90 (45 deg.) elbows. 90 deg. bends shall be constructed with two V90 elbows separated by at least 1' of straight pipe. Outlet pipes stubbed into inlets or other drainage structures shall not be less than 6" above the structure flow line. Outlet pipes discharging to grassed areas shall have concrete aprons, hardware cloth, an apron, and apron facing as shown in Index No. 287 for Edgework outlets.

10. Pay Item shall be based on the size of the smooth interior products. The contract unit price for Underdrain, LF, shall include the cost of pipe, fittings, aggregate, sock, filter fabric, underdrain cleanouts, and concrete aprons.

   The contract unit price for Underdrain Outlet Pipe, LF, shall be full compensation for trench excavation, pipe and fittings, concrete aprons, hardware cloth for concrete aprons, stubbing into drainage structures, backfilling place and disposal of excess materials.

The contract unit price for Underdrain Inspection Box, E4, shall be the number completed and accepted.

DESIGN NOTES

1. The type of underdrain should be selected to meet design water removal rates and soil conditions. Cautions are prescribed in the use of these typical sections since specific 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 chemical 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 V underdrain is intended for use in detention basins and other locations which require a filtration system. The standard fine aggregate specified for Type V underdrain conforms to filtration gradation requirements of Chapter 62-25 FAC.

6. The designer should detail the plans, the location of:
   (a) Type V underdrain, (b) nonstandard locations of Type I, II, and III underdrain, (c) underdrain inspection boxes, (d) cleanouts for Type V underdrain, and (e) underdrain outlet pipes.

7. The designer should specify the flow line elevations at the beginning, bends, junctions and ends of underdrain pipes and outlet pipes.

8. The designer should evaluate whether an external filter fabric envelope is required around underdrain Types I, II, and III. When required, fabric shall be specified in the plans.
**DEVELOPMENT CHECKLIST**

**STANDARD INDEX NO. XXXXX, SHEET X OF X**

**UPPER LIMIT**

- Filter Fabric Envelope
- 4" of Coarse Aggregate
- No Filter Fabric
- Crown Matches Ditch or Basin Bottom
- Ditch or Basin Bottom
- Filter Fabric Envelope
- Optional Trench Side
- 3" of Coarse Aggregate

**LOWER LIMIT**

- Filter Fabric Envelope
- Optional Trench Side
- Coarse Aggregate
- Underdrain Pipe
- Filter Fabric Envelope
- Slope To Match Top of Fine Aggregate

**SECTION AA**

CLEANOUT FOR TYPE II UNDERDRAIN

- Filter Fabric Wrap
- 6" Min.
- Coarse Aggregate
- Underdrain Pipe
- Cleanout Riser (Nonperforated)
- Wye Fitting
- Elbow

**TYPE II a**
GENERAL NOTES FOR CONCRETE PAVEMENT SUBDRAINAGE

1. No trench greater than 2' in depth will be allowed overnight. Trenches shall be backfilled at all times.

2. Concrete pavement subdrainage shall be constructed adjacent to the low edge of the roadway pavement and under travel lanes, auxiliary pavement and shoulders, as called for 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 20' before the M-20 point (100' overlap). Concrete pavement subdrainage shall be placed on the low side of ramps at crossover terminations.

3. Concrete pavement subdrainage shall be constructed on a grade parallel with the edge of pavement profile, except on profiles flatter than one-tenth percent (0.10%).

4. Immediately prior to placing the filter fabric the entire vertical-faced of the concrete pavement shall be cleaned to remove adhering base material and soil.

5. The Contractor shall devise a procedure for holding the filter fabric in position on the vertical faces of the trench. The procedure must be approved by the Engineer prior to placement of the drainpipe.

6. The upper end of each separate run of the concrete pavement subdrainage pipe shall be capped.

7. Outlet pipes shall be constructed at a maximum of 500' intervals. Elbows or 90° bends shall be used to connect the outlet pipe to the concrete pavement subdrain pipe. The elbows or bends shall be of the same material as the outlet pipe but compatible with the pipe. When directed by the Engineer, outlet pipes shall be stubbed into existing inlets or into existing ditch pavements at an elevation 6" above the inlet flange or ditch bottom. Concrete aprons and bordering sod are not required for stubbed outlet pipes but replacement sodding will be required at trenches for pipes stubbed into paved ditches.

In sag vertical curves separate outlet pipes for concrete pavement subdrainages from opposite directions shall use a single apron unless otherwise shown in the plans or otherwise directed by the Engineer.

Backfill around outlet pipes shall be cohesive soils, drainrocks will not be permitted.

8. Existing paved shoulder that is removed for the construction of outlet pipes shall be replaced with Type SP asphaltic concrete at the rate of 500 LB per ST.

9. The contract unit price for Edgedrain Outlet Pipe (4") LF, shall be full compensation for removal of existing shoulder pavement, trench excavation, pipe and fitting, concrete apron, hardware cloth, soil, stubbing into existing inlets and paved ditches, restoration of ditch pavement, backfill in place, and disposal of excess materials.
DRAINCRETE SUBDRAINAGE

NEW CONSTRUCTION

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 4.

2. The contractor shall define the construction of edgdrain edgdrains 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 paving.

METHOD OF PAYMENT

NEW CONSTRUCTION:

1. The contract unit price for Edgdrain (Draincrete) 1.5 shall be full compensation for trench excavation, disposal of excess material, filter fabric, edgdrain edgdrain pipe and fittings, and edgdrain concrete. Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 4.

FIR REHABILITATION:

1. The contract unit price for Edgdrain (Draincrete) 1.5 shall be full compensation for removal of existing shoulder pavement, trench excavation, disposal of excess materials, filter fabric, edgdrain edgdrain pipe and fittings, and edgdrain concrete, necessary for edgdrain construction.

Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 4.

Shoulder pavement shall be paid for under the contract unit price for Type 5SP, Ashphaltic Concrete.

Shoulder joint seal shall be paid for under the contract unit price for Pavement Joint, 1.5.
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 confirm the construction of draincrete edgdrain in 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.

NEW CONSTRUCTION:

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

   Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 4.

2. Type B-12.5 shall be paid for under the contract unit price for Optional/Scale.

3. Shoulder pavement shall be paid for under the contract unit price for Type SP, Asphaltic Concrete.
STEEL WELL GRATE DETAIL
NEENAH GRATE CATALOG NO. R-4341-A
OR EQUIVALENT

Note: Steel well grate to be installed over 24" deep well. Steel grate to be hot dipped galvanized after fabrication. Cost to be included in the price of casing.

TOP SLAB PLAN

SECTION A-A

SPECIAL MANHOLE STRUCTURE DETAIL WITH OUTFALL

STRUCTURE WITH NO OUTFLOW

Design Notes

1. Depth of casing varies, 60' min.
2. Depth of open hole, 10'-20'.
3. Actual size of the inflow and outflow chambers will be determined by the size of the pipes (Refer to Table 3 of Index 200). The width of the box shall be constant based on the largest pipe. The length is to be adjusted based on size and orientation of the pipes.
GENERAL NOTES:


LIVE LOAD: H-93.

CONSTRUCTION LOADING: It is the construction Contractor's responsibility for providing supporting construction loads that exceed AASHTO H-93, and any construction load applied prior to a test 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 slabs 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.

REINFORCING STEEL: ASTM A615, see the "Box Culvert Data Tables" in the Contract Plans for grade and bar spacing. See the Reinforcing Bar List in the Contract Plans for bar sizes and bar bending details.

TABLE 1 - MINIMUM BAR SPlice LENGTHS FOR LONGITUDINAL REINFORCING

<table>
<thead>
<tr>
<th>BAR</th>
<th>Splice (in) Φ (in)</th>
<th>BAR</th>
<th>Splice (in) Φ (in)</th>
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<tr>
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<td>1-0&quot;</td>
<td>5/32</td>
<td>1-0&quot;</td>
</tr>
</tbody>
</table>

TABLE 1 NOTE: Splice lengths are based on AASHTO Class B tension lap splice for the Specification Section 346 concrete class shown.

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 based on the live loads and dimensional restrictions shown in the General Notes of this Index and to the Table of the culverts, as shown in the Contract Plans, as shown in the Contract Plans.

2. Headwalls with skew angles less than 1-0" or greater than 0-0" require special design authorization. Other design options should be considered. Contact the District Drainage Engineer to obtain authorization.
CULVERT (BARREL) NOTES:
1. Space Bars 110 and 112 with a bar in each corner, and at the 1/2 of interior walls (for multiple barrel culverts only), and the remaining bars placed at equal spacing shown in the Contract Plans. Adjust last bar spacing when required.
2. Place Bars 113 and 114 at spacing shown in the Contract Plans evenly between Bars 109 and 111.
3. Locate the first transverse bar from the ends of the culvert at one half the bar spacing, but provide the minimum reinforcement cover and not greater than 4" clear.

TYPICAL SECTION THRU SINGLE BARREL CULVERT

WINGWALL ELEVATION - Variable Height
(Left End shown - other corners similar)

WINGWALL NOTES:
1. Align construction joint perpendicular to wingwall.
2. In the vicinity of the construction joint, field bend reinforcement as necessary to maintain minimum reinforcement cover.
3. For constant height wingwalls, variable length bars 405, 406, & 408 are not required, and as such the limits of Bars 401 & 407 extend the full length of the wingwall and the limits of Bars 403 & 404 extend to the full height of the wingwall.
PARTIAL PLAN TOP SLAB
(Left Side, Left Skew)

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

PARTIAL PLAN BOTTOM SLAB
(Right Side, Right Skew)

LONGITUDINAL SECTION THRU CULVERT
(Transverse Top & Bottom Slab Reinforcing Not Shown For Clarity)

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 5).

Center of Traffic Lanes

Depth of #10 bars not use upper or
lower points in normal or super-elevated
roadway sections unless so directed by
the Structures Design Office.
END ELEVATION
(Showing Constant Height And Variable Height Wingwalls)

DETAILED TRAFFIC RAILING ATTACHMENT TO HEADWALL

NOTES:
1. For small angles, the Contractor may elect to fill the area between the box and the wingwall footing with unreinforced concrete. For wingwall skew angles less than 30 degrees, field bond wingwall reinforcement as necessary while maintaining cover. No additional/cementitious/hydraulic filled for this work.
2. Location of Construction Joint determined by WP at theoretical intersection of:
   - Outside face of Headwall and outside face of Box Exterior Wall, for SW290°;
   - Outside face of Wingwall and outside face of Box Exterior Wall, for SW190°.
3. Provide 6" chamfer when angle "A" is greater than 45°. Maintain minimum wall thickness. Field adjust reinforcing to maintain cover.
4. Wingwall Skew Angles (SW) are measured from the adjacent box exterior wall to the wingwall.
5. Turn or extend Wingwall/Cutoff Walls as necessary to meet Box Cutoff Wall.
6. Provide additional reinforcement in the top of the top slab below traffic railings to ensure a minimum area of 0.80 sq.in./ft transverse reinforcing.

DETAIL J
LEFT HEADWALL SECTION
(Right Headwall Similar)

DETAIL K
LEFT CUTOFF WALL SECTION
(Right Cutoff Wall similar)
**INLET TYPE A GRATE**

**NOTES:**
1. Cost of Steel Grating to be included in cost of Box Culvert.
2. **2** reinforcing blocks 2" clear for Slightly and Moderately Aggressive Environments, and 3" clear for Extremely Aggressive Environments.

---

**INLET IN TOP OF BOX CULVERT**

- Location of Number: 20 or more
- Bridge Culvert:
  - The number is to be placed in the center of the top surface of all bridge culvert headwalls.
  - For Bridge Number see Plan-Profile sheets.

---

**SECTION THRU RECESSED V-GROOVE TO FORM INSCRIBED FIGURES**

**BASE PLASTIC FIGURES** 3" in height as approved by the Engineer may be used in lieu of numbers formed by ⅝" V-Grooves. V-Grooves should be formed by preformed figures.
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
PIPE BLOCKOUT NOTES:
1. Cut box culvert reinforcement as required to maintain 2" cover.
2. For Precast Sections construct opening on a minimum of 1-5/8" away from box joint except opening may be a minimum of 1-0" away from joint when at least 2'-0" of clearance to the box to box joint is provided on the opposite side of the pipe opening.
3. Pipe blockout diameter to be 6" greater than pipe outside diameter.
4. See Drainage Plans for pipe, offset, placement, and invert elevation.

C-I-P END CAP DETAILS AND CONNECTION TO PRECAST BOX

SECTION H-H
(Showing additional blockout reinforcing only)
Provide 50% of vertical reinforcing cut by blockout on each side of pipe at each face (Typ.)

SECTION 1-1
Additional horizontal reinforcing (Typ.)

VIEW G-G
(Headwall, Toe Slab and Cutoff Wall Reinforcing not shown for clarity)

ELEVATION VIEW
PIPE BLOCKOUT DETAILS

---

SUPPLEMENTAL DETAILS FOR PRECAST CONCRETE BOX CULVERTS

2010 FDOT Design Standards
LINK SLAB NOTED:
1. Provide a Cast-In-Place Link Slab to ensure uniform joint opening of precast box culverts when the differential settlement shown in the plans exceeds the following limits, except that a Link Slab is not required for differential settlements less than 0.5".

\[
AY \leq \frac{760}{R} \times W
\]

Where:
- \(AY\) = Maximum Long-Term Differential Settlement (ft.)
- \(R\) = External radius of Box Culvert (ft.)
- \(W\) = Length of Box Culvert Segments (ft.)
- \(L\) = Effective length for single curvature deflection (ft.)

2. Extend Link Slab to back of headwalls and to limits of existing box culverts for extensions.

**LINK SLAB TYPICAL SECTION**
(Multiple Barrel Culvert shown, Single Barrel Culvert similar)

* Install dowels with an Adhesive Bonding Material System in accordance with Specification Section 416. The Contractor may substitute mechanical couplers in lieu of adhesive bonded dowels. Shift dowels to clear box culvert reinforcing.

**ESTIMATED LINK SLAB QUANTITIES**

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<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
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<tr>
<td>Class II or IV Concrete (Culvert)</td>
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**BILLY OF REINFORCING STEEL**

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<th>MARK</th>
<th>SIZE</th>
<th>NO. Req'd</th>
<th>LENGTH</th>
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<tr>
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<td>2 per Barrow/ft.</td>
<td>1</td>
<td>As read.</td>
</tr>
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**REINFORCING STEEL BENDING DIAGRAMS**

**NOTE:**

1. All bar dimensions are cut to cut.
2. Lap splice length for Bars 4M is 1.4" minimum.

**CONSTRUCTION DETAIL**

**SCHEMATIC LONGITUDINAL SECTION (NEW CONSTRUCTION)**

**SCHEMATIC LONGITUDINAL SECTION (WIDENING)**

**DIFFERENTIAL SETTLEMENT COUNTERMEASURES FOR PRECAST BOX CULVERTS**
### Table 1A - Standard Precast Box Culvert Designs (Cover) - 1 & 4 Spans

<table>
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<tr>
<th>Width</th>
<th>Depth</th>
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<th>Cover</th>
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See General Note 5

### Table 1B - Standard Precast Box Culvert Designs (Cover) - 2 & 3 Spans

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See General Note 5
### Table 2A: Standard Precast Box Culvert Designs (2" Cover) - 5' & 6' Spans

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Top T (in.)</th>
<th>Side T (in.)</th>
<th>Bottom T (in.)</th>
<th>Height (in.)</th>
<th>Reinforcement Areas (sq. in./ft)</th>
<th>Avg Ext Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' x 3'</td>
<td>2 - 4'</td>
<td>0.5 - 0.6</td>
<td>0.2 - 0.3</td>
<td>0.22 - 0.34</td>
<td>-</td>
<td>45</td>
</tr>
<tr>
<td>5' x 4'</td>
<td>2 - 4'</td>
<td>0.5 - 0.6</td>
<td>0.2 - 0.3</td>
<td>0.22 - 0.34</td>
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<td>45</td>
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<tr>
<td>5' x 5'</td>
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<td>0.22 - 0.34</td>
<td>-</td>
<td>45</td>
</tr>
<tr>
<td>5' x 6'</td>
<td>2 - 4'</td>
<td>0.5 - 0.6</td>
<td>0.2 - 0.3</td>
<td>0.22 - 0.34</td>
<td>-</td>
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### Table 2B: Standard Precast Box Culvert Designs (2" Cover) - 5' & 6' Spans

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Top T (in.)</th>
<th>Side T (in.)</th>
<th>Bottom T (in.)</th>
<th>Height (in.)</th>
<th>Reinforcement Areas (sq. in./ft)</th>
<th>Avg Ext Length (ft)</th>
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<tr>
<td>5' x 3'</td>
<td>2 - 4'</td>
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<td>5' x 4'</td>
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<td>0.22 - 0.34</td>
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<td>5' x 5'</td>
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<td>5' x 6'</td>
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<td>0.2 - 0.3</td>
<td>0.22 - 0.34</td>
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<td>45</td>
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</table>

**Note:** Tables show the design parameters for standard precast box culvert designs with a 2" cover for spans ranging from 5' to 6', including various rise options and the corresponding top, side, and bottom thicknesses, along with the reinforcement areas and average external length.
<table>
<thead>
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See General Note 5
### TABLE 5 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 9" SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (ft)</th>
<th>TOP SLAB</th>
<th>BUTT JOINT</th>
<th>SIDE WALL</th>
<th>HANCOCK</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>TOP SLAB</th>
<th>BUTT JOINT</th>
<th>SIDE WALL</th>
<th>HANCOCK</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>ALL EXT LENGTH (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9' x 9'</td>
<td>5.5 - 12'</td>
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<td>9' x 9'</td>
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<td>9' x 9'</td>
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<td>0.01</td>
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<tr>
<td>9' x 9'</td>
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<td>9' x 9'</td>
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### TABLE 6 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 10" SPANS

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<tr>
<th>SPAN x RISE (ft)</th>
<th>TOP SLAB</th>
<th>BUTT JOINT</th>
<th>SIDE WALL</th>
<th>HANCOCK</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>TOP SLAB</th>
<th>BUTT JOINT</th>
<th>SIDE WALL</th>
<th>HANCOCK</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>ALL EXT LENGTH (ft)</th>
</tr>
</thead>
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</table>

**NOTES:**
1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 2 for General Notes.
### TABLE 9A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 3' & 4' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE</th>
<th>SLAB / WALL THICKNESS</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>ALL EXT LENGTH (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ft)</td>
<td>(in.)</td>
<td>(in.)</td>
<td>(in.)</td>
</tr>
<tr>
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<td>Top</td>
<td>Bottom</td>
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<td>4' x 4'</td>
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**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
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See General Note 5

<table>
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See General Note 5
### Table 11A - Standard Precast Box Culvert Designs (3" Cover) - 7' Spans

<table>
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<th>SPAN (ft)</th>
<th>RISE (ft)</th>
<th>WALL THICKNESS (in)</th>
<th>SLENDERNESS (H/w)</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>ALL EXT LENGTH (in)</th>
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<tr>
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### Table 11B - Standard Precast Box Culvert Designs (3" Cover) - 7' Spans

<table>
<thead>
<tr>
<th>SPAN (ft)</th>
<th>RISE (ft)</th>
<th>WALL THICKNESS (in)</th>
<th>SLENDERNESS (H/w)</th>
<th>REINFORCEMENT AREAS (sq. in./ft)</th>
<th>ALL EXT LENGTH (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 x 4'</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>43</td>
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<td></td>
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**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
### Table 12A - Standard Precast Box Culvert Designs (3" Cover) - 8' Spans

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Top (in)</th>
<th>Bottom (in)</th>
<th>Side (in)</th>
<th>Reinforcement Areas (sq in/ft)</th>
<th>All Ext Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top (in)</td>
<td>Bottom (in)</td>
<td>Side (in)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>24</td>
<td>22</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>48</td>
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<td>12</td>
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<td>120</td>
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</table>

### Table 12B - Standard Precast Box Culvert Designs (3" Cover) - 8' Spans

<table>
<thead>
<tr>
<th>Span x Rise (ft)</th>
<th>Top (in)</th>
<th>Bottom (in)</th>
<th>Side (in)</th>
<th>Reinforcement Areas (sq in/ft)</th>
<th>All Ext Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top (in)</td>
<td>Bottom (in)</td>
<td>Side (in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
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<td>22</td>
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<td>12</td>
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<td>56</td>
<td>120</td>
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</tbody>
</table>

**NOTES:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.

---

**2010 FDOT Design Standards**

Sheet 2

Sheet 7

Sheet 14
### Table 13A - Standard Precast Box Culvert Designs (3" Cover) - 9' Spans

<table>
<thead>
<tr>
<th>Span x Rise (s)</th>
<th>Top (in)</th>
<th>Butt (in)</th>
<th>Side (in)</th>
<th>Haunch (in)</th>
<th>Reinforcement Areas (sq in/H)</th>
<th>Adj Ext Length (M)</th>
</tr>
</thead>
<tbody>
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### Table 13B - Standard Precast Box Culvert Designs (3" Cover) - 9' Spans

<table>
<thead>
<tr>
<th>Span x Rise (s)</th>
<th>Top (in)</th>
<th>Butt (in)</th>
<th>Side (in)</th>
<th>Haunch (in)</th>
<th>Reinforcement Areas (sq in/H)</th>
<th>Adj Ext Length (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9' x 5'</td>
<td>4</td>
<td>2 - 3</td>
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<td>0.66</td>
<td>-</td>
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</tr>
<tr>
<td>9' x 6'</td>
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<tr>
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**Notes:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
### TABLE 14 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 10' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (ft)</th>
<th>SLAB / WALL THICKNESS</th>
<th>DESIGN EARTH COVER (sq. ft./lin. ft.)</th>
<th>REINFORCEMENT AREAS (sq. in./lin. ft.)</th>
<th>ALL EXT LENGTH (in.)</th>
</tr>
</thead>
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<tr>
<td>10' x 5'</td>
<td>4</td>
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<td>0.65 0.73 0.66 0.24 0.24 0.24 0.50 0.52</td>
<td>58</td>
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<tr>
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<tr>
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<td>25</td>
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<td>58</td>
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<tr>
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<td>50</td>
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<td>58</td>
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<td>0.65 0.73 0.66 0.24 0.24 0.24 0.50 0.52</td>
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### TABLE 15 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 11' SPANS

<table>
<thead>
<tr>
<th>SPAN x RISE (ft)</th>
<th>SLAB / WALL THICKNESS</th>
<th>DESIGN EARTH COVER (sq. ft./lin. ft.)</th>
<th>REINFORCEMENT AREAS (sq. in./lin. ft.)</th>
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<tr>
<td></td>
<td>10</td>
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<td>0.65 0.64 0.65 0.12 - - - -</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>3 - C6</td>
<td>0.65 0.64 0.65 0.12 - - - -</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>2 - C3</td>
<td>0.65 0.73 0.66 0.24 0.24 0.24 0.50 0.52</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>2 - C3</td>
<td>0.65 0.73 0.66 0.24 0.24 0.24 0.50 0.52</td>
<td>58</td>
</tr>
<tr>
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<td>125 125 125</td>
<td>0.65 0.73 0.66 0.24 0.24 0.24 0.50 0.52</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.

**2010 FDOT Design Standards**

**Sheet No.:**

**Index No.:**

**Rev.:** 292

**Date:** 01/01/07

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**Number:** 292
SAFETY MODIFICATION FOR INLETS IN BOX CULVERTS
CONCRETE CURB AND GUTTER

When used on high side of roadways, the cross slope of the gutter shall match the cross slope of the adjacent pavement. The thickness of the lip shall be 6", unless otherwise shown on plans.

Note: For use adjacent to concrete or flexible pavement. For details depicting usage adjacent to flexible pavement, see Sheet 2. Expansion joint, preformed joint filler and joint seal are required between curb & gutter and concrete pavement only, see Sheet 2.
CURB AND GUTTER ENDINGS

CURB TYPE A

Curb and Gutter Endings

CURB AND GUTTER TYPES E & F

Shoulder gutter

Type E

Type F

CONTRACTION JOINT IN CURB AND GUTTER

CONTRACTION JOINT IN CURB

CONCRETE BUMPER GUARD

ASPHALTIC CONCRETE CURB

GENERAL NOTES

1. For curb, gutter and curb & gutter provide 1/4" - 1/2" contraction joints at 10 centers (max.) Contraction joints adjacent to concrete pavement on tangents and flat curves are to match the pavement joints, with intermediate joints not to exceed 10 centers. Curb, gutter and curb & gutter expansion joints shall be located in accordance with Section 520 of the Standard Specifications.

2. Ends of Curbs Types B and D shall transition from full to zero heights in 3'.

EXPANSION JOINT BETWEEN GUTTER AND CONCRETE PAVEMENT

Applies to both high and low sides of pavement, low side shown.

Applies to shoulder gutter only where adjoining traffic lanes.
### DESIGN NOTES

1. The plan views shown are for turn lane taper shapes and dimensional purposes only. They do not prescribe the use of curb and gutter, shoulders or separators specifically for other rural urban conditions.

2. Total deceleration distances must not be reduced except where lesser values are imposed by unreluctable control points.

3. Right turn lane tapers and distances identified left turn lanes under stop control conditions. Right turn lane tapers and/or distances are site specific under free flow or yield conditions.

4. These left turn configurations apply to continuous left turn lanes only where specifically called for in the plans.

5. For pavement markings see Index No. 17486.

### GENERAL NOTES

- **Added:**
- **Changed:**
- **Deleted:**

### REVISION LOG

**Name / Initials:**

**Date:**

**DESCRIPTION**

**APPROVED BY**

**DRAWN BY**

**CHECKED BY**

**FHWA APPROVAL**

---

**TURN LANES • CURBED AND UNCURBED MEDIANS**

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Entry Speed (mph)</th>
<th>Clearance to Stop Distance</th>
<th>Total Decel. Distance</th>
<th>Clearance to Stop Distance</th>
<th>Total Decel. Distance</th>
<th>Clearance to Stop Distance</th>
<th>Total Decel. Distance</th>
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<td>75</td>
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<td>110</td>
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<td>150</td>
<td>185</td>
<td>240</td>
<td>150</td>
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<td>50</td>
<td>40/44</td>
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<td>340</td>
<td>220</td>
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</table>

---

**CURB AND GUTTER**

- **Type A:**
- **Type B:**
- **Type C:**
- **Type D:**

---

**CONCRETE CURB OR CURB AND GUTTER** (Refer To Index No. 300)

**FLUSH AND/OR CURBED SEPARATION**

**RAISED SEPARATION DOUBLE LEFT TURNS**

**RAISED SEPARATION SINGLE LEFT TURNS**

△ The length of taper may be increased to \( L_2 \) for single left turns and \( L_3 \) for double left turns when:

- a. Left turn queue vehicles are adequately provided for within the design queue length.
- b. Through vehicle queues without access to left turn lane.
- c. Approved by District Design Engineer.

---

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**MEDIAN CURB AND TRAFFIC SEPARATOR JUNCTURE DETAILS**

**Delineator Post (Refer To Index No. 17486)**

**Concrete Curb Or Curb And Gutter**

**2% Misc. Asphalt Pav**

**Queue Length** (Measured From Stop Bar Location)**

**Traffic Separator** (Refer To Index No. 300)

---

**DESCRIPTION**

**REVISIONS**

**NAME / INITIALS**

**DATE**

**DESCRIPTION**

**APPROVED BY**

**DRAWN BY**

**CHECKED BY**

**FHWA APPROVAL**

---

**DESIGNED BY**

**NAME / INITIALS**

**DATE**

**DESCRIPTION**

**DEVELOPMENT CHECKLIST**

**STANDARD INDEX NO. XXXXX, SHEET X OF X**

**ORIGINAL RELEASE DATE**

**DATE**

**SHEET NO.**

**INDEX NO.**

**2010 FDOT Design Standards**

**Revision**

**07/01/05**

**1 of 1**

**Last**

**NAME / INITIALS**

**DATE**

**DESCRIPTION**

**APPROVED BY**

**DRAWN BY**

**CHECKED BY**

**FHWA APPROVAL**

---

**DESIGNED BY**

**NAME / INITIALS**

**DATE**

**DESCRIPTION**

**DEVELOPMENT CHECKLIST**

**STANDARD INDEX NO. XXXXX, SHEET X OF X**

**ORIGINAL RELEASE DATE**

**DATE**

**SHEET NO.**

**INDEX NO.**

**2010 FDOT Design Standards**

**Revision**

**07/01/05**

**1 of 1**

**Last**
TYPICAL SECTION THRU TRAFFIC SEPARATOR
(Bridge Deck Shown, Approach Slab Similar)

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

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

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

REINFORCING STEEL OPTION A

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

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 is shown. For treatment of separators on skewed bridges see Index No. 490.
TYPICAL SECTION THRU TRAFFIC SEPARATOR
(Bridge Deck Shown, Approach Slab Similar)

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

- At the Contractor’s option, one piece bar may be substituted for Bars 48 and 4E.

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

FIELD END AND CUT REBAR AS REQUIRED TO MAINTAIN COVER

REINFORCING STEEL OPTION A
(NOT PERMITTED ON BRIDGE DECKS WITH PRESTRESSING STEEL)

BRIDGE INSTALLATIONS - TYPE "F" CURB

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

DETAIL AT POURING JOINT WITH BACKER ROD EXPANSION JOINTS

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.
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

REINFORCING STEEL OPTION A

Bars 4E See Note
Bars 4A Length as required
Bars 4B

Note:
Length of Bars 4E is 2-8½” for 4-0” Separator.
Length of Bars 4A is 4-8½” for 4-0” Separator.
Length of Bars 4B is 6-8½” for 4-0” or 4-8½” for 8-6” Separator.

REINFORCING STEEL OPTION B

Bars 4C See Note
Bars 4A Length as required
Bars 4D

Note:
Length of Bars 4C is 2-4½” for 4-0” Separator.
Length of Bars 4A is 4-4½” for 4-0” Separator.
Length of Bars 4D is 6-10½” for 8-6” Separator.

ALTERNATE REINFORCING STEEL DETAILS (WELDED WIRE REINFORCEMENT)

OPTION A: Use Welded Wire Reinforcement 3’ x 4’ - W5.0 x W6.7 as required by plans in place of Bars 4A, 4B, and 4E. Bend the Welded Wire Reinforcement to the dimensions of Bar 4B shown in the Bending Diagram for Reinforcing Steel Option A.

OPTION B: Use Welded Wire Reinforcement 3’ x 4’ - W5.0 x W6.7 as required by plans in place of Bars 4A and 4C shown in Reinforcing Steel Option B. Note: Welded Wire Reinforcement shall conform to ASTM A85.

SPICE DETAIL
(Between WWR 3’ x 4’ - W5.0 x W6.7 Sections)

DRAINAGE JOINT DETAIL
FOR 5° OPENING OR LESS

See Structures Plans, Superstructure Sheets for location(s) of drainage joints. Locations for drainage joints shall be limited to the constant width section of separator.

BARS 4D

NOTES:
1. All dimensions are in to. 4. Layback joints are to be provided. 
2. The 8” vertical dimension shown for Bars 4B and 4D are based on a slab 65½” thick or greater without a wearing surface. If slab thickness is less than 65½”, decrease this dimension by an amount equal to the difference in thickness. If a wearing surface is to be provided, increase this dimension by an amount equal to the wearing surface thickness.

REINFORCING STEEL NOTES:
1. All dimensions are to
2. The 8” vertical dimension shown for Bars 4B and 4D are based on a slab 65½” thick or greater without a wearing surface. If slab thickness is less than 65½”, decrease this dimension by an amount equal to the difference in thickness. If a wearing surface is to be provided, increase this dimension by an amount equal to the wearing surface thickness.

ESTIMATED TRAFFIC SEPARATOR QUANTITIES

CONCRETE:

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<th>Lbs/Bar</th>
<th>Per Ft.</th>
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<td>4’-0”</td>
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<td>CONCRETE</td>
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<td>0.089</td>
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<td>CONCRETE</td>
<td>8’-0”</td>
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STEEL:

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<th>Per Ft.</th>
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<td>STEEL</td>
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<td>0.493</td>
<td>0.526</td>
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</table>

REINFORCING STEEL:

(All quantities are based on an 8½” slab.)

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<th>Type</th>
<th>Width</th>
<th>Lbs/Bar</th>
<th>Per Ft.</th>
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<td>REINFORCING STEEL</td>
<td>8’-0”</td>
<td>12.5</td>
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</tbody>
</table>

DOWEL DETAIL

Dowel/Bar 4D

NOTES:
1. Dowl/Bar 4D in lieu of dowel bored may be used.
2. Provide and install an adhesive bonding material system in accordance with Sections 406 and 937 of the Specifications.

BRIDGE INSTALLATIONS - TYPE “E” AND “F” CURBS
Note:
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
GENERAL NOTES

1. Public sidewalk curb ramps shall be constructed in the public right of way at locations that will provide continuous unobstructed pedestrian circulation paths to pedestrian areas, elements and facilities in the public right of way and to accessible pedestrian routes on adjacent sites. Curb facilities with sidewalks and those without sidewalks are to have curb ramps constructed at all street intersections and at turnouts that have curb returns.

Partial curb returns shall extend to the limit prescribed by Index No. S15 to accommodate curb ramps. Ramps constructed at locations without sidewalks shall have a landing constructed at the top of each ramp, see Sheet 6.

2. The location and orientation of curb ramps shall be as shown in the plans.

3. Curb ramp running slopes at unrestrained sites shall not be steeper than 1:12 and cross slope shall be 0.02 or flatter. Transition slopes shall not be steeper than 1:12.

When altering existing pedestrian facilities where existing site development precludes the accommodation of a ramp slope of 1:12, a running slope between 1:12 and 1:10 is permitted for a rise of 6" maximum and a running slope of between 1:10 and 1:8 is permitted for a rise of 3" maximum. Where compliance with the requirements for cross slope cannot be fully met, the minimum feasible cross slope shall be provided.

Ramp running slope is not required to exceed 8" in length; except at sites where the plans specify a greater length.

4. If a curb ramp is located where pedestrians must walk across the ramp, then the walk shall have transition slopes to the ramp. The maximum slope of the transitions shall be 1:10. Ramps with curb returns may be used at locations where other improvements provide guidance away from that portion of curb perpendicular to the sidewalk. Improvements for guidance are not required at curb ramps for linear pedestrian traffic.

5. Curb ramp detectable warning surfaces shall extend the full width of the ramp and 24" deep. Detectable warning surfaces shall be constructed in accordance with Specification S27. See Sheet 6 of 6 for detectable warning layouts. Transition slopes are not to have detectable warnings.

6. Where a curb ramp is constructed within existing curb, curb and gutter and/or sidewalk, the existing curb or curb and gutter shall be removed to the nearest joint beyond the curb transitions or up to curb gutter. The gutter transitions are to the extent that no remaining section of sidewalk is less than 5' long. The existing sidewalk shall be removed to the nearest joint beyond the transition slope or walk area or to the extent that no remaining section of sidewalk is less than 5' long. For details of Concrete Sidewalk See Index J10.

7. Alpha-numeric identifications are for reference (plans, permits, etc.).

8. Public sidewalk curb ramps are to be paid for as follows:

Ramps, reconstructed sidewalks, walk around sidewalks, sidewalk and sidewalk curbs are to be paid for under the contract unit price for Sidewalk Concrete, Type III, Type II, Type II, Type III, Type II, and Type III. When a separate payment is made for the removal, replacement, and labor expenses of existing curb, curb and gutter, and/or sidewalk, the cost of removal and disposal of the features shown shall be included in the contract unit price. Curb and gutter and/or sidewalk respectively.

9. Acceptance Criteria for Detectable Warnings:

(a) The ramp detectable warning surface shall be complete and uniform in color and texture.
(b) 90% of the individual protruding domes must comply with the design criteria.
(c) There may be no more than 4 non-conforming domes in any one square foot of surface.
(d) No two adjacent domes may be non-compliant.
(e) Surface may not deviate more than 0.10" from a true plane.

10. All sidewalk surfaces, ramp surfaces, and landings with a cross slope shown in this Index is to be 0.02 maximum at all ramps surfaces and ramp transition slopes with a slope shown in this Index is to be 1:12 maximum.
DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS WHERE
RAMP AND LANDING DEPTH ARE NOT RESTRICTED BY RIGHT OF WAY.
Ramp Widths For Curb Ramps CR 10, CR 11, CR 15, CR 16, And CR 17 May Be Reduced To 3' Min. In Restricted Conditions When Approved By The Engineer.

For BACK OF SIDEWALK CURB OR BUFFER TRANSITION And For RAMP AND SIDEWALK CURB OPTIONS See Sheet 4.

** 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**

**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 landings not required at driveways, parking lots, or other areas with pavement cross-slopes less than 2% (0.02).
MEDIAN CROSSWALKS

5' Refuge With Maximum Slope Of 0.02 Must Be Provided When Slopes Of 0.05 Or Greater And 5' In Length Are Not Available On Crosswalk. 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 0.02 Rate When The Edge Of Pavement Elevations Are Equal. The Slopes May Intersect At 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.

Curb Transition ID: Existing Edges May Be Removed And Reconstructed Curb Or Curb And Gutter For Pedestrian Use. See General Note 6.

Curb Types A Or B Or Curb & Gutter Type E (Curb And Gutter Type E Shown)

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.

Concrete Landing 0.02 Max. Slope

6' Ramp Run 1:12

Conform To Median Width

Concrete Landing 0.02 Max. Slope

6' Ramp Run 1:12

Conform To Median Width
On curb ramps, landings and flush transitions perpendicular to the curb line, rows of domes shall be aligned with the centerline of the ramp. (See Pictorial View A)

PICTORIAL VIEW A

PICTORIAL VIEW B

On landings and flush transitions at radius returns, the rows of domes are not required to be aligned with the centerline of the ramp. (See Pictorial View B)

PICTORIAL VIEW B

PICTORIAL VIEW C

On curb ramps at radius returns, rows of domes shall be aligned with the centerline of the ramp. (See Pictorial View C)

# Detectable warnings may be placed perpendicular across the bottom of the curb ramp, but only if the bottom of the curb ramp is no more than 5 feet from the back-of-curb.

TYPICAL PLACEMENT OF DETECTABLE WARNING AT CURB RAMPS
METAL OR PLASTIC CAPS FOR DOWEL BARS

TRANSVERSE EXPANSION JOINT

TRANSVERSE CONTRACTION JOINT, VIBRO CAST METHOD

TRANSVERSE CONTRACTION JOINT, SAWED METHOD

DOWEL BAR LAYOUT

TRANSVERSE JOINTS ARE TO BE SPACED AT A MAXIMUM OF 10'. DOWELS ARE REQUIRED AT ALL TRANSVERSE JOINTS UNLESS OTHERWISE NOTED IN PLANS.

DOWELS (LENGTH 18")

<table>
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<th>Diameter</th>
<th>6-9/16&quot;</th>
<th>7-9/16&quot;</th>
<th>9-9/16&quot;</th>
<th>11-1/2&quot;</th>
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<tbody>
<tr>
<td>Pavement Thickness</td>
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<td>6&quot;</td>
<td>6&quot;</td>
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LONGITUDINAL BUTT CONSTRUCTION JOINT

LONGITUDINAL LANE-TIE JOINT

LONGITUDINAL JOINTS

Note: For joint seat dimensions see Sheet 2.
CONCRETE—CONCRETE JOINTS

FOR NEW PROJECTS:
PREFORMED ELASTOMERIC COMPRESSION SEAL

FOR REHABILITATION PROJECTS:
BACKER ROD BOND BREAKER

CONCRETE—ASPHALT SHOULDER JOINTS

JOINT SEAL DIMENSIONS

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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 immediately prior to placing of concrete in the adjacent lane.

ALTERNATE KEYWAY AND HOOK BOLT

STEEL HOOK BOLT ASSEMBLY

KEYED JOINT

JOINT LAYOUT AT THRU INTERSECTION: JOINT LAYOUT AT ‘T’ INTERSECTIONS

NOTES
1. Longitudinal joints will not be required for single lane pavement 14' or less in width.
   For entrance and exit ramp joint details, see Sheet 4 of 4.
2. Arrangement of longitudinal joints are to be as directed by the Engineer.
3. Manholes, meter boxes and other projections into the pavement shall be boxed-in with ½" preformed expansion joint material.

JOINT ARRANGEMENT

Note: Proprietary contraction and expansion assemblies may be used. Products shall be introduced to the State Construction Office in accordance with section 10 of the Product Evaluation Procedure.
2-THRU LANES WITH SINGLE LANE ENTRANCE RAMP

ENTRANCE TAPER WITH AUXILIARY LANE

ENTRANCE RAMP WITH ADDED LANE

2-THRU LANES WITH SINGLE LANE EXIT RAMP

EXIT TAPER WITH AUXILIARY LANE

3-THRU LANES WITH AUXILIARY LANE AND 2-LANE EXIT RAMP

JOINT LAYOUT AT ENTRANCE AND EXIT RAMP TERMINALS

* 13' with tied Concrete Shoulders or 14' with Asphalt Shoulders.
**DESIGN NOTES**

1. For rehabilitation projects, the designer must indicate in the plans the number of slabs to be removed, the number of subslabs to be constructed/reconstructed, and the location of expansion joints.

2. Pay quantity for expansion joint to be calculated across pavement at right angles to the centerline of the roadway pavement. Shoulder pavement joint included.

**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 subslab, 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.

### PLAN

For Joint Payment See General Note No. 3.

### REINFORCING STEEL

- **Class I Concrete**: W-50, Varies to W-60
- **Sheet Metal Strip**: 0.012" (Center About Expansion Joint)

**WITH RIGID SHOULDER PAVEMENT**

- Compression Seal
- Concrete Pavement
- Sheet Metal Strip
- Subslab

**WITH GRASSED SHOULDER OR FLEXIBLE SHOULDER PAVEMENT**

- Compression Seal
- Concrete Pavement
- Sheet Metal Strip
- Subslab

### SECTION AA EXPANSION JOINT

**OPTIONAL SEALS**

- Polyurethane Compression Seal
- Installed As Per Manufacturer’s Specifications.

**DETAIL SHOWING SHEET METAL STRIP**

**J O I N T  D I M E N S I O N S**

**COMPRESSION SEAL DETAIL**

**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 16 ga. steel, 12" wide and shall be galvanized in accordance with ASTM A-526, Coating Designation 590.

**2010 FDOT Design Standards**

**BRIDGE APPROACH EXPANSION JOINT**

**CONCRETE PAVEMENT**

**Revision 306**

**Sheet No.** 1 of 1

**Last**
FLEXIBLE PAVEMENT NOTES

PAVEMENT REMOVAL AND REPLACEMENT

Pavement shall be mechanically sawed.

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. 514).

BACKFILL

COMPACTED AND STABILIZED FILL OPTION

Backfill material shall be placed in accordance with Section 125 of the Standard Specifications.

In Stage #1, construct compacted fill beneath the haunches of the pipe, using mechanical tamp suitable for this purpose. This compaction applies to the material placed beneath the haunches 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 materials placed beneath the haunches of the pipe and above any bedding.

In Stage #3, construct compacted fill along the sides of the pipe and up to the bottom of the base for replacement pavement.

FLOWABLE FILL OPTION

If compaction cannot be achieved through normal mechanical methods, then flowable fill may be used.

Flowable fill is to be placed in accordance with Section 121 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 combined, if approved by the Engineer.

In Stage #1, place flowable fill midway up on both sides of the utility. Allow to harden before placing Stage #2.

In Stage #2, place flowable fill to the bottom of the existing base course.

RIGID PAVEMENT NOTES

PEAVEMENT REMOVAL AND REPLACEMENT

High early strength cement concrete (3500 psi) shell meeting the requirements of Standard Specification 346 shall be used for rigid pavement replacement.

Pavement shall be mechanically sawed and restored to conform with existing pavement joints within 12 hours. (See Index No. 305)

GRANULAR BACKFILL

Any granular system that is removed shall be replaced with the same type materials. Any granular system that is damaged shall be repaired with methods approved by the Engineer.

All materials shall be placed in accordance with the Standard Specifications. All materials shall be special select soil/s in accordance with Index No. 556.

In Stage #1, construct compacted fill beneath the haunches of the pipe, using mechanical tamps suitable for this purpose. This compaction applies to the material placed beneath the haunches of the pipe and above any bedding.

In Stage #2, construct fill along the sides of the pipe and up to the bottom of the base for replacement pavement.

FLOWABLE FILL OPTION

If mechanical compaction cannot be achieved through normal mechanical methods, then flowable fill may be used.

Flowable fill is to be placed in accordance with Section 121 of the Specifcations, 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 combined, if approved by the Engineer.

In Stage #1, place flowable fill midway up on both sides of the utility. Allow to harden before placing Stage #2.

In Stage #2, place flowable fill to the bottom of the base layer.

RIGID PAVEMENT CUT

TRENCH CUTS AND RESTORATIONS ACROSS ROADWAYS

GENERAL NOTES

1. The details provided in this standard index apply to cases in which jack and turn or directional boring methods are not required by the Engineer.

2. Flowable fill shall not be placed directly over loose, or high plastic, or much material (see Index 502) which will cause settlement due to fill weight. Where highly compressible material exists, the amount and depth of flowable fill must be engineered to prevent pavement settlement.

3. These details do not apply to utility cuts longitudinal to the centerline of the roadway. For this purpose, see paragraph on trenching across roadway.

4. Method of construction must be approved by the Engineer.

5. Pipe may require special granular backfill up to 6" above top of pipe. Geotextile may be required to encapsulate the special granular material.

6. Where asphalt concrete overlays exist over full-slab concrete pavement, the replacement pavement shall have an overlay constructed over the replacement slab. The overlay shall match the existing asphalt pavement thickness. The replacement friction course shall match the existing friction course, except structural course is made in lieu of dense graded friction course.

Existing broken and patched pavements shall be treated as flexible pavements.

Trench shoulder pavement, curb, curb and gutter, and their substructure disturbed by utility trench construction shall be restored in kind.

9. The use of flowable fills to reduce the load traffic on a facility is acceptable but must have prior approval of the Engineer. Flowable fill use is allowed only when properly engineered for pavement crossings, whether straight or diagonal, and shall not be installed for significant depth or lengths. The maximum length shall be fifty (50) feet and a maximum depth of six (6) feet unless supported by an engineering document prepared by a registered professional engineer that specializes in soils engineering. The engineering document shall address the evaluation of local groundwater flow interruption and settlement potential.

10. If excavate flowable fills to be used when the flowable fill option is selected.

11. When approved by the Engineer, in lieu of the pavement base, non-excavate flowable fill may be used for manhole stabilization and ring and cover adjustments. Excavate flowable fill shall not be used within the limits of the pavement base.
NOTES FOR UTILITY CONFLICT PIPE

1. These details are for construction field expediency to resolve utility conflicts that cannot be resolved 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 C476. 4000 psi may be used in lieu of Class 1 concrete.

3. Minimum opening for pipe shall be the pipe ID plus 6". Mortar used to seal the pipe into the opening will be 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) Administrator. The FDEP will review for permit. This index provides accepted methods for addressing conflicts when and where they cannot be reasonably avoided. To be submitted along with the plans shall be a justification describing inordinate cost and the impracticality of avoidance. It should be 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 submittal to the FDEP.

SECTION LONGITUDINAL TO CARRIER PIPE
(Nonpressure Or Nonfluid Carrier Installations)
No Joints Allowed Within Structure

UTILITY CONFLICT CONDITION I

Carrier Casing: The Casing Shall Be Rated to the Greatest Pressure Or Either the Carrier That’s Called For By Design Or That’s Required By Construction. The casing may be steel, cast iron, ductile iron or plastic. The casing can be seamless or seams with sleeves.

Annular Space Plug/Seal Option:
Flexible P/U Or Neoprene Flexible Seal
See Note No. 3

SECTION LONGITUDINAL TO CARRIER PIPE
(Pressure Or Fluid Carrier Installations)

UTILITY CONFLICT CONDITION II

UTILITY CONFLICT PIPES THRU STORM DRAIN STRUCTURES

DESIGNER’S NOTE
"Sump" Conflict Manholes Shall Not Be Used Unless The System Is Hydraulically Designed To Account For The Headloss Generated If The Sump Is Completely Blocked

2010 FDOT Design Standards
MISCELLANEOUS UTILITY DETAILS

Sheet No. 2 of 3
FOR TWO OR MORE LAKES (TWO LANES SHOWN)

PARTIAL CUTS FOR RING AND COVER ADJUSTMENTS

NOTES
1. No irregular seams are permitted. All seams must be clean scribed.
2. Pavement cut seams for underground utility structures in rigid pavement are the same longitudinally, but the transverse seams shall extend to the nearest existing joint.
3. See Sheet 1 for replacement pavement.

NONTRENCH PAVEMENT CUTS FOR UNDERGROUND UTILITY STRUCTURES IN PAVEMENT

LONGITUDINAL CUT LINES FOR CURBED AND UNCURBED FACILITIES
Must coincide with a regular seam or midpoint in order
To be outside the wheel path
**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. Repairs 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 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 finished grade.

5. Removal of the damaged concrete pavement slabs by WSU. 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, all saw cut over runs into adjacent slabs with epoxy.
## SLAB REPAIR AND REPLACEMENT CRITERIA

### CRACKING

<table>
<thead>
<tr>
<th>DISTRESS PATTERNS</th>
<th>SEVERITY/DESCRIPTION</th>
<th>REPAIR METHOD</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longitudinal</strong></td>
<td>Light: 45°, no faulting, spalling ≤ 5&quot; wide</td>
<td>None</td>
<td>Figure 10.2</td>
</tr>
<tr>
<td>Moderate: 6&quot; width, 45°; spalling ≤ 3&quot; wide</td>
<td>Clean and Seal</td>
<td>Figure 10.2</td>
<td></td>
</tr>
<tr>
<td>Severe: width ≥ 12&quot;, ≥ 60° faulting, ≥ 6&quot;</td>
<td>Replace</td>
<td>Figure 10.3</td>
<td></td>
</tr>
<tr>
<td><strong>Transverse</strong></td>
<td>Light: 45°, no faulting, spalling ≤ 5&quot; wide</td>
<td>None</td>
<td>Figure 10.2</td>
</tr>
<tr>
<td>Moderate: 6&quot; width, 45°; spalling ≤ 3&quot; wide</td>
<td>Clean and Seal</td>
<td>Figure 10.2</td>
<td></td>
</tr>
<tr>
<td>Severe: width ≥ 12&quot;, ≥ 60° faulting, ≥ 6&quot;</td>
<td>Replace</td>
<td>Figure 10.3, 10.4, and 10.5</td>
<td></td>
</tr>
<tr>
<td><strong>Corner Break</strong></td>
<td>A corner of the slab is separated by a crack that intersects the adjacent longitudinal and transverse joint, describing an approximate 45° angle with the direction of traffic.</td>
<td>Full Depth</td>
<td>Figure 10.4 and 10.5</td>
</tr>
<tr>
<td><strong>Intersecting Random Cracks (Shattered Slab)</strong></td>
<td>Cracking patterns that divide the slab into three or more segments.</td>
<td>Full Depth</td>
<td>Figure 10.3 and 10.4</td>
</tr>
</tbody>
</table>

### JOINT DEFICIENCIES

<table>
<thead>
<tr>
<th>DISTRESS PATTERNS</th>
<th>SEVERITY/DESCRIPTION</th>
<th>REPAIR METHOD</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spall/Nonwheel Path</strong></td>
<td>Light: spall width ≤ 1/2&quot;, ≤ 5&quot; slab depth, ≥ 12&quot; in length</td>
<td>None</td>
<td>Figure 10.4 and 10.5</td>
</tr>
<tr>
<td>Moderate: ≥ 1/2&quot;, ≤ 5&quot; slab depth, ≥ 12&quot; in length</td>
<td>None</td>
<td>Figure 10.4 and 10.5</td>
<td></td>
</tr>
<tr>
<td>Severe: ≥ 3&quot; or length ≥ 12&quot;</td>
<td>Full Depth</td>
<td>Figure 10.4 and 10.5</td>
<td></td>
</tr>
<tr>
<td><strong>Spall/Wheel Path</strong></td>
<td>Light: spall width ≤ 1/2&quot;, ≤ 5&quot; slab depth, ≥ 12&quot; in length</td>
<td>None</td>
<td>Figure 10.4 and 10.5</td>
</tr>
<tr>
<td>Moderate: ≥ 1/2&quot;, ≤ 5&quot; slab depth, ≥ 12&quot; in length</td>
<td>Full Depth</td>
<td>Figure 10.4 and 10.5</td>
<td></td>
</tr>
<tr>
<td>Severe: ≥ 3&quot; or length ≥ 12&quot;</td>
<td>Full Depth</td>
<td>Figure 10.4 and 10.5</td>
<td></td>
</tr>
</tbody>
</table>

### SURFACE DETERIORATION

<table>
<thead>
<tr>
<th>DISTRESS PATTERNS</th>
<th>SEVERITY/DESCRIPTION</th>
<th>REPAIR METHOD</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pop Outs Nonwheel Path</strong></td>
<td>Light: Small pieces of surface pavement broken loose, normally ranging from 1 to 4 in. diameter and ≤ 2 in. in depth.</td>
<td>Not deemed to be a traffic hazard</td>
<td>Keep under observation</td>
</tr>
<tr>
<td>Severe: Flying debris deemed a traffic hazard</td>
<td>Full Depth</td>
<td>Figure 10.4</td>
<td></td>
</tr>
<tr>
<td><strong>Pop Outs Wheel Path</strong></td>
<td>Small pieces of surface pavement broken loose, normally ≥ 3&quot; diameter and 2&quot; in depth.</td>
<td>Not deemed to be a traffic hazard</td>
<td>Full Depth</td>
</tr>
<tr>
<td>Severe: Flying debris deemed a traffic hazard</td>
<td>Full Depth</td>
<td>Figure 10.4</td>
<td></td>
</tr>
</tbody>
</table>

### MISCELLANEOUS DISTRESS

<table>
<thead>
<tr>
<th>DISTRESS PATTERNS</th>
<th>SEVERITY/DESCRIPTION</th>
<th>REPAIR METHOD</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Faulting</strong></td>
<td>Light: ≤ 1/8&quot;</td>
<td>None</td>
<td>Figure 10.3</td>
</tr>
<tr>
<td>Moderate: ≤ 1/8&quot;</td>
<td>Grid</td>
<td>Figure 10.3</td>
<td></td>
</tr>
<tr>
<td>Severe: ≥ 1/8&quot;</td>
<td>Grid</td>
<td>Figure 10.3</td>
<td></td>
</tr>
<tr>
<td><strong>Lane To Shoulder Drop-Off</strong></td>
<td>Light: ≤ 2&quot;</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>Moderate: ≤ 2&quot;</td>
<td>Build Up</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Severe: ≥ 2&quot;</td>
<td>Build Up</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Water Bleeding Or Pumping</strong></td>
<td>Seeping or ejection of water through joints or cracks.</td>
<td>Install appropriate drainage, edge drain, permeable subbase, reseal joints, etc.</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Blowups</strong></td>
<td>Upward movement of transverse joints or cracks often accompanied by shattering of the concrete.</td>
<td>Full Depth</td>
<td>Figure 10.3 and 10.4</td>
</tr>
</tbody>
</table>

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2010 FDOT Design Standards

CONCRETE SLAB REPLACEMENT
**NOTES FOR CONCRETE SIDEWALK ON CURBED ROADSWAYS**

1. Sidewalks shall be constructed in accordance with Section 522 of the FDOT Standard Specifications. Public sidewalks curb ramps shall include detectable warnings and be constructed in accordance with Index No. 304. Detectable warnings are not required where sidewalks intersect urban flooded turnouts.

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".

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 PipeGuardrail shown in the plans.

5. Sidewalk shall be paid for under the contract unit price for Sidewalk Concrete (--- Thick), S.Y.

---

**CONCRETE SIDEWALK**

---

**SIDEWALK WITH EDGE BEAM FOR SURFACE MOUNTED RAILINGS**

---

**SIDEWALK WITH UTILITY STRIP**

---

**SIDEWALK WITHOUT UTILITY STRIP**

---

---
NOTES FOR CONCRETE SIDEWALKS ON UNCURBED ROADWAYS

1. Sidewalks shall be constructed in accordance with Section 522 of the FDOT Standard Specifications.

2. Provide detectable warnings that extend the full width of the sidewalk and 24" deep from the edge of pavement where sidewalks abut the following vehicular ways:
   - side roads and streets
   - driveways with signalized entries
   - driveways with entrance volumes greater than 6000vpd
   - driveways with entrance speeds of 25 mph or greater
   - right-in/right-out composite driveways

Detectable warning surfaces shall conform to the requirements described in the General Notes of Index 304. To the extent practical, the rows of truncated domes in a detectable warning surface should be aligned to be perpendicular or radial to the street, roadway, or driveway, as applicable.

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 Railings 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 (___ Thick), SY.

---

CONCRETE SIDEWALK FOR UNCURBED ROADWAYS

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GENERAL NOTES

1. The illustrations for guardrail applications are standard configurations and adjustments are to be made as required by site specific conditions to attain optimum design for function, economy and serviceability.

2. The beginning of guadrail need shall be at the greatest of the upstream distances from the hazard, as determined from Figures 1 and 2, and other applicable details of this Index.

3. Use Panel Type, panel length = 12-6". Guardrail shall be constructed with rol elements 12-6" in length except where 25'-0" elements are called for by this and other standards (indexes) or specifically called for in the plans.

4. Post spacing shall be 8'-6" except that reduced spacing shall be used for: (a) transits to anchorage at rigid structures such as bridges, (b) steep slopes, and (c) special post applications. Reduced post spacing required for special end anchorage assemblies and for special spacing called for in the plans.

5. Guardrail mounting height for the W-beam without rubber and for the H-beam is 1'-0" to 2'-0" from the center of the beam, and for W-beam with rubber 2'-0" to center of beam. The height is critical and shall be adjusted to allow no clearance of 3'-0" above and 1'-0" below the standard mounting height is permissible over necessary surface irregularities (e.g., across shoulder gutter, inset and roadway surface break lines).

6. Framed end anchorage assemblies providing 4" offset are the standard end treatments for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach ends will be constructed only when the design of framed end anchorage assemblies is called for in the plans. Type II assemblies shall be used for the single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach ends will be constructed only when the design of framed end anchorage assemblies is called for in the plans. The plans call for end anchorage assembly "flared" and do not identify the specific system(s) to be used, the contractor has the option to construct any "flared" approved assembly provided in this Index or identified on the Qualfed Products List (QPL), subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.

7. If the plans call for end anchorage assembly "parallel" and do not identify the specific system(s) to be used, the contractor has the option to construct any 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.

8. If the plans call for a specific end anchorage assembly, substitutions with other end anchorage assemblies will be permitted unless approved by the Engineer. Approved substitutions will be eligible for VCP consideration.

9. When an end treatment is attached to guardrail with Pedestrian Safety Treatment, only end treatment systems with tender posts are to be used. Proprietary end anchorage systems must be identified on the QPL. Manufacturers seeking approval of proprietary end anchorage systems for inclusion on the QPL must submit application along with design documentation showing the end anchorage system in conformance to NCHRP Report 250 Type II standard with FHWA comments accepted or rejected. Guardrail is to be installed per approved QPL drawings and approved by the Engineer.

10. At grade transitions to traffic barriers, "flared" offset may be used for a guardrail and end anchorage system, and is compatible with FHWA guardrail systems. System approval will be contingent on FHWA's evaluation of test traffic performance results for consistency with FHWA guardrail application and use. It is acceptable that engineering drawings signed and sealed by a qualified professional engineer be used for "flared" guardrail systems.

11. At above ground railway hazards where the face of guardrail is offset from the hazard less than the 4 minimum for standard W-beam, other configurations may be applicable: see General Note 41 and the minimum offset table on Sheet 19. For guardrail with post spacing less than 0'-6" the reduced spacing should extend a minimum of one panel advance of the hazard. Minimum offset cannot be utilized if safety concrete barrier shall be used unless other shielding is approved by the Engineer of Record. See Index No. 410 for safety concrete barrier and typical applications, and the plans for special barrier arrangements.

12. In addition to use at railroad hazards or other areas where the Engineer has deemed guardrail necessary, guardrail should be provided on shoulder sections where 2.0<' on the clear zone and 656 height is 6' or greater. Curved sections where 5 slopes are steeper than 1:3 and 656 heights is 6' or greater within 22' of the traveled way should be evaluated for installation of guardrail. Additional guidance for evaluating the need for guardrail can be found in the Plans Preparation Manual.

13. The guardrail to bridge connections contained in this Index are for bridges with Test Level 4 traffic railing bolers. For guardrail to concrete barrier wall connections see Index No. 420. For existing bridges receiving retrofit traffic railing bar eries see Index No. 420.

14. The W-beam guardrail system in this index is the standard system to be used on the State Highway System. When the Test Level 3 semi-rigid barrier is required.

15. The W-beam guardrail panel shall be used in guardrail transitions to traffic railing barriers. To concrete and certain water filled safety shaped barriers, certain crash cushions and as a continuous barrier when called for in the plans. Four additional information on installation, post spacing, rails, location of W-beam panel and offset block configurations see details elsewhere in this Index, and Index Nos. 402, 410 and 414. The use of W-beam guardrail with standard offset blocks (Test Level 3 semi-rigid system) may be considered where one or more of the conditions listed below or similar conditions are anticipated or exist:

a. W-beam deflection is marginal.

b. W-beam with rubber considered functionally deficient, continued ...
GENERAL NOTES

1. These drawings are representative of the various proprietary guardrail end anchorage assemblies listed on the Department's Qualified Products List (QPL). For specific details and requirements see the vendor drawings on the QPL at www.dot.state.fl.us/specifications/office.

2. These drawings present the general graphics to show the limits of payment for guardrail and end anchorage assemblies, modifications to the shoulder and placement of the miscellaneous asphalt mix strips.

3. These drawings, along with the various vendor drawings on the QPL, are intended to show sufficient details for installation of the end anchorage assemblies and their connection to shoulder guardrail. This excludes the requirement for shop drawing submittals unless otherwise called for in the plans. The various end anchorage assemblies shall be assembled in accordance with the manufacturer’s detailed drawings, procedures, and specifications.

4. The various proprietary end treatments listed on the QPL are intended for use as approach end guardrail anchorages for shoulder guardrail. The effective length of the end treatments vary—refer to the vendor drawings on the QPL for the length and the use of special panels and details. Standard guardrail, guardrail transitions, or other special treatments shall not be included within the limits of the end anchorage assembly. See the vendor drawings for the alignment of the end treatment with respect to the normal guardrail alignment.

5. Flared or parallel end anchorage assemblies shall not be used in medians where horizontal clearance requires use of a back rail.

6. Each of the various end anchorage assemblies have unique features. Careful attention should be given to the types and orientation of the posts and other components. Refer to the vendor drawings on the QPL for the specific requirements of each system.

7. For galvanizing requirements of the metallic components see Standard Specifications Section 967.

8. The end anchorage assemblies shown on the QPL are suitable for all design speeds.

9. Flared end anchorage assemblies shall be paid for under the contract unit price for Guardrail End Anchorage Assembly (Flared), EA.

Parallel end anchorage assemblies shall be paid for under the contract unit price for Guardrail End Anchorage Assembly (Parallel), EA.

The unit price for end anchorage assemblies shall be full compensation for furnishing and installing all components in accordance with the plans, the manufacturer’s detail drawings, procedures, and specifications and these drawings.

APPROACH END ANCHORAGE DETAILS

PLACEMENT OF PARALLEL OPTION AT CURBED LOCATIONS

FLARED OPTION

PARALLEL OPTION
The clear zone limit or horizontal clearance limit in accordance with the criteria in Volume I Chapters 2, 4, and 26 of the "Plans Preparation Manual" and Index No. 700.

The clearance limit is determined on the diagram and equations above to establish 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 the 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 guardrail 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 the 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 to 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).
- \( x \): 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, it is measured from the inside edge of the near approach traffic lane (see Figure 2).

**For Flared and Parallel End Anchorage:** The beginning length of need is to be set at the center of post #1. That is, the departure line must intersect the face of the rollout post #1.

**For Flared End Anchorage:** 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 \( \frac{1}{2} " \) for 45 mph or less and \( \frac{1}{2} " \) for greater than 45 mph.

**Length of Advancement - Figure 1**

### Design Speed mph

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>( x ) (Length Of Advancement) Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>16 (0-8)</td>
</tr>
<tr>
<td>250</td>
<td>13 (0-6)</td>
</tr>
</tbody>
</table>

**Note:** The length of advancement is determined from the diagram and equations above. The length of advancement can be no less than that required by other details of the index.
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**
GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS

DIVIDED ROADWAY - DETAIL B

GUARDRAIL APPLICATION FOR NARROW MEDIAN AND GORE HAZARDS

UNDIVIDED ROADWAY - DETAIL C

ONE-WAY TRAFFIC - DETAIL G
GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL LENGTH OF APPROACH SLAB
MEDAINS WITH 10' BRIDGE SHOULDERS

MEDAINS WITH 6' BRIDGE SHOULDERS

DETECTION LOG

DESIGNED BY

REVISION LOG

MEDAINS WITH 6' BRIDGE SHOULDERS

MEDAINS WITH 10' BRIDGE SHOULDERS

APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING
EXTENDING FULL APPROACH SLAB LENGTH IN NARROW MEDAINS WITH FLUSH SHOULDERS

GUARDRAIL LENGTHS

<table>
<thead>
<tr>
<th>MEDIAN WIDTH (ft)</th>
<th>6' BRIDGE SHOULDERS</th>
<th>10' BRIDGE SHOULDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PANELS (No.)</td>
<td>LENGTH (ft)</td>
<td>PANELS (No.)</td>
</tr>
<tr>
<td>30</td>
<td>14.5</td>
<td>205.25</td>
</tr>
<tr>
<td>28</td>
<td>12.5</td>
<td>156.25</td>
</tr>
<tr>
<td>26</td>
<td>11.5</td>
<td>143.75</td>
</tr>
<tr>
<td>14</td>
<td>9.5</td>
<td>118.75</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 width and narrow bridge shoulders and end anchorage or 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 (S_r) along the runouts from the approach roadways; however, when calculated speeds (S_c) are less than 30 mph, crash cushions shall be no less in size than for 30 mph, see speed diagram below. The number of panels may be reduced when installing a crash cushion more than 2.5 ft in width, see # below.

# Number shown is the minimum; number of panels plus a W-Thir beam transition panel single faced guardrail must have a length of five (5) or more panels.

SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS

WHERE REQ'D AND END ANCHORAGE TYPE II LEADER
MEDIANs WITH 10' BRIDGE SHOULDERS

MEDIANs WITH 6' BRIDGE SHOULDERS

GUARDRAIL LENGTHS

- 6' BRIDGE SHOULDERS
- 10' BRIDGE SHOULDERS

Note: The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS

APPRAoch GUARDRAil TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING
EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN NARROW MEDIANs WITH FLUSH SHOULDERS
LEGEND

1. Edge of traffic lane for simple curve runouts.
2. Edge of travel lane for taper runouts.
3. Taper
4. Pavement return (radius R2).
5. Flared end anchorage to be installed except when existing guardrail on intersecting drive or side road abuts the project.
6. Post for locating flare, proximate to PC or PT.
7. No. 2 post for Radii 25' or less.
8. Between No. 4 and No. 5 posts for Radii 30' or greater.
9. Post for locating flare, proximate to PC or PT.
10. No. 3 post for Radii 25' or less.
11. Between No. 4 and No. 5 posts for Radii greater than 25'.
12. Expanded shoulder for guardrail.
13. Expanded shoulder for flared guardrail end anchorage.
15. Flared guardrail end anchorage.
16. Rigid guardrail to be installed when guardrail required on the intersecting drive or side road (Radius R2).
17. End anchorage Type II (radius return only).
18. Guardrail/Installation limited to roadway right of way unless otherwise called for in the plans.

TAPER TURNOUTS

Note: The guardrail application shown on this sheet are for highways with flush shoulders and no restraints for constructing flared end anchorages and minimum lengths of guardrail. For highways with flush shoulders and restraints to constructing flared anchorages, see General Note No. 6.

Where openings in guardrail are required in close proximity to bridge traffic rails or ends of concrete barrier walls, and minimum length guardrail with flared end anchorages cannot be applied, either controlled release returns or energy absorbing terminals are to be applied.

GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES

SIMPLE CURVE TURNOUTS
GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB DETAIL
BRIDGES OVER STREAMS

BRIDGES OVER STREAMS

BRIDGES OVER RAILROADS

BRIDGES OVER ROADWAYS OR RAILROADS

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

2010 FDOT Design Standards

GUARDRAIL
MISCELLANEOUS PAVING FOR STANDARD GUARDRAIL SECTIONS

SHOULDER WITH OR WITHOUT 5' PAVEMENT

PAVED SHOULDERS

SHOULDER GUTTER

DOUBLE FACE RAIL

SECTIONS AA (EXAMPLE FOR 30' CLEAR ZONE)

SECTION BB (EXAMPLE FOR 30' CLEAR ZONE)

SECTION CC (EXAMPLE FOR 30' CLEAR ZONE)

SHOULDERS, SLOPES AND MISCELLANEOUS PAVING FOR FLARED END ANCHORAGE ASSEMBLIES
**PERMISSIBLE POST AND OFFSET BLOCK COMBINATIONS**

**NOTE**

For location of guardrail with offset behind curb and gutter refer to the Plan Preparation Manual, Volume I, Section 4.3.5.

**LOCATION AT CURB & GUTTER SECTIONS—DETAIL L**
**REFLECTOR SPACING**

Note: Adjustment in spacing may be required to fit exact guardrail lengths as directed by the Engineer. For minimum installations length 62’5’’ provide one reflector at each end and one at the approximate center.

***For curves greater than 2° the spacing shall be reduced to 100 through the curve.

**REFLECTOR MOUNTING**

1. Reflectors shall conform to Section 393 of the Standard Specifications.
2. Reflectors shall conform to the color of the rear lane edge line.
3. Reflectors installed on median guardrail shall have retro-reflective sheeting on both sides of the reflector.
4. The cost for reflectors shall be included in the contract unit price for guardrail.

**REFLECTORS—DETAIL M**

**NOTES**

1. Pipe Rail required on steel guardrail post when pedestrian way and bikeway are located 4’ or less from back of the posts. Pipe rail shall not extend beyond the last post of the approach end anchorage assembly. Begin and end the pipe rail in accordance with the Pipe Rail End detail. Refer to Sheet 1, notes 6 for guardrail end treatment requirements.

2. When guardrails with timber posts are located with the back of posts 4’ or less from the rear edge of the pedestrian way or bikeway, the bolt ends will require one of the following treatments:
   (a) Treating back flush with the face of the nuts and welding or
   (b) Use of post bolts 15” in length with the washers and nuts counter sunk into sides 1’ to 1½’ deep or
   (c) Use of post bolts 15” in length with sleeve nuts and washers.

3. The cost for Pipe Rail, mounting components and installation shall be included in the contract unit price for guardrail. Bolt end treatment for timber post shall be included in the contract unit price for guardrail.

**PEDESTRIAN SAFETY TREATMENTS**

**PIECE RAIL END FIXTURE**

FOR LOCATIONS USED BY PEDESTRIANS OR CYCLISTS

**PIPE RAIL MOUNTING**
**APPROACH TREATMENT FOR CURB AND GUTTER**

**DETAIL Q**

*Note: For Proprietary End Treatments See the Qualified Products List.*

Curb ramps shall follow guardrail ramps, see elsewhere in this Index for additional guardrail ramp information.

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**PLAN**

- 2" Misc. Asphalt
- 0.02 (Std.)

**SECTION CC**

- 1-3/8" (HRT 350 & REGEN)
- 2-3/8" (FLEX 350)
- 2-3/8" SRT/HEA-6 POST

**SECTION BB**

- 1-1/4" (HRT 350 & REGEN)
- 1-7/8" (FLEX 350)
- 1-7/8" SRT/HEA-6 POST

**SECTION AA**

- 0.02 (Std.)

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*Safety pipe rails required when the back of steel guardrail posts are 4' 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.*

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**Sidewalk** (Width Varies - 5' Std., 4' Min.)

- 21-6" (Curb And Gutter Flare)
- 37-6" Guardrail Flare
- 35-4" Drop Curb
- 35-4" Guardrail Flare
- Curved Transition
- Flared End Anchorage Assembly

---

**ADVANCE CHECKED**

- FHWA APPROVAL

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**DEVELOPMENT CHECKLIST**

**STANDARD INDEX NO. XXXXX, SHEET X OF X**

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**Sheet No.**

- 18 of 26

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**Last Updated:**

- 07/01/05

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**2010 FDOT Design Standards**

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**GUARDRAIL**

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FOR REPLACEMENT OF EXISTING W6x18 GUARDRAIL POSTS ON APPROACH SLABS AND BRIDGES

NOTES:
1. See Index No. 102 for special steel posts required for construction and repair of guaular
   transitions to bridge traffic railing barrier retrofits on existing bridges. See Structures Index
   No. 478 through 479 for special steel posts required to construct traffic railing barrier retrofits
   on existing bridges.
2. Either anchor bolts, concrete wedge anchors or approved adhesive-bonded anchors for
   structural applications may be used. Anchor bolts, wedge anchors and adhesive anchors shall
   have a minimum tensile strength of 60,000 psi and galvanized in accordance with ASTM A53.
   Stainless steel components may be substituted but components plated in accordance with
   ASTM A633 are not acceptable. Adhesive anchor rods shall be equal in diameter to that
   required for anchor bolts. Wedge anchors are to be installed in accordance with the
   manufacturer's recommendations, assuming 3,000 psi compressive strength for concrete.
   Anchor bolts shall also meet the following requirements:
   (a) tensile load each anchor approach slab 4,000 lbs.
   (b) shear load each anchor approach slab 3,000 lbs.
3. Posts are to be plumbed by adjusting nuts or mortar seating. Posts installed using anchor
   bolts and adhesive anchors are to be set with adjusting nuts as detailed, unless the Engineer
   approves the use of mortar seating in lieu of adjusting nuts. Posts installed using wedge
   anchors are to be set with mortar seating. Base plates shall be anchored with mortar.
4. Adhesive-bonded anchors for structural applications shall comply with Section 937 and be
   installed in accordance with Section 416. Drilled hole diameter shall be in accordance with the
   manufacturer's instructions.
5. Anchors and rebar shall be installed in accordance with the manufacturer's specifications.
6. Seepage and base units shall be galvanized in accordance with ASTM A423. Any damaged
   galvanized areas to be re-metallized in accordance with Section 565 of the Standard Specifications.
7. Steel posts are not to be substituted for any post in a guardrail approach end

SPECIAL STEEL GUARDRAIL POSTS

W6x9.5 OR W6x9 STEEL POST
STANDARD TIMBER AND STEEL GUARDRAIL POSTS
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 anchorages mounted on curb inlets shall be in accordance with special steel guardrail posts Sheet 23, and paid for under the contract unit price for Special Guardrail Post, EA.

3. Variations shown for the locations of special posts mounted on inlets are established from standard post spacing (6'-3") clearance of standard posts from inlets (4") min.) of single and double offset blocks on standard posts adjacent to the inlets. Optional flange mountings and concrete anchor edge distances (2" for grouted and 3/4" for expansion anchors). The number of posts and their locations may vary by reducing post spacing and adjusting the length of rail panel(s).

4. Encased guardrail posts shall conform in section to standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Post, EA. Payment shall include cost of foam wrap and concrete encasement.

SPECIAL POST LOCATIONS ON CURB INLETS

2010 FDOT Design Standards

GUARDRAIL

Sheet No. 22 of 26
END ANCHORAGE ASSEMBLY TYPE II

CONCRETE ANCHOR BLOCK OPTION

TYPE II NOTES

1. Unless specified in the plans, the contractor can supply either the cable anchor option or the concrete anchor block option.

2. Type II end anchorage assemblies are approved for all grades and are intended for use as:
   (a) end anchorage for single face free standing guardrail systems;
   (b) approach end guardrail at single face free standing guardrail systems when end anchorage is located outside of the clear zone and;
   (c) both approach and trailing ends of double face guardrail systems.

3. End anchorage for these beam guardrail shall be constructed in accordance with the 2010 FDOT Design Standards, as called for in the plans or by permit.

The payment for the items of end anchorage assembly Type II shall be full compensation for furnishing and installing either the Round or the Buffer End Section, the Beam, Anchor Plate, Cable Assembly, Pete Sleeve, Soil Plate, Steel Tube, Bearing Plate, Short Timber Breakaway Post, Offset Blocks and the necessary hardware.

CABLE ANCHOR OPTION
MODIFIED ECCENTRIC LOADER TERMINAL NOTES

1. The MELT is applicable for design speeds up to 45 mph. The MELT is intended for use as an anchor and postanchor for shoulder guardrail. Its alignment is a function of the normal guardrail alignment with an effective length of 37.5 including three standard W-beam panels outside of any standard guardrail, guardrail transitions or other special treatments.

2. This standard drawing is produced by the Florida Department of Transportation solely for use by the Department and its assigns. This standard drawing provides the general graphics and information necessary to define identity component parts of the MELT and their incorporation into a whole system.

3. This standard drawing is sufficient for plan details for the MELT when installed in connection with shoulder guardrail and prescribes the requirement for shop drawings submitted unless the plans otherwise call for such submittals. The MELT shall be assembled in accordance with the distributor's detailed drawings, procedures and specifications.

4. The first two posts must be short timber breakaway posts with steel foundation tubes and soil plates, post Nos. 3 thru 6 must be CFT timber posts and post No. 7 must be a standard timber post.

5. The MELT can not be used in medians where horizontal clearance requires the use of a backrail.

6. See the General Notes for galvanizing requirements of metallic components.

7. If the plans call for the MELT at a specific location, substitutions with other end anchorages assemblies will be permitted unless approved by the Engineer. If the plans call for end anchorages assembly filed at a specific location, the contractor may consider any DITT approved file that meet the applications for that location. Where a filed end anchorages is called for in the plans, any approved substitution with a parallel end anchorages will be eligible for VOSIP consideration.

8. The MELT shall be paid for under the contract unit price for Guardrail, End Anchor Assembly (Fitted), 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.

DIAPHRAGM PLATE (2 Req'd.)

Note: Steel plates and attached soil plates may be installed by:

1. Enclosing, backfilling and compacting to provide full passive soil resistance to all surfaces of the tube and soil plate.

2. Driving steel tube and soil plate as a unit with a dummy timber post to prevent damage to breakaway post.
CONTROLLED RELEASE RETURN NOTES

1. Controlled release returns are intended for use in (a) in openings in continuous guardrail for roadway and side road access when ramps and/or transitions or standard guardrail elements cannot be applied (Sheet 12) and (b) for shielding the ends of bridge traffic rails and barriers where the roadway and side road access is in close proximity to the structure and where the structure is not permitted the use of approved fixed and parallel types of Guardrail End Assemblies.

2. Controlled release returns are not intended as a substitute or replacement for the appropriate use of approved vehicle impact attenuators.

3. Controlled release returns with either 8", 16" or 24" radius are designed for highway speeds of 60 mph or less; the 32" radius return is to be used only for highway speeds of 60 mph or less. The 32" radius return is to be used only for highway speeds of 45 mph or less.

4. The controlled release return shown are designed as full returns based on an intersection of 90°. The return can be terminated with the Guardrail End Anchor Assembly Type CRT or connected to standard guardrail as shown or as otherwise detailed in the plans.

5. The Guardrail End Anchor Assembly Type CRT is to be used only for the controlled release returns with 8", 16", 24" and 32" radius shown in the assembly is not to be used in any tangent or defaulted rail applications. Other types of end anchor assemblies are not to be used in the controlled release returns.

6. The area immediately behind the control-release return shall have slopes not steeper than 1:2 and shall be maintained free of fixed objects in accordance with the area limits tabulated in the plan below.

7. The surface approach of the controlled release return shall have a transverse slope not exceeding 1:20. The effective width of the transverse surface is to be based on standard vehicle departure, return radii and preceding undesirable. The width of the transverse surface shall be no greater than the corresponding 15" and 20", 8" values tabulated below.

8. The curved guardrail portion of the controlled release return shall be full section shop bent panels (12.5" or 25") panels.

9. Washers are not to be used between the guardrail beam and the head of the post head bolt at any controlled release terminal (CRT) post or at any Guardrail End Anchor Assembly Type CRT breakaway breaker post.

10. The guardrail beam of the 8" radius return is not bolted to the center control-release return.

11. See the General Notes for galvanizing requirements of metallic components.

12. Controlled release return systems shall be paid for under the contract at prices for Guardrail (400), Guardrail (Shop-bent Panels), (E) and Guardrail, End Anchor Assembly (Type CRT), as called for in the plans, or by permit and shall be full compensation for furnishing and installing all components in accordance with the plans and with this index. CRT returns are included in the cost for guardrail.
Notes:

1. Typical placement shown. May be constructed at other locations as called for in the plan.

2. Rubrail required on median side or ditch side of barrier.

MOUNTING HEIGHT FOR DOUBLE FACED GUARDRAIL ON MEDIAN SHOULDERS (FREeways)

GUARDRAIL ON MEDIAN SLOPES

GUARDRAIL ON OUTSIDE SLOPES

GUARDRAIL ON SLOPES

RUBRAIL TERMINATION
GENERAL NOTES

1. This index provides thrie-beam transition and connection details for approach and guardrail on existing bridges, and anchorages for traffic and traffic railing retrofits and safety shapes on existing bridges. Sheets 1 through 23 apply to bridges with retrofitted traffic railings. Sheets 24 through 30 show the traffic and guardrail connections. Sheet 40 applies to bridges with safety shaped traffic railing.

2. The schemes identified by Arabic numerals in this index are complementary to the bridge traffic railing barrier retrofit schemes with the numeral-identification in Index Nos. 470 through 530, 600 through 663. The schemes in this index, identified by Roman numerals are complementary to bridge safety shaped traffic railing barriers determined to be in accordance with applications of criteria specified in the Structures Manual.

3. For guardrail applications and details of related hardware and accessories that are not provided on this index, refer to Index No. 400.

NOTES FOR GUARDRAIL TRANSITIONS CONNECTING TO TRAFFIC RAILING RETROFITS ON EXISTING BRIDGES

1. The transition details shown on this sheet shows all the standard post spacings within the typical thrie-beam approach transitions connecting to existing bridges with retrofit traffic railings, and (b) depict the typical alignments of the approach transitions.

2. The curb and gutter flare shown on this sheet is typical of flares that are to be constructed when approach slab curbs extend to the beginning of the slab, and other treatment to curb blunt ends are not in place.

3. The special steel post for roadway thrie-beam transitions detailed on this sheet is specific to all transition applications on this index that require one or more steelposts.

The special steel post and base plate assembly shall be fabricated using ASTM A576 or ASTM A403 Grade 36 steel. Welding shall conform to AWS D1.1. The assembly shall have hot-dip zinc coated in accordance with Section 5.36 of the Specifications.

Anchor studs shall be fully threaded rods in accordance with ASTM F1554, Grade 36 or ASTM A425, Grade 67. All nuts shall be heavy hex in accordance with ASTM A563 or ASTM A432. Anchor studs and nuts shall be hot-dip zinc coated in accordance with the Specifications. After the nuts have been snug tightened, the anchor stud threads shall be a single punch distorted immediately above the top nuts to prevent loosening of the nuts. Distorted threads shall be coated with a galvanizing compound in accordance with the Specifications.

Adhesive bonding materials for anchors shall comply with Specification Section 9.37 and be installed in accordance with Specification Section 11.3.2.3. The plan views for vicinity of structure shall show the primary configurations for each particular scheme. The associated pictorial views shall show the variations.

5. For installing thrie-beam terminal connector to traffic railing vertical face retrofits, see instructions on Sheets 22 through 30 and the Fab. notation on Sheet 23.

6. Payment for connections to traffic railing vertical face retrofits are made under the contract unit price for Bridge Anchorages Assembly, E4, and shall be full compensation for bolt hole construction, terminal connector, terminal connector plate and bolts, nuts and washers.

DESIGN NOTES FOR GUARDRAIL TRANSITIONS CONNECTING TO TRAFFIC RAILING RETROFITS ON EXISTING BRIDGES

1. For selection of an appropriate transition scheme, see the Structures Manual for instructions to the Structures and Roadway engineers.

GUARDRAIL TRANSITION ALIGNMENTS FOR BRIDGE THRIE-BEAM AND VERTICAL FACE TRAFFIC RAILING 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 (THREE-BEAM RETROFIT)
PARTIAL PLAN VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS
FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
SEE INDEX NOS. 473 & 476 - SCHEME 2

SEE INDEX NOS. 473 & 476 - SCHEMES 3 & 4

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)

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 (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)
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (THREE-BEAM RETROFIT)
SEE INDEX NO. 481 - SCHEME 1

SEE INDEX NO. 481 - SCHEME 2

SEE INDEX NO. 481 - SCHEME 3

Note:
*2½" x ⅜" Three-Beam Terminal Connector Plate (_back-up plate) and ⅜" x ⅜" x 12" Long
*1/2" hex bolts and nuts (5 per leg) with 256" plain washers under heads and nuts

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

Note:
#211 x 1/2" x 3/8" Thrie-Beam Terminal Connector Plate (Back-Up Plate), And 3/8" D x 12" Long
#6 Hex Bolts And Nuts (A Nutkit) With 2 1/2" OD Plain Round Washers Under Heads And Nuts
SEE INDEX NO. 482 - SCHEME 1

SEE INDEX NO. 482 - SCHEME 4

SEE INDEX NO. 482 - SCHEME 5

PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

Note:
- #211 x 12" x 1/2" Tri-Beam Terminal Connector Plate (Back-Up Plate), And 1/8" @ x 12" Long
- 3/4" x 3/4" x 1/4" Galvanized Steel HDG (or HDG) With 2511/8" HD Round Washers Under Heads And Nuts

2010 FDOT Design Standards
GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES
PARTIAL PLAN VIEWS OF TRAFFIC RAILING (VERTICAL FACE RETROFIT)

**Note:**

- #21” x 12” x 1½” Thru-Beam, Terminal Connector Plates (Back-Up Plates), and 3½” 0 MS Hex Bolts And Nuts (20” Long For Scheme 1 And Length To Fit For Schemes 2 And 3) (Regd) With 2½” OD Plain Round Washers Under Heads And Nuts.

**2010 FDOT Design Standards**

GUARDRAIL TRANSITIONS AND CONNECTIONS FOR EXISTING BRIDGES
PICTORIAL VIEWS OF GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR BRIDGE TRAFFIC RAILING (VERTICAL FACE RETROFIT)

SEE INDEX NO. 482 - SCHEMES 2 & 5

PICTORIAL VIEW
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 RETROFIT

1. Where Guardrail Extensions Are Required Beyond The Trailing End Of Bridges, With Traffic Railing Vertical Face Retrofits, Guardrail Connections To The Bridge Railing Will Be By SPECIAL END SIGNS For W-Beam Guardrail Extensions And BY TWEE-BEAM TERMINAL CONNECTOR For Three-Beam Guardrail Extensions.


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, Eq.

THRIE-BEAM RETROFIT NOTES

1. See indexes for bridge thrie-beam traffic railing retrofits.

2. Trailing end guardrail to be paid for under the contract unit price for the parent roadway guardrail and measure includes length of end anchorage assembly: additional payment made for end anchorage assembly. No additional payment for connecting roadway thrie-beam to bridge thrie-beam retrofit.

TRAILING END GUARDRAIL AND ANCHORAGE FOR BRIDGE TRAFFIC RAILING (THRIE BEAM RETROFITS)
GUARDRAIL APPROACH TRANSITIONS AND CONNECTIONS FOR EXISTING FLAT SLAB, PRESTRESSED BEAM AND GIRDERS BRIDGES

WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

**NOTE FOR GUARDRAIL TRANSITIONS TO SAFETY SHAPE TRAFFIC RAILINGS 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 thrie-beam guardrail connection shall be in accordance with Table J of Index No. 400.
2. When retrofitting the thrie-beam guardrail existing wing posts or existing bridge safety shape traffic railing, attachment construction to be paid for under the contract unit price for Guardrail Bridge Anchorages, EA, and shall be full compensation for bolt hole construction, terminal connector, terminal connector plate(s) and bolts, nuts and washers.

**APPROACH POSTS AND SPECIAL OFFSET BLOCKS**

Block assemblies for special offsets can be made up of one special block plus one standard size block or at three standard size blocks held together with approximately equal size, with the pieces secured for relative position by 16d galvanized nails, see 26d HAD. FOR PREVENTION OF OFFSET ROOF RAILING - Index 400. The nested rails shall be installed to the blocks and posts at posts (a), (c), and (d). The details shown are for approach slides with intermediate extender plate, extending beyond parapet type traffic railing termini.

**DEVELOPMENT CHECKLIST**

STANDARD INDEX NO. XXXXX, SHEET X OF X

**REVISION LOG**

Added: 

Changed: 

Deleted: 

**APPENDIX I**

**APPENDIX II**

**APPENDIX III**

**APPENDIX IV**

**APPENDIX V**

**APPENDIX VI**

**APPENDIX VII**

**APPENDIX VIII**

**APPENDIX IX**

**APPENDIX X**

**APPENDIX XI**

**APPENDIX XII**

**APPENDIX XIII**

**APPENDIX XIV**

**APPENDIX XV**

**APPENDIX XVI**

**APPENDIX XVII**

**APPENDIX XVIII**

**APPENDIX XIX**

**APPENDIX XX**

**APPENDIX XXI**

**APPENDIX XXII**

**APPENDIX XXIII**

**APPENDIX XXIV**

**APPENDIX XXV**

**APPENDIX XXVI**

**APPENDIX XXVII**

**APPENDIX XXVIII**

**APPENDIX XXIX**

**APPENDIX XXX**

**APPENDIX XXXI**

**APPENDIX XXXII**

**APPENDIX XXXIII**

**APPENDIX XXXIV**

**APPENDIX XXXV**

**APPENDIX XXXVI**

**APPENDIX XXXVII**

**APPENDIX XXXVIII**

**APPENDIX XXXIX**

**APPENDIX XL**

**APPENDIX XLI**

**APPENDIX XLII**

**APPENDIX XLIII**

**APPENDIX XLIV**

**APPENDIX XLV**

**APPENDIX XLVI**

**APPENDIX XLVII**

**APPENDIX XLVIII**

**APPENDIX XLIX**

**APPENDIX L**

**APPENDIX LA**

**APPENDIX LB**

**APPENDIX LC**

**APPENDIX LD**

**APPENDIX LE**

**APPENDIX LF**

**APPENDIX LG**

**APPENDIX LH**

**APPENDIX LJ**

**APPENDIX LL**

**APPENDIX LM**

**APPENDIX LN**

**APPENDIX LO**

**APPENDIX LP**

**APPENDIX LQ**

**APPENDIX LR**

**APPENDIX LS**

**APPENDIX LT**

**APPENDIX LU**

**APPENDIX LV**

**APPENDIX LW**

**APPENDIX LX**

**APPENDIX LY**

**APPENDIX LZ**

**APPENDIX MA**

**APPENDIX MB**

**APPENDIX MC**

**APPENDIX MD**

**APPENDIX ME**

**APPENDIX MF**

**APPENDIX MG**

**APPENDIX MH**

**APPENDIX MI**

**APPENDIX MJ**

**APPENDIX MK**

**APPENDIX ML**

**APPENDIX MM**

**APPENDIX MN**

**APPENDIX MO**

**APPENDIX MP**

**APPENDIX MQ**

**APPENDIX MR**

**APPENDIX MS**

**APPENDIX MT**

**APPENDIX MU**

**APPENDIX MV**

**APPENDIX MW**

**APPENDIX MX**

**APPENDIX MY**

**APPENDIX MZ**

**APPENDIX NA**

**APPENDIX NB**

**APPENDIX NC**

**APPENDIX ND**

**APPENDIX NE**

**APPENDIX NF**

**APPENDIX NG**

**APPENDIX NH**

**APPENDIX NI**

**APPENDIX NJ**

**APPENDIX NK**

**APPENDIX NL**

**APPENDIX NM**

**APPENDIX NN**

**APPENDIX NO**

**APPENDIX NP**

**APPENDIX NQ**

**APPENDIX NR**

**APPENDIX NS**

**APPENDIX NT**

**APPENDIX NU**

**APPENDIX NV**

**APPENDIX NW**

**APPENDIX NX**

**APPENDIX NY**

**APPENDIX NZ**

2010 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)

GROSS REFERENCE: For Transition Block Details, Quantities and reinforcement see Sheet 3.
### PLAN VIEW OF TRANSITION BLOCK
(QUALITATIVE NOT SHOWN FOR CLARITY)

- **1** & **3** Adhesive-Bonded Dowels
- **3** Strips (Field Bend) (Typ.)
- Edge of Existing Approach Slab (Location varies)

### ELEVATION OF TRANSITION BLOCK
(QUALITATIVE NOT SHOWN FOR CLARITY)

- **1** & **3** Adhesive-Bonded Dowels
- **3** Strips (Field Bend) (Typ.)

---

**NOTES:**

- **CONCRETE:** Concrete for Transition Blocks shall be Class II (Miscellaneous).
- **REINFORCING STEEL:** Reinforcing steel shall be ASTM A415, Grade 60.
- **ANCHOR RODS:** Steel Anchor Rods shall be ASTM A36, ASTM A709 Grade 36 or ASTM A415, Grade 60 hot-dip galvanized in accordance with Specification Section 967.
- **BEAM GUARDRAIL:** Guardrail components and installation shall be in accordance with Design Standards Index 400.
- **ADHESIVE-BONDED DOWELS:** Adhesive Bonding Material Systems for Dowels shall comply with Specification Section 637 and be installed in accordance with Specification Section 646.
- 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 (Recessed) (LF). Payment for Transition Block work will be made under Pay Item Concrete Class II (Miscellaneous) (CY) and Reinforcing Steel (Roadway) (LF).

---

**ESTIMATED QUANTITIES**

<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>L.F.</td>
<td>60</td>
</tr>
<tr>
<td>Guardrail (Recessed)</td>
<td>LF</td>
<td>12.5</td>
</tr>
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</table>
REFLECTIVE BARRIER MARKER SPACING ON WALL

<table>
<thead>
<tr>
<th>Distance From</th>
<th>Edge of Travel</th>
<th>Lane to Barrier</th>
<th>Spacing (ft)</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00-2.00</td>
<td>40.0</td>
<td>0.00</td>
<td>40.0</td>
<td>0.00</td>
</tr>
<tr>
<td>2.01-8.00</td>
<td>40.0</td>
<td>0.00</td>
<td>80.0</td>
<td>0.00</td>
</tr>
<tr>
<td>&gt; 8.00</td>
<td>40.0</td>
<td>0.00</td>
<td>none required</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Symmetrical About E

REFLECTIVE BARRIER MARKERS ARE REQUIRED ON THE TOP 18" CONCRETE BARRIER WALLS IN ACCORDANCE WITH THE TABLE ABOVE (Typical)

FULL WALL

For concrete barrier wall details at piers, highway lighting and guardrail connections, see other sheets of this Index.

Standard barrier to be paid for under contract unit price for Median Concrete Barrier Wall, LF.

STANDARD WALL SECTIONS

1. Class II concrete shall be used for all reinforced and plain (unreinforced) concrete barrier walls except in moderately and extremely aggressive environments; Class IV concrete shall be used. Rebar shall be used in the aggregate size shall be 4 bars. Exposed concrete shall have a Class 3 surface finish in accordance with Section 529 of the Standard Specifications, unless other finish called for in plans. The finishes shall have a Class 5 applied finish coating in accordance with Section 450 only when called for in the plans.

2. Concrete wall terminal notes for design speeds 250 mph:
   a. Terminal outside clear zone of the approach traffic with "Detail II" and treatment.
   b. Terminal within a shielded location.
   c. Terminal protection by the use of a crash cushion system.
   d. Terminal in conjunction with a suitably designed transition to another barrier.

3. Expansion joints in wall required only at bridge ends and/or at locations where walls are an integral part of existing or proposed concrete barrier walls. Joints are to match an existing or proposed expansion joint.

4. When the barrier is installed adjacent to the pavement the top 12" of the subgrade shall be compacted to at least 100% of the density as defined in the AASHO TR-99 specifications.

WALL FACE SAFETY SHAPES

1. Class II concrete shall be used for all reinforced and plain (unreinforced) concrete barrier walls except in moderately and extremely aggressive environments; Class IV concrete shall be used. Rebar shall be used in the aggregate size shall be 4 bars. Exposed concrete shall have a Class 3 surface finish in accordance with Section 529 of the Standard Specifications, unless other finish called for in plans. The finishes shall have a Class 5 applied finish coating in accordance with Section 450 only when called for in the plans.

2. Concrete wall terminal notes for design speeds 250 mph:
   a. Terminal outside clear zone of the approach traffic with "Detail II" and treatment.
   b. Terminal within a shielded location.
   c. Terminal protection by the use of a crash cushion system.
   d. Terminal in conjunction with a suitably designed transition to another barrier.

3. Expansion joints in wall required only at bridge ends and/or at locations where walls are an integral part of existing or proposed concrete barrier walls. Joints are to match an existing or proposed expansion joint.

4. When the barrier is installed adjacent to the pavement the top 12" of the subgrade shall be compacted to at least 100% of the density as defined in the AASHO TR-99 specifications.

END ELEVATION

TO BE USED ON H/WAY TERMINAL LOCATED CLEAR ZONE WIDTH FROM EDGE OF THE NEAR APPROACH TRAFFIC LANE

CONCRETE BARRIER WALL TERMINAL DETAIL II

END ELEVATION DESIGN SPEED 45 MPH OR LESS CONCRETE BARRIER WALL TERMINAL FOR NARROW MEDIAN DETAIL III

GENERAL NOTES

5. Cost-in-place barrier wall normally with a continuous pour without transverse contraction joints. Cast-in-place segments with a length 140" shall be joined to adjacent sections by doweling. See Detail VIII on Sheet 2.

6. Precast construction is allowed as an alternate to cast-in-place construction.
   a. Precast segments 140" in length shall be joined by a transverse joint in accordance with details C & D on Sheet 2. The minimum segment length is 200.
   b. Doweling of the prestressed sections shall be facilitated by the use of sand-cement grout or equivalent method to assure uniform bearing.
   c. Reinforcement may be required for handling stresses.

7. On roadways designated for reverse loading all downstream ends that are not shielded or outside the clear zone shall be marked.

8. Cost of reinforcing steel and reflective barrier markers shall be included in the contract unit price for concrete barrier wall. See individual details for pay item information.

9. For barrier wall layout details see Indexes Nos. 217, 218 and 219.

10. Concrete barrier wall with New Jersey Safety Shape may not be substituted for the Standard F Shape Barrier.

2010 FDOT Design Standards
CONCRETE BARRIER WALL
**CONCRETE BARRIER WALL TRANSITION BETWEEN WIDE AND NARROW MEDIAN**

When barrier wall end located outside approach clear zone or horizontal clearance.

**SHOULDER TREATMENT WHEN CRASH CUSHIONS SHIELDING CONCRETE BARRIER WALL END LOCATED INSIDE APPROACH CLEAR ZONE OR HORIZONTAL CLEARANCE**

**W-BEAM GUARDRAIL CONNECTION TO CONCRETE BARRIER WALL TRAILING ENDS**

**FREE END REINFORCEMENT**

Note: Free end reinforcement required for nonreinforced walls at the locations indicated: abutting ends of true joints; ends with guardrail connections; ends with reductive crash cushion connections; and ends connecting to bridge rails or other rigid barrier walls.
CONCRETE MEDIAN BARRIER WALL TRANSITIONS AT BRIDGE PIERS
**REINFORCING STEEL MODIFICATIONS AT BARRIER WALL INLETS (INDEX NO. 218)**

**REINFORCED CONCRETE BARRIER WALL (SHOULDER)**

**DIMENSIONS AND QUANTITIES**

<table>
<thead>
<tr>
<th>CANTILEVER WALL</th>
<th>L-WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td><strong>Width</strong></td>
</tr>
<tr>
<td>ft</td>
<td></td>
</tr>
<tr>
<td>2' 65&quot;</td>
<td>3'-3&quot;</td>
</tr>
<tr>
<td>57 to 64'</td>
<td>3'-9&quot;</td>
</tr>
<tr>
<td>50 to 58'</td>
<td>4'-3&quot;</td>
</tr>
<tr>
<td>41 to 49'</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>36 to 40'</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>28 to 35'</td>
<td>6'-6&quot;</td>
</tr>
<tr>
<td>25 to 27'</td>
<td>7'-0&quot;</td>
</tr>
</tbody>
</table>

Quantities shown are for information only. For method of payment see Payment section. Barrier wall inlets (Index 218) shall be isolated from the barrier wall stem and footing by 1" expansion material. All walls may be made up of segments of 20' or more in length provided the segments are joined by a transverse joint in accordance with Detail B, Sheet 2. Segments shall have dimensions same as walls above.

**PAYMENT:**

Walls to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigid-Shoulder), L.F.

**DESIGN NOTES:**

Reduce the vertical steel spacing to 4 inches O.C. a distance of 4 feet each side of all cold joints.

Use of this barrier wall should be limited to special applications such as hazard encroachment into the clear zone where barrier wall deflection, rotation or translation cannot be tolerated.

- (a) Structure supporting piers, abutments and piers
- (b) Pumping station, control or similar critical stations
- (c) Quarries
- (d) Irregular vertical grades
- (e) Historic structures or monuments
- (f) Rail or transit travel way or passenger stations (g) Other similar occurrences

**NOTES:**

BENDING DIAGRAMS

Bar 4F

Bar 4C

Bar 4H

For use in areas where obstructions require localized omission of toe

Bar 4H Modified

Note: All longitudinal reinforcement #4 bars. Minimum segment length for this wall is 20 feet. Wall to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigid-Retaining), LF.

Quantities: Class II Concrete 0.29 CY/LF
Reinforcing Steel 28.6 LBS/LF

Reinforced Concrete Barrier Wall (Retaining)
WITH PLAIN CONCRETE BARRIER WALL (SHOULDER)

Guardrail (For Additional Details See Index No. 400)

Transition Section
2 Panels
Approach End Anchorage
Assembly (GAL) Shown

With Shoulder Gutter
For shoulder gutter requirements see plans.

15" Shoulder Gutter
Transition to suit barrier wall terminal configuration
Deflected Shoulder Gutter
When required for variations in shoulder widths

WITH GRASSED OR PAVED SHOULDERS AND GUARDRAIL

EITHER REINFORCED CONCRETE BARRIER WALL (SHOULDER) OR RETAINING WALL WITH CONCRETE TRAFFIC RAILING. A CONCRETE BARRIER WALLS ON APPROACHES TO BRIDGES
Concrete Barrier Wall (Rigid) (Curb & Gutter)

Curb and Gutter Without Utility Strip and with Adjacent Bicycle Lane

NOTE

X = length of advancement in feet for near and opposing approach lanes. See Sheet 14.

For locations with utility strips see Sheet 10. For transition and sidewalk see Sheets 12 & 13, for sectional details see Sheet 14.

The 1.5" offsets to toe of barrier wall cannot be reduced to accommodate hazards; however, hazards located in the stem of the wall may be accommodated by the detail on Sheets 22 & 23.
**NEAT LINE PICTORIAL VIEW**

**NOTE:** Drainage slots shall be located at least points along the sidewalk, and unless otherwise shown in the plans, slots shall be spaced at intervals not exceeding 50 in. At junctions and 50 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)**

---

**SECTION BB**

WITH OR WITHOUT UTILITY STRIP

**NEAT LINE PICTORIAL VIEW**

**SECTION AA**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) ● TRANSITION SEGMENT ● WITH ADJACENT BICYCLE LANE**

---

**SECTION CC**

**PICTORIAL VIEW**

---

**DEVELOPMENT CHECKLIST**

STANDARD INDEX NO. XXXXX, SHEET X OF X
**RIGHT SIDE APPROACH SHOWN — LEFT SIDE OPPOSITE HAND**

**NEAR LANE APPROACH**

**OPPOSING LANE APPROACH**

WITH OR WITHOUT UTILITY STRIP — UTILITY STRIP SHOWN — SEE SHEET 10 & 11 FOR APPLICATIONS.

**LENGTH OF ADVANCEMENT**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) WITH ADJACENT BICYCLE LANE**

### Quantities

<table>
<thead>
<tr>
<th>Length# (Barrier Wall)</th>
<th>#</th>
<th>Conc. Size</th>
<th>C Y Per Lb.</th>
<th>Rein. Steel Size</th>
<th>Per Lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.7 to 47.7</td>
<td>6-10&quot;</td>
<td>0.26</td>
<td>29</td>
<td></td>
<td></td>
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<tr>
<td>48 to 55</td>
<td>6-0&quot;</td>
<td>0.31</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 to 47</td>
<td>6-6&quot;</td>
<td>0.33</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 to 41</td>
<td>7-0&quot;</td>
<td>0.35</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 to 35</td>
<td>8-0&quot;</td>
<td>0.36</td>
<td>42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equation Variables:**

\[ \text{d} = \text{Distance in feet from near edge of the near approach traffic lane to back of hazard or clear zone width whichever is lesser. For left side hazards and clear zones on two-way undivided facilities} \]

\[ \text{d}_{a} = \text{Distance in feet from near edge of the near approach traffic lane to the face of barrier at offset control point. For left side hazards on two-way undivided facilities} \]

**Note:** The minimum length of advancement for both near and opposing lane approaches is 40'.

**Bar 41 Bending Diagram**

Note: All transverse reinforcement is bars. Shorter segments due to construction or expansion joint shall be dowelled in the manner described for Transition Segments on Sheet 13.

Transverse expansion joints are to be constructed at the juncture of walk transitions and curb and gutter, and at intervals so that spacing will not exceed 100'.

For barrier wall details see Index No. 219. Inlet extends into bicycle lane 12". Wall to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigid-Curb & Gutter), LF.
TWO-WAY TRAFFIC (UNDIVIDED)

ONE-WAY TRAFFIC

BRIDGE END HAZARD

TWO-WAY TRAFFIC (UNDIVIDED)

HAZARD 4' OR LESS FROM FACE OF CURB

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)

CURB AND GUTTER WITH UTILITY STRIP AND WITHOUT ADJACENT BICYCLE LANE

NOTE:

- Length of advancement in feet for near and opposing approach lanes. See Sheet 19.
- For locations without utility strips see Sheet 16.
- For transition and sidewalk see Sheets 17 & 18 and for sectional details see Sheet 19.
- The 2.5' offsets to toe of barrier wall cannot be reduced to accommodate hedges; however, hedges located in the stem of the wall may be accommodated by the details on Sheets 22 & 23.
CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) ● TRANSITION SEGMENTS ● WITHOUT ADJACENT BICYCLE LANE
Section BB

Section AA

Section CC

**NEAT LINE PICTORIAL VIEW**

NOTE: Drainage slots shall be located at all line points along the sidewalk, and, unless otherwise shown in the plans, slots shall be spaced at intervals not exceeding 50 ft in 18 in sections and 20 ft 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)**

- Transition Segments Shall Be Doweled Into The End Of The Barrier Wall In The Following Manner:
  - Four 1" diameter holes 6" deep on 6" centers shall be drilled in the end of the barrier and 1/8" long set in an adhesive bonding material. The ends of the dowels extending into the transition segment shall be wrapped with a layer of 15 lb. Type II asphalt-saturated roofing felt with the ends crimped.

- When Construction Joints Are Utilized For Transition Segment Construction, The Stem Shall Be Doweled To The Existing In The Following Manner:
  - Five 1/8" bars 15" long shall be embedded 7" into the footing. The dowels shall be spaced 15" on centers with the first dowel located 12" from the barrier wall. Dowels may be placed within or adjacent to the keyway.

**PICTORIAL VIEW**

**WITH OR WITHOUT UTILITY STRIP**

**NEAT LINE PICTORIAL VIEW**

**WITH UTILITY STRIP**

**WITHOUT UTILITY STRIP**

**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

<table>
<thead>
<tr>
<th>Design Speed $\text{mph}$</th>
<th>Length of Advancement, Ft. $(X)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>16 (0-6)</td>
</tr>
</tbody>
</table>

Note: The minimum length of advancement for both near and opposing lane approaches is 40.

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.
- $X$: Distance in feet from near edge of the near approach traffic lane to the face of curb at offset control point. For left side hazards on two-way undivided facilities $d$ is measured from the inside edge of the nearest opposing traffic lane.

Concerte Barrier Wall (Rigid-Curb & Gutter), LF.
PLAN FOR DESIGN SPEED ≤ 45 MPH

NOTE:
For details at rigid hazard see Sheet 21.

PLAN FOR DESIGN SPEED ≥ 50 MPH

Note: For continuous barrier between independent bents or single pier columns see Sheets 21-23.

SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS
WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 3'

<table>
<thead>
<tr>
<th>ARC LENGTH (FT)</th>
<th>DISTANCE &quot;x&quot; (FT)</th>
<th>OFFSETS &quot;y&quot; (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>8</td>
<td>0.96</td>
</tr>
<tr>
<td>8</td>
<td>11.98</td>
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<tr>
<td>18</td>
<td>15.86</td>
<td>1.03</td>
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<td>20</td>
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<td>21</td>
<td>20.91</td>
<td>1.76</td>
</tr>
<tr>
<td>24</td>
<td>23.83</td>
<td>2.30</td>
</tr>
<tr>
<td>25</td>
<td>24.83</td>
<td>2.49</td>
</tr>
</tbody>
</table>

Note:
Walls may be constructed in chords having lengths ≤ 4 feet.

NOTES:
1. This wall is intended for use where the wall has bearing against
the hazard. When the length between bent supports or pier columns
exceeds 15, the affected segments shall be constructed in
accordance with the detail for Reinforced Concrete Barrier Wall
(Shoulder), Section TT or Section TQ; this index.
In cases where the barrier wall and slope pavement or other
structure would occupy the same location, the wall and structure
are to be modified as detailed in the plans.

2. The barrier wall radial segments are intended for use on approach
and trailing ends of both one-way and two-way facilities. The
guardrail connections shown on this sheet apply to one-way
approaches and to the approaching and trailing ends of two-lane
two-way facilities. On trailing ends of two-way multiline and
two-way facilities the end connection on Sheet 1 may be used.
For walls with normal offsets from hazards and their guardrail
connections, see Sheet 24 & 25.

3. Refer to Index No. 400 for additional guardrail information.

4. Wall to be paid for under the contract unit price for Shoulder
Concrete Barrier Wall (Rigid - Shoulder), I.P.

# 12" x 12" x 0.05 galvanized steel back-up plate with 3/8" post bolts (either 14" or 18" long)
and nuts with 3/4" plain round washers under nuts.

**  Attach three-beam terminal connector to shoulder barrier wall with a 12" x 12" x 0.05
three-beam terminal connector plate and 3-1/2 x 12" long #2 hex bolts and nuts with 3/8" plain round
washers under heads and nuts.
Rigid Hazard
(Bridge Pier Or Pile Shown)

5/8" Expansion Material

Dowelled Joint

When Distance Between Bent Supports Or Pier Columns Exceeds 15 See Sheet 22 & 23.

BARRIER WALL AT SQUARE OR RECTANGULAR SHAPED HAZARD
PARTIAL PLAN

SECTION AA

TO BE CONSTRUCTED IN LIEU OF SECTION AA WHEN THRU DRAINAGE REQUIRED

SECTION BB

SECTION CC

SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS
WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 3'

NOTE:
- Vertical reinforcement = 4 bars at 12" centers.
- Horizontal reinforcement = 5 bars.

CONCRETE BARRIER WALL
When back of Wall Located In Front of Hazard Face The Fillets Are to Be Adjusted To Maintain Walls Full Bearing Surface Against Hazard.

When Approach Shielding Is Guardrail And Curb & Gutter, Construct 13' (Min.) Of Concrete Barrier Wall Section "TT" Or Section "100". Construct Curb & Gutter Flame At End Of Wall With Full Height Curb Index No. 300 And, Connect Guardrail To Wall With Transition Rails In accordance With Sheet Nos. 24 & 25.

When Approach Shielding Is Guardrail And Curb & Gutter, Construct 13' (Min.) Of Concrete Barrier Wall Section "TT" Or Section "100". Construct Curb & Gutter Flame At End Of Wall With Full Height Curb Index No. 300 And, Connect Guardrail To Wall With Transition Rails In accordance With Sheet Nos. 24 & 25.

Reinforced 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.

<table>
<thead>
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<th>DESCRIPTION</th>
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<th>Deleted:</th>
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<tr>
<td>REINFORCED CONCRETE BARRIER WALL APPLICATIONS</td>
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<td></td>
</tr>
<tr>
<td>13' Feet</td>
<td>Reinforced Concrete Barrier Wall (Shoulder/0 With Flush Shoulders) Or, Section &quot;TT&quot; Or Section &quot;100&quot; With Curb &amp; Gutter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;13' Feet</td>
<td>Reinforced Concrete Barrier Wall (Shoulder/0 With Flush Shoulders) Or, Section &quot;TT&quot; Or Section &quot;100&quot; With Curb &amp; Gutter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrier wall footings that conflict with bent or pier foundations shall be modified as described in the plan.</td>
<td></td>
<td></td>
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</table>
HAZARD PENETRATING STEM OF RIGID CONCRETE BARRIER WALLS

The details on sheets 22 & 23 are treatments to the T-shape concrete barrier wall depicted on Sheet Nos. 9 through 19, where site conditions impose reduced clearances between above ground hazards and the walls. Bridge bent supports and piers are shown. These treatments are not applicable to hazards that cannot provide lateral support for the walls. See the plans for limits of wall sections applied and other associated wall treatments.
STANDARD TIMBER OR PLASTIC OFFSET BLOCKS • FIELD TRIMMED
FOR USE AT SECTIONS AA, BB, CC & DD

STANDARD GUARDRAIL APPROACH TO SHOULDER BARRIER

1. The longitudinal dimensions and pay limits shown for median
concrete barrier wall also apply to shoulder concrete barriers.
2. W-beam elements do not apply to these transition schemes.
   For barrier wall-trailing end guardrail connections for one-way lanes,
   see Sheet 2.
3. Where warning is necessary to fit nested beams, the nested
   beams shall be milled in accordance with Index No. 400.
4. Either steel or timber guardrail post may be used, timber posts shown.
5. The nested beams shall not be bolted to block and posts at points shown.
6. On the trailing side of MEDIUM BARRIER WALL, offset blocks may be omitted at points
   numbers (1), (2), (3), (4), (5) and (8). (See Sheet 25).
7. For additional guardrail information refer to Index No. 400.

GUARDRAIL CONNECTION TO CONCRETE BARRIER WALL APPROACH ENDS

2010 FDOT Design Standards

CONCRETE BARRIER WALL

Index No. 400, Detail K
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 AASHTO LRFD 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 322 of the Specifications, unless another finish is called for in the plans. The surfaces shall have a Class 3 applied Finish 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. Transverse contraction joints may be used at a spacing 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 AASHTO T-99 specifications.
4. Isolate Barrier Wall Inlets, Index 216, from Pier Protection Barriers and Footings with 1" expansion material.
5. On roadways designated for reverse lanes, mark all downstream barrier ends that are not shielded or outside the clear zone with Type 5 Object Markers. Include the cost of the Object Marker in the cost of the Pier Protection Barrier.
6. Payment: Pier Protection Barrier and Crash Wall to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigid Shoulder 42") L.F., 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 PPM and Index 700 for minimum recoverable trench and horizontal clearance requirements.

Establish the offset from the Pier Protection Barrier to the bridge pier, column or pile based on project constraints.

Determine the required Pier Protection Barrier height, i.e. 42" or 54", in accordance with the requirements of the LRFD Bridge Design Specifications and the Structures Design Guidelines.

Determine the appropriate limiting stations of the Pier Protection Barrier and its end treatment(s) using the Pier Protection Barrier Length of Advance diagrams provided.

Select Pier Protection Barrier terminal treatment for bridge designs greater than or equal to 50 mph:
- a. Terminated outside of the clear zone of any approach traffic
- b. Terminated within a shielded location
- c. Terminated by a suitable transition to the roadway

Determine the appropriate footing configuration(s) (T-Front Curb or Back Curb) 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 location 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.

Designate the Pier Protection Barrier height, footing configuration(s) and limiting stations on the Plan-Profile sheets, e.g.:

Begin 42" Pier Protection Barrier with Front Curb or Back Curb Footing, Sta 100+00.00

Indicate Crash Wall locations (when required) and lengths on the Plan-Profile sheets. Design Crash Wall height to match height of adjacent Pier Protection Barrier.

In absence of continuous concrete barrier, determine guardrail requirements in accordance with Indexes 402 and 420.

Show Cross Sections as required to locate Pier Protection Barrier, Crash Wall (when required) and footings adjacent to bridge piers, columns or footings, drainage structures, utilities, etc.

Prepare Traffic Control Plans to accommodate Pier Protection Barrier, Crash Wall (when required) and footing construction.

Include lengths (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.
LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

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:

L = 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, L 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 of 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.
LENGTHT OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION
(LEFT SIDE OPPOSITE HAND)
ONE-WAY TRAFFIC

TWO-LANE TWO-WAY TRAFFIC

NOTES:
See Index 410 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
1. The Pier Protection Barrier rapid segments are intended for use on approach and trailing ends of both one-way and two-way facilities. The guardrail connections shown on this sheet apply to one-way approaches and to the approaching and trailing ends of two-lane two-way facilities. On trailing ends of two-lane facilities, the end connection on Index 410, Sheet 2 may be used.

2. Refer to Index No. 410 Detail J for additional guardrail information.

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**FLARED END TREATMENT - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION**

**END TREATMENT - PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION**

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**NOTE**  
PPB = Pier Protection Barrier.
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)

Embankment and construction information.

Estimated 42" PPB Quantities

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<tr>
<th>Item</th>
<th>Unit Quantity</th>
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<tr>
<td>Rebar total</td>
<td>33.10</td>
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Estimated 54" PPB Quantities

<table>
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<tr>
<th>Item</th>
<th>Unit Quantity</th>
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<tr>
<td>Rebar total</td>
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GENERAL NOTES

1. The ‘Portable Temporary Low Profile Barrier For Roadside Safety’ is a licensed 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.

4. 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 permanently marked with an identification 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.

5. 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.

6. 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.

7. Tubular markers shall be installed along the run of barrier at the ends and at 50' centers on tangents and 25' centers on radii. 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.

8. 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, 1100 S. University Blvd, 115000, Gainesville, Florida, 32611-5500. Telephone: 352-392-5929, Fax: 352-392-5930. Reference UF#: 11052.

9. 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 wall.

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

END VIEWS

DEFLECTION SPACE AT DROPOFFS

PLAN VIEW OF APPROACH END OFFSET

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

DEVELOPMENT CHECKLIST

STANDARD INDEX NO. XXXXX, SHEET X OF X

2010 FDOT Design Standards

LOW PROFILE BARRIER
PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY
LEGEND

BARRIER OPENINGS AT DRIVeways

TYPE I OBJECT MARKER

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY
LEGEND

- Type I Object Marker

**BARRIER OPENINGS AT DRIVEWAYS**

PORTABLE TEMPORARY LOW PROFILE BARRIER FOR ROADSIDE SAFETY

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* 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.
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, straps, keeper pins, or guardrail components for installing Type K Barrier Units.

FABRICATOR QUALIFICATION: 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 fall below 5000 psi will be rejected.

REINFORCING STEEL: All reinforcing steel shall be ASTM A 416, Grade 60 except for Bars 601, 602 and 603. Bars 601, 602 and 603 shall be ASTM A 706 except that a 1/4" 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 975. The minimum limit 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 5' of the plan dimensions. Correct placement of Bars 60 is critical for proper fit up and performance of individual Barrier Units.

At the option of the Fabricator, Deformed Welded Wire Fabric in accordance with ASTM A 497 and the details shown on Sheet 2 may be utilized in lieu of Bars 44 and 56.

All dimensions in the Bending Diagrams are out to out. All reinforcing bars shall have a 2" minimum cover except as noted.

LIFTING SLEEVE ASSEMBLY: Inclusion of the Lifting Sleeve Assemblies is optional. Steel 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 450 and 521. Finish the top and sides of the Barrier Units with a General Surface Finish. Finish the bottom 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 0.7 tons.

ALTERNATE DESIGN: Manufacturers seeking approval of proprietary concrete or steel 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 or steel barrier in the configurations shown herein, is a minimum of 3'-6" 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'-6" in freestanding configuration, 3.5' in bolted down configuration and 1'-0" in spiked down configuration.
SECTION D-D
(Reinforcement not shown for clarity)

* Measured from end of Barrier Unit to outside edge of Bars 60.

ELEVATION VIEW

SECTION THRU LIFT/DRAIN SLOT

PLAN VIEW

ESTIMATED TEMPORARY CONCRETE BARRIER QUANTITIES

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<th>UNIT</th>
<th>QUANTITY</th>
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<td>CY</td>
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<tr>
<td>Reinforcing Steel</td>
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Cross References:
For Section A-A, Section D-D and Section C-C see Sheet 3.

The above quantities are for one Barrier Unit.
### Alternate Reinforcing Steel Detail

**Welded Wire Reinforcement**

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<thead>
<tr>
<th>Configuration</th>
<th>Diagrams</th>
<th>Notes</th>
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<tr>
<td>No. 4 Bar Over Drain Slots (Conventional Steel)</td>
<td><img src="image" alt="Diagram" /></td>
<td>Place 2 = No. 5 Bars (2.5&quot;) long in bottom of Welded Wire Reinforcement cage as shown. D 17.2 spacing shall match spacing for Bars 4A shown in Elevation View, Sheet 2. Field trim D 17.2&quot; to clear drain slots by 2&quot;.</td>
</tr>
<tr>
<td>No. 4 Typical Bar (Conventional Steel)</td>
<td><img src="image" alt="Diagram" /></td>
<td>Place 2 = No. 5 Bars (2.5&quot;) long in bottom of Welded Wire Reinforcement cage as shown. D 19.7&quot; spacing shall match spacing for Bars 4A shown in Elevation View, Sheet 2. Field trim D 19.7&quot; to clear drain slots by 2&quot;.</td>
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### Conventional Reinforcing Steel Bending Diagrams

#### Bill of Reinforcing Steel

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<td>4</td>
<td>10</td>
<td>6&quot;-1&quot;</td>
</tr>
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<td>4</td>
<td>2</td>
<td>5&quot;-5&quot;</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>5</td>
<td>12&quot;-3&quot; (Straight)</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>6</td>
<td>3&quot;-1&quot;</td>
</tr>
<tr>
<td>D1</td>
<td>6</td>
<td>2</td>
<td>8&quot;-4&quot;</td>
</tr>
<tr>
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</tr>
<tr>
<td>E</td>
<td>4</td>
<td>4</td>
<td>2&quot;-0&quot;</td>
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#### Top View

**Bars 6D1, 6D2 & 6D3**

**Side View**

**Bars 6D1, 6D2 & 6D3**

### Notes

- Provide 1/2" Chamber at top and bottom corners of Barrier.
- For clarity, Bars 6D not shown for clarity.
NOTES 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 expressly specified in the Plans, the Barrier Units shall be placed in locations where they can be impacted from the road 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. Appropriate weight of one unit equals 27 tons.

SURFACE PREPARATION: Except as shown for the Black Piled Roadway Installations, removal of 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 A709 Grade 50. Nondestructive testing of welds shall be required. At the Contractor’s option, a 3/8” diameter hole may be provided in the Connection Pin or Top Plate at the discretion of the Contractor, as shown for the installation of a vandal resistant bolt.

CONNECTION PIN INSTALLATION: Initial set Barrier Units by using a 3/8” wooden block between ends of adjacent units. Install Connection Pin between adjacent Barrier Units as shown, then pullinly placed Barrier Unit away from adjacent Barrier Unit to remove slack between Connection Pin and Bars 60 (except as shown on Sheet 50). Barrier Units shall not be used unconnected.

DEVIATIONS: Mount Type C Steady-Burn Lights on top of Barrier Units that are used as traffic barriers along travelways in work zones. Space the lights at 50 centers in transits, 100 centers on curves and 200 centers on tangent alignments. Refer to “Warning Lights” on Index No. 600 for additional information.

REUSE OF UNITS: Barrier Units may be reused if they have the structural integrity and surface quality of new units.

REUSE OF CONNECTION PINS: Connection pins may be reused if they have the structural integrity of new pins.

INSTALLATIONS ON CURVED ALIGNMENTS: The details presented in these Standards are shown for installations on tangent alignments. Details for horizontally curved alignments are similar.

TRANSITIONS: Transitions are required between freestanding bolted down, staked down and back filled Type K Barrier Installations, see Sheet 2 for transition requirements and details. Transitions are also required between installations of Type K Barrier and other types of temporary barrier, see Index No. 415 for transition requirements and details. Splices and transitions are required between installations of Type K Barrier and permanent Bridge or Roadway Traffic Railing, seeSheets 9 through 15 for transition requirements and details.

PAYMENT: Barrier Units for work zone traffic control and other temporary applications shall be paid for under the contract unit price for Barrier Wall (Temporary FPL) (Type K), LF. Any relocation of the Barrier Units required for the project shall be paid for under the contract unit price for Barrier Wall (Temporary FPL) (Type K), LF. Type C Steady-Burn Lights shall be paid for under the contract unit price for Lights (Temp. Barrier Wall/Mount) (Type C, Steady-Burn), LF. The Contractor shall furnish Barrier Units except when the Plans specify the availability of Department stock units. Regardless of unit source the Contractor shall furnish all hardware and be responsible for all handling including loading, transport, unloading, stacking, installation, removal and return. 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 INSTALLATION:

THREE-BEAM GUARDRAIL: Provide Three-Beam Guardrail for splices in accordance with 44SHC 200. Class II (Zinc coated) and as follows:
- Two panels per splice (One panel per side of Class I (12 Gauge), or
- Four panels per splice (Two double panels per side of Class I (12 Gauge).
- Guardrail panel length shall be 12 ft. 6 in.
- Provide and install all associated metal guardrail components (Terminal Connectors, Shoulder Bolts, End Bolts and Nuts, Filler Plates, etc.) in accordance with Index No. 400.
- Install four Guardrail-Anchor Bolts at each splice in any of the standard seven anchor bolt holes in the Three-Beam Terminal Connector.
- It is required that all steel components be field dressed before installation and fabricated steel to suit reinforcement details. Guardrail-Anchor Bolts in Type K Barrier Units, shall Three-Beam Terminal Connector so that reinforcing steel is provided to suit reinforcing details. Do not use reinforcing steel in Type K Barrier Units.
- Drilling or cutting through reinforcing steel within permanent concrete traffic railings is permitted. Do not drill or cut through utilities or conduits within permanent concrete traffic railings.

GUARDRAIL OFFSET BLOCKS: Provide and install timber Offset Blocks meeting the material requirements of Index No. 400. Field trim Offset Blocks as required for proper fit. Use Offset Blocks as shown and required in order to prevent bending or kinking of Three-Beam Guardrail panels.

CONCRETE FOR PILING: TYPICAL TRAFFIC RAILING TYPE: Provide concrete for filling the required areas of Traffic Railings as shown meeting the material requirements of Specification Section 346. Any Class, or a commercially available precasted concrete mix (3000 p.s.i. minimum compressive strength). Sampling, testing, evaluation and certification of the concrete in accordance with Specification Section 346 is required. The concrete must meet the requirements of the Plans and their subsequent specifications. Concrete filling forms or by hand methods to the general configurations shown as to provide a smooth shape transition between the Barrier Unit and the adjacent traffic railing. A low slump is desirable for placing and finishing concrete by hand methods. Cure the concrete filling application as a curp or compound, by covering with a wet tarp or burlap for a minimum of 24 hours. Completely remove the concrete fill upon relocation or removal of the Type K Temporary Concrete Barrier.
TYPICAL SECTION (BRIDGE DECK SHOWN, APPROACH SLAB OR RIGID PAVEMENT SIMILAR INSTALLATION ADJACENT TO DROP-OFF SHOWN, MEDIAN TRANSITION INSTALLATION SIMILAR)

NOTES 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 of concrete box girder) or on bridge superstructures consisting of longitudinally post-tensioned, 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 A 327 or ASTM F 1554 Grade 36. Nut shall be in accordance with ASTM A 263 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. The number and positions of Anchor Bolts required in Transition Installations are shown in Sheets 6 and 9 of Index No. 416. Drilling through deck reinforcing steel to install Anchor Bolts is permitted. Unless otherwise shown in the Plans or at the Contractor's option, Barrier Units may be installed by through bolting (where geotechnically possible) or by the use of Adhesive-Bonded Anchor Bolts. Do not drill into 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 0.25". 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 SYSTEMS: Adhesive Bonding Material Systems for Anchor Bolts shall be Type HMO in accordance with Specification Section 9.37. and shall be installed in accordance with Specification Section 4.76. Prior to installation of the Barrier Units, if the Plan location(s), install a demonstration Barrier Unit using the proposed production installation method, at a location approved by the Engineer. The production test requirements of Specification Section 4.76.6 shall be installed. Adhesive-Bonded Anchor Bolts in the demonstration Barrier Unit shall be tested at least 28 days after casting with a 25,000 pound tensile load. Install and test additional demonstration Barrier Units when requested by the Engineer. Remove the demonstration Barrier Unit prior to testing Barrier Bolts. Perform the test Anchor Bolts after testing as directed by the Engineer.

REMOVAL OF ANCHOR BOLTS: Upon removal, reposition 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 9.38 or with an Epoxy Resin Compound, Type 1 or 2, in accordance with Specification Section 9.36. If a flexible pavement overlay is present and to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.

TREATMENT AT BRIDGE DECK EXPANSION JOINT SCHEMATIC

BOLTED DOWN BRIDGE, APPROACH SLAB, ROADWAY AND TRANSITION INSTALLATIONS

2010 FDOT Design Standards

TYPE K TEMPORARY CONCRETE BARRIER SYSTEM

Sheet No. 414

5 of 15

Rev. 01/08
NOTES FOR STAKED DOWN ROADSIDE AND TRANSITION INSTALLATIONS:

LIMITATION OF USE: This installation technique can only be used on flexible pavement or on an Asphalt Pad as shown. Stakes must not be installed on both sides of the Barrier Units.

ASPHALT PAD: Where existing flexible 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 not required. No separate payment will be made for the Asphalt Pad.

STAKE: Provide steel for Stake assemblies in accordance with ASTM A 36 or ASTM A 709 Grade 36. All 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 E70XX. Nondestructive testing of welds is not required.

Install three (3) Stakes on the traffic side of the Barrier Units as shown, except for Transition Installations. For the number and positions of stakes required in Transition Installations, see Sheets B and C and Index No. 415. Install Stakes so that the Stop Plate is snug against the bottom of the Anchor Blockout.

BURIED UTILITIES: Prior to installation of Stakes verify locations of all adjacent buried utilities, drainage structures, pipes, etc. If 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 Stakes and completely fill the remaining holes in flexible pavement that is to remain with hot or cold patch asphalt material.

REUSE OF STAKES: Stakes may be reused if they have the structural integrity of new stakes.

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TYPICAL SECTION (BRIDGE DECK SHOWN, APPROACH SLAB SIMILAR)

NOTES FOR FREE STANDING BRIDGE OR APPROACH SLAB INSTALLATIONS:

KEEPER PINS: Keeper Pins shall be 5/8" diameter, smooth steel bar in accordance with ASTM A 36 or ASTM A 709 Grade 36. As directed by the Engineer, in order to limit vibration induced translation of the Barrier Units, install one (1) Keeper Pin per Barrier Unit on the traffic side of the Barrier Units as shown. Do not drill into or otherwise damage bridge deck expansion joints or drains.

REMOVAL OF KEEPERS: 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 G, in accordance with Specification Section 926. It is flexible pavement overlay present and is to remain, completely fill the remaining holes in the flexible pavement with hot or cold patch asphalt material.

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STAKED DOWN ROADWAY AND TRANSITION INSTALLATIONS

FREESTANDING ROADWAY INSTALLATION

TYPE K TEMPORARY CONCRETE BARRIER SYSTEM

2010 FDOT Design Standards
Sheets:

Sheet No. 37/1/07
Sheet No. 5/15

Type No.

414
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 330 with the exception that the use of a pre-emergent herbicide is not required. No separate payment will be made for the Asphalt Pad.

FREESTANDING ROADWAY MEDIAN INSTALLATION

TYPICAL SECTION

NOTES FOR BACK FILLED ROADWAY INSTALLATIONS:

BACK FILL MATERIAL: Provide backfill material consisting of any available clean soil. Compact backfill material until the soil mass is firm and unyielding. Provide erosion controls specified in the Plans. In case erosion controls specified in the Plans are not sufficient, provide erosion controls required to maintain the integrity of the backfill embankment.

GEOTEXTILE FABRIC: Provide Type D-2 Geotextile Fabric in accordance with Index No. 198 to contain backfill material behind barrier units. Geotextile Fabric may be continuous over the length and height of the installation or may be individual pieces as required to cover the backfill area and any vertical joints between barrier units.

TYPICAL SECTION

FREESTANDING BRIDGE OR APPROACH SLAB MEDIAN INSTALLATION

TYPICAL SECTION

NOTES FOR FREE STANDING BRIDGE OR APPROACH SLAB MEDIAN INSTALLATION:

KEEPER PINS: Keeper Pins shall be ½" diameter, smooth steel bar in accordance with ASTM A 36 or ASTM A 709 Grade 36.

As directed by the Engineer in order to limit vibration induced translation of the Barrier Units, install one (1) Keeper Pin per Barrier Unit 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 drains.

REMOVAL OF KEEPER PINS: Upon removal of the Barrier Units, remove all Keeper Pins and completely fill the remaining holes in bridge decks and approach slabs that are to remain with sawn, beveled or crimped with Zincum Ammonium Phosphate Concrete in accordance with Specification Section 920 or with an Epox Resin Compound, Type I or II, 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.
**APPROACH TRANSITION FROM FREESTANDING TO BOLTED OR STAKED DOWN TYPE K TEMPORARY CONCRETE BARRIERS**

**APPROACH TRANSITION FROM FREESTANDING TO BACK FILLED TYPE K TEMPORARY CONCRETE BARRIERS**

---

**TRAILING END TRANSITION FROM BOLTED OR STAKED DOWN TO FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS**

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**TRAILING END TRANSITION FROM BACK FILLED TO FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS**

---

**LEGEND:**

- Dot indicates number and position of Bots or Stakes

N.B. Where Barrier is located within Clear Zone of opposing traffic, Approach Transition is required.
TRANSITION FROM FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS TO BRIDGE MEDIAN TRAFFIC RAILING OR ROADWAY MEDIAN CONCRETE BARRIER WALL

# NOTE:
Where Barrier is located within Clear Zone of opposing traffic, Approach Transition is required.

TRANSITION FROM FREESTANDING TYPE K TEMPORARY CONCRETE BARRIERS TO BRIDGE TRAFFIC RAILING OR ROADWAY CONCRETE BARRIER WALL

TRANSITION FROM BOLTED OR STAKED DOWN TYPE K TEMPORARY CONCRETE BARRIERS TO BRIDGE TRAFFIC RAILING OR ROADWAY CONCRETE BARRIER WALL

LEGEND:
Dot indicates number and position of Bolts or Stakes
PARTIAL PLAN VIEW AT MEDIAN TRAFFIC RAILING

32" F or New Jersey Shape
Bolted or Staked Down Type K Barrier Units

 Median Traffic Railing

* Thrie-Beam Guardrail Splice

Align Top of Type K Barrier Unit with Traffic Railing at its end

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)

Partial Plan View

PARTIAL PLAN VIEW AT SHOULDER 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)

Bolted or Staked Down Type K Barrier Units

* Thrie-Beam Guardrail Splice

Vertical End Taper required for 42" F Shape Traffic Railing & 8' or 14' Traffic Railing / Sound Barrier

PARTIAL ELEVATION VIEW - FLORIDA CORRAL TRAFFIC RAILING

42" Vertical Shape Traffic Railing (shown), 32" Vertical Shape Traffic Railing (similar)

Partial Elevation View

APPENDIX TRANSITION SPLICE DETAIL FOR F AND NEW JERSEY SHAPE TRAFFIC RAILINGS AND 8' & 14' TRAFFIC RAILING / SOUND BARRIERS (CONCRETE BARRIER WALL SIMILAR)
**2010 FDOT Design Standards**

**Partial Plan View**

Freestanding Type K Barrier Units shown Bolted or
Staked Units similar. See Plans for specific requirements.

**Partial Elevation View**

Freestanding Type K Barrier Units shown Bolted or
Staked Units similar. See Plans for specific requirements.

**Trailing End Splice Detail**

For F and New Jersey Shape Traffic Railings
And 8’ & 14’ Traffic Railing / Sound Barriers

Cross References:
See Sheet 13 for Section 4-A,
Section 8-B and Section E-C.

**Partial Plan View**

Freestanding Type K Barrier Units shown Bolted or
Staked Units similar. See Plans for specific requirements.

**Partial Elevation View**

Freestanding Type K Barrier Units shown Bolted or
Staked Units similar. See Plans for specific requirements.

**Trailing End Splice Detail**

For Florida Corral and Vertical Shape Traffic Railings

Cross References:
See Sheet 13 for Section 4-A,
Section 8-B and Section E-C.

2010 FDOT Design Standards

Type K Temporary Concrete Barrier System
GENERAL NOTES

1. Temporary Concrete Barrier walls on roadways may be any of the following:
   a. The FDOT Type F Temporary Concrete Barrier Wall (Design Standard Index 414); F-Shaped units only.
   b. The FDOT 415 Temporary Concrete Barrier Wall unit shown on Sheets 1 and 3 of this Index, if manufactured prior to October 1, 2002, in good condition, and installed in accordance with this Index. Units may be either F-Shaped or New Jersey Shape. The FDOT 415 unit shown in this Index is the design provided in Index No. 415 in prior editions of the Design Standards. See NOTICE below. Since 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 wall systems meeting NCHRP 350 Test Level 3 criteria and included on the Qualified Products List. Units may be either F-Shaped or New Jersey Shape unless otherwise noted in the plans.

2. The FDOT 415 units with the optional end connections shown in this index may be interconnected within a run of walls. However, interlocking units with different shapes (F-Shaped, New Jersey Shaped) and units with dissimilar connections (415, Type K) or different within a continuous run of walls is not permitted. See Sheets 6 through 8 for required treatment for continuation of runs of barrier with different shapes or dissimilar connectors.

3. Alignment, length, need, anchorage and end treatment shall be in accordance with this index.

4. Wall units shall not be 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 50' centers in transitions, 100' centers on curves and 200' centers on tangent roadways. For additional information refer to Index 600.

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), LF. Type C Steady-Burn Lights shall be paid for under the contract unit price for Lights, Temporary, Barrier Wall Mount (Steady-Burn), EU.

FOOT 415 TEMPORARY CONCRETE BARRIER WALL UNIT AND GENERAL NOTES

When Shielding Above Ground Hazards:

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Deflection Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 mph or Less</td>
<td>2&quot;</td>
</tr>
<tr>
<td>50 mph and Greater</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

When Shielding Dropoffs:

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Deflection Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 mph or Less</td>
<td>2&quot;</td>
</tr>
<tr>
<td>50 mph and Greater</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

| Dropoffs 4' or Less and No Traffic Below | 2" |
| Other Dropoff conditions other than 4' | 4" |

When used as a Temporary Median Barrier separating opposing traffic lanes:

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Offset To Travelway</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 mph or Less</td>
<td>0' min. 2' preferred</td>
</tr>
<tr>
<td>50 mph and Greater</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

Note: These deflection space requirements also apply to approved options identified in General Notes 414.

DEFLECTION SPACE REQUIREMENTS
The approach departure line location is determined by the line intersect with the back of the hazard or the area to be shielded; however, the intersect offset distance is not to be beyond the clear zone limit. The trailing departure line is determined by the line intersect with the front of the downstream end of the hazard or the area to be shielded.

The length of barrier wall is the distance from the approach departure line intersect with the upstream toe of the temporary concrete barrier wall to the trailing departure line intersect with the downstream toe of the temporary concrete barrier wall.

Where temporary concrete barrier wall end units are not anchored, two and one-half (2 1/2) wall units (min.) are required beyond the length of barrier need for wall end anchorages.

Proprietary reductive crash cushions designed for use with temporary concrete barriers have the beginning length of need and departure line intersect point indicated on the respective G5's drawing for each proprietary crash cushion. Where reductive crash cushions are located on the departure line by their length of need reference point, the wall upstream end must be aligned with the crash cushion, and the 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 anchorages.

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 other 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 1:10 or flatter for speeds ≤ 45 mph and 1:15 or flatter for speeds ≥ 50 mph; see Index No. 642 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 1:10 vertical:10 horizontal.

**ALIGNMENT AND LENGTH OF NEED**
NOTES FOR WALL END SHIELDING

1. Redirective crash cushions are the principal (standard) device to be used for shielding approach ends of temporary concrete barrier walls. Except where the plans designate a particular type crash cushion for a specific location, the contractor has the option to construct any of the redirective crash cushions listed on the Qualified Products List, subject to the uses and limitations described in their respective drawings. 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, on loan, shared between projects, or made up of mixed new and used components.

3. Integral crash cushions are not optional systems for locations designated for redirective crash cushions by the plans. They cannot be substituted for redirective crash cushions, and are not eligible for VECP consideration.

4. A yellow post mounted Type 1 Object Marker shall be centered 3 ft in front of the nose of all temporary crash cushions. Mounting hardware shall be in accordance with Index Nos 1860 and 1863. 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.D.

ANCHOR PLATE REQUIREMENTS FOR BARRIER WALL END UNITS ABUTTING CRASH CUSHIONS

1. For temporary barrier wall end units requiring anchor plates, see sheets 5 through 10.

2. The temporary concrete barrier wall anchor plate depicted above is a proprietary design by Energy Absorption Systems, Inc. Other temporary anchorages can be substituted when workability is assured by any of the following:
   - a) proven by associated crash test of redirective crash cushions, or
   - b) meet anchorage provisions 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 would be included in the cost for the adjuvant redirective crash cushion.
MEDIAN HAZARDS WITHIN CLEAR ZONES BOTH ROADWAYS

MEDIAN HAZARDS EXTENDS TO OR BEYOND CLEAR ZONES BOTH ROADWAYS

Note: Anchor Plates Required Only On End Units Abutting Crash Cushions. Schematics on this sheet based on 26 units.

See Sheet 2

BARRIER WALL END UNIT ANCHORAGE
45 MPH OR LESS

50 MPH OR GREATER

SHOULDER BARRIER ON UNDIVIDED FACILITIES

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.
45 MPH OR LESS

50 MPH OR GREATER

APPROACH SHOULDER BARRIER ON UNDIVIDED FACILITIES

LEGEND

CONTINUATION OF BARRIER • FROM OTHER TYPE BARRIERS TO BARRIER TYPE K

BARRIER TYPE K ON BRIDGES AND APPROACH SLABS

TEMPORARY CONCRETE BARRIER
45 MPH OR LESS

50 MPH OR GREATER
* Anchor Plates Required Front Side Only On Unit Abutting Crash Cushion (See Sheet 4).
* Overlap Reference Line

DEPARTURE (TRAILING) SHOULDER BARRIER ON UNDIVIDED FACILITIES

CONTINUATION OF BARRIER • FROM BARRIER TYPE K TO OTHER TYPE BARRIERS
BARRIER TYPE K ON BRIDGES AND APPROACH SLABS
SHIELING WALL ENDS WITH REDIRECTIVE CRASH CUSHIONS (REDIRECTIVE OPTION)  
(CONTINUATION ON SHEET 10)
UNIDIRECTIONAL - SEPARATED TRAFFIC

TWO-WAY TRAFFIC WITH CRASH CUSHION LOCATED OUTSIDE OPPOSING LANE CLEAR ZONE OR ONE-WAY TRAFFIC

SHOULDER - RIGHT OR LEFT (RIGHT SIDE SHOWN)

BIDIRECTIONAL - SEPARATED TRAFFIC

TWO-WAY TRAFFIC WITH CRASH CUSHION LOCATED WITHIN OPPOSING LANE CLEAR ZONE

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 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.

SHIELING WALL ENDS WITH REDIRECTIVE CRASH CUSHIONS (REDIRECTIVE OPTION)
INERTIAL CRASH CUSHION ARRAYS

NOTES FOR TEMPORARY GATING CRASH CUSHIONS

1. The crash cushion arrays shown in 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 only when a temporary gating crash cushion or inertial crash cushion 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 back of 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 lane of the opposing traffic.

3. Inertial crash cushions may be installed in accordance with the manufacturer's specifications and recommendations, and can be constructed of alternating 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 feet from the face of all crash cushion arrays. 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.

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, provided a configuration using the system for this substitution has been detailed in the approved QPL drawings. Manufacturers seeking approval of temporary gating crash cushion systems for inclusion on the QPL must submit application along with design documentation showing the crash cushion system is crash tested to NCHRP Report 350 Test Level 3 criteria, is acceptable by FHWA, and is compatible with FDOT temporary barrier wall systems. System approvals will be contingent on FDOT's evaluation of crash test performance results for consistency with FDOT temporary barrier wall end shielding applications and uses. If approved, installation drawings signed and sealed by a professional engineer licensed in the State of Florida will be required.

7. Temporary crash cushions (gating) are to be paid for, per array, under the contract unit price for Vehicular Impact Attenuator/Crash Cushion (Gating) (Temporary), 1.0.

TEMPORARY INERTIAL CRASH CUSHION FOR SHIELDING ENDS OF TEMPORARY CONCRETE BARRIER WALL
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 bars. 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.

GUARDRAILS: For Guardrail connection details see Index Nos. 400 and 410.

SUPELEVATED BRIDGES: All the guardrail on the Contractor to the Traffic Railing on super-elevated bridges may be constructed perpendicular to the roadway surface. If an adjoining railing is constructed parallel, transition the end of the Traffic Railing from perpendicular to parallel over a minimum distance of 20 ft. The cost of all modifications will be at the Contractor's expense.

PEDESTRIAN AND BICYCLE RAILING: See Index Nos. 821 and 822 for Notes, Details and post spacings for Traffic Railings with Aluminum Pedestrian/Bicycle Railings.


NAME DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing 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 name shall be shown in the General Notes in the Structure Plan. 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 3" in height may be used, as approved by the Engineer. In lieu of the letters and figures formed by 3/4" V-Grooves, V-Grooves shall be formed by perforated letters and figures.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall meet Specification Section 955. Install markers on top of the Traffic Railing 2" from the face on the traffic side at the spacing shown in the table above. Reflector color (white or yellow) shall match the color of the near edge. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing.

JONTS: See Plans, Superstructure, Approach Slab and Retaining Walls Sheets for actual dimensions and joint orientation. Open Railing Joints at Deck Transition 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 1/8 Pier or Intermediate Pier similar.

Provide 3/4" Intermediate Open Joints at:
(1) Substructure supports where superstructure slab is continuous.
(2) Midspan where span length exceeds 90 ft.
(3) Intermediate 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 junction slabs.
SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
(Section thru Bridge Deck shown, Section thru Approach Slab and Retaining Walls similar)

PLAN - Railing End Transition
(Showing Bars 5V and 5S)

DETAIL "A"
(Railing on Approach Slab shown, Railing on Retaining Wall similar)

NOTE: Unit Railing End Transition and Guardrail Index 420 Concrete Barrier Walls used beyond the Approach Slab or Retaining Wall. See Structures Plans, Plan and Elevation Sheet and roadway Plans. If Railing End Transition is omitted, extend Typical Section to end of the Approach Slab or limiting station on Retaining Wall, and space Bars 5P and 5V at 8" (Typ.)

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/steel located within the limits of Bars 5V, provided that the total area of longitudinal/steel beneath the railing, as required by calculation, is not reduced. Show these bars on the Structures Plans, Superstructure Sheets with the deck steel.

All Bars 5P, 5S and 5V as shown are included in the Estimated Traffic Railing Guidebar. Do not include Bars 5P, 5S and 5V in the reinforcing bar lists and estimated quantities for supporting bridge decks, approach slabs or retaining walls.

NOTES:
- 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.
- If required, adjustments to the bar spacing for Bars 5P and 5V shall be made immediately adjacent to begin or end bridge.

CROSS REFERENCE:
For all sections of Section A-A and View B-B see Sheet 1.
**TRAFFIC RAILING NOTES**

**JUPTS** - See Plans, Structure, Approach 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 #: Pier or Intermediate Bent similar. Provide #: Intermediate Open Joint at #:.

(1) - Substructure supports where superstructure slab is continuous.
(2) - Midspan where span length exceeds 90 ft.
(3) - Intermediate locations (equally spaced) between midspan and substructure supports where span length exceeds 180 ft.

**CONCRETE AND REINFORCING STEEL** - See Structures Plans, General Notes. Guardrail for Guardrail connection details see Index No. 400.

**SUPERELEVATED BRIDGES** - At the option of the Contractor the Traffic Railings on Supercharged bridges may be constructed perpendicular to the roadway surface. The cost of all modifications will be at the Contractor's expense.

**REFLECTIVE RAILING MARKERS** - Reflective Railinck Markers shall be Specification Section 993. Install markers at top of the Traffic Railing along the centerline at the spacing shown in the table above. Reflector color (white or yellow) shall match the color of the near edge line. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing.
**ALTERNATE REINFORCING STEEL (WELDED WIRE REINFORCEMENT) DETAILS**

**WELDED WIRE REINFORCEMENT NOTES:**
1. At the option of the Contractor, Welded Wire Reinforcement may be utilized in lieu of all Bars.
   5R, 5S, and 5W. Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded Wire Reinforcement at Railing End Transition shall be field bent inward as required (Pieces 1 & 2) to maintain cover. The top of Piece 1 shall be cut to allow overlap.
3. Place WWR panels so as to minimize the end overlapping of longitudinal wires at Railing Ends and Open Joints. Overhangs greater than 6" are not permitted.

**SPlice DETAIL**
(Between WWR Sections)

**Welded Wire Reinforcement (WWR) Piece No. 1**

**Welded Wire Reinforcement (WWR) Piece No. 2**

**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

<table>
<thead>
<tr>
<th>ROADWAY CROSS-SLOPE</th>
<th>CNN SLOPE AT CROWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% to 2%</td>
<td>94° 90° 94° 90°</td>
</tr>
<tr>
<td>2% to 6%</td>
<td>93° 87° 90° 90°</td>
</tr>
<tr>
<td>6% to 10%</td>
<td>96° 84° 90° 90°</td>
</tr>
</tbody>
</table>

$94$ and $90$ shall be $90\degree$. If Contractor elects to place railing perpendicular to the deck, and approach slabs.

**BILL OF REINFORCING STEEL**

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>5</td>
<td>6'-1&quot;</td>
</tr>
<tr>
<td>S</td>
<td>5</td>
<td>As Req.</td>
</tr>
<tr>
<td>W</td>
<td>5</td>
<td>5'-3&quot;</td>
</tr>
</tbody>
</table>

Length as Required

**BAR 5S**

**STIRRUP BAR 5R**

**STIRRUP BAR 5W**

To Be Field Cut and Bent (10 required per Railing End Transition)

**TRANSITION STIRRUP BAR 5W**

**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. Bar 5S may be continuous or spliced at the construction joints. Bar splices for Bars 5S 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 at the bottom legs.

**ESTIMATED TRAFFIC RAILING QUANTITIES**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
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<tr>
<td>Concrete</td>
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</tr>
<tr>
<td>Rebar</td>
<td>LB/LF</td>
<td>23.29</td>
</tr>
</tbody>
</table>

(The above quantities are based on a crowned roadway, with a 2% cross slope.)

**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.

**DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT**

2010 FDOT Design Standards

TRAFFIC RAILING - (MIDWAY 32" F SHAPE)
PLAN
(Reinforcing Steel not shown for clarity)

REFLECTIVE RAILING MARKER SPACING

<table>
<thead>
<tr>
<th>Distance to Face of Railing</th>
<th>Spacing (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot; to 8'-6&quot;</td>
<td>40&quot;</td>
</tr>
<tr>
<td>&gt; 8'-6&quot;</td>
<td>None Required</td>
</tr>
</tbody>
</table>

ELEVATION OF INSIDE FACE OF RAILING
(Reinforcing Steel not shown for clarity)

TRAFFIC RAILING NOTES

This railing has been structurally evaluated to be equivalent or greater in strength to other safety type 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, when the marker shall be placed at one end of the bridge. On bridges, when the 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 costs of installing the markers shall be included in the Contract Unit Price for the Traffic railing.

RAILINGS ON RETAINING WALLS: If the Traffic Railing is to be provided on a retaining wall, the railing section will be the same as shown on Exhibit No. 422, Sheet 2. All other details such as the guardrail transition attachment, the maximum spacing of the 1/2" open joints and 1/4" V-Groove shall apply.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall meet Specification Section 993.

RAILINGS ON RETAINING WALLS: If the Traffic Railing is to be provided on a retaining wall, the railing section will be the same as shown on Exhibit No. 422, Sheet 2. All other details such as the guardrail transition attachment, the maximum spacing of the 1/2" open joints and 1/4" V-Groove shall apply.

ELEVATION OF INSIDE FACE OF RAILING
(Reinforcing Steel not shown for clarity)

TRAFFIC RAILING NOTES

NAME, DATE, AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing so as to be on the driver's right side when approaching the bridge. The Date shall be on the railing at the same location as shown in the General Notes. The Date shall be placed on the bridge at the same location as shown in the General Notes.

JOINTS: See Plans, Superstructure, Approach Slab and Retaining Wall Sheets for actual dimensions and joint orientation. Open Railing Joints are required only at expansion joint locations. The dimensions of the deck joint for treatment of railings on skewed bridges see Index No. 490. Deck Joint at Begin Bridge and End Bridge shown. Deck Joint at Piers or Intermediate Bents similar.

Provide 1/2" Intermediate Open Joints at:
1. Substructure supports where superstructure slab is continuous.
2. Midspans where span length exceeds 90 ft.
3. Intermediate locations equally spaced between midspan and substructure supports where span length exceeds 180 ft.
4. Adjacent to expansion joints on retaining wall and at expansion joints on retaining wall/intersection slabs.
SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
SECTION THRU BRIDGE DECK SHOWN

NOTES:

- Begin placing Railing Bars 5T and 5X on Approach Slab at the railing end and proceed toward Begin or End Bridge to ensure placement of guardrail out 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 as required to maintain cover in Railing End Transition.

- Omit Railing Taper, End Transition and Guardrail Concrete Barrier Walls used beyond the Approach Slab or Retaining Wall. See Structures Plans, Plan and Elevation Sheet and ROAEOY Plans. If Railing End Transition is omitted, extend typical Section to end of the Approach Slab or limiting station on Retaining Wall, and space Bars 5T and 5X at 1-0" (Typ.)

VIEW B-B
(End View of Traffic Railing, Approach Slab shown, Retaining Wall Junction Slab similar)

CROSS REFERENCE:
For location of Section A-A, detail "A" and View B-B, see Sheet 1.

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 5T, provided that the total area of longitudinal steel beneath the railing as required by calculation is not reduced. Show these bars on the Structures Plans, Superstructure Sheets with the deck steel.
- All Bars 5S, 5T, and 5X as shown are included in the Estimated Traffic Railing Quantities. Do not include Bars 5S, 5T, and 5X in the reinforcing bar lists and estimated quantities for supporting bridge decks, approach slabs or retaining walls.
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>5</td>
<td>As Regd.</td>
</tr>
<tr>
<td>T</td>
<td>5</td>
<td>10'-8''</td>
</tr>
<tr>
<td>X</td>
<td>5</td>
<td>6'-8''</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROADWAY CROSS-SLOPE</th>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% to 2%</td>
<td>90°</td>
<td>90°</td>
</tr>
<tr>
<td>2% to 6%</td>
<td>87°</td>
<td>87°</td>
</tr>
<tr>
<td>6% to 10%</td>
<td>84°</td>
<td>96°</td>
</tr>
</tbody>
</table>

Length as Required

BAR 5S

TRANSITION STIRRUP BARS 5T
To Be Field Cut (1/of each required per Railing End Transition)

TRANSITION STIRRUP BARS 5X
To Be Field Cut (1/2 of each required per Railing End Transition)

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are cut to cut.
2. The 4'-0" x 6'-8" vertical dimension shown for Bars 5T and 5S is 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 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 4'-0" x 90°.
4. All reinforcing steel at the open joints shall have a 1" minimum cover.
5. Bars 5S may be continuous or spliced at the construction joints. Bar splices for Bars 5S shall be a minimum of 3'-0".
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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>CYL/F</td>
<td>0.145</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>LB/FL</td>
<td>50.68</td>
</tr>
</tbody>
</table>

(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)
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 ends. On bridges longer than 100 ft one marker shall be placed at each end of the bridge. On bridges 100 ft or less and a 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.
- PED ESTRIKABICYCLE RAILING AND SPECIAL HEIGHT BICYCLE RAILING DETAILS: See Index No. 422 for Pedestrian/Bicycle Railing Details and Installation Details and Notes.
- REFLECTOR RAILING MARKERS: Reflective Markers shall meet Specification Section 993. Install markers on top of the Traffic Railing 2" from the face on the traffic side of the space shown in the table above. Reflector color white or yellow shall match the color of the near edge joints. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing.

**RAILINGS ON RETAINING WALLS**
- If the Traffic Railing is to be provided on a retaining wall, the railing section will be the same as shown on Sheet 2. All other details such as the guardrail/transmission attachment, the maximum spacing of the 3/4" open joints and 3/4" V-Groove shall apply.
- NAME, DATE, AND BRIDGE NUMBER: The name and Bridge Number shall be placed on the Traffic Railing as to be seen on the or 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 placed in the General Notes of the Structures Plans. The date shall be the year the bridge is completed. No date shall be placed when the existing railing is removed, and the new railing is provided. 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 3/4" V-Grooves. V-Grooves shall be formed by perforated letters and figures.

**OPEN JOINTS**
- See Structures Plans, Superstructure, Approach Slab Sheets and Retaining Walls for actual dimensions and joint orientation. Open Joint Details at Deck Expansion Joint locations shall match the dimensions of the Deck Joint. For treatment of railings on skewed bridges see Index No. 450. Deck Joint at Begin or End Bridge shall be shown. Deck Joint at Pier or Intermediate Pier shall be shown. Provide 3/4" Intermediate Open Joints at:
  (1) Substructure supports where superstructure slab is continuous.
  (2) Midspan where span length exceeds 90 ft.
  (3) Intermediate locations where the span length exceeds 180 ft.
  (4) At ends of approach slabs where adjacent to retaining walls at expansion joints on retaining wall/intersection slabs.
SECTION A-A
TYPICAL SECTION THRU TRAFFIC RAILING
SECTION THRU BRIDGE DECK SHOWN

NOTES:
- omit Railing End Taper and Guardrail if Concrete Barrier Walls are used beyond the Approach Slab. See Structures Plans, Plan and Elevation Sheet and Roadway Plans. If Railing End Taper is omitted, extend Typical Section to end of Approach Slab. Begin placing Railing Bars ST and SX 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 ST and SX shall be made immediately adjacent to Begin or End Bridge. Shifts and rotate Bars ST and SX on Approach Slab in end taper section as required to maintain cover.

INSTRUCTIONS TO DESIGNER:
- For Bridge Decks up to a maximum thickness of 9", the two bars SS placed in the bridge deck may substitute for the longitudinal deck steel located within the limits of Bars ST, provided that the total area of longitudinal steel beneath the railing, as required by calculation, is not reduced. Show these bars on the Structures Plans, Superstructure Sheets with the deck steel.
- All Bars SS, ST and SX as shown are included in the Estimated Traffic Railing Quantities. Do not include Bars SS, ST and SX in the reinforcing bar lists and estimated quantities for supporting bridge decks, approach slabs or retaining walls.

RAILING END DETAIL
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

<table>
<thead>
<tr>
<th>BILLS OF REINFORCING STEEL</th>
<th>CROSS-SLOPE</th>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARK</td>
<td>SIZE</td>
<td>LENGTH</td>
<td>0% to 2%</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>As Req.</td>
<td>90°</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>9' - 9&quot;</td>
<td>90°</td>
</tr>
<tr>
<td>X</td>
<td>5</td>
<td>5' - 10&quot;</td>
<td>90°</td>
</tr>
</tbody>
</table>

DETAIL "A" - SECTION AT INTERMEDIATE OPEN JOINT

NOTE: At Intermediate Open Joints, the lower 1' 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

REINFORCING STEEL NOTES:

1. All dimensions in the bending diagrams are cut to cut.
2. The 3' = B/2" 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 S4 = 90°.
4. All reinforcement shall have a 2" minimum cover.
5. Bars SS may be continuous or spliced at the construction joints. Bar splices for Bars SS 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.

ESTIMATED TRAFFIC RAILING QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
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<td>Reinforcing Steel</td>
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<td>25.90</td>
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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) (Reinforcing Steel Not Shown For Clarity)

NOTE:
- End Post dimensions for a given span shall match.

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 550, TL-4 Criteria.
- AGGREGATE ILLUMINATION: The aggregate used in the concrete mix shall be 65% aggregate.
- MARKERS: Elevation markers shall be placed on top of the Traffic Railing on the end bents. On bridges longer than 100 ft, one marker shall be placed at each end of the bridge. On bridges up to 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: See Guardrail connection details in Index No. 400.
- SUPERELEVATED BRIDGES: At the option of the Contractor the Traffic Railing on super-elevated bridges may be constructed parallel to the roadway surface. The cost of all modifications will be at the Contractor’s expense.

RECEIVING WALL: If the Traffic Railing Barrier is to be provided on a retaining wall, the railing sections will be the same as on Sheets 3 and 4. See Retaining Wall Plans for payment.

NAME, DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing system on the driver’s right side when approaching the bridge. The name shall be as shown in the General Notes in the Structures Plans. 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 3” in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by 9/16” V-grooves.

V-grooves shall be formed by preformed letters and figures.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall meet Specification Section 368. Markers on top of the Traffic Railing 2” from the face on the traffic side at the spacing shown in the table above. Reflect color (white or yellow) shall match the color of the near edgeline. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing.

NOTES:
- (MF) means next Face, (MF) means For Face.

CROSS REFERENCES:
- For Sections see Sheets 3 and 4.
- For Quantity and Quantity Breakdown see Sheet 5.

INSTRUCTION TO DESIGNER:
1. Indicate use of curb beneath railing on low side of deck without sidewalks and other locations where required to contain bridge deck runoff. Define Curb location in Structures Plans Superstructure Sheets by Stationing Units or other applicable standards.

2010 FDOT Design Standards
TRAFFIC RAILING (CORRAL 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 7/12 to 7/2 and 4V on Approach Slab at the barrier end and proceed toward begin or end bridge to ensure placement of guardrail bolt holes.
- If required adjustments in the bar spacing for Bars 7/12 or 7/2 and 4V should be made immediately adjacent to begin or end bridge.

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

ELEVATION OF INSIDE FACE OF RAILING WITH GUARDRAIL ON APPROACH SLABS GREATER THAN 40'-0" ALONG GUTTER (WITHOUT CURB SHOWN, WITH CURB SIMILAR)
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

SECTION C-C

TYPICAL SECTIONS THRU RAILING END SECTION ON APPROACH SLAB WITH SIDEWALK AND GUARDRAIL

APPRAOH SLAB (FLEXIBLE PAVEMENT APPROACHES) SHOWN, APPROACH SLAB (RIGID PAVEMENT APPROACHES) SIMILAR

PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK

(Bar R, S and T not shown for clarity)

RAILING ADJACENT TO SIDEWALK NOTES:

1) End Post detailed above, Interior Post and Approach Slab end Section similar.
2) For decks to 85" place Bars T.P1 and T.P2 and 4 V with the bottom mat of reinforcement as shown in Section 4-A. For decks and slabs thicker than 85" place Bars T.P1 and T.P2 and 4 V with 6" embed.
3) Alternate bars T.P1 and T.P2 at each post. At End Posts, 3 each (min.) required, at Intermediate Post 6 each required.
4) Reverse direction of every other Bar 4 V to match direction of Bars T.P1 or T.P2.
5) Shift deck and approach slab transverse reinforcement minimally to allow placement of Bars T.P1 6, 4 V.

CROSS REFERENCES:

For Locations of Sections see Sheets 1 and 2.
For Quantities and Rebar Details see Sheet 5.

2010 FDOT Design Standards

TRAFFIC RAILING - (CORRAL SHAPE)
<table>
<thead>
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<th>MARK</th>
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<th>LENGTH</th>
<th>LB/BAR</th>
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<tbody>
<tr>
<td>P1</td>
<td>7</td>
<td>7-3&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>P2</td>
<td>7</td>
<td>7-3&quot;</td>
<td>14.82</td>
</tr>
<tr>
<td>P3</td>
<td>7</td>
<td>7-3&quot;</td>
<td>14.65</td>
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<tr>
<td># P4</td>
<td>7</td>
<td>7-3&quot;</td>
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<tr>
<td># P5</td>
<td>7</td>
<td>2-11&quot;</td>
<td>1.94</td>
</tr>
<tr>
<td>P1</td>
<td>6</td>
<td>As Req.</td>
<td>15 (R.A.F.)</td>
</tr>
<tr>
<td>P2</td>
<td>5</td>
<td>As Req.</td>
<td>10.54 (R.A.F.)</td>
</tr>
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<td>As Req.</td>
<td>8.67 (R.A.F.)</td>
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<td>3-0&quot;</td>
<td>5.52</td>
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<td>6</td>
<td>10-4&quot;</td>
<td>17.02</td>
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<td>U</td>
<td>5</td>
<td>4-8&quot;</td>
<td>4.87</td>
</tr>
<tr>
<td>V1</td>
<td>4</td>
<td>3-0&quot;</td>
<td>7.12</td>
</tr>
<tr>
<td>### V2</td>
<td>4</td>
<td>3-6&quot;</td>
<td>2.34</td>
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**Notes:**

1. All dimensions in the bending diagrams are cut to cut.
2. The reinforcement for the railing on a CDP Concrete Retaining Wall shall be the same as detailed above for a 6" deck with δA = 90° where applicable. If bottom horizontal bars of Bar 7P1, 7P2, and 4V1 prohibit placement, Bars P74 and 4V2 may be substituted for Bars 7P1, 7P2, 4V1 as shown.
3. All reinforcing steel at the top joints shall have a 2" minimum cover unless otherwise noted.
4. At Construction Joints Bars 6R1, 5R2, and 4R3 may be continuous or spliced. Where bars are spliced provide a 2-6" min. lap length for Bar 6R1, a 2-0" min. lap length for Bars 5R2 and a 1-3" min. lap length for Bar 4R3.

5. The skew angle for Bars 7P3 may vary between joint to joint and side to side, see Structures Plans, Superstructure Sheets for details.

---

**Bill of Reinforcing Steel**

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>LB/BAR</th>
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**Reinforcement Steel Notes:**

1. All dimensions in the bending diagrams are cut to cut.
2. The reinforcement for the railing on a CDP Concrete Retaining Wall shall be the same as detailed above for a 6" deck with δA = 90° where applicable. If bottom horizontal bars of Bar 7P1, 7P2, and 4V1 prohibit placement, Bars P74 and 4V2 may be substituted for Bars 7P1, 7P2, 4V1 as shown.
3. All reinforcing steel at the top joints shall have a 2" minimum cover unless otherwise noted.
4. At Construction Joints Bars 6R1, 5R2, and 4R3 may be continuous or spliced. Where bars are spliced provide a 2-6" min. lap length for Bar 6R1, a 2-0" min. lap length for Bars 5R2 and a 1-3" min. lap length for Bar 4R3.

5. The skew angle for Bars 7P3 may vary between joint to joint and side to side, see Structures Plans, Superstructure Sheets for details.

---

**Estimated Traffic Railing Quantities**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONCRETE QUANTITY (CY)</th>
<th>REBAR QUANTITY (LB)</th>
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</thead>
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<tr>
<td>Typical 10'-0&quot; Section w/ Curb</td>
<td>1.13</td>
<td>45.1</td>
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<tr>
<td>Typical 10'-0&quot; Section w/o Curb</td>
<td>1.03</td>
<td>42.8</td>
</tr>
<tr>
<td>Approach Slab w/ Guardrail End Section</td>
<td>0.14</td>
<td>(per ft)</td>
</tr>
</tbody>
</table>

---

**Roadway or Sidewalk Cross-Slope:**

- **High Side:** 0% to 2%: 90°, 90°
- **Low Side:** 2% to 6%: 83°, 87°
- **6% to 10%:** 86°, 84°

δA shall be 90° if Contractor elects to place Railing Perpendicular to the Deck.
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK
- SKEW ANGLE GREATER THAN 15 DEGREES

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. Railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radially to this line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
2. Bars 4½ in not shown shall be placed perpendicular or radially to the gutter.
3. Edge of Approach Slab adjacent to the roadway shall follow the edge of the roadway field cut and shifted to maintain clearance, see Detail 5. Buy this sheet for similar details.
4. Bridge Deck and Approach Slab without Guardrail Attatched (shown).
5. Bars 7/8 & 4V shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement at Bars 7/8 & 4V.
6. Railings at the grade end and proceed toward Begin or End Bridge to ensure placement of guardrail holes. If required, adjustments to the bar spacing for Bars 7/8 & 4V shall be made immediately adjacent to Begin or End Bridge.

NOTES:
1. Railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radially to this line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
2. Bars 4½ in not shown shall be placed perpendicular or radially to the gutter.
3. Bridge Deck and Approach Slab without Guardrail Attatched (shown).
4. Alternate bars 7/8 with Bars 7/8 and reverse direction of every other Bar 4V to facilitate placement of concrete.
5. Bars 7/8 & 4V shall be rotated to match bridge deck reinforcement. Shift deck transverse reinforcement minimally to allow placement at Bars 7/8 & 4V.
6. Railings at the grade end and proceed toward Begin or End Bridge to ensure placement of guardrail holes. If required, adjustments to the bar spacing for Bars 7/8 & 4V 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 rails and guardrails which have been crash tested to NCHRP Report 350.5-7 Criteria.

CONCRETE AND REINFORCED STEEL: See Structures Plans, General Notes.

MARKERS: Elevation Markers shall be placed on top of the Traffic Railing at the ends of bridges. On bridges longer than 100 ft, one marker shall be placed at each end of the bridge. On bridges less than 100 ft or less than one marker shall be placed at each 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.

SUPERELEVATED BRIDGES: At the option of the Contractor the Traffic Railing on super-elevated bridges may be constructed perpendicular to the roadway surface. If an adjoining railing is constructed plane, transition the end of the Traffic Railing from perpendicular to plumb over a minimum distance of 20'-0". The cost of all modifications while at the Contractor’s expense.

GUARDRAILS: For Guardrail connection details, see Index No. 400.

RAILINGS ON RETAINING WALLS: In the Traffic Railing is to be provided on a retaining wall, the railing section shall be the same as shown on Sheet 2. All other details such as the guardrail transition attachment, the maximum spacing of the 3/4" open joints and 3/8" V-groove shall apply.


ELEVATION OF INSIDE FACE OF RAILING (Reinforcing Steel not shown for clarity) (Railing on Bridge Deck and Approach Slab shown, Railing on Retaining Wall similar)

TRAFFIC RAILING 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 Name shall be shown in the General Notes in the Structural Plans. The Date shall be shown in the General Notes in the Structural Plans. The Date shall be shown in the General Notes in the Structural Plans.

CROSS REFERENCE: For Sections 4-1 View 0-10 and Detail 4 see Sheet 2. For Detail 4 see Sheet 3.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall meet Specification Section 395. Install markers on top of the Traffic Railing 2'-0" from the face on the traffic side at the spacing shown in the table above. Reflectors (white or yellow) shall match the color of the near edge line. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing.
**PLAN - Railing End Transition**
(Showing Bars 5V, 8SI, 552 and 8T2)

- Rotate Bars 5V as shown to maintain clearance.

**DETAIL "A"**

* Where railings of adjacent bridges are to be built back to back, the outside vertical plane of the railing and deck may coincide along a plane centered 1/8" up from each gutter line. A bond breaker will be required. See Structures Plans, Superstructure Sheets for Details.

**INSTRUCTION TO DESIGNER**

For bridge decks up to a maximum thickness of 11", the two Bars 552 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 steel beneath the railing, as required by calculation, is not reduced. Show these bars on the Structures Plans, Superstructure Sheets with the deck steel.

- Bars 5V, 8SI and 8T2 as shown are included in the Estimated Traffic Railing Quantities. Do not include Bars 5V, 8SI and 8T2 in the reinforcing bar lists and estimated quantities for supporting bridge decks, approach slabs or retaining walls.

**VIEW B-B**
(Section thru Approach Slab shown, Section retaining walls similar)
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

**BILL OF REINFORCING STEEL**

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<th>LENGTH</th>
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</thead>
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<td>P</td>
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<tr>
<td>S1</td>
<td>8</td>
<td>As Req'd</td>
</tr>
<tr>
<td>S2</td>
<td>5</td>
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<td>T1 &amp; T2</td>
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<td>13-3/8&quot;</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>6-3/4&quot;</td>
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**ROADWAY CROSS-SLOPE**

<table>
<thead>
<tr>
<th></th>
<th>LOW GUTTER</th>
<th>HIGH GUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% to 2%</td>
<td>90°</td>
<td>90°</td>
</tr>
<tr>
<td>2% to 6%</td>
<td>93°</td>
<td>97°</td>
</tr>
<tr>
<td>6% to 10%</td>
<td>96°</td>
<td>94°</td>
</tr>
</tbody>
</table>

Drafts shall be 90° if contractor elects to place railing perpendicular to the deck.

**DETAIL "B" – SECTION AT INTERMEDIATE OPEN JOINT**

NOTE:  
All 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**

---

**ESTIMATED TRAFFIC RAILING QUANTITIES**

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<th>UNIT</th>
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</tr>
<tr>
<td>Reinforcing Steel</td>
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<td>44.7</td>
</tr>
</tbody>
</table>

Note:  
The estimated railing quantities are based on a 2% deck cross slope railing on low side of deck.
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 in Index 400.
3. Establish the end of barrier based on design length of 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.

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 Barriers 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. The cost of the transition(s) is to be included in the cost of the Crash Cushion.

Optional Crash Cushions will be paid for under the contract unit price for Vehicular Impact Attenuator/ Crash Cushion (optional 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.

NOTE:
Total length of Crash Cushion for the TAU II units is based on use of the Compact Backstop. When the POS Backstop is used, these lengths are reduced by 1.57 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 design length of 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.

### GUARDRAIL APPLICATION

<table>
<thead>
<tr>
<th>Design Speed</th>
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<th>Total Length Of Crash Cushion (Ft.)</th>
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<td>29.56</td>
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<td>TAU II</td>
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GENERAL NOTES

1. The opaque visual barrier is intended to function as a visual screen, and is not intended to resist vehicle impact loads nor to restrain, contain or restrict vehicles or cargo. The barrier is designed to withstand zone wind loading and strikes by light debris and, designed to yield to exceptional strikes by vehicles or cargo, and to contain fragmented 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 3/4" in length, embed 6" into the barrier wall and set with an approved chemical grout. Embedment holes shall be 3/4" diameter, drilled to a depth 1 1/2" below the top of the dowel, unless greater depth is required to accept manufactured grout caps.

3. When the opaque visual barrier is constructed in conjunction with project concrete barrier walls, dowels may be set as described above, in either the drilled or preformed holes or, placed in the barrier wall's cast. For dowels that are placed when the wall is cast, the dowel shall be 3' in length and embeded to a depth of 12".

4. When longitudinal reinforcing bars are encountered in the stem of existing barrier, shift the dowels to clear, maintaining the 1 1/2" cover minimum to the face of the opaque visual barrier.

5. 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.

6. For single faced barrier walls that are constructed around other vertical structures, the opaque visual barrier shall follow the alignments of only one of the walls and be centered atop that wall.

7. For dual median barrier walls that follow different alignments, profile designs, the opaque visual barrier shall be constructed atop the wall with the higher elevation, unless conditions dictate otherwise. Laterals, transitions or end overlaps for opaque visual barriers that alternate between dual walls shall be detailed in the plans.

8. For median barrier walls that are divided when connecting to separated bridges, the opaque visual barrier shall be constructed atop the approach side barrier wall unless differential profiles dictate locating the opaque visual barrier on the departure side barrier wall.

9. Opaque visual barriers to be located on capped fills between dual barrier walls shall be detailed in the plans.

10. In lieu of the reinforcement shown, the Contractor may substitute weighted wire fabric equal to or better than that shown, when approved by the Engineer. Details shall be submitted with requests for substitution.

11. The Contractor may construct contiguous precast concrete panels in lieu of the cast-in-place opaque screen when approved by the Engineer. Panel design and method for anchorage to the barrier wall shall be detailed by shop drawings when requesting the Engineer's approval.

12. The Contractor may construct the opaque screen monolithically with the barrier wall, however, the screen design shall not be modified so as to cause the wall to be dynamically active from strikes on the screen; see design considerations in Note 1 above.

13. Exposed concrete surfaces shall have a Class 3 surface finish in accordance with Section 521 of the Standard Specification, unless another finish is called for in the plans. The surfaces shall have a Class 5 Applied Finish Coating in accordance with Section 400 only when called for in the plans.

14. Payment for opaque visual barrier shall be full compensation for concrete, reinforcement, dowels, casting, placement, driving, grouting, finishing and work incidental thereto, and shall be paid for under the contract unit price for Opaque Visual Barrier (Concrete) (2'-3" height), LF.

ESTIMATED QUANTITIES, LF
Concrete 0.042 CY
Reinforcing Steel 3.27 Lbs #
3.38 Lbs With 2'-3" Dowels
This Traffic Railing Retrofit has been structurally evaluated to be equivalent or greater in strength than 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 416, Grade 60.

**THREE-BEAM GUARDRAILS**: Steel Three-Beam Elements shall meet the requirements for Class B (10 Gauge) Guardrail of ASHTO M 180, Type II (Zinc coated). The minimum panel length for Three-Beam Elements shall be 12'-4" Field drilled holes for Post connections shall be 3/8" by 25/64" slotted holes.

**GUARDRAIL BOLTS**: Guardrail bolts and nuts shall be in accordance with AA5701 M8.6.

**GUARDRAIL POSTS AND BASE PLATES**: Posts and Base Plates shall be in accordance with ASTM A 36 or ASTM A 570 Grade 36.

**ANCHOR BOLTS, NUTS AND WASHERS**: Adhesive-bonded Anchors and Anchor Bolts shall be fully threaded rods in accordance with ASTM F 1554 Grade 30 or ASTM A 495 Grade 87. At the Contractor's option, Anchor Bolts for through bolting may be in accordance with ASTM 449. All nuts shall be single self-locking hex nuts and in accordance with ASTM A 495 or ASTM A 294. Flat Washers shall be in accordance with ASTM F 1554 and Plate Washers (for slotted holes only) shall be in accordance with ASTM A 36 or ASTM A 570 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 anchor's shackle are galvanized with a galvanizing compound in accordance with the Specifications.

**COATINGS**: All nuts, bolts, anchors, washers, guardrail posts, anchor plates and base plates shall be hot-dip galvanized in accordance with the Specifications. Guardrail Post Assemblies shall be hot-dip galvanized after fabrication.

**ADHESIVE-BONDED ANCHORS AND DOWELS**: Adhesive Bonding Material Systems for Anchors and Dowels shall comply with Specification Section 9.17 and be installed in accordance with Specification Section 946. The field testing proof loads required by Specification Section 946 shall be applied at the top of the guardrail. The information must be clearly visible from the right side of the approaching travel lane. The shear and adhesive backing shall comply with Specification Section 907 and may comprise of individual decals of letters and numbers.

**PAYMENT**: Payment will be made under Motor Traffic Railing (Three-Beam Retrofit) which shall include all materials and labor required to fabricate and install the barrier and galvanized guardrail where necessary to maintain post spacing. The Pedestrian Safety Pipe Rail, Transition Blocks and Curbs, Bridge Name Plate, Reflective Railing Markers and installation of Elevator Markers, where required, will not be paid for directly but shall be considered as incidental work.

---

### REFLECTIVE RAILING MARKER SPACING

<table>
<thead>
<tr>
<th>Distance - Edge of Travel Lane to Face of Railing</th>
<th>Spacing (ft)</th>
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</thead>
<tbody>
<tr>
<td>&lt; 4'</td>
<td>40'</td>
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<td>4' to 8'</td>
<td>80'</td>
</tr>
<tr>
<td>&gt; 8'</td>
<td>None Required</td>
</tr>
</tbody>
</table>

---

**TRAFFIC RAILING NOTES**

**THREE-BEAM EXPANSION SECTION**: Three-Beam Expansion Sections shall be installed at locations shown in the Plans. Instal all nuts for splice bolts finger-tight at 26 1/2" slots in three beam expansion sections. Nuts shall fully engage bolts with a minimum of one nut thread extending beyond the nuts. Dash the first thread on the outside of the nut to prevent loosening. Tighten guardrail bolts with 3/8" slotted holes at the bottom of the rail to ensure that the bolt heads are in full contact with three-beam elements but not so tight as to impede movement due to expansion.

**NEOPRENE PAWS**: Neoprene pads must be plain pads with a diameter hardness of 60 or 70 and meet the requirements of Specification Section 9.17, except that testing of the finished pad will not be required.

**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 Three Beam Guardrail at the spacings shown in the table below. Reflector color (white or yellow) shall conform to color of the near edge line.

**PEDESTRIAN SAFETY PIPE RAILS**: Pedestrian Safety Pipe Rails shall be installed for in the Plans. See Index No. 400 for details.

**BRIDGE NAME PLATE**: If a portion of the existing Traffic Railing is to be removed that carries the bridge name, number and date, or if the installation of the Traffic Railing (Three Beam Retrofit) will obscure the bridge name, number and date, then replace the information that has been removed or obscured, with 3" raised lettering on white nonreflective sheeting applied to the top of the adjacent guardrail. The information must be clearly visible from the right side of the approaching travel lane. The sheeting and adhesive backing shall comply with Specification Section 994 and may comprise of individual decals of letters and numbers.
PARTIAL PLAN
INTERMEDIATE JOINT SKEW DETAIL

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
MODIFIED POST SPACING AT INTERMEDIATE DECK JOINTS DETAIL FOR INDEX NOS. 471, 475 & 476

8" Min. Guardrail Post Assembly
Offset Blocks Required on Index No. 470

1-1/2" Min. 60° 8 Adhesive-Bonded Anchors
PARTIAL ELEVATION OF INSIDE FACE OF RAILING
MODIFIED POST SPACING AT INTERMEDIATE DECK JOINTS DETAIL FOR INDEX NOS. 472, 473 & 474

THREE-BEAM EXPANSION SECTION

2-1/2" x 26" Splice Bolt Expansion Slots (Typ.)
2-1/2" x 26" Post Bolt Slots

THREE-BEAM EXPANSION SECTION

2-1/2" x 26" Splice Bolt Expansion Slots (Typ.)
2-1/2" x 26" Post Bolt Slots
NOTES:
1. On approach end provide Index No. 403 (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 Joint 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 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.
SECTION A-A
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
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</thead>
<tbody>
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<tr>
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BAR BENDING DIAGRAMS

Dowel Bar 4D (Standard 180° Hook)

NOTES:
1. All bar dimensions are to be cut to length as required.
2. The 1'-2" vertical dimension shown for Bar 4D is based on an existing 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.

SECION B-B
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB

(SCHEMATIC SHOWN, SCHEME 3 SIMILAR)

DETAIL "A"

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 Curb A see Post Dimension Table on Index 470, Sheet 3.
PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING

SCHEME 1

RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS

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.

SCHEME 2

RAILING END TREATMENT FOR PARALLEL WING WALLS

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.
**Scheme 3 Notes:***

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 @ 9° and rotate Dowels/Bars 4B within Curb and Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

3. A single 7/8" 0 x 6" Adhesive-Bonded Anchor may be omitted as shown when 2" clear cover cannot be provided.
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

6-3" spacing (Typ. except as noted along Bridge, see Note 2)

1-6" Min. for non-skew joints. For treatment of skewed Intermediate Deck Joints see Skew Detail Index No. 470, Sheet 2 (Typ.).

CROSS REFERENCES:
For Section 4.4 see Sheet 2.
For Traffic Railing Notes and Details see Index No. 470.

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 trailing end see roadway plans.

2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing of 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 grinding or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

CROSS REFERENCES:
For Section 4-4 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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<tr>
<td>M</td>
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BAR BENDING DIAGRAMS

DOWEL BAR 4D

DOWEL BAR 4L

NOTE: All bar dimensions are out to out.

SECTION B-B
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

MATCH FRONT FACE OF THREE-BEAM GUARDRAIL ALONG BRIDGE
OFFSET (BACKS) AS REQUIRED (SCHEMES 3 AND 4 ONLY)

EXISTING CURB OVERHANG

MATCH SHAPE OF EXISTING CURB

NOTE: Match Dieline at "A" for all schemes.

BAR 4M

2'-8"

3'-8"

1'-7"

2"-86"
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 extended on trailing ends with no opposing traffic.
2. Field bend DowelBars 41 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 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 extended on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curb.
2. Field bend or fit DowelBars 40 and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
PARTIAL PLAN OF RAILING

Varies (6'-3" Max, 3'-16½" Min.)

Typ. along Approach Slab
Post Spacing Scheme 3 as measured to @ Post Bolts
Additional Posts required for Scheme 4 (shown, dashed, number reqd. varies)
Asphalt Overlay when present (Varies)
Guardrail/Post Assembly (Typ.)

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Existing Wing Post and Traffic Railing not shown for clarity)

SCHEMES 3 AND 4
RAILING END TREATMENT FOR FLARED INTEGRAL CURBS

SCHEMES 5 AND 6
RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS

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.

2. Field bend Dowel Bars 4L 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 grading as required. Exposed existing reinforcing steel shall be turned 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

CROSS REFERENCES:
For Match Line see Sheets 3 & 4.
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 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

SHOWN:
- 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.

DETAIL "A"

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 10" w. see Post Dimension Table on Index 470, Sheet 3.
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 grinding or milling as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and ground over.

CROSS REFERENCES:
For Section A-4 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

Dowel Bar 4L

BAR 4M

NOTE: All bar dimensions are out to out.

SECTION B-B
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

CROSS REFERENCES:
For location of Section 4-A see Sheet 3.
For location of Section 4-B see Sheet 4.
For location of View C-C see Sheet 3.
For application of Dim. A see Footnote Table on Index 470, Sheet 3.

VIEW C-C

DETAIL "A"

MATCH SHAPE OF EXISTING CURB

Asphalt Overlay when present (Varies)

Top of Curb

Dowel Bars 4D (10" Embedment) (See Note 2, Sheet 3)

Existing Approach Slab

Existing Approach Slab
**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 or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.

2. Field bend Downbars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

**Partial Elevation of Inside Face of Railing**

(Existing 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 Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match exiting 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 9th Downbars 4D and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

TRAFFIC RAILING - (THREE-BEAM RETROFIT)

WIDE CURB TYPE 1

2010 FDOT Design Standards
PARTIAL PLAN OF RAILING

2 - Variable Spacing

Varieties (3'-16" Max. spacing)

Typ. along Approach Slope

Post Spacing Scheme 3 as measured to $ Post Bolts

Asphalt Overlay when present

Thrie-Beam Guardrail

Guardrail Post Assembly with Offset Block (Typ.)

Existing Approach Slab

Existing Bridge Deck

Front Face of Backwall & Begin or End Bridge

Existing Curb

Existing Flared Wing Wall

Intermediate Deck Joint

Existing Traffic Railing

(Existing Wing Post and Traffic Railing not shown for clarity)

SCHEMES 3 AND 4

RAILING END TREATMENT FOR FLARED INTEGRAL CURBS

SCHEMES 5 AND 6

RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS

SCHEMES 5 AND 6 NOTES:

1. Provide Transition Block (as shown) or Curb if existing Approach Slope Curb does not extend to end of Approach Slope. 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 2nd top and side clearance and 3rd bottom clearance.

2010 FDOT Design Standards
TRAFFIC RAILING - (THRIE-BEAM RETROFIT) WIDE CURB TYPE 1
NOTES:

1. On approach and provide Index No. 452 (as shown) or other site specific treatment, see Roadway Plans.
   For treatment at 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.
SECTION A-A
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

SECTION B-B
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB (SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

BILL OF REINFORCING STEEL

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</tr>
<tr>
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BAR BENDING DIAGRAMS

MATCH FRONT FACE OF
THREE-BEAM GUARDRAIL ALONG BRIDGE

MATCH TOP OF CURB ALONG BRIDGE

MATCH CURB WHEN PRESENT (VARIES)

DOWEL BAR 4D

DOWEL BAR 4L

NOTE: All bar dimensions are cut to cut.
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 previously and approved for a NCHRP Report 350 Test Level A rating, except for the Tapered End Transition on Index No. 484.

CONCRETE: Concrete for the Traffic Railing (Vertical Face Retrofit), Spread Footing Approaches and replacement curb sections shall be
Class IV. Concrete for Curb Transition Blocks shall be Class II (Bridge Deck).

REINFORCING STEEL: Reinforcing steel shall be ASTM A615, Grade 60, except Expansion Dowel Bar which shall be ASTM A36 smooth round bar hot-dip galvanized in accordance with the Specifications.

EXPANSION SLEEVE ASSEMBLY: Pipe sleeve shall be ASTM D2234 PVC pipe, SCH13.5. 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 polyisocyanurate 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 COVERS: Adhesive Bonding Material Systems for Anchors and Dowels shall comply with Specification Section 937 and be installed in accordance with Specification Section 416. The field testing proof loads required by Specification Section 416 shall be 23,800 lbs for Dowel Bars 60 on the inside face (traffic side) of the railing (1/2" embedment) and 18,500 lbs for Dowel Bars 60 along the outside face of the traffic railing (1/2" min. embedment).

BRIDGE ON CURVED ALIGNMENTS: The details presented in these Standards are shown for bridges on tangent alignments. Details for bridges on horizontal curved alignments are similar.

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 was constructed. Letters and figures may be 3" tall back plastic as approved by the Engineer or 3" V-Grooves. V-Grooves shall be formed by preformed letters and figures.

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.

SURFACE FINISH: 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 Railing Markers shall meet Specification Section 993. Install markers on top of theTraffic Railing 2" from the face on the traffic side of the spacing shown in the table below. Reflector color (white or yellow) shall match the color of the near edge line.

PAYMENT: Payment under Traffic Railing (Vertical Face Retrofit) include all materials and labor required to construct the railing. Incidental work required for expansion blocks, curbs, spread footings approaches, reflector marking (including installation) shall be included under Traffic Railing (Vertical Face Retrofit).

![Diagram of Traffic Railing with dimensions and markings]

### REFLECTIVE RAILING MARKER SPACING

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<th>Spacing (ft)</th>
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<td>&gt; 4' to 8'</td>
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<td>&gt; 8'</td>
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### ESTIMATED TRAFFIC RAILING QUANTITIES

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TYPICAL TREATMENT OF RAILING ALONG BRIDGE

1. On approach end 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 Thru-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, 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'-6" minimum dimension shall apply to both the front and back face of the railing. For treatment of railing and see Roadway Plans. If vertical face retrofit extends beyond bridge and approach slab ends, see Index No. 484 for treatment and Details.

2. Field cut bars SS and DowelBars 60 to maintenance within Vertical Face Retrofit Railings.

3. Where existing structure has been removed and not replaced in new concrete, match adjoining areas and finish flat by grouting or grinding as required. Exposed existing reinforcing steel not encased in new concrete shall be burned off 2" below existing concrete and grouted over.

CROSS REFERENCE:
For General Notes, Estimated Quantities, Detail, Expansion Dowel Detail, Reinforcing Steel Notes & Bending Diagrams see Index No. 480.
**PARTIAL PLAN OF GUARDRAIL**

**SHEE1E 1**

**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

**SHEE1E 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 trating 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.

**PARTIAL ELEVATION OF INSIDE FACE OF GUARDRAIL**

**SHEE1E 2**

**RAILING END TREATMENT FOR PARALLEL WING WALLS**

**SHEE1E 2 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 Index No. 482, Sheet 1. If skewed, if the skew along the block joint extends across the width at the railing, the 2'-6” minimum dimension shall apply to both the front and back face of the railing.

2. 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 railing ends with no opposing traffic.

3. Field bend DowelBars 4L within Transition Block as required to maintain 2” top and side clearance and 3” bottom clearance.

**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

(Railing Reinforcing and Expansion Dowel Assemblies not shown for clarity)
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 Backwall, Begin or End Bridge & Match Line (See Sheet 1)
- Parallel Portion of Vertical Face
- Only Present (See Note 1)
- Limiting Station of Transition
- Varies (1'-0" Min.)

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
**PARTIAL PLAN OF RAILING**

- **Existing Bridge Deck**: Bars 60 spacing of Rolling Joints (Typ.) on bridge except as noted for skewed deck joints.
- **Direction of Traffic**: Bars 60 spacing of Rolling Joints (Typ.) on bridge except as noted for skewed deck joints.
- **Asphalt Overlay when present** (Variates)
- **Top of Existing Curb**: 3/8 Open Joint Spacing - 90°-90° (Max.)
- **Front Face of Blockwall**: Begin or End Bridge & Match Line
- **End of Blocks**: Sheets 5, 3, 4, & Index No. 486, Sheets 5 & 8
- **Curb heights vary from 3" min. to 1-2" max.**

**CROSS REFERENCE:**
For General Notes, Estimated Quantities, Dowel Detail, Expansion Dowel Detail, Reinforcing Steel Notes & Bending Diagrams see Index No. 480.

**TYPICAL TREATMENT OF RAILING ALONG BRIDGE**

1. On approach end 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 Three-Beam Terminal Connector to railing as shown above. If limiting station of Roadway Guardrail Transition is along the Wing Wall, see Schemes 2, 3, 4 & 5, Sheets 3 and 4. On skewed bridges, if the skew along the deck joint extends across the width of the railing, the 2-5° minimum dimension shall apply to both the front and back face of the railing. For treatment of trailing end see Roadway Plans. Vertical face retrofit extends beyond bridge and approach slab ends, see Index No. 484 for treatment and details.

2. Field cut Bars 55 and Dowel/Bars 60 to maintain clearance within Vertical Face Retrofit Railing.

3. Where existing structure has been removed and not enclosed in new concrete match adjoining areas and finish flat by grouting or grading as required. Exposed existing reinforcing steel enclosed in new concrete shall be turned off 2" below existing concrete and grouted over.

**TYPICAL SECTION THRU EXITING APPROACH SLAB AND END BENT WING WALL SHOWING LIMITS OF REMOVAL**
(Schemes 4 and 5 only)

**TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB**
(Schemes 2 and 3 only)
**PARTIAL ELEVATION OF INSIDE FACE OF GUARDRAIL**

*Existing Wing Post not shown for clarity*

**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 railing ends with no opposing traffic.

2. Field bend DowelBars 4L within Transition Block as required to maintain 2" top and side clearances and 3" bottom clearance.

3. If a SteelGuardrail 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 2**

**RAILING END TREATMENT FOR PARALLEL CURBS**

**SCHEME 2 NOTES:**

1. See Roadway Plans for limiting station of Roadway Guardrail Transition or other specific treatment. If limiting station of Roadway Guardrail Transition is on the bridge, see Sheet 1. (On skewed bridges, if the skew along the deck joint extends across the width of the railing, the 2'-6" minimum dimension shall apply to both the front and back face of the railing.

2. Provide Transition Block (as shown) or Curb if Existing Approach Slab Curb does not extend beyond end of existing End Beam 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 railing ends with no opposing traffic.

3. Field bend DowelBars 4L within Transition Block as required to maintain 2" top and side clearances 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 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 driling of holes and installation of bars.

3. At the Contractor's option, along the length of the Approach Slab curb that is to be replaced, Dowel Bars 6N 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 with a 1.00 minimum embedment.

---

**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 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 driling of holes and installation of bars.

3. At the Contractor's option, along the length of the Approach Slab curb that is to be replaced, Dowel Bars 6N 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 with a 1.00 minimum embedment.
**Partial Plan of Railing**

- Existing Wing Post (Type Varies)
- 2 of 30 lb Smooth Roofing Paper along joint
- Parallel portion of Existing Flared Wing Wall may or may not exist (Length varies)

- Vertical Face Reinforcement (Type Varies)
- Bars 40 Typ. (Exp. Dowel Sleeve Assembly)
- Bars 60 cut to clear Backwall

- Gutter Line (Cut Existing Approach Slab along this line)
- roadway guardrail transition (See Note 1 Below & Note 2 Sheet 1)

- 3'-0" Transition Block (See Note 3)
- Existing Approach Slab

**Partial Elevation of Inside Face of Railing**

- Existing Wing Post, Railing Reinforcing and Expansion Dowel Assemblies not shown for clarity

**Scheme 5**

**Railing End Treatment for Parallel Curbs**

- Curb heights vary from 5" min to 10" max. Match height and shape of existing curb on bridge.

- Existing Wing Post (Type Varies)
- Various (1'-0" Min.)

**Section C-C**

**Typical Section Thru Railing Along Approach Slab**

- (Scheme 4 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 along the wing wall, attach Throat 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 if existing Approach Slab Curb does not extend beyond end of existing End Batten 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 railings with no opposing traffic.

4. Field bond Dowel Bars 4N 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 60 may be cast in 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.
**Partial Plan of Railing**

- **Open Joint Spacing**
  - 1/2" Open Joint Spacing ~ 90°-0' (Max.)
  - 1/2" Groove Spacing ~ 30°-0' (Max.)

- **Intermediate Open Joint**
  - 1/2" Open Joint Spacing (Typ.)

- **Asphalt Overlay**
  - When present (Varies)

- **Traffic Railing Surface**
  - Top of Existing Curb

- **Roadway Guardrail Transition**
  - See Note 1

**Typical Section Through Existing Traffic Railing Showing Limits of Removal (Bridge Deck Shown, Wing Wall Similar)**

**Notes:**
1. On approach end 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 Thru-Beam Termination Guardrail 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 along the deck joint extends across 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 end slab, see Roadway Plans. If vertical face retrofit extends beyond bridge and approach slab ends, see Index No. 484 for treatment and details.
2. Field cut Bars 55 and Dowel Bars 60 to maintain clearance within Vertical Face Retrofit Railing.
3. Where existing structure has been removed and not encased in new concrete, match adjoining areas and finish hot by grouting or grinding as required. Exposed existing reinforcing steel must be encased in new concrete or chiselled off 1" below existing concrete and grouted over.

**Typical Section Through Railing on Bridge Deck**

**Typical Section Through Railing on Wing Wall**

**Cross Reference:**
For General Notes, Estimated Quantities, Dowel Detail, Expansion Dowel Detail, Reinforcing Steel Notes & Bending Diagram, see Index No. 480.
PARTIAL PLAN OF GUARDRAIL

PARTIAL ELEVATION OF INSIDE FACE OF GUARDRAIL

SCHEME 1
RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS

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.

SCHEME 2
RAILING END TREATMENT FOR PARALLEL WING WALLS

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 Thru-Beam Terminal Connector to railing as shown above. If limiting station of Roadway Guardrail Transition is on the bridge, see Sheet 1. On skewed bridges, if the skew along the deck joint extends across the width of the railing, the 2" minimum dimension shall apply to both the front and back face of the railing.

2. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend beyond end of existing End B deck 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.

3. 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 Thrie-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

Asphalt Overlay when present (Varies)

Final Riding Surface

Existing Curb

Existing Approach Slab

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

Roadway Guardrail Transition (See Note 1 Below & Note 1, Sheet 1)
**SCHEMATIC PLAN VIEW - NEAR LANE APPROACH**

- **Limits of Payment for Vertical Face Retrofit** (include Tapered End Transition when provided)
  - **X** (Length of Advancement, Ft.)
  - **Begin Vertical Face Traffic Rolling Tapered End Transition**
  - **End of bridge end wing (flared wing shown, parallel wing similar) or other hazard that requires shielding**

**SCHEMATIC PLAN VIEW - OPPOSING LANE APPROACH**

- **Limits of Payment for Vertical Face Retrofit** (include Tapered End Transition when provided)
  - **X** (Length of Advancement, Ft.)

**LENGTH OF ADVANCEMENT - TAPERED END TRANSITION (40 MPH OR LESS)**

**DESIGN NOTES:**

- The Tapered End Transition should only be used when space is limited which precludes the use of a guardrail end treatment or crash cushion.

1. Distance in feet from near edge of near approach traffic lane to either:
   - (a) the back of hazard, when the hazard is located inside the clear zone or horizontal clearances; or
   - (b) the clear zone or horizontal clearances, when it extends to, or beyond the clear zone or horizontal clearances.

2. For left side hazards on two-way undivided facilities, "D" is measured from the inside edge of the near approach traffic lane as shown above.

**NOTES:**

1. The minimum length of advancement for both near lane and opposing lane approaches is 20°.

2. For Design Speeds greater than 40 mph the Tapered End Transition is not permitted. See Index No. 460 for length of advancement of guardrail or other project specific end treatments.

**CROSS REFERENCES:**

- For General Notes, Dowel Details, Expansion Dowel Details, Reinforcing Steel Notes and Reinforcing Steel Bending Diagram see Index No. 480.
TAPERED END TRANSITION

CROSS REFERENCES:
For Section 4-A, B-B and X-X see Sheet 4.
SECTION X-X (TYPICAL CURB, TYPE VARIES, TYPE F SHOWN)
(See Index No. 300 and Plans for Details)

# Match Cross Slope of high side and low side at begin or end bridge or approach side.

**#** Match curb height of adjacent bridge and approach slab. Adjust height in transition area to match adjoining roadway curb.

SECTION A-A
TYPICAL SECTION
(9" Curb shown, 6" Curb similar)

SECTION B-B
TAPERED END TRANSITION
(Bars SS not shown for clarity)

SECTION C-C
(GUARDRAIL END TRANSITION)

CROSS REFERENCES
For location of Sections A-A, B-B-9
and X-X see Sheet 2.
For location of Section C-C see Sheet 3.

NOTE: Quantities are based on a 9" curb, no curb cross slope.
PARTIAL PLAN

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Expansion Dowel Assemblies and Bars 4C not shown for clarity)

SCHEME I ~ MODIFICATION FOR INDEX NO. 481, 482 AND 483 ~ SCHEME I
RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING
WALLS WITH NARROW CURBS (SHOWN), WIDE CURBS
AND INTERMEDIATE CURBS (SIMILAR)

CROSS REFERENCE
For Section A-A see Sheet 4
For Expansion Dowel Assembly and
placement of DowelBars 60 Details
see Index 480.

SECTION E-E (NARROW CURB SHOWN,
WIDE AND INTERMEDIATE CURBS SIMILAR)
**SCHEME 2 - MODIFICATION FOR INDEX NO. 481 - SCHEME 2**

**RAILING END TREATMENT FOR PARALLEL WING WALLS WITH NARROW CURBS**

**NOTES:**
1. Remove existing concrete along saw cut joints. Existing reinforcing steel may be cut at joint or extended into new concrete. Exposed existing reinforcing not encased in new concrete shall be removed 1" below existing concrete surface and grouted over.

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**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

(Expansion Dowel Assemblies and Bars 4C not shown for clarity)

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**SECTION F-F**

**SECTION THRU EXISTING CURB AND APPROACH SLAB TO BE REMOVED**

(Free Standing Curb Similar)

**CROSS REFERENCES**

For Section 4-4 see Sheet 4.
For Section 4-5 see Sheet 5.
For Expansion Dowel Assembly and placement of Dowel/Bars 60 details see Index 480.
**Scheme 4 ~ Modification for Index No. 482 Scheme 2**

Railing end treatment for parallel curbs and wing walls with wide curbs

**Scheme 5 ~ Modification for Index No. 482 Scheme 3 and 4**

Railing end treatment for parallel curbs and flared wing walls with wide curbs

Partial Plan of Railing

Partial Elevation of Inside Face of Railing

(Existing Wing Post, Expansion Dowel Assemblies and Bars 4G not shown for clarity)

CROSS REFERENCES:
- For Section A-4 see Sheet 4
- For Section D-0 see Sheet 6
- For Section G-C & H-H see Sheet 7
- For Expansion Dowel Assemblies Details see Index 480.

Traffic Railing - (Vertical Face Retrofit) Spread Footing Approach
PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Expansion Dowel Assemblies and Bars 4C not shown for clarity)

SCHEME 6 ~ MODIFICATION FOR INDEX NO. 483 SCHEME 2
RAILING END TREATMENT FOR PARALLEL CURBS AND
WING WALLS WITH INTERMEDIATE CURBS

CROSS REFERENCES:
For Section A-A see Sheet 4.
For Section D-D see Sheet 5.
For Expansion Dowel Assembly
and placement of Dowel Bars 60
Details see Index 486.

TRAFFIC RAILING - (VERTICAL FACE RETROFIT)
SPREAD FOOTING APPROACH
PARTIAL PLAN OF RAILING

PARTIAL ELEVATION OF INSIDE FACE OF RAILING
(Expansion Dowel Assemblies and Bars 4C not shown for clarity)

SCHEME 7 ~ MODIFICATION FOR INDEX NO. 483 SCHEME 3
RAILING END TREATMENT FOR PARALLEL CURBS AND FLARED WING WALLS WITH INTERMEDIATE CURBS

Note: #2 Match curb height at adjoining existing end bent wing.

CROSS REFERENCES:
For Section 4-4 see Sheet 4.
For Section 4-5 see Sheet 5.
For Section 4-7 see Sheet 9.
For Expansion Dowel Assemblies and placement of Dowel Bore 60 Details see Index 480.
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK, TRAFFIC RAILING INDEX NO. 420 AND PEDESTRIAN/BICYCLE RAILING INDEX NO. 820, OTHER TRAFFIC RAILINGS SIMILAR

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 Railing reinforcement vertical bars 5V & 5P may be shifted up to 1" (Max.) and rotated up to 10 degrees as required to allow proper placement. Bars 5V adjacent to expansion joint 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 vertical leg being placed, the remainder of bar shall be discarded. Cut bars 5V may be rotated to maintain clearance.
4. railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
5. V Intermediate Open Joints and V-Grooves in railing and parapet shall be placed perpendicular or radial to the gutter line or inside face of parapet line. See Structures Plans, Superstructure Sheets for locations.
6. At begin or end approach slab extend slab at the railing ends 3" (gutter side or back face of railing as required) as shown to provide a base for casting of the railing.
7. Begin placing Railing Bars 5P and 5V 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 5P and 5V shall be made immediately adjacent to Begin or End Bridge.

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 joint at Intermediate Piers are similar.
3. Partial должна be inserted for guidance only. See Structures Plans, Superstructure and Approach Slab Sheets for skew angles, joint orientation, dimensions and details.
4. Railing on Raised Sidewalks shall be treated similar to the Partial View of Bridge Deck with Traffic Railing Index No. 420 (Details shown in the upper right corner of this sheet).
5. If Welded Wire Fabric is used in lieu of conventional reinforcement placement of the Welded Wire Fabric shall be similar to those shown above. Capping of horizontal elements to facilitate placement shall be minimized where possible.

SKREW DETAILS FOR TRAFFIC RAILINGS, PARAPETS AND TRAFFIC SEPARATORS
PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH MEDIAN TRAFFIC RAILING INDEX NO. 421

NOTES:
1) Median Traffic Railing reinforcement vertical Bars S.W. may be shifted up to 1" (Max.) and rotated up to 10 degrees as required to allow proper placement.
2) Transition Stirrup Bars S.W. shall be used as required at railing ends adjacent to expansion joints to facilitate placement of bars in acute corners. Rotation Bars S.W. 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 6" 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 S.R. and S.W. 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 S.R. and S.W. 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 6" 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 WRF vertical elements shall be similar to those shown above. Clipping of horizontal elements to facilitate placement shall be minimized where possible.

PARTIAL PLAN VIEW OF BRIDGE DECK AND APPROACH SLAB WITH TRAFFIC SEPARATOR INDEX NO. 302

NOTES:
1) Traffic Separator transverse reinforcement adjacent to deck expansion joints shall be field adjusted to maintain clearance and spacing. Bars shall be field cut as shown, bars may be rotated to maintain clearance.
2) Traffic Separator ends at deck expansion joints shall follow the deck joint limits. Drainage Joints and 1/2" V-Grooves shall be placed perpendicular or radial to the 6" of the Traffic Separator. See Structures Plans, Superstructure and Approach Slab Sheets for details.
GENERAL NOTES

1. All details shown on this index for removal of organic and plastic materials apply unless otherwise shown on the plans.

2. Utilization of excavated materials shall be in accordance with Index No. 505.

3. Where organic or plastic materials are encountered, backfill 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 plastic soils as defined under soil classifications for Plastic (P) and High Plastic (H) on Index No. 505.

5. The term "Organic Material" 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 plans unless directed otherwise by the District Geotechnical Engineer.

REMOVAL OF ORGANIC MATERIAL

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 ASTM T 267 on the portion of a sample passing the No. 4 sieve.

6. The normal depth of side ditches shall be 3.5 below the shoulder point except in special cases.

7. In municipal areas, where underground storm drainage is to be constructed beneath the proposed pavement, the grade of the underground filter material shall extend above the bottom of the stabilized section of the subgrade. Gradation of the filter material shall conform to FDOT specifications. Minimum grade on underground pipe shall be 0.2%.

8. See Index No. 506 for miscellaneous earthwork details.

DESIGN NOTES

1. At locations where organic material or other soft soil deposits persists to such depth that removal is impractical, the construction of a geosynthetic foundation over those soils should be considered. The Engineer of Record should request guidance from the District Geotechnical Engineer and make a geosynthetic foundation design in accordance with Index No. 501 when pursuing geosynthetic alternatives.

2. The designer shall take into consideration the feasibility of roadway widening to the outside, and where widening is anticipated specify in the plans the limits of removal of organic and plastic materials necessary to accommodate anticipated widening.
REMOVAL OF PLASTIC MATERIAL ON DIVIDED FREEWAYS, ARTERIALS AND MAJOR COLLECTORS HAVING FLUSH MEDIANS, AND, ON UNDIVIDED ARTERIALS AND MAJOR COLLECTORS

TYPICAL CUT SECTION

Note: When this detail is applied to minor collectors and local facilities, the undercut may be reduced to 18".

REMOVAL OF PLASTIC MATERIAL ON DIVIDED FREEWAYS, ARTERIALS AND MAJOR COLLECTORS

Added: Storm Sewer Mains to Storm Drain Trunk lines.

DEVELOPMENT CHECKLIST

STANDARD INDEX NO. XXXXX, SHEET X OF X

Original Release Date: 12/18/07

REMOVAL OF PLASTIC MATERIAL ON INTERSTATE FACILITIES, FREEWAYS, DIVIDED ARTERIALS AND MAJOR COLLECTORS HAVING DEPRESSED MEDIANS

REMOVAL OF ORGANIC AND PLASTIC MATERIAL

Note: For GENERAL NOTES see Sheet 1.
GENERAL NOTES

1. All designs shall meet the requirements shown on this sheet and the contract documents.

2. $T_d = \frac{T_{s,s}}{C_{r,s}}$

3. Intermediate reinforcement shall be rolled out parallel to slope face.
REINFORCED EMBANKMENT

SOIL REINFORCEMENT
- Maximum vertical spacing between reinforcement layers is 36 inches.
- Minimum vertical spacing between reinforcement layers is 6 inches.

GEOSYNTHETIC REINFORCED FOUNDATIONS CONSTRUCTED ON SOFT SOILS
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<th>PROPERTY</th>
<th>REQUIRED TEST METHOD</th>
<th>MRAPF GEOLON HP 370</th>
<th>MRAPF GEOLON HP 570</th>
<th>MRAPF GEOLON HP 665</th>
<th>MRAPF GEOLON HP 770</th>
<th>MRAPF GEOLON HS 400</th>
<th>MRAPF GEOLON HS 600</th>
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<th>MRAPF GEOLON HS 1150</th>
<th>MRAPF MIRAMEX GR</th>
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**APPROVED GEOSYNTHETIC PRODUCTS (WOVEN GEGRID)**

**APPLICATION AND PROPERTIES**

**GEOSYNTHETIC REINFORCED SOILS**
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<th>PROPERTY</th>
<th>REQUIRED TEST METHOD</th>
<th>MORAFI BQG12</th>
<th>MORAFI BQG12</th>
<th>MORAFI GEO/LIN HS 2400</th>
<th>MORAFI GEO/LIN HS 3000</th>
<th>COMPRAC 70-70</th>
<th>GEOTEX 330ST</th>
<th>GEOTEX 2x2HM</th>
<th>GEOTEX 3x3HM</th>
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<th>GEOTEX 4x4HM</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 (Woven Geogrid)**

**Application and Properties**

**Geosynthetic Reinforced Soils**
# TABLE OF WOVEN GEOGRID VALUES

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<th>PROPERTY</th>
<th>REQUIRED TEST METHOD</th>
<th>MARAPI MG 2XT</th>
<th>MARAPI MG 3XT</th>
<th>MARAPI MG 5XT (Matrex 3D0)</th>
<th>MARAPI MG 7XT</th>
<th>MARAPI MG 8XT</th>
<th>MARAPI MG 10XT (Matrex 6D0)</th>
<th>MARAPI MG 18XT (Matrex 9D0)</th>
<th>MARAPI MG 20XT (Matrex 10D0)</th>
<th>MARAPI MG 22XT (Matrex 11D0)</th>
<th>MARAPI MG 24XT (Matrex 24D0)</th>
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**APPROVED GEOSYNTHETIC PRODUCTS**  
(WOVEN GEOGRID)  
APPLICATION AND PROPERTIES
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<th>SYTEN SF 35</th>
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**Approved Application Usage:**
1. Steepened Slopes
2. Reinforcement of Foundations over Soft Soils
3. Reinforced Embankment
4. Construction Embankment
5. Minimum 3' Overlap

**Approved Geosynthetic Products (Woven Geogrid)**

**Application and Properties**

---

**2010 FDOT Design Standards**

**Geosynthetic Reinforced Soils**
## Table of Woven Geogrid Values

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<th>RAUGRID 6/3</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 Expendent
* Minimum 3' Overlap

APPROVED GEOSYNTHETIC PRODUCTS (WOVEN GEGRID)
APPLICATION AND PROPERTIES
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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 Excavant
6. = Minimum 3' Overlap

**APPROVED GEOSYNTHETIC PRODUCTS (EXTRUDED GEOGRID)**
APPLICATION AND PROPERTIES
## TABLE OF EXTRUDED GEORGRID VALUES

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<th>REQUIRED TEST METHOD</th>
<th>TENSAR UX 1400 HS</th>
<th>TENSAR UX 1500 HS</th>
<th>TENSAR UX 1600 HS</th>
<th>TENSAR UX 1700 HS</th>
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<th>TENAX MS 330</th>
<th>COMBGRID 30/30 G1</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 Overlay

### APPROVED GEOSYNTHETIC PRODUCTS

**EXTRUDED GEORGRID**

**APPLICATION AND PROPERTIES**

---

**2010 FDOT Design Standards**

**GEOSYNTHETIC REINFORCED SOILS**
DIVIDED ROADWAYS

UNDIVIDED ROADWAY

GENERAL NOTES
1. Roadway dimensions are representative. Subgrade dimensions and control lines are standard. The details shown on this Index do not supersede 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 base. It should be placed uniformly in 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 placed 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 individual test value which exceeds four (4) percent, shall not be used in the subgrade portion of the roadbed.

5. Highly organic soils, composed primarily of partially decayed organic matter, often dark brown or black in color with an odor of decay, and sometimes fibrous, shall be designated as musk. Further, any stratum or strata of soil which contains pockets of highly organic material may be designated as Musk (M). Highly organic soils shall not be used within the subgrade or embankment portion of the roadbed, with the exception of musk used as a supplement to construct a finish soil layer as described in Section 162 of the FDOT Standard Specifications.

DESIGN NOTES
1. The designer shall take into consideration the expected roadway widening to the outside, and where widening is anticipated specify in the plans the location of the future widening control line for utilization of high Plastic (P) soils and/or soils classified as organic material in the embankment.

2. The designer shall take into consideration the position of the drainage swales in the portion of the embankment where 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, and/or soils classified as organic material to locations that will not inhibit the infiltration of stormwater from the swales.
DIVIDED ROADWAYS

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 a separator layer using 2" Type SP. This will be placed on a working platform using 12" of Type B Stabilization.

RIGID PAVEMENT - TREATED PERMEABLE BASE OPTION

UNDIVIDED ROADWAY

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<th>CLASSIFICATION (AASHTO M 145)</th>
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<td>M</td>
<td>Muck</td>
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</table>

Classification listed left to right in order of preference.

- Certain types of 2-4 materials are likely to retain 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. They may be used in the subgrade portion of the roadway when approved by the District Materials Engineer. 2-2-4 materials placed below the existing water level must be nonplastic and contain less than 15% passing the No. 200 U.S. Standard sieve.
- For cut sections this dimension may be reduced to 24"; see Index No. 500.
- For minor collectors and local facilities this dimension may be reduced to 18".

See General Notes No. 4 & 5 for utilization of soils classified as organic material or muck.
DIVIDED ROADWAYS

DESIGN NOTE
1. Concrete pavement is to be placed over Optional Base Group I Type B-12.5 only. Asphalt base as identified in the plans. This will be placed on a working platform using 12" of Type B Stabilization.

UNDIVIDED ROADWAY

SYMBOL SOIL CLASSIFICATION (AASHTO M 145)
S Select A-1, A-3, A-4**
W High Plastic A-2-5, A-2-7, A-5, Or A-7 (ALL WITH LL > 50)
M Muck A-8

Classification listed left to right in order of preference.

* See General Notes No. 4 & 5 for utilization of soils classified as organic material or muck.

** Certain types of A-2-4 materials are likely to retain 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. They 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 10% passing the No. 200 U.S. Standard sieve.

For cut sections this dimension may be reduced to 24"; see Index No. 500.
For minor collectors and local facilities this dimension may be reduced to 18".

RIGID PAVEMENT – ASPHALT BASE OPTION
DIVIDED ROADWAYS

UNDIVIDED ROADWAY

**Note:** SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

**RIGID PAVEMENT - SPECIAL SELECT SOIL OPTION**
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
Normal Crowned Section

Super Elevation Section LT. & RT.
Super Elevation Section LT.
Plane Inclined Section RT.

Plane Inclined Section LT.
Super Elevation Transition LT.
Full Super Elevation LT. & RT.
Super Elevation Transition RT.
Full Super Elevation RT.

B-Lane Pavement with One Lane Sloped to Median
### SUPERELEVATION RATES (e) FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

**e\(_{\text{max}}\) = 0.05**

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#### CHARTED VALUES

**DEGREE OF CURVE (D)**

- When the speed curves and the degree of curve or radius lines intersect above this line, the pavement is to be super-elevated (positive slope) at the rates indicated at the lines intersecting points.
- When the speed curves and the degree of curve or radius lines intersect between these limits, the pavement is to be super-elevated at the rate of 0.02 (positive slope).
- When the speed curves and the degree of curve or radius lines intersect below this line, the pavement is to have normal crown (typically 0.02 and 0.01 downward slopes).  

**GENERAL NOTES**

1. Maximum rate of super-elevation for urban highways and high speed urban streets shall be 0.05.

2. Super-elevation shall be obtained by rotating the plane successively about the break points of the section until the plane has attained a slope equal to that required by the chart. The rotation should traverse the entire section and further super-elevation be required, the remaining rotation of the plane shall be about the low edge of the inside travel lane. Crown to be removed in the auxiliary lane to the outside of the curve only when the adjoining travel lanes require positive super-elevation.

3. When positive super-elevation is required, the slope of the gutter on the high side should continue the super-elevated pavement.

4. In construction, short vertical curves shall be placed at all angular profile breaks within the limits of the super-elevated transition.

5. The variable super-elevation transition length “L” 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 super-elevated in a similar manner.

7. For super-elevation of lower speed urban streets, see the FDOT Manual Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways. For super-elevation of curves on rural highways, urban freeways and high speed urban highways, see Index No. 510.
Superelevation Transition Sections

For Urban Highways and High Speed Urban Streets
### BASE THICKNESS AND OPTION CODES

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#### 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 Limerock, Cemented Granular, Shell/Rock, Bank Run Shell and Graded Aggregate Base at LRB 100. The base thickness shown is Type B-12.5. All subbase thicknesses are 4".

$ To be used for widening only, three feet or less.

$ Based on minimum practical thicknesses.

$ Restricted to nonlimited access shoulder base construction.

---

### GENERAL USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS

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Not Recommended For 20 Year Design Accumulated 18 kip Equivalent Single axle (ESAL) Loads greater than 1,000,000

Note:
These base materials may be used on FDOT projects when approved in writing by the districts Materials Engineer and shown in the plans.

* Based on Minimum Practical Thickness

LIMITED USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS
For additional information refer to FDOT Rules Chapters 14-96 and 14-97.

**SKETCH ILLUSTRATING DEFINITIONS**

**ELEMENT DESCRIPTION**

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**LEGEND**

- **A** Return Radius Point
- **B** Buffer Areas
- **C** Driveway Angle
- **D** Corner Clearance
- **E** Setback
- **F** Outside Radius
- **G** Inside Radius
- **H** Distance Between Connections
- **I** Flare

**GENERAL NOTES**

1. For definitions and descriptions of access connection "Categories" and access "Classifications" of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, "State Highway Connection Permits Administrative Process and Rule Chapter 14-97, "State Highway System Access Management Classification System and Standards."

2. For this index the term "turnout" applies to that portion of driveways, roads or streets adjoining the outer roadway. For this index the term "connection" encompasses a driveway, street or road and their appurtenant islands, separators, transition faces, auxiliary lanes, travel lanes, shoulders, drain pipes and structures, crossovers, sidewalks, curb cut ramps, signing, pavement marking, required signalization, maintenance of traffic or other means of access to or from controlled access facilities. The turnout requirements set forth in this index do not provide complete intersection design, construction or maintenance requirements.

3. The location, positioning, orientation, spacing and number of connections and median openings shall be in accordance with FDOT Rule Chapter 14-97.

4. On Department construction projects all driveways 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. Driveways shall have sufficient length and size for all vehicular queuing, queueling, queueling, that detailed for "Urban Faired Turnouts", or, that described in "Table 10 2-1" for connections with radio returns and/or auxiliary lanes.

**DESIGN NOTES**

1. Prior to the adoption of FDOT Rules Chapters 14-96 and 14-97, connections to the State Highway System were defined and permitted by Chapter 14-94. Connections have been refined by Categories under Rule 14-96 and the term "Class" has been applied to highway segments of the State Highway System as defined under Rule 14-97.

**SUMMARY OF GEOMETRIC REQUIREMENTS FOR TURNOUTS**

- **Street or road intersection design, with possible auxiliary lanes and channelization, may be necessary. Intersection design, with possible auxiliary lanes and channelization, should be considered for connections with more than 4000 trips/day.** Returns with 50' radius or more are required, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radius are to be increased and median lanes, travel lanes, shoulders, lane fences, separators or/and islands constructed, as determined by the Department to be necessary for safe turning movements.

- **Any connection requiring or having a specified median opening with left turn storage and served directly by a median opening shall have radio returns.**

- **Where a connection is intended to align with a connection across the highway, the through lanes are to align directly with the corresponding through lanes.**

- **For new connections and for connections on new construction and reconstruction projects, pavement materials and thicknesses shall meet the requirements applicable to that detailed for "Urban Faired Turnouts", or, that described in "Table 10 2-1" for connections with radio returns and/or auxiliary lanes.**

- **The responsibility for the cost of construction or alteration to an access connection shall be in accordance with FDOT Rule Chapter 14-96.**
Footnotes:
1. 5½" joints shall be constructed with preformed joint filler.
2. 6½" Open joints placed at equal (20' max.) intervals for driveways over 20' wide. Joints in curb and gutter to match joints in driveways.
3. When connecting to side street curb and gutter sections, the no drop curb limits should extend back to the side street radius point. With or without curb and gutter, no driveway should be more than 3' from the curb.
4. Driveway (6½' concrete) shall be of uniform width (W) to the right of way line.
5. Widths recommended to 3' Min. in restricted conditions when approved by the Engineer.

Alpha-numeric identification of a flared driveway type specifically called for in the plans, see sheets 3 and 4.


**SPECIAL NOTES FOR URBAN FLARED TURNOUTS**

1. Driveways indicated as ‘Adverse Applications’ are those with slopes that can cause overhang and drop for representative standard passenger vehicles under fully loaded conditions or with slopes that can cause drivers who are leaving the roadway to slow or stop to the extent that traffic demand volume will be impeded.
2. Driveways indicated as ‘Marginal Applications’ are those with slopes that can cause overhang and drop for representative standard passenger vehicles under fully loaded conditions when the driveway is located on the low side of fully superstructured roadways.
3. Driveways indicated as ‘General Applications’ are those with slopes that can readily accommodate representative standard passenger vehicles and those that can accommodate representative standard trucks, vans, buses, and recreational vehicles operating under normal/crown and superstructure conditions.
4. The standard flared driveways on this index may not accommodate vehicles with low beds, low undercargage or low appendage features. Where such vehicles are design vehicles, driveways are to have site specific flare designs on Category III designs.
5. When specific flare type driveways are to be constructed, the type shall be designated in the plans using the assigned alpha-numeric designation.
DRIVEWAY SECTIONS ON CURBED FACILITIES WITH SIDEWALKS

SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

M 1

M 1

M 2

M 2

A 1

A 1

A 2

A 2

A 3

A 3

A 4

A 4

A 5

A 5

A 6

A 6

A 7

A 7

A 8

A 8

A 9

A 9

A 10

A 10

A 11

A 11

A 12

A 12

A 13

A 13

A 14

A 14

A 15

A 15

A 16

A 16

A 17

A 17

A 18

A 18

A 19

A 19

A 20

A 20

A 21

A 21
MODIFICATIONS OF 'ADVERSE' AND 'MARGINAL' APPLICATIONS

SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

MODIFICATIONS TO ADVERSE AND MARGINAL SECTIONS

ADVERSE AND MARGINAL SECTIONS MODIFIED TO ACHIEVE GENERAL APPLICATION

ADVERSE SECTIONS MODIFIED TO ACHIEVE MARGINAL APPLICATION

SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

See DESIGNED NOTES FOR URBAN PLAINED TURNOOUTS ON SHEET 2.

May Be Reduced To 3' Min. In Restricted Conditions When Approved By The Engineer. Depth Less Than 3' Allowable Only Under Findings Of Infeasibility.
LIMITS OF CLEARING & GRUBBING, STABILIZING AND BASE AT INTERSECTIONS

Drainage pipe size and length shall be shown on the plans, or as stipulated by permit or, as determined by the Engineer during construction. The size shall be at least that established by the FDOT Design District and it shall be at least 10\(^{\circ}\) diameter or equivalent. For minimum, carry over the drainage pipe as shown in Index No. 205. Pipe arch or elliptical pipe may be required to obtain necessary carry. At minimum, carry over the drainage pipe as shown in Index No. 205. Pipe arch or elliptical pipe may be required to obtain necessary carry.

Stable material may be required for graded turnouts to private property as directed by the Engineer in accordance with Section 102-8 of the Standard Specifications.

The 5\(^{\circ}\) pavement of graded connections is not required where there is paved shoulder 4\(^{\circ}\) or more in width. The 5\(^{\circ}\) pavement requirement may be waived for connections serving one or two homes or field entrances with less than 20 trips per day, or 5 trips per hour as approved by permit or by the Engineer, or when not itemized in the plans.

Paved turnouts are to be constructed for all paved connecting facilities. The connecting points will be determined by the Engineer. Paved turnouts are to be constructed for all connecting facilities over 4000 vehicles per day. The connecting point shall be at the R/W line.

See “Summary Of Geometric Requirements For Turnouts” chart for return radii, lengths and supplemental information.
### MATERIAL TYPES AND THICKNESSES IN DRIVING AREAS FOR RURAL AND URBAN CONNECTIONS

<table>
<thead>
<tr>
<th>Course</th>
<th>Materials</th>
<th>Thickness (in.)</th>
<th>Connections</th>
<th>Roadway</th>
</tr>
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<tbody>
<tr>
<td>Structural</td>
<td>Asphaltic Concrete</td>
<td>2&quot;</td>
<td>1&quot;)</td>
<td>1&quot;)</td>
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<tr>
<td>Notes</td>
<td>Optional Base (See Index No. 514)</td>
<td>0.0 G. 2</td>
<td>0.0 G. 2</td>
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</tbody>
</table>

1. Minimum thickness.
2. All materials shall be approved by the Department prior to placement.
3. Connection structure other than traffic lanes. See Notes 1 and 2 below.
4. Traversable areas (bypass lanes), auxiliary lanes serving more than a single connection, and all median crossovers including their auxiliary lanes and/or transition tapers. See Notes 1 and 2 below.

### NOTES

1. The pavement should be structurally adequate to meet the expected traffic loads and should not be less than that shown above, except as approved by the Department for graded connections. Other Department approved pavement equivalences may be used at the discretion of the Engineer. For additional information see Index No. 514.

2. Auxiliary lanes and their transition tapers shall be the same structure as the abutting roadway pavement or any of the roadway structures tabulated above, whichever is thicker.

3. If an asphalt base course is used for a turnout, its thickness may be increased to match the edge of roadway pavement in lieu of a separate structural course. 6" of Portland cement concrete will be acceptable in lieu of the asphalt base and structural courses. See Notes 4 and 5 below.

4. A structural course is required for flexible pavements when they are used for auxiliary lanes serving more than a single connection.

5. Connections paved with Portland cement concrete shall be Class NS concrete at least 6" thick. The Department may require greater thickness when called for in the plans or stipulated by permit. Materials and construction are to conform with 2007 Standard Specifications Sections 347, 550, and 932.

6. The Department may require other pavement criteria where local conditions warrant.

### PAVEMENT STRUCTURE FOR TURNOUTS AND AUXILIARY LANES

#### TABLE 515-1

![Diagram of pavement structure for turnouts and auxiliary lanes](Image)

#### LEGEND

- Graded Or Paved
- Required Paving
- Limits Of Department Maintenance

#### NOTES

1. Auxiliary lane pavements and crossover pavements shall be maintained by the Department.

2. Department maintenance of turnout pavement shall extend out to 5' from edge of the travel way or limits of paved shoulders, and extend to include auxiliary lanes. The remainder of any turnout paved area on the right of way shall be maintained by the owner or his authorized agent. As a function of routinely reworking shoulders, the Department may grade and shape existing material on improved areas beyond the maintained pavement.

3. Control and maintenance of drainage facilities within the right of way shall be the responsibility of the County, unless specified otherwise by Department permit.

4. The maintenance and operation of highway lighting, traffic signals, associated equipment, and other necessary devices shall be the responsibility of a public agency.

5. All pavement markings on the State highways, including accelerated and deceleration lane markings, and signing installed for the operation of the State highways shall be maintained by the Department.

6. All signing and marking installed for the operation of the connection (such as stop bars and stop signs for the connection) shall be the responsibility of the permittee.

#### LIMITS OF CONSTRUCTION AND MAINTENANCE FOR RURAL CONNECTIONS
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. On all rural turnouts the transition (L) nearest the roadway shall be shaped or crowned to direct stormwater runoff to the roadside ditch. Debris, flumes or other appropriate runoff control devices shall be constructed when runoff volumes are sufficient to cause erosion of the shoulder. Similar runoff control devices shall be constructed as necessary to properly direct and control the stormwater runoff on urban turnouts.

2. The Option 1 profile is intended for locations where roadway, turnout taper and auxiliary lane stormwater 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.
### Areas for One 5' Deep Turnout (SY)

<table>
<thead>
<tr>
<th>Drive Width (ft)</th>
<th>Intersection</th>
<th>Normal</th>
<th>Type I</th>
<th>Type II</th>
<th>Skewed</th>
<th>Type I</th>
<th>Type II</th>
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### PAVEMENT STRUCTURE FOR 5’ DEEP TURNOUTS

<table>
<thead>
<tr>
<th>Course</th>
<th>Material</th>
<th>Minimum Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>Asphalitic Concrete</td>
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<tr>
<td>Base</td>
<td>Optional (See Index No. 514)</td>
<td>0.875’</td>
</tr>
</tbody>
</table>

**Notes:**

1. Turnout structural course to be the same materials 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.

### 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 item.
6. Payment for feathering friction course is to be included in the unit price for Asphalitic Concrete Friction Course placed on the roadway. Feathered areas will be included in measured quantities. Feathering is not required for FX-5 friction course.
GENERAL NOTES FOR RAISED RUMBLED 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 strips at intersections shall be constructed only when specified in the plans.
   See Index 14-1006 for rumble strip placement on approaches to narrow bridges.

2. Raised rumble strips are to be constructed in accordance with Section 546 of the Specifications.

3. Where any portion of a curve falls within the limit of rumble strips shown in these details, additional rumble strip sets spaced at 300' centers shall be constructed throughout the remainder of the approaching curve.

4. Raised rumble strips shall be paid for per set under the contract unit price for Rumble Strips Set, 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 strip.

Note: Rumble strips may be required for one or more legs of the intersection (one leg shown for spacing information). Rumble strips shall be constructed only on the legs identified in the plan. See General Note No. 1.

** May be decreased in urban areas with low operating speeds.

Thermoplastic Rumble Strip (Typical) *

# Use multiple applications to achieve desired 1/2" thickness

Note: Shoulder thermoplastic rumble strip sets shall match edge line color. Interior thermoplastic rumble strip sets shall be white.

THERMOPLASTIC SET

Asphalt Rumble Strip (Typical)

5" (6 Strips)

5/8"

RAISED RUMBLE STRIPS AT INTERSECTIONS

PLAN

SECTION AA FOR THERMOPLASTIC AND ASPHALT RUMBLE STRIP SETS

2010 FDOT Design Standards

RUMBLE STRIPS

518
HALF PLAN
LIMITED ACCESS FACILITIES
SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT

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 1000 ft or back to the gore recovery area for major 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 546 of the Specifications.

4. When friction course extends more than 8" beyond the edge of the travel lanes, 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), PM. 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

RIGID PAVEMENT WITH RIGID PAVEMENT SHOULDER

ISOMETRIC - LONGITUDINAL CUT

ISOMETRIC - LONGITUDINAL CUT (RIGID PAVEMENT)
**Pedestrian Railing**
(Picket Railing shown, other railings similar)

**STAIR TREAD AND RISER DETAILS**

1. The greatest riser height within the flight of steps shall not exceed the smallest by more than 1/6".
2. The greatest tread depth within the flight of steps shall not exceed the smallest by more than 1/8".

**NOTE**: Provide a maximum of 12 risers between landings.

**ELEVATION**

1. 3 Bars @ 12" chs. (1/2" Min. Cover)
2. 3 Bars @ 12" chs. (1/2" Min. Cover)
3. 4 Bars @ 12" chs. (1/2" Min. Cover)
4. 5" Min.
5. 5" Min.
6. 3 Bars @ 12" chs. (1/2" Min. Cover)
7. 3 Bars @ 12" chs. (1/2" Min. Cover)
8. 5" Min.
9. 5" Min.

**PLAN AT JUNCTION OF STEPS & LANDING**

1. Align Railings
2. Pedestrian Railing (Typ.)
3. Checkwall
4. Handrail (Typ.)
5. Landing
6. 1/2" Expansion Joint (Prewelded Joint Filler)

**SECTION A-A**

1. 5"-3" Picket Railing
2. 5"-0" Guardrail
3. 6"-5" Picket Railing
4. 4 Bars (1/2" Min. Cover)
5. 4 Bars (1/2" Min. Cover)
6. 4 Bars (1/2" Min. Cover)

**SECTION B-B**

1. 5"-3" Picket Railing
2. 5"-0" Guardrail
3. 6"-5" Picket Railing
4. 4 Bars (1/2" Min. Cover)
5. 4 Bars (1/2" Min. Cover)
6. 4 Bars (1/2" Min. Cover)

**SECTION C-C**

1. 5"-3" Picket Railing
2. 5"-0" Guardrail
3. 6"-5" Picket Railing
4. 4 Bars (1/2" Min. Cover)
5. 4 Bars (1/2" Min. Cover)
6. 4 Bars (1/2" Min. Cover)

**NOTES**: 
1. Do not use this Index for suspended (structural) steps or stairways.
2. Construct steps in accordance with Section 522 of the
   FDOT Standard Specifications.
3. Concrete: Grade #30, Specification 347
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 checkwalls shall be paid for under the contract unit price for Class #30 Concrete (Concrete Steps), CY. Cost of reinforcing steel shall be paid for under the contract unit price for Reinforcing Steel (Miscellaneous), LB.
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 tapers 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 conjunction 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 Lanes - APPROACH AUXILIARY LANE

EXIT TERMINALS

TWO-LANE RAMPS

SECTION WHEN SHOULDER GUTTER USED
SECTION AA
ACCELERATION LANE WITH SHOULDER GUTTER

ACCELERATION LANE WITHOUT SHOULDER GUTTER

DECELERATION LANE WITH SHOULDER GUTTER

DECELERATION LANE WITHOUT SHOULDER GUTTER

SHOULDER TREATMENT

AT SPEED CHANGE LANES AT FREEWAY RAMP TERMINALS

FREEWAY RAMP TERMINALS
1. Standard cross road entrance terminals. To be used when roadway alignment is tangent and no bridges are located within the merging lane.

2. Parallel cross road entrance terminals. Recommended when a bridge is located within the merging lane, turning roadway speed is less than 60% of thru roadway speed at or for the combinations of horizontal alignment shown elsewhere on this sheet.

3. Standard cross road exit terminal. To be used when roadway alignment is tangent.

4. 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 thru roadway speed, or for the combinations of horizontal alignment shown elsewhere on this sheet.

FOOTNOTES:
# Normal shoulder pavement width
+ Adjust for grades if greater than 2% (See Exhibit 10-71, 445HTO).

CROSSROAD TERMINALS

LEFT TURN CONTROL

SIGNALIZED OR UNSIGNALIZED

RAMP TERMINALS ON CURVES

NOTE: Ramp terminals on curves should be avoided when possible.
4-LANE WITH TWO-WAY LEFT-TURN LAINES

**DESIGN SPEED (mph)** | **$T_d$ (FEET)** | **$T_d$ (FEET)**
---|---|---
0-30 | 0.50 | 1.25
30-45 | 0.75 | 1.50
45+ | 1.00 | 2.00

Note: For locations with unacceptable control points, minimum taper rates for lane drop ($T_d$) will be 1:20.

4-LANE UNDIVIDED FLARED - SYMMETRICAL

GENERAL NOTE
1. For pavement markings refer to Index No. 17146.
**FLARED & PAINTED LEFT Turner FOR 2-LANE 2-WAY ROADWAYS**

### Design Speed

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>$L_d$ (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>60</td>
<td>240</td>
</tr>
</tbody>
</table>

### Right Side Widening

- $L_d$:
- $T_o$:
- Queue Length:
- $L_d$:
- Varies:

### Centered Widening

- $L_d$:
- $T_o$:
- Queue Length:
- $L_d$:
- Varies:

### Left Side Widening

- $L_d$:
- $T_o$:
- Queue Length:
- $L_d$:
- Varies:
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

L = \frac{WS}{2} \leq 45 \text{ mph}

L = \frac{WS}{120} < 45 \text{ 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 radius and offsets are valid only for tangent alignment, design speeds ≤ 45 mph, the median widths and lane widths shown.

2. Approach lane departures (Δ=5') are suitable for design speeds up to 60 mph. Interior curves (Δ=1') are suitable for normal crown for design speeds up to 50 mph. Merging curves (Δ ≥ 5') will require super-elevation.

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
RIGHT ROADWAY CENTERED ON APPROACH ROADWAY
TWO LANE TO FOUR LANE TRANSITION

L = WS for speeds > 45 mph
L = 25' for speeds ≤ 40 mph
Where:
W = Width of lateral transition in feet.
D = Design speed.
RIGHT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION

LWS for speeds ≥ 45 mph
LTS for speeds ≤ 40 mph
Where:
W = Width of lateral transition in feet
Sgs = Design speed
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for 8' minimum clearance between trucks making opposing movement. The depicted design only applies where roads and streets intersect at 90° to the mainline and have centersline common with the opposing road or street. Swep paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-trailer.

RETURN NO. 1
RETURN NO. 2
RETURN NO. 3
RETURN NO. 4

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 mainline. Swep paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-trailer.
RETURN NO. 1

RETURN NO. 2

RETURN NO. 3

RETURN NO. 4

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for 4' minimum clearance between trucks making opposing movement. The depicted 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 WB-50 tractor-semitrailer.

40' MEDIAN 4-LANE DIVIDED ● PARALLEL TURN BAY ● 2001 AASHTO WB-50
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside turning and for minimum clearances between trucks making opposing movement. The depicted 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-semi-trailer.

RETURN NOS. 1 & 2 VACANT

RETURN NOS. 3 & 4

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside turning and for minimum clearances between trucks making opposing movement. 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 SU and WB-40 tractor-semi-trailer.

40' MEDIAN • 4-LANE DIVIDED • TAPERED TURN BAY • 2001 AASHTO SU & WB-40
NOTES

Keynotes On Sheet 2.

FLOOR
6" Rein. Concrete Slab
W/WF6x6-W2.4 x W1.4
1'-6" x 1'-6" Drop Fitting & Slab
Perimeter & Interior Posts.

Harden & Broom Finish Slab Surface.

STRUCTURE
Posts: 8 x 8 PT
Beams: 4 x 6 PT
Framing: 4 x PT As Described.

Misc Members: 1x and 2x As Described.

ROOF
3'-6" x 10" Wood Decking.

30 mil Asphalt Impregnated Fiberglass
Felt Underlayment.

Standing Seam Metal Roof (24 G4
Steel or 0.032 Alum.) W/Kynar 500
Finish.

Structure, Decking & Roofing Shall Be
Designed To Withstand 130 mph Wind Load.

BUILDING CODE

Picnic Pavilions Shall Be Constructed
According To The Requirements Of The
Appropriate Sections Of Applicable

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 on rural/highways shall be set with the roadside face of the box offset from the edge of the traveled way a minimum distance of the greater of the following:
   (a) Shoulder width plus 8” to 12”.
   (b) 10’ for ADT over 10,000 vpd.
   8’ for ADT 2000 to 10,000 vpd.
   6’ for ADT under 2000 vpd.
   2’ - 6’ for low speed and ADT under 1000 vpd.

When a mailbox is installed within the limits of an arterial it should be placed behind the guardrail whenever practical.

Malicious on curved highways, roads and streets shall be set with the face of the box between 6” and 12” back of the face of curb. If the sidewalk abuts the curb or if an unusual condition exists which makes it difficult or impractical to install a service box at the curb, the contractor with concurrence of the local post authority may be permitted to install mailboxes at the back edge of the sidewalk, where they can be served by the carrier from the sidewalk.

6. Mailboxes shall be set at the bottom of the box between 42” and 48” above the mailbox surface, unless the U.S. Postal Service establishes other height restrictions.

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 (QPL).

Neighborhood Delivery and Collection Box Units (NDCBU) are a specialized multiple mailbox installation that must be located outside the highway and street clear zones. The location of NDCBU is the sole responsibility of the Postmaster for the delivery route under consideration.

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 shoulder groundline, which is permitted for mailboxes on rural/highways. On urban roads and streets where mailbox support posts are set within right 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 driveway entrances mailboxes shall be placed on the far side of the driveway in the direction of the delivery route.

11. At intersecting routes 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.

Wood support posts shall be in conformance with the material and dimensional requirements of Section 392 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 shall be cleaned of all loose scale prior to painting. 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, platforms, 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 made for each installation with the exception of NDCBU. The payment shall be made for each installation for 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, replacing or relocation.
FLANGED CHANNEL

STEEL PLATFORM

STEEL BRACKET

STEEL FLANGED CHANNEL SUPPORT POSTS
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
**Settlement Plate**

**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, AS.

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**Plan**

**Timber Plate**

- **Threaded or Socket Type Cap**
- **Steel or PVC Schedule 40 Pipe (Casing)**
- **Casing To Be Installed In 5 Sections, As Required**
- **Threaded or Socket Type Fittings (PVC Socket Type Shown)**
- **PVC Casing Sections Not Permitted Below Steel Sections**

**Plan Details:**

- **6 x 2 x 8 Treated Timbers**
- **2 x 6 Treated Timber**
- **1/2" Dia. Bolt, Nut & Washer (Bolt Thread End Up)**

**Steel Plate**

- **Iron Pipe Cap**
- **2 x 6 Treated Timber (See Detail Above)**
- **Timber Plate**

**Threaded or Socket Type Cap**

**Steel or PVC Schedule 40 Pipe (Casing)**

**Casing To Be Installed In 5 Sections, As Required**

**Threaded or Socket Type Fittings (PVC Socket Type Shown)**

**PVC Casing Sections Not Permitted Below Steel Sections**

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**Notes:**

- **STEM AND PLATE OPTIONS**

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2010 FDOT Design Standards

Revision 540

Sheet No. 1 of 1
1" - 3 1/2 " CALIPER TREE PLANTING

GENERAL NOTES:

1. All dimensions ±1/8" 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 3/4 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 root ball shall be set 1"-2" above finished grade and set plumb to the horizon. If planting pit too deep, remove the tree and firmly pack additional soil on the bottom of the planting pit to raise the rootball. After positioning the tree in the planting pit, slice through rootballs with 3 or 4 vertical slashes (top to bottom) equally distributed around the tree.

4. Backfill shall be loosened existing soil. Remove rocks, sticks, or other deleterious materials greater than 1" in any direction prior to backfilling. Water and tamp to remove air pockets. If existing soils contain excessive sand, silt, or other material not conducive to proper plant growth, contact Engineer prior to planting.

5. Soils 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 trunk flare, 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 polyester. All wood stakes or anchors shall be located beyond the edge of soiling and located below finished grade, unless otherwise specified.

8. Sabal Palms may be hurricane cut. All other palms must have fronds tied with biodegradable twine. Palm trunks shall have no burn marks, scars, or sanding.

9. All dimensions provided for wood materials are nominal.

10. When a permanent, subsurface, or drip irrigation system is provided, a soiling is not required. Mulch to edge of planting pit.

11. Alternate tree bracing and guy systems approved by the Engineer may be used in lieu of the tree bracing and guy methods detailed on this Index. Alternate tree protection systems approved by the Engineer may be used in lieu of the tree protection barricades detailed on the index.

12. Remove aboveground guy systems at the end of the establishment period.
CABBAGE PALM PLANTING
FOR UP TO 24" CLEAR TRUNK

NOTE: For all other palms, use detail provided by landscape architect in contract plans.

CABBAGE PALM PLANTING ON SLOPE
FOR UP TO 24" CLEAR TRUNK

4" AND LARGER CALIPER TREE PLANTING ON SLOPE
1" - 3 1/2" CALIPER TREE PLANTING ON SLOPE

2 x 4 Wood Braces
(Minimum of three
Wood Braces) spaced
at 120° apart. Saw cut
ends at proper angle to
allow for flush
connection to wood
batten. Nail Wood Braces
securely to wood
batten.

30° Minimum Depth of Wood Stake

Existing Soil

Existing Soil

Planting Pit: 2 Times Width of Rootball

NOTE: Stake into firm existing soil.

WOOD STAKING DETAIL

With boards positioned face to face,
Nail brace securely to wood stake below finished
grade.

2 x 4 Wood Stake

2 x 4 Wood Brace

Existing Soil

Mulch

Soil Ring for water collection

2 1/2" Of Trunk Height Minimum

W O O D  B A T T E N  D E T A I L

2 x 4 Wood Brace

2 x 4 x 12

Wood Batten

Existing Soil

Straps Securely Fastened to Tree

Top of Wood Stakes and Straps positioned between 1/2" to 3/4" of tree height

Three Wood Stakes Spaced at 120° Apart

2" Minimum Depth of Wood Stake

Existing Soil

Placing Pit: 2 Times Width of Rootball

NOTE: Stake provided as Rise Run

MULTI-TRUNK TREE PLANTING

2 x 4 Wood Brace

Existing Soil

Soil Ring for water collection

Existing Soil

Mulch

Straps Securely Fastened to Tree

Top of Wood Stakes and Straps positioned between 1/2" to 3/4" of tree height

Two Wood Stakes Spaced at 180° Apart

Existing Soil

Placing Pit: 2 Times Width of Rootball

NOTE: Stake provided as Rise Run

4" AND LARGER CALIPER TREE PLANTING ON SLOPE

1" - 3 1/2" CALIPER TREE PLANTING ON SLOPE
NOTE: For groups of trees, place barricades between trees and construction activity.

GROUND COVER/SHRUB PLANTING

GROUND COVER/SHRUB PLANTING ON SLOPE

GROUND COVER/SHRUB LAYOUT DETAIL

TREE PROTECTION BARRICADE

NOTES: Critical Protection Zone: The area surrounding a tree within a circle described by a radius of one foot for each inch of the tree trunk diameter at 54" above finished grade. For groups of trees, place barricades between trees and construction activity.

Tree Protection Barricades shall be located to protect a minimum of 75% of the Critical Protection Zone.
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 (S) applies to normal and skewed intersections (intersecting angles between 60° and 120°). When vertical and/or horizontal curves are not present. Sight distance (S) is measured along the major roadway from the center of the entrance lane or center of the minor roadway at the center of the approach (right or left) of the major roadway. Distances S1 and S2 are measured from the centerline of the entrance lane of the minor roadway to a point on the edge of the near side or opposite traffic lane on the major roadway. Distance S1, is measured from the centerline of the entrance lane at the minor roadway to a point on the median line of the center orICW 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 2.

   b. Clear sight must be provided between vehicles at intersection stop locations, and vehicles on the major roadway within dimension A.

   c. Since observations are made in both directions along the line of sight, the reference datum between roadways is 3'-6" above respective pavements.

4. Barrier systems within intersection sight corridors, where penetration into the sight window might occur, shall be located to provide the least adverse affect practical.

5. The corridor defined by the limits of clear sight is a restricted planting area. Drivers of vehicles on the intersecting roadway and vehicles on the major roadway must be able to see each other clearly throughout the limits of S1 and S2. If in the Engineers judgment, landscaping interferes with the line of sight corridor prescribed by these standards the Engineer may rearrange, relocate or eliminate plantings. Plants within the restricted areas are limited to selections as follows:

   - Ground Cover & Trunked Plants (Separate or Combined)

     Ground Covers - Plant selection of low growing vegetation which at maturity does not attain a height greater than 18" below the sight line datum. For ground cover in combination with trees and palms with the following heights below the sight line datum, will apply: 24" for trees and palms ≤ 11\' - 0"; and, 18" for sabal palms > 11\' - 0" (in within Sight Window).

     Trunked Plants - Plant selection of a mature trunk diameter 4" or less measured at 6' above the ground. Canopy or high borne foliage shall be lower than 5' above the sight line datum. These selections shall be spaced no closer than 20'.

   - Trees:

     Trees can be used as lawn covers or as lawn covers or shrubbery for other Department approved material. The clear sight window must be in accordance with the WINDOW DETAIL modified to meet the height requirements listed in 'Ground Covers' above. Tree size and spacing to conform to the following tabular values:

<table>
<thead>
<tr>
<th>Description</th>
<th>50</th>
<th>55</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>35</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>(Inches)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Minimum Spacing</td>
<td>22</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>To 8 (or Trees)</td>
<td>28</td>
<td>33</td>
<td>38</td>
</tr>
</tbody>
</table>

   Sizes and spacings are based on the following conditions:

   1. Single line of trees in the median parallel to but not necessarily in line with the centerline.

   2. A straight approach roadway, with skew limits as described in No. 2 above.

   3. Trees and palms ≤ 11\' in diameter casting a vertical shade band on a vehicle entering at stop bar location when viewed by mowing driver beginning at distance 'S' see SHADOW DIAGRAM, Sheet 2.

   4. Sabal palms with diameters > 12" spaced at intervals providing a 2" second full view of entering vehicle at stop line, when viewed by mowing driver beginning at distance 'S' see PERCENTAGE DIAGRAM, Sheet 2.

   5. Trees with diameters ≤ 11\' and trees with diameters > 11\' - 0" to be spaced based on trees with diameters > 11\' - 0".

   For any other conditions the tree sizes, spacings and locations shall be detailed in the plans see Design Note No. 5.

DESIGN NOTES

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 should be done for all intersections.

2. Details are based on the AASHTO "Policy on Geometric Design of Highways And Streets, 2001, CHAPTER 9 INTERSECTION SIGHT DISTANCE CASES B and F, and Department practices for channelized median openings (left turns from major roadways).

3. The minimum driver eye set back 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 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 an 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 oncoming 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 signals are 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 triangle 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 triangle to the left for Case B should be provided to accommodate right turns from that approach.

5. Where curvature, superelevation, adverse slope profiles or other conditions preclude the use of standard tree sizes and spacing, a view of shadow and illumination constraints must be documented and the size and location of trees in medians detailed in the plans.

6. Intersection sight distance values are provided for Passenger Vehicles, SUV Vehicles and Combination Vehicles. Intersection 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 roadsides serving truck terminals, the use of tabulated values for SUV Vehicles or Combination Vehicles should be considered.

---

SIGHT DISTANCE AT INTERSECTIONS

**PLAN**

Special Areas Limited to Ground Cover

**For Signalized and Unsignalized Intersections, the median area along left turn lanes, including the taper, shall be limited to ground cover with height not greater than 18" below the sight line datum regardless of whether or not the area is within the limit of clear sight.**

---
Note:
Lines For Limit Of Clear Sight Are Opposite Hand When Major Road Near Lane Traffic Moving Left (e.g., One-Way Left).

PICTORIAL
ORIGIN OF CLEAR SIGHT LINE ON MINIR ROAD

Perception Diagram
Setting Sabal Palm (State Tree) Spacing

Shadow Diagram

Legend

Areas Free Of Sight Obstructions

The d values in this table were established by the method referenced in Design Note 2, and are applicable to urban, predominantly curved roadways with design speeds of 45 mph or less and meeting the restricted conditions defined in Index No. 700. For horizontal clearance (H) at six feet (6'), the values for d are determined by the equation d = d_w / (1 + H/6). For roadways with nonrestricted conditions, d and d should be based on the geometry for the left turn and on clear zone widths (See Index No. 700).

For wide medians where the turning vehicle can approach the through lanes at or near 90°, use d values from tables on sheets 3 or 6. (The clear sight line origin is assumed to be 14.5' from the edge of the near lane.)

Channelized Directional Median Openings

2010 FDOT Design Standards

Sight Distance At Intersections
### 4 LANE DIVIDED ROADWAY

**SIGHT DISTANCES** ($d$ & ($d_v$) AND RELATED DISTANCES ($d_1$, $d_2$, $d_m$, & $d_o$) (FEET))

**NOTES FOR 4-LANE DIVIDED ROADWAY**

1. See Sheet 2 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 (445770).

**Case B - Intersection with Stop Control on the Minor Road.**

**INSET A**

**INSET B**

**REFERENCES**

- 2010 FDOT Design Standards
- Sheet No.
- Index No.
- 2010 FDOT Design Standards
- Revision
- 5 of 6
- Last
**Inset A**

Where the median is sufficiently wide for the design vehicle to pause in the median (vehicle length plus 6' min.) the clear line of sight to the right ($d_r$) is measured from the vehicle pause location, i.e., not from the crossroad stop position. Distances $d_r$ & $d_m$ do not apply.

**Inset B**

**Notes for 6-Lane Divided Roadway**

1. See sheet 2 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.

**Sight Distances ($d$, ($d_r$) & ($d_v$) and Related Distances ($d_x$, ($d_L$), ($d_L$) & ($d_{VL}$) (Feet))**

**6 Lane Divided**
**NAME**

**DATE**

---

**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/Asphalt</td>
</tr>
</tbody>
</table>

**STOP ZONE FOR RUBBER CROSSING**

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Zone Length (Distance From Stop)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 Mph or Less</td>
<td>2500 ft</td>
</tr>
<tr>
<td>50 - 65</td>
<td>500 ft</td>
</tr>
<tr>
<td>70</td>
<td>200 ft</td>
</tr>
</tbody>
</table>

Notes:
1. Type R Crossings are NOT to be used for multiple track crossings within zones for an existing or scheduled future vehicular stop. Zone lengths are charted above.
2. Single track Type R Crossings within the zones on the chart may be used unless engineering or safety considerations dictate otherwise.

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**VERTICAL ROADWAY ALIGNMENT THROUGH A RAILROAD CROSSING**

**General Notes**

1. The Railroad Company will furnish and install all track bed (ballast), crosstees, rails, crossing surface panels and accessory components. All pavement material, including that through the crossing, will be furnished and installed by the Department or its Contractor, unless negotiated otherwise.
2. When a railroad grade crossing is located within the limits of a highway construction project, a transition pavement will be maintained as appropriate to protect the crossing from low clearance vehicular impacts. Construction project is completed and the final highway surface is constructed.
3. The Central Design Office shall maintain a list of currently used Railroad Crossing Products and periodically distribute the current list to the District Offices as the list is updated.
4. The Railroad Company shall submit engineering drawings for the proposed crossing surface type to the Construction Project Engineer and the District Design Office for concurrence with the List of Railroad Crossing Products. The approved engineering drawings of the crossing surface type shall be made a part of the installation agreement.
5. Sidewalks shall be constructed through the crossing between approach sidewalks. Sidewalks shall be constructed with appropriate materials to allow unobstructed travel through the crossing in accordance with ADA requirements.
6. All asphalt shall be installed in accordance with Index No. 514 and Section 300 of the Standard Specifications.

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**2010 FDOT Design Standards**

**Index No.** 514

**Sheet No.** 1 of 1
PREFACE
All projects and works on highways, roads and streets shall have a traffic control plan. All work shall be executed under the established plan and Department approved procedures. This Index contains information specific to the Federal and State guidelines and standards for the preparation of traffic control plans and for the execution of traffic control in work zones, for construction and maintenance operations and utility work on highways, roads and streets on the State Highway System. Certain requirements in this Index are based on the high volume nature of State highways. For highways, roads and streets off the State Highway System, the local agency (City/County) having jurisdiction may adopt requirements based on the minimum requirements provided in the MUTCD.

Index No. 600 provides Department policy and standards. Changes are only to be made thru Department approved procedures. Index Nos. 601 thru 670 provide typical applications for various situations. Modification can be made to these Indexes as long as the changes comply with the MUTCD and Department Design Standards.

The sign spacings shown on the Indexes are typical (recommended) distances. These distances may be increased or decreased based on field conditions, in order to avoid conflicts or to improve site specific traffic controls.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
The Florida Department of Transportation has adopted the "Manual On Uniform Traffic Control Devices For Streets And Highways" (MUTCD) and subsequent revisions and addenda, as published by the U.S. Department of Transportation, Federal Highway Administration, for mandatory use on the State Maintained Highway System whenever there exists the need for construction, maintenance operations or utility work.

ABBREVIATIONS
Abbreviations assigned to the 600 series Design Standards and applicable to traffic control plans, unless otherwise identified in the plans, are as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>DTV</td>
<td>District Traffic Engineers</td>
</tr>
<tr>
<td>FDOT</td>
<td>Florida Department Of Transportation</td>
</tr>
<tr>
<td>HARR</td>
<td>Highway Advisory Radio</td>
</tr>
<tr>
<td>L</td>
<td>Lat. Length, Buffer Length Or Taper Length Plus Buff Space</td>
</tr>
<tr>
<td>MAS</td>
<td>Motorist Awareness System</td>
</tr>
<tr>
<td>MOT</td>
<td>Maintenance Of Traffic</td>
</tr>
<tr>
<td>MOTC</td>
<td>Maintenance Of Traffic Committee</td>
</tr>
<tr>
<td>MUTCD</td>
<td>Manual On Uniform Traffic Control Devices For Streets And Highways</td>
</tr>
<tr>
<td>NCWP</td>
<td>National Cooperative Highway Research Program</td>
</tr>
<tr>
<td>PCMS</td>
<td>Portable Changeable (Variable) Message Sign</td>
</tr>
<tr>
<td>PRI</td>
<td>Portable Regulatory Sign</td>
</tr>
<tr>
<td>RPM</td>
<td>Raised Retroreflective Pavement Markers</td>
</tr>
<tr>
<td>RDDU</td>
<td>Radar Speed Display Unit</td>
</tr>
<tr>
<td>S</td>
<td>Posted Speed Of (45 Plus 10 Permissible Speed) (MPH)</td>
</tr>
<tr>
<td>SLED</td>
<td>Speed and Law Enforcement Officer</td>
</tr>
<tr>
<td>TTC</td>
<td>Temporary Traffic Control</td>
</tr>
<tr>
<td>TCPG</td>
<td>Traffic Control Plan(s)</td>
</tr>
<tr>
<td>TCZ</td>
<td>Traffic Control Zones</td>
</tr>
<tr>
<td>TM1</td>
<td>Truck Mounted Attenuator</td>
</tr>
<tr>
<td>TCPG</td>
<td>Traffic Control Plan(s)</td>
</tr>
<tr>
<td>W</td>
<td>Width Of Taper Transition In Feet, i.e., Lateral Offset</td>
</tr>
</tbody>
</table>

SYMBOLS
The symbols shown are found in the FDOT site menu under Traffic Control/Cell Library on the CAD/S system. Symbols assigned to the 600 series Design Standards and applicable to traffic control plans, unless otherwise identified in the plans, are as follows:

- Work Area, Hazard Or Work Phase (Any pattern within a boundary)
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Channelizing Device
- Type III Barricade
- Work Zone Sign
- Flasher
- Traffic Signal
- Advance Warning Arrow Panel
- Portable Signal
- Crash Cushion
- Stop Bar
- Worker Vehicle With Flashing Beacon
- Shadow ES1 Or Advance Warning (AW) Vehicle With Advance Warning Arrow Panel And Warning Sign
- Truck Mounted Attenuator (TMA)
- Orange Flag For TCZ Signs
- Type B Light For TCZ Signs
- Low Enforcement Officer
- Portable Regulatory Sign
- Radar Speed Display Unit
- Portable Changeable (Variable) Message Sign
- Lane Identification + Direction Of Traffic

GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES

2010 FDOT Design Standards
13 of 13
Sheet No. 600
Revision 600
07/01/09
DEFINITIONS

Regulatory Speed (In Work Zones)
The maximum speed permitted for the work zone is indicated by the regulatory speed limit signs. The work zone speed must be shown or noted in the plans. This speed should be used as the minimum design speed to determine radius lengths, departure rates, flare rates, lengths of need, clear zone widths, taper lengths, crash cushion requirements, marker spacings, superelevation and other similar features.

Advisory Speed
The maximum recommended travel speed through a curve or a hazardous area.

Travel Way
The portion of the roadway for the movement of vehicles. For traffic control through work zones, travel way may include the temporary use of shoulders and any other permanent or temporary surface intended for use as a lane for the movement of vehicular traffic.

a. Travel lane: The designated widths of roadway pavement marked to carry through traffic and to separate it from opposing traffic or traffic occupying other traffic lanes.

b. Auxiliary lane: The designated widths of roadway pavement marked to separate travel lanes, change, turning, passing and climbing maneuvers from through traffic.

Detour, Lane Shift, and Diversion
A detour is the redirection of traffic onto another roadway to bypass the temporary traffic control zone. A lane shift is the redirection of traffic onto another section of the permanent pavement. A diversion is the redirection of traffic onto a temporary roadway, usually adjacent to the permanent roadway and within the limits of the right-of-way.

Above Ground Hazard
An above ground hazard is any object, material or equipment other than traffic control devices that encroaches upon the travel way or that is located within the clear zone which does not meet the Department's safety criteria, i.e., anything that is greater than 4 feet in height and is firm, unyielding and doesn't meet breakdown requirements.

TEMPORARY TRAFFIC CONTROL DEVICES

Temporary traffic control devices shall be removed as soon as practical when they are no longer required. When work is suspended for short periods of time, temporary traffic control devices that are no longer appropriate shall be removed or covered. Arrow Panels, Portable Changeable Message Signs, Radar Speed Display Towers, Portable Regulatory Signs, and any other trailer mounted devices shall be stored and transported in a safe manner that will not cause any damage to the equipment.

PEDESTRIAN AND BICYCLIST

When an existing pedestrian or bicycle way is located within a temporary traffic control zone, accommodation must be made to accommodate pedestrians and cyclists. A safe and efficient alternative may be chosen, such as crosswalks or Painted Bike Paths. Only temporary traffic control devices may be used to provide for the disabled must be provided.

Advanced notification of sidewalk closures and marked detours shall be provided by appropriate signs.

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)

Overhead work using a modified lane closure is allowed if all of the following conditions are met:

a. The modified lane closure is allowed only at the work zone.

b. Work operations are 60 minutes or less.

c. Speed limit is 45 mph or less.

d. Safety equipment in the work area has high-intensity, rotating, flashing, oscillating, or strobe lights operating.

OPTION 2 (OVERHEAD WORK ABOVE AN OPEN TRAFFIC LANE)

Overhead work above an open traffic lane is allowed if all of the following conditions are met:

a. The work area is located on a utility pole, light pole, signal pole, or their appurtenancers.

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 within an area bounded by 2 feet outside the edge of travelway and 18 feet in height.

e. Aircraft equipment in the work area has high-intensity, rotating, flashing, oscillating, or strobe lights operating.

OPTION 3 (OVERHEAD WORK ADJACENT TO AN OPEN TRAFFIC LANE)

Overhead work adjacent to an open traffic lane is allowed if all of the following conditions are met:

a. The work area is located on a utility pole, light pole, signal pole, or their appurtenancers.

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 within 2 feet from the edge of travelway up to 18 feet in height.

OPTION 4 (OVERHEAD WORK MAINTAINING TRAFFIC WITH NO ENCROACHMENT BELOW THE OVERHEAD WORK AREA)

Traffic shall be detoured, shifted, diverted or paced to not encroach upon the area directly below the overhead work operations in accordance with the appropriate standard index drawing or detailed in the plans. This option applies to, but is not limited to, the following construction activities:

a. Beam, girder and segment placement.

b. Deck form placement and removal.

c. Concrete deck placement.

d. Hauling construction located at edges of deck.

e. Structure demolition.

OPTION 5 (CONDUCTOR/CABLE PULLING ABOVE AN OPEN TRAFFIC LANE)

Conductor cable and/or demagnetized conductor installations shall be in accordance with proper tension shall be done in accordance with the appropriate Standard Index or temporary traffic control plan. Continuous pulling operations of secured cable and/or conductors are allowed over open lanes of traffic with no encroachment by any part of the work activities, materials or equipment within the minimum vertical clearance above the traffic area. The utility company may use techniques to ensure that pull ropes and conductors/cables are not at risk below the minimum vertical clearance.

Railroads

Railroad crossings affected by a construction project shall be evaluated for traffic reduction before starting work on the tracks. The evaluation should include at minimum a traffic volume, distance from the tracks to the intersections, lane closure or lane locations, signal timing, etc.

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 curves.

Intersections: Traffic control devices at intersections must provide sight distances for the road user to perceive potential conflicts and to traverse the intersection safely.

ABOVE GROUND HAZARD

Above ground hazards (see below) 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 constitutes an above ground hazard must be stored/removed from the travelway and clear zone or be shielded by a barrier or crash cushions.

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 traffic lane. The table below gives clear zone widths in work zones for medians and roadside conditions other than for roadside canals where roadside canals are present. Clear zone widths are to conform with the distances to canals as described in Volume 2, Chapter 4, Section 4.2 and Exhibit 4-4-2 and 4-9 of the Plans Preparation Manual.

<table>
<thead>
<tr>
<th>WORK ZONE SPEED (MPH)</th>
<th>TRAVEL LANES &amp; MULTILANE RAMPS (FEET)</th>
<th>AUXILIARY LANES &amp; SINGLE LANE RAMPS (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-70</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>55</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>40-50</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>30-40</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>ALL SPEEDS</td>
<td>4&quot; BEHIND FACE OF CURB</td>
<td>4&quot; BEHIND FACE OF CURB</td>
</tr>
<tr>
<td></td>
<td>CURB &amp; GUTTER</td>
<td></td>
</tr>
</tbody>
</table>

OVERWEIGHT/OVERSIZED 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 Permit 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 over weight/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 Permit Office shall be notified immediately.

LANE WIDTHS

Lane widths of through roadways should be maintained through work zone travel lanes wherever practical. The minimum widths for work zone travel lanes shall be as follows: 12' for Interstates with at least one 18' lane provided in each direction, unless normally excepted 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 spaces) in any given direction on the Interstate or on state highways with a posted speed of 55 MPH or greater.

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>DESIGN SPEED</th>
<th>MINIMUM RADIUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPH</td>
<td>FEET</td>
</tr>
<tr>
<td>65</td>
<td>3750</td>
</tr>
<tr>
<td>60</td>
<td>3400</td>
</tr>
<tr>
<td>55</td>
<td>1840</td>
</tr>
<tr>
<td>50</td>
<td>1390</td>
</tr>
<tr>
<td>45</td>
<td>1080</td>
</tr>
<tr>
<td>40</td>
<td>820</td>
</tr>
<tr>
<td>35</td>
<td>610</td>
</tr>
<tr>
<td>30</td>
<td>430</td>
</tr>
<tr>
<td>Superelevate When Smaller Radial Is Used</td>
<td></td>
</tr>
</tbody>
</table>
### 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 be labeled as ANSI/ISEA 107-2004. The background color shall be red, orange, yellow, or green, and shall be visible at a minimum distance of 1,000 feet. Class 3 apparel shall be used for 1,000 feet.

**WORKERS:** All workers within the right-of-way shall wear ANSI/ISEA Class 2 apparel. Workers operating machinery or equipment in the work zone shall wear class 3 apparel. Non-maintained work zone clothing could become entangled during operation or wear 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 consistent with FDOT requirements such as NFPA, USHA, ANSI, etc., the other standards shall prevail.

**FLAGGERS:** For daytime activities, flaggers shall wear ANSI/ISEA Class 2 apparel. For nighttime activities, flaggers shall wear ANSI/ISEA Class 3 apparel.

### FLAGGER CONTROL

Where flaggers are used, a FLAGGER symbol or sign must replace the WORKERS symbol or sign. The flagger must be clearly visible to approaching traffic for a distance sufficient to permit proper response by the material to the flagging. The flagger’s actions, and to perform their duties by preventing or reducing speed or to stop as required before entering the work site. Flaggers shall be positioned in the most visible position, maintaining maximum color contrast between the flagger’s high-visibility safety apparel and equipment, and the work area background.

**Hand-Signaling Devices**

The STOP/SLOW paddle is the primary hand-signaling device. The STOP/SLOW paddle shall have an octagonal shape or a rigid handle. If the STOP/SLOW paddle is placed on a rigid staff, the minimum length of the staff measured from the bottom of the paddle to the end of the staff that rests on the ground should be 6 feet. The STOP/SLOW paddle shall have at least 24 inches wide with letters at least 6 inches high and should be fabricated from a rigid semicircular material. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be orange with black letters and border. When used at night-time, the STOP/SLOW paddle shall be retrofitted with light-emitting diodes.

Flag use is limited to immediate emergencies, intersections, and when working on the centerline or shared left turn lanes where two sets of flaggers are required and there is opposing traffic in the adjacent lanes. Flags, when used, shall be a minimum of 24 inches square, made of a good grade of red material, and securely fastened to a staff that is approximately 36 inches in length. When used at night-time, flags shall be retrofitted with light-emitting diodes.

Flag signals, lanterns, or other lighted signal that will direct, red warning light shall be used at night.

### REGULATORY SPEEDS IN WORK ZONES

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.

In general, the regulatory 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 allowable 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 5% increments.

Temporary regulatory speed signs shall be removed as soon as the conditions requiring the speed reduction no longer exist. Once the work zone regulatory sign speeds are removed, the regulatory speed signs existing prior to construction will automatically go back into effect unless new speed limit signs are provided for in the plans.

Do projects with interspersed work activities, speed reductions should be located in proximity to those activities which merit a reduced speed, and not “bunched” together in the project area. At the departure point of each activity, 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 reduced, consideration shall be given to supplementing the existing signs when the construction work zone is between existing regulatory signs. For projects where the reduced speed conditions exist for greater than 1 mile in rural/interstate (non-urban) or in rural/urban interstate or additional regulatory speed signs shall be placed at no more than 1 mile intervals. Engineering judgement shall be used to determine the placement of the additional signs. Locating these signs beyond ramp entrances and beyond major intersections are examples of proper placement. For urban situations (non-urban), additional speed signs are to be placed at a minimum of 1,000 feet.

When field conditions warrant speed reductions different than those shown in the TCP, the contractor may submit to the project engineer for approval by the Department a signed and sealed study to justify the need for further reducing the posted speed, or the engineer may request the District Traffic Operations (STOP) to investigate the need. It is not to interfere with the TCP to issue regulations for regulatory speeds in work zones due to the revised provisions of F.S. 318.074(1)(B) Advisory Speed plates will be used on the sign for the field engineer for temporary use while processing a request to change the regulatory speed specified in the plans when deemed necessary. Advisory speed plates cannot be used alone but must be placed below the construction warning sign for which the advisory speed is required.

For additional information refer to the FDOT Plans Preparation Manual, Volume 1, Chapter 10.
SIGN PLACEMENT

Post-mounted signs installed at the side of the road shall be a height of at least 7 feet measured from the bottom of the sign to a horizontal line extended from the near edge of the pavement. Signs mounted on guardrails, 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 II Lights and Orange Flags are not required except for survey work zones.

Vinyl signs may be used for Day or Night Operations but not to exceed 2 day except as noted in the standards. Type II Lights and Orange Flags are not required except for survey work zones.

INTERSECTING ROAD SIGNING

Signage 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 lag signage be less than a ROAD WORK AHEAD sign.

SIGN COVERING AND INTERMITTENT WORK STOPPAGE SIGNING

Existing or temporary traffic control signs that are no longer applicable or are inconsistent with intended travelpaths shall be removed or fully covered. Sign blanks or other available coverings must completely cover the existing sign. Rigid sign coverings shall be the same size as the sign it is covering, and bolted in a manner to prevent movement. Sign covers are incidental to work operations and are not 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 (RC-L) warning sign should be used for the advanced warning signage 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-third mile or more when 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 of 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-4) sign may be used as an alternate to the ROAD WORK AHEAD or the ROAD WORK XXX FT. (W-10) 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—you must read the road work sign midway to the next sign whichever is less.

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT SIGN

The SPEEDING FINES DOUBLED WHEN WORKERS PRESENT sign should be installed on all projects, but may be omitted if the work operation is less than 1 day. The placement 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 grooved surface or paved road.

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 1 mile this sign should be omitted and signing coordinated in accordance with Index No. 600, ADJACENT AND/OR OVERLAPPING WORK ZONE SIGNING.

PROJECT INFORMATION SIGN

The Project information sign shall be installed when called for in the plans.
GENERAL NOTES:

1. All signs shall be post mounted when work operations exceed one day except for:
   a. Road closure signs mounted in accordance with the vendor drawing for the Type III barricade
      shown on the QPL.
   b. Pedestrian advanced warning or regulatory signs mounted on sign supports in accordance with
      the vendor drawing shown on the QPL.

TEMPORARY SIGN SUPPORT NOTE:

1. Signs mounted on temporary supports or barricades, and barricade/sign combination shall be
   crashworthy in accordance with NCARP 350 requirements and included on the Qualified Products
   List (QPL).

POST MOUNTED SIGN NOTES:

1. For Single Post Sign Supports, use the appropriate rural or urban type (2) Post Sign Support Mounting
   Detail.

2. Use only approved systems listed on the
Department’s Qualified Products List (Manufacturers
seeking QPL approval Index 11600). Submit soil plate
details for foundation depth design.

3. Provide 3 lb/ft² Steel U Channel Posts with a
   minimum section modulus of 0.43 in³ for 60 ksi
   steel, or a minimum section modulus of 0.31 in³
   for 70 ksi steel.

4. Provide 4 lb/ft² Steel U Channel Posts with a
   minimum section modulus of 0.56 in³ for 60 ksi
   steel, or a minimum section modulus of 0.47 in³
   for 70 ksi steel.

5. Steel U Channel Posts shall meet the material
   requirements of Specification 700 with the exception
   that galvanization is not required.

6. Sign attachment bolts, washers, nuts and spacers
   shall conform with ASTM A457 or A 4.36

7. For diamond warning signs with supplement plaque
   (up to 3 ft² in area), use 4 lb/ft² posts for up to 10
   ft CLEAR Height (measure to the bottom of diamond
   warning sign).

8. Install 4 lb/ft² Steel U Channel Posts with approved
   breakaway splice in accordance with the
   manufacturer’s detail shown on the QPL.

9. The contractor may install 3 lb/ft² Steel U Channel
   Posts with approved breakaway splice in accordance
   with the manufacturer’s detail shown on the QPL.

10. Install all posts plumb.

11. The contractor may set posts in preformed holes to
    the specified depth with suitable backfill/tamped
    securely on all sides, or drive 3 lb/ft² sign posts and
    any size base post in accordance with the
    manufacturer’s detail shown on the QPL.

12. The soil plate as shown on the QPL vendor
    drawing is not required for base posts or sign posts
    driven through existing asphalt roadway or shoulder
    pavement.

SIGN ATTACHMENT DETAIL

WORK ZONE SIGN SUPPORTS

TYPICAL FOUNDATION DETAIL

See QPL for post, splice and connection details.
No bolts installed closer than 1" to cutting edge.

POST AND FOUNDATION TABLE FOR
WORK ZONE SIGNS

<table>
<thead>
<tr>
<th>SIGN SHAPE</th>
<th>CIRCUMFERENCE (IN)</th>
<th>NUMBER OF STEEL U CHANNEL POSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td>36 of 48</td>
<td>1</td>
</tr>
<tr>
<td>Rectangle</td>
<td>48 (W x H)</td>
<td>1</td>
</tr>
<tr>
<td>Circle</td>
<td>56 of 60</td>
<td>2</td>
</tr>
<tr>
<td>Square</td>
<td>56 of 60/54 of 60</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes For Table:
1. Use 3 lb/ft² posts for Clear Height up to
2. Minimum foundation depth is 4.0 feet
   10 and 4 lb/ft² posts for Clear Height
   for 3 lb/ft² posts and 4.5 feet for 4 lb/ft²
   up to 12'.
   posts.
MANHOLES/CROSSWALKS/JOINTS
Manholes extending 1' or more above the travel lane and crosswalks having an uneven surface greater than 6" shall have a temporary asphalt apron constructed as shown in the diagram below.

All transverse joints that have a difference in elevation of 1' or more shall have a temporary asphalt apron constructed as shown in the diagram below.

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.

TRUCK-MOUNTED ATTENUATORS
Truck-mounted attenuators (TMA) can be used for moving operations and short-term stationary operations. For moving operations, see Index Nos. 807 and 809. For short-term stationary operations, see Part VI 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. Pavement with overlays of either a structural or friction course are a positive means to achieve obliteration.

_SIGNALS_
Existing traffic signals or operations that require modification in order to carry out work zone traffic control shall be included in the TCP and be approved by the District Traffic Operations Engineer.

Maintain all existing actuated or traffic responsive manufacturers signal operations for main and side street movements for the duration of the Contract and require restoration at 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 Control is required.

_CHANNELIZING AND LIGHTING DEVICES_
Channelizing and lighting devices for work zone traffic control shall be as prescribed in Part VI of the MUTCD, subject to supplemental revisions provided in the contract documents and Index 650 requirements.

Approved devices are listed on the Department’s Qualified Product List.

_CHANNELIZING AND LIGHTING DEVICE CONSISTENCY_
Barriques, vertical panels, cones, hular markers and drums shall not be intertwined within either the lateral transition or within the tangent alignment.

_WARNING LIGHTS_
Warning lights shall be in accordance with the MUTCD except for the application limitations stipulated below.

_Fixtures__

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 continuously warn drivers that they are approaching or proceeding in a hazardous area. Flashing lights shall be used to delineate the travel way or travel lane, and at locations where they will form a continuous line to the drivers eyes. The Type A light will be used to mark obstructions that are located adjacent to or in the intended travel way. Type A lights shall be used in conjunction with the first advanced warning sign in a warning sequence.

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 sign where two or more signs are used this applies to all approaches to any work zone. The light shall be mounted on the channel post or on the upper edge of the sign nearest the traffic.

_TYPE C 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 or travel lane, lane changes, diversion 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" x 18" (min.) 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 to:
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 800 feet in advance of the work zone or conflicts or 1/2 to 2 miles in advance of complex traffic control systems which require new and/or unusual traffic maneuvers.

If PCMS are to be used at night, the intensity of the flashes shall be reduced during darkness when lower intensities are desirable.

For additional information refer to the FDOT Plans Preparation Manual, Volume I, Chapter 19.

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 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 taper for each closed lane.

When Advance Warning Arrow Panels are used at night, the intensity of the flashes shall be reduced during darkness when lower intensities are desirable.

<table>
<thead>
<tr>
<th>MODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOVE/MERGE LEFT</td>
</tr>
<tr>
<td>⚠️ Minimum Required Lamps ⚠️</td>
</tr>
</tbody>
</table>
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 (4:1) 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.

<table>
<thead>
<tr>
<th>Index No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Temporary guardrail and anchorage</td>
</tr>
<tr>
<td>411</td>
<td>Temporary low profile barrier</td>
</tr>
<tr>
<td>414</td>
<td>Temporary concrete barrier</td>
</tr>
<tr>
<td>415</td>
<td>Temporary concrete barrier</td>
</tr>
</tbody>
</table>

4. Warning device spacing shall be as shown in Table 1.

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Cone or Tubular Markers</th>
<th>Type I or Type II Barricades or Vertical Panels or Drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper</td>
<td>Tangent</td>
<td>Taper</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>30 to 45</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>50 to 70</td>
<td>25</td>
<td>50</td>
</tr>
</tbody>
</table>

DROP-OFFS IN WORK ZONES

SHOULDER TREATMENT

NOTES

1. Shoulder treatment may be used in lieu of barrier. Warning devices are required.

2. Dolly inspections shall be conducted to assure that no erosion, excessive slopes, rutting, or other adverse conditions exist. Any deficiencies shall be repaired immediately.

3. Compensation for the placement and removal of the material required for the shoulder treatment shall include the cost for Maintenance Of Traffic, LS. Use of shoulder treatment in lieu of a barrier is not eligible for WEO consideration.

TRAVEL LANE TREATMENT FOR MILLING OR RESURFACING

NOTES

1. This treatment applies to resurfacing or milling operations between adjacent travel lanes.

2. Whenever there is a difference in elevation between adjacent travel lanes, the RW-11 sign with "UNEVEN LANES" is required at intervals of 1/2 mile maximum.

3. If D is 15° or less, no treatment is required.

4. Treatment allowed only when D is 3° or less.

5. If the slope is steeper than 1 in 4 (not to be steeper than 1 in 1), the RW-11 and MUT-15-56 signs shall be used as a supplement to the RW-11; this condition should never exceed 3 miles in length.
1. Sign height shall be 7' minimum. Sign offset from edge of travelway should be between 5' and 10' and relatively consistent throughout the project phase.

2. Signs should show specific business names. Logos may be provided by business owners BUSINESS ENTRANCE sign in accordance with Index 17155 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

TABLE I

<table>
<thead>
<tr>
<th>Device Spacing</th>
<th>Max. Distance Between Devices (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tubular Markers</td>
</tr>
<tr>
<td>Taper</td>
<td>Taper</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>30 to 45</td>
<td>25</td>
</tr>
<tr>
<td>50 to 70</td>
<td>25</td>
</tr>
</tbody>
</table>

EXECUTIVE SUMMARY

A. TEMPORARY LANE SEPARATOR

1. Temporary lane separators shall be supplemented with any of the following approved fixed (surface mounted) channelizing devices: tubular markers, vertical panels, or opposing traffic lane divider panels. Opposing traffic lane divider panels with all center lane dividers to separate opposing vehicular traffic on a two-lane, two-way operation.

2. Reflectors materials shall have a smooth sealed outer surface which will display the same approximate color day and night.

3. 12" openings for drainage shall 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.

4. Tubular Markers, Vertical Panels, and Opposing Traffic Lane Divider panels shall not be intersected within the limits where the temporary lane separator is used.

5. The Contractor has the option of using temporary lane separators systems (including channelizing devices) from the qualified products list to the temporary asphalt separator and channelizing devices detailed on this sheet.

6. Temporary lane 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, relocate, maintain, and remove the temporary lane separator. Any damage to existing pavement caused by the removal of temporary lane separator shall be satisfactorily repaired and the cost of such repairs are to be included in the cost of Maintenance of Traffic, LS.

SECTION AA

FIXED (SURFACE MOUNTED) CHANNELIZING DEVICES

TUBULAR MARKER ORANGE

VERTICAL PANEL ORANGE

OPPOSING TRAFFIC LANE DIVIDER W6-6 B/D

Asphalt (See Note 5)

Lane Separator

Fixed (Surface Mounted)

Channelizing Devices

Plan View

Diagram View

New Page
CHANNELIZING AND LIGHTING DEVICE NOTES

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, water-resistant type labels 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 multiples of the 6'-0" unit.

5. No sign panel should be mounted on any barricade type unless the barricade/sign combination was found to be crashworthy and the sign panel is mounted in accordance with the vendor drawings for the barricade shown on the QPL.

6. During hours of darkness, warning lights shall be used on drums, vertical panels, Type I, Type II, and Type III direction indicator barricades in accordance with "Warning Lights" in Index No. 600.

7. Ballast shall not be placed on top rails or any stripped rails or higher than 15" above the driving surface.

8. The direction indicator barricades may be used in two or more components 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.

9. The splicing of sheeting is not permitted on either channelizing devices or MUTCD signs.

10. For rails less than 3'-0" long, 4" stripes shall be used.

11. 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 colors when used at night.

IDENTIFICATIONS - CHANNELIZING AND LIGHTING DEVICES
**TEMPORARY SUBSTITUTION OF RPM'S FOR PAINT OR REMOVABLE TAPE**

1. Paint or removable tape are the required work zone markings and shall be placed in accordance with the plans and specifications. 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 condition permits the placement of appropriate work zone marking. Temporary substitution of RPM's for work zone markings will be allowed for equipment malfunction, placement at the appropriate work zone marking 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.

**USE OF RPM'S TO SUPPLEMENT PAINT OR REMOVABLE TAPE IN WORK ZONES**

1. RPM's shall be installed as a supplement to:
   a. Lane lines.
   b. Edge lines in transition & approach areas.
   c. Edge lines of gore areas.

2. Placement of RPM's should be as shown in Index No. 17352 with the following exceptions:
   a. RPM's shall be placed at 5 feet center to center in approach and transition areas.
   b. Class 0 markers shall be placed at a maximum spacing of 5 feet center to center.

**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 the 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 black RPM's. The spacing between RPM's shall be 2'-6". 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**

- Centerline of Pavement Marking
- Lane Lines
- Edge Lines
- Travel Lines
- Edge of Travel Way
- Total Width of Travel lanes divided by the number of travel lanes unless other widths are shown in the plans.

---

**GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES**

2010 FDOT Design Standards
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 T&O devices shall be placed in accordance with other applicable T&O Indexes.

4. When construction activities encroach on a sidewalk refer to Index No. 660.

5. For general T&O requirements and additional information, refer to Index No. 600.

SYMBOLS

- Work Area
- Lane Identification + Direction of Traffic

CONDITIONS

WHERE ANY VEHICLE EQUIPMENT, WORKMEN AND THEIR ACTIVITIES ARE BEHIND AN EXISTING BARRIER, MORE THAN 2' BEHIND THE CURB, OR 15' OR MORE FROM THE EDGE OF TRAVELeway.

OFFSET ZONE:
- a) Behind an existing barrier,
- b) More than 2' behind the curb,
- c) 15' or more from the edge of travel way.
GENERAL NOTES

1. When four or more work vehicles enter the travel lanes in a one hour period or less (excluding establishing and terminating the work area), the advanced WORKERS sign shall be substituted for the WORKERS sign. For location of flaggers and PLACED signs, see Index No. 603.

2. WORKERS sign to be removed or fully covered when no work is being performed.

3. SHOULDERS sign may be used as an alternate to the WORKER signs only on the side where the shoulder work is being performed.

4. When a side road intersects the highway within the TMC zone, additional TMC devices shall be placed in accordance with other applicable TMC Indexes.

5. For general TMC 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, flashing, oscillating, or strobe lights operating.

CONDITIONS

WHERE ANY VEHICLE EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCOMPASS THE AREA CLOSER THAN 20 BUT NOT CLOSER THAN 10 TO THE EDGE OF TRAVEL WAY.
ROAD WORK AHEAD

ONE LANE ROAD AHEAD

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

END ROAD WORK

END ROAD WORK

DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Spacing (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 or less</td>
<td>200, 200, 200, 200</td>
</tr>
<tr>
<td>25</td>
<td>150, 150, 150, 150</td>
</tr>
<tr>
<td>30</td>
<td>100, 100, 100, 100</td>
</tr>
<tr>
<td>35 or greater</td>
<td>50, 50, 50, 50</td>
</tr>
</tbody>
</table>

* The ROAD WORK 1 MILE sign may be used as an alternate to the ROAD WORK AHEAD sign.

** 500' beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.

*** BE PREPARED TO STOP sign may be omitted for speeds of 45 MPH or less.

TABLE I DEVICE SPACING

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Cones or Tubular Markers</th>
<th>Type I or Type II Barriers or Vertical Panels or Drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 to 45</td>
<td>Taper, Taper, Taper</td>
<td>Taper, Taper, Taper</td>
</tr>
<tr>
<td>50 to 70</td>
<td>20, 50, 20</td>
<td>50, 50</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:
   (i) Flag-carrying vehicle;
   (ii) Official vehicle;
   (iii) Pilot vehicles;
   (iv) Traffic signals.

3. 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.

4. The ONE-LANE ROAD sign shall be fully covered and the FLASHERS signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.

5. The two channelizing devices directly in front of the work area and the one channelizing device at the end of the work area may be omitted provided vehicles in the work area have highly-intensity rotating, flashing, oscillating, or strobe lights operating.

6. For general TCO 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 3' OUTSIDE THE EDGE OF TRAVEL WAY.
ROAD WORK
END
BE PREPARED TO STOP
ROAD WORK AHEAD
ONE LANE ROAD AHEAD
STOP
SPEEDING FINES DOUBLED
WHEN WORKERS PRESENT
SLOW
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 of 2 do not apply when AFAD are used.

DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>#&lt;br&gt;(See Sheet 1 Notes)</th>
<th>0&lt;br&gt;(See Sheet 1 Notes)</th>
<th>250</th>
<th>250</th>
<th>250</th>
<th>250</th>
<th>250</th>
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</thead>
<tbody>
<tr>
<td>40 or less</td>
<td>200 200 200 200 200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 - 60</td>
<td>350 350 350 350 175</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 - 75</td>
<td>300 300 300 300 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 or greater</td>
<td>250 250 250 250 500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notice: The Florida Department of Transportation has received approval from FHWA to experiment with the use of the automated flagger assistance devices (AFAD). AFAD's shall only be used when called for in the plans that include the appropriate pay item and development specifications or approved by the State roadway Design Office.
GENERAL NOTES

1. The "FLASHER" legend sign may be substituted for the symbol sign.

2. When vehicles in a parking zone block the line of sight to TIZ signs, the signs shall be post mounted and located in accordance with Index No. 1700.

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. Flaggers shall be in sight of each other or in direct communication at all times.

6. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.

7. For general TIZ requirements and additional information, refer to Index No. 600.

DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed</th>
<th>Spacing (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-40 mph or less</td>
<td>A</td>
</tr>
<tr>
<td>45 mph or less</td>
<td>200</td>
</tr>
<tr>
<td>45 mph or less</td>
<td>350</td>
</tr>
</tbody>
</table>

CONDITIONS
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.

ROAD WORK AHEAD AND END ROAD WORK sign may be omitted

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, occulting, or strobe lights operating.
e) Volume and complexity of the roadway has been considered.
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 TCS signs or when TCS signs encroach on a normal pedestrian walkway, the signs shall be posted and located in accordance with Index No. 17502.

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. Flagger 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 TCS requirements and additional information, refer to Index No. 600.

8. The two channelizing devices directly in front and directly in front of 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.

DURATION NOTES

1. ROAD WORK AHEAD 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.
   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.
SIGNAL MOUNT DETAILS

GENERAL NOTES

1. 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 signals is limited, the signals may be mounted on span wire at the discretion of the Engineer.

   Where the maximum distance between portable traffic signals (receiver/transmitter) 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 ROAD WORK 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 highways 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 TTC Indexes.

8. For general TTC 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.

SYMBOLS

- Work Area
- Sign with 18" x 18" (Min.) Orange Flag And Type II Light
- Work Zone Sign
- Channelizing device (See Index No. 500)
- Traffic Signal
- Type III Barricade
- Flagger
- Stop Bar
- Portable Signal
- Lane Identification / Direction of Traffic

2010 FDOT Design Standards - Revision 606

TWO-LANE TWO WAY, WORK WITHIN THE TRAVEL WAY SIGNAL CONTROL

CONCLUSIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCroach ON ONE LANE OR MORE LANE OF A TWO-LANE TWO-WAY ROADWAY AND TRAFFIC SIGNALS ARE NEEDED.
SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS
SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS

SINGLE LANE CLOSURE • SHORT BRIDGES

2010 FDOT Design Standards
TWO-LANE TWO WAY, WORK WITHIN THE TRAVEL WAY
SIGNAL CONTROL
MOMENTARY ROADWAY CLOSURE • HAUL ROUTE CROSSING
The distance between the advance warning sign and the work location should not exceed 5 miles.

WORK ON SHOULDER

GENERAL NOTES
1. Where work activities within 2 ft 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 flashing, 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 FCZ 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

Detour Connection To Existing Pavement To Be
Constructed Under TCO Plan Of Index No. 651
(Same For Opposite Connection)

Required Only When (T) Exceeds 500'

Double Yellow Refractored Pavement Markings

500' Dr $\frac{T}{2}$ Whichever Is Less

White Refractored Pavement Markings

500' 500' 500'

Required Only When (T)

SPEED LIMIT XX

TIP 1 OR Type II Barricades Or Vertical Panels Or Drums At 50' Centers

SPEED LIMIT XX

SPEED LIMIT XX

1. For speed sign applications, see Index No. 600.

2. Where 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 past mounted delineators at 50' centers may
be substituted for the barricades, vertical panels or drums.

3. On the existing pavement, allowing 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 lines.

4. Where the tangent distance (T) exceeds 600' and no
passing or stopping sight distance restrictions exist, the
yellow refractored markings used to indicate the centerline
of the traveled way may be replaced with yellow refractored
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 TCO Indices.

6. If temporary structures are required on the diversion, traffic
control will be in conformance with Index No. 650.

7. For general TCO requirements and additional information,
turn to Index Nos. 600 and 17352.

8. If posted speed for Work Zone is 45 mph or less, use
"ROAD WORK $\frac{1}{2}$ MILE" and space accordingly.

**GENERAL NOTES**

**SYMBOLS**

- Work Area
- Sign With 20" x 18" (Min.) Orange
  Plug And Type B Light
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Type III Barricade
- Lane Identification = Direction of Traffic

**CONDITIONS**

WHERE ANY VEHICLES, EQUIPMENT, OR WORKERS ARE
IN THE WORK ZONE, SUPERVISE THE WORK OF BOTH
LANES AND A TRAFFIC DIVERSION
IS CONSTRUCTED.
GENERAL NOTES

1. If the work operation (excluding establishing and terminating the work zone) requires that two or more work vehicles cross the offset zone in any one hour, traffic control shall be in accordance with Index No. 622.

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 travelway, both roadways. Work performed in the median behind curb and gutter shall be in accordance with Index No. 622.

5. When a side road intersects the highway within the work area, additional traffic control devices shall be placed in accordance with other applicable TCOZ Indexes.

6. When construction activities encroach on a sidewalk, refer to Index No. 660.

7. For general TCOZ requirements and additional information, refer to Index No. 600.

SYMBOLS

- Work Area
- Lane Identification + Direction of Traffic

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE BEHIND AN EXISTING BARRIER, MORE THAN 15' BEHIND THE CURB, OR 15' OR MORE FROM THE EDGE OF TRAVELWAY.
ROAD WORK AHEAD

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

GENERAL NOTES

1. If the work operation approaches on the through traffic lanes or when four or more work vehicles enter or exit through traffic lanes in a one-hour period (excluding establishing and terminating the work areas), a flagger shall be provided and a FLASHER 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 travelway.

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 WORKERS symbol sign.

6. When a side road intersects the highway within the TCZ zone, additional TCZ devices shall be placed in accordance with other applicable TCZ Indexes.

7. 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 endanger the area closer than 15' but not closer than 2' to the edge of travelway.

DISTANCE BETWEEN SIGNS

<table>
<thead>
<tr>
<th>Speed</th>
<th>Spacing (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mph or less</td>
<td>500-300</td>
</tr>
<tr>
<td>25 mph</td>
<td>300-200</td>
</tr>
<tr>
<td>30 mph or greater</td>
<td>200-100</td>
</tr>
</tbody>
</table>

# 500 beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.

SYMBOLS

- Work Area
- Sign with 18"x18" (Ni.) Orange Flag And Type II Light
- Channelizing Device (See Index No. 600)
- Lane Zone Sign
- Lane Identification + Direction Of Traffic

<table>
<thead>
<tr>
<th>Table II</th>
<th>Taper Length ~ Shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>9(\frac{a}{b})</td>
</tr>
<tr>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>40</td>
<td>72</td>
</tr>
<tr>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>50</td>
<td>155</td>
</tr>
<tr>
<td>55</td>
<td>185</td>
</tr>
<tr>
<td>60</td>
<td>200</td>
</tr>
<tr>
<td>65</td>
<td>217</td>
</tr>
<tr>
<td>70</td>
<td>233</td>
</tr>
</tbody>
</table>

\(\frac{a}{b}\) Minimum shoulder width.

\(\frac{a}{b}\) = Length of shoulder taper in feet

\(\frac{a}{b}\) = Width of total shoulder in feet (combined paved and unpaved width)

\(\frac{a}{b}\) = Posted speed limit (mph)
### GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.

2. On undivided 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 left lane closed and lane ends signs substituted for the right lane closed and lane end signs.

4. Signs and traffic control devices are to be modified in accordance with INTERMITTENT WORK STOPPAGE details (sheet 2 of 2) when no work is being performed and the highway is open to traffic.

5. The two channeling devices directly in front of the work zone may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.

6. 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 travelway. See Index No. 612 for shoulder taper formulas.

7. When a side road intersects the highway within the TCC zone, additional TCC devices shall be placed in accordance with other applicable TCC devices.

8. This TCC plan does not apply when work is being performed in the middle lanefield of a six or more lane highway. See Index No. 614.

9. For general TCC requirements and additional information, refer to Index No. 600.

### DURATION NOTES

1. Temporary white edgeline may be omitted for work operations less than 3 days.

2. Signs, arrow panel 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 LANE ADJACENT TO EBONT WORK AREA, THE AREA 2 OUTSIDE THE EDGE OF TRAVEL WAY.

---

### Table I - Device Spacing

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Cones or Tubular Markers</th>
<th>Type I or Type II Mallard Devices or Warning Panels or Drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 - 25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>25 - 50</td>
<td>25</td>
<td>50</td>
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<tr>
<td>50 - 75</td>
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<td>50</td>
</tr>
<tr>
<td>75 - 100</td>
<td>25</td>
<td>75</td>
</tr>
</tbody>
</table>

### Table II - Buffer Space and Taper Length

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Buffer Space</th>
<th>Taper Length (12&quot; Lateral Transition)</th>
<th>Notes (Margin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>155</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>250</td>
<td>245</td>
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<td>45</td>
<td>305</td>
<td>320</td>
<td></td>
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<tr>
<td>55</td>
<td>360</td>
<td>540</td>
<td></td>
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<tr>
<td>65</td>
<td>425</td>
<td>600</td>
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<tr>
<td>70</td>
<td>485</td>
<td>720</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>545</td>
<td>780</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>605</td>
<td>840</td>
<td></td>
</tr>
</tbody>
</table>

When Buffer Space cannot be attained due to geometric constraints, the greatest attainable length shall be used, but not less than 200 ft.

For lateral transitions other than 12", use formula L = Lw where L shown in the notes column.

Where:
- L = Length of taper in feet
- W = Width of lateral transition in feet

1. Speeding fines are doubled when工序 is presented.

---

### ROAD WORK AHEAD

- Speeding fines double when workers present.
- Right lane closed ahead.
- Median
- White reflectorized pavement markings

---

### DEVELOPMENT CHECKLIST

<table>
<thead>
<tr>
<th>Name / Initials</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJ. MGR.</td>
<td></td>
</tr>
<tr>
<td>ESTIMATOR</td>
<td></td>
</tr>
<tr>
<td>SUPERVISOR</td>
<td></td>
</tr>
<tr>
<td>CONTRACTOR</td>
<td></td>
</tr>
<tr>
<td>INSPECTOR</td>
<td></td>
</tr>
<tr>
<td>QA/QC MANAGER</td>
<td></td>
</tr>
<tr>
<td>DESIGN OFFICE</td>
<td></td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td></td>
</tr>
<tr>
<td>ENGINEERING</td>
<td></td>
</tr>
<tr>
<td>CONTRACTOR</td>
<td></td>
</tr>
<tr>
<td>OWNER</td>
<td></td>
</tr>
</tbody>
</table>

---

### 2010 FDOT Design Standards

- MULTILANE WORK WITHIN THE TRAVEL WAY
- MEDIAN OR OUTSIDE LANE
SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

Temporary Pavement Markings Placed Through Work Area
And Devices Relocated Laterally 2' to 4' Outside Edge Of Travel Way.

Arrow Panel Operation Discontinued
And Arrow Panel Shalt Be Removed Or Relocated Outside The Clear Zone Or Be Shielded By A Barrier Or Crash Cushion.

UNEVEN LANES

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

Temporary Pavement Markings Placed Through Work Area
And Devices Relocated Laterally 2' to 4' Outside Edge Of Travel Way.

Arrow Panel Operation Discontinued
And Arrow Panel Shalt Be Removed Or Relocated Outside The Clear Zone Or Be Shielded By A Barrier Or Crash Cushion.

UNEVEN PAVEMENT

INTERMITTENT WORK STOPPAGE - LANE REOPENED TO TRAFFIC
The Proposed Work Zone Speeds are recommended speeds for the traffic control plan as detailed below. 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.
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 no removing pavement marking used for marking new edge lines and centerlines.

**GENERAL NOTES**

1. When a side road intersects the TTC zone, additional TTC devices shall be placed in accordance with other applicable TTC Indexes.
2. For general TTC 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.)
- Channelizing Device (See Index No. 500)
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic

---

**Table I**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Cone or Tubular Markers</th>
<th>Type I or Type II Barriades or Vertical Planes or Drums</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>30 to 45</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>50 to 70</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

**Table II**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Buffer Space Length (50')</th>
<th>Taper Length (20')</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>250</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>200</td>
<td>35</td>
</tr>
<tr>
<td>35</td>
<td>250</td>
<td>45</td>
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<td>40</td>
<td>300</td>
<td>50</td>
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<tr>
<td>45</td>
<td>350</td>
<td>55</td>
</tr>
<tr>
<td>50</td>
<td>400</td>
<td>60</td>
</tr>
<tr>
<td>55</td>
<td>450</td>
<td>65</td>
</tr>
<tr>
<td>60</td>
<td>500</td>
<td>70</td>
</tr>
</tbody>
</table>

**Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction**

500'

**ROAD WORK**
CONDITION NOTES

1. See General Notes, Sheet I 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. 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 roadway is open to traffic.

4. 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 markings used for marking new edge lines and centerlines.

5. For general TLCI requirements and additional information, refer to Index No. 600.
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 TCOJ signs, the signs shall be mounted and located in accordance with Index No. 17500.
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 barriers, vertical panels, cones, tubular markers and drums shall not be greater than 25 feet.
6. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
7. For general TCOJ requirements and additional information, refer to Index No. 600.

DURATION NOTES

1. Signs and arrow panels 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 the work zone.
   d) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.
   e) Visibility and complexity of the roadway has been considered.

SYMBOLS

- Work Area
- Sign with 18" x 18" (Min.) Orange Flag and Type B Light
- Channelizing Device (See Index No. 600)
- Work Zone Sign
- Stop Bar
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic

DURATION NOTES

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF AT LEAST ONE MEDIAN TRAFFIC LANE
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) Outside travel lane and adjoining auxiliary lane
   (d) Inside travel lane
   (e) Inside travel lane and adjoining auxiliary lane

2. If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT (LEFT) LANE CLOSED AHEAD sign replaced by ROAD WORK AHEAD signs, and the merge symbol signs eliminated.

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. 17300.

4. If the work space extends across a crosswalk, the crosswalk should be closed using the information in Index No. 660.

5. Signs are required on the median side for divided highways.

6. 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.

7. For general TCZ requirements and additional information, refer to Index No. 650.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.)
- Orange Flag and Type B Light
- Channelizing Device (See Index No. 600)
- Type III Barricade
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Identification = Direction of Traffic

DURATION NOTES

1. Signs and arrow panels 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

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.

Table I

<table>
<thead>
<tr>
<th>Device Spacing</th>
<th>Max. Distance Between Devices (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>Cones or Tubular Markers</td>
</tr>
<tr>
<td></td>
<td>Type I or Type II</td>
</tr>
<tr>
<td></td>
<td>Lateral Transition (12&quot;)</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>30 to 45</td>
<td>25</td>
</tr>
</tbody>
</table>

Table II

<table>
<thead>
<tr>
<th>Device Spacing</th>
<th>Taper Length - Merge (12&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>Taper (ft.)</td>
</tr>
<tr>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>30</td>
<td>180</td>
</tr>
<tr>
<td>40</td>
<td>320</td>
</tr>
<tr>
<td>45</td>
<td>540</td>
</tr>
</tbody>
</table>

For lateral transitions other than 12", use formula for L shown in the notes column. Where:

\[
L = \frac{1}{2} W \cdot \frac{v}{50} \cdot \left( \frac{W}{V} \right)
\]
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. 17302.
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. 650.

DURATION NOTES

When Buffer Space cannot be attained due to geometric constraints, the greatest attainable length shall be used, but not less than 200 ft.

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)

CONDITIONS

WHERE ANY VEHICLE EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE
Pavement REQUIRING THE CLOSURE OF THE CENTER LANE NEAR AN INTERSECTION

** Table I **

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Max. Distance Between Devices (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone of Tubular Markers</td>
<td>Type I or Type II</td>
</tr>
<tr>
<td>Taper</td>
<td>Tangent</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>50 to 45</td>
<td>25</td>
</tr>
</tbody>
</table>

** Table II **

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Buffer Space (ft.)</th>
<th>Taper Length (12° Lateral Transition) (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>155</td>
<td>125</td>
</tr>
<tr>
<td>30</td>
<td>200</td>
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<td>305</td>
<td>300</td>
</tr>
<tr>
<td>45</td>
<td>360</td>
<td>360</td>
</tr>
</tbody>
</table>

Road Work Ahead

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

ROAD WORK AHEAD

Center Lane Closed Head

### 500 beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.

SPEED LIMIT

Work Area

Sign With 18” x 28” (Min.)
Orange Flag And Type B Light
Channeling Device (See Index No. 600)
Work Zone Sign
Advance Warning Arrow Panel
Lane Identification + Direction of Traffic
CONCLUSIONS

WHERE ANY VEHICLE EQUIPMENT, WORKERS, OR THEIR ACTIVITIES ENCOMPASS THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF AUXILIARY LANES, FOR WORK AREA LENGTH OF LESS THAN 500 FT, ROAD WORK END WORK AREA 200 FT OR MORE FROM INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Channelizing Device (See Index No. 609)
- Advance Warning Arrow Panel
- Tall Bar
- Road Work Ahead
- Road Work Closed
- Road Work Open

GENERAL NOTES

1. If the work area extends across a crosswalk, the crosswalk should be closed using the information in Index No. 650.

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: 15' up to 25 MPH; 50' for 30-40 MPH; 70' for 45 MPH.

Spacing for devices parallel to the travel lanes shall be 25' centers for cones or tubular markers and 50' centers for Type I or Type II barricades or vertical panels or drums for 250', thereafter, cones or tubular markers of 50' centers and Type I or Type II barricades or vertical panels or drums at 100 centers.

5. For general TC2 requirements and additional information, refer to Index No. 600.
**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 arrow panel and sign message.
5. Where work activities within 2 of the edge of travelway 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
- Vehicle with Advance Warning Arrow Panel and Sign Message
- Truck Mounted Attenuator (TMA)
- Lane Identification And Direction Of Traffic

**WORK ON SHOULDER**

**WORK WITHIN TRAVEL LANE**

**CONDITIONS**

**MOVING OPERATION**

- ADVANCE WARNING ARROW PANEL MODE • MOVE/MERGE LEFT [RIGHT]
  - Where adequate shoulder width is not available, the advance warning vehicle may drive in the lane.
GENERAL NOTES

1. TWO-WAY TRAFFIC signals shall be repeated every 1/2 mile in each direction, throughout the tangent distance (T).

2. L (min.) = WS for speeds 2 45 mph
   \[
   \frac{\text{min.}}{\text{mph}}
   \]
   \[
   \frac{\text{max.}}{\text{mph}}
   \]
   Where:
   W = Width of lateral transition in feet
   S = Posted speed limit (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' with the limits of the tangent, or post-mounted delineators at 50' centers may be substituted for barricades, vertical panels or drums.

4. Alter 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. When 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. 600.

SYMBOLS

- 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 REQUIRE THE CLOSURE OF ONE ROADWAY AND THE OPPOSING ROADWAY IS CONVERTED TO TEMPORARY TWO-WAY TRAVEL BY WAY OF CROSSESORS.
GENERAL NOTES

1. TWENTY-FIVE MILE TRAFFIC signs shall be repeated every 45 mile 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 travelway. See Index No. 615 for shoulder taper formulas.

3. Where the tangent distance (T) exceeds 250', spacing between cones or barrel markers may be increased to 50' or spacing between Type II or Type III 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 lane(s) 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 TTC indexes.

6. For general TTC requirements and additional information, refer to Index No. 600.

SYMBOLS

- Work Area
- Signing Devices
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic

CONDITIONS

WHERE ANY VEHICLE EQUIPMENT, WORKERS IN THESE ACTIVITIES REQUIRE THE CLOSURE OF THE LANES IN ONE DIRECTION AND A DIVERSION IS PROVIDED BY UTILIZING ONE LANE OF THE GIVING TRAFFIC LANES.

Table II

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>L (ft)</th>
<th>Notes (Merge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>180</td>
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<tr>
<td>65</td>
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<tr>
<td>80</td>
<td>720</td>
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</tr>
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<td>85</td>
<td>780</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>840</td>
<td></td>
</tr>
</tbody>
</table>

For lateral transitions other than 1/2 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)
1. This Index does not apply to limited access facilities.

2. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with applicable TCP Indexes.

3. Traffic volume or complexity of the roadway may dictate additional devices, signs, flagmen and/or a traffic control officer.

4. The buffer space may be omitted if there are no sight obstructions to vehicles approaching the Flagger/Officer for a distance equal to the buffer space.

5. The BE PREPARED TO STOP sign may be omitted if all of the following conditions are met:
   a) Speed limit is 45 mph or less.
   b) No sight obstructions to vehicles approaching the Flagger/Officer for a distance equal to the buffer space.
   c) Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

6. On undivided highways the median sign as shown are to be omitted.

7. For general TCZ requirements and additional information refer to FDOT Index No. 600.

CONDITIONS
PLANNED CLOSURE NOT EXCEEDING 5 MINUTES.
When Other Construction Or Maintenance Operations Occur Within 1 Mile, Signs Are To Be Coordinated In Accordance With Index No. 600.

Maximum Spacing Between Cones And Tubular Markers Shall Be 25'. Maximum Spacing Between Type I Or Type II Barriers Or Vehicle Panels Or Drums Shall Be Based On The Speed Limit As Follows: 15' Up To 25 MPH; 30' For 30-40 MPH; 45' For 45 MPH Or Greater.

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 TCZ Indexes.

4. For general TCZ requirements and additional information, refer to Index No. 600.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS, OR THEIR ACTIVITIES ARE BEING CONDUCTED IN THE TWO WAY LEFT TURN LANE.

SOURCES

- [2010 FDOT Design Standards](https://www.fdot.gov/)
CONDITION A

When the paving train is in lane 1, the U-turning vehicle shall cautiously turn into lane 2 and proceed in lane 1 to the front of the train.

CONDITION B

When the paving train is in lane 1, the U-turning vehicle shall cautiously turn into lane 1 and proceed in lane 1 to the front of the paving train.

CONDITION A & B

The advance warning arrow panels are required under no circumstances will the traffic transition be located within the limits of the crossover.

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
   - WS for speeds > 45 mph
   - WS² for speeds > 40 mph
   - WS 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 bollards or vertical panels or drums shall be based on the speed limit as follows: 15' up to 35 MPH, 30' for 35-40 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 bollards 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 No. 2, Sign Nos 1, 2, 3 and the Pagger Actuated Advance Warning Arrow Panel shall be moved ahead to a crossover in advance of the paving lane taper. Project advance warning signs (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 No. 2, Sign Nos 1, 2, 3 and the Pagger Actuated Advance Warning Arrow Panel shall be moved ahead to a crossover in advance of the "RIGHT LANE CLOSED" 5G. "MILE" Sign. Project advance warning signs (not shown) shall be located in advance of the relocated Sign No. 3.
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 RAF materials acceptable for crossing surfacing.

2. Temporary median crossovers shall be located only in areas having adequate sight distance. Drilled access facilities temporary median crossovers shall not be located within 150 feet of intersections nor within 2000 feet of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.

3. For paving train or 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 panels 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, I.S.

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 to the Engineer.

Symbols:

D  Work Zone Sign
-  Lane Identification = Direction of Traffic
□  Temporary Pavement

LENGTH OF ACCESS LANES (ft.)

<table>
<thead>
<tr>
<th>Grade</th>
<th>D2</th>
<th>D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2% or less</td>
<td>530'</td>
<td>1540'</td>
</tr>
<tr>
<td>3 to 4% upgrade</td>
<td>530'</td>
<td>2310'</td>
</tr>
<tr>
<td>3 to 4% Downgrade</td>
<td>710'</td>
<td>925'</td>
</tr>
</tbody>
</table>
TRUCKS ENTERING HIGHWAY

STAY IN YOUR LANE

LENTH OF ACCESS LANES (Fe)

<table>
<thead>
<tr>
<th>Grade</th>
<th>0.1</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2% or less</td>
<td>590</td>
<td>1540</td>
</tr>
<tr>
<td>3 to 4% Upgrade</td>
<td>530</td>
<td>2130</td>
</tr>
<tr>
<td>3 to 4% Downgrade</td>
<td>710</td>
<td>925</td>
</tr>
</tbody>
</table>

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 Cables And Tubular Markers Shall Be 25'

L (Min.) = 4S

S = Existing Posted Speed (MPH)

SYMBOLS
- Channelizing Device (See Index No. 800)
- Work Zone Sign
- Advance Warning Vehicle
- Lane Identification = Direction of Traffic
- Temporary Pavement
GENERAL NOTES

1. Work operations shall be continued on one traffic lane, leaving the opposite lane open to traffic.

2. Additional one-way control may be affected by the following means:
   (1) Flag-carrying vehicles
   (2) Official vehicle
   (3) Pilot vehicles
   (4) Traffic signals

   When flaggers are the sole means of one-way control, the flagger shall be in sight of each other or in direct communication at all times.

3. The ONE-LANE ROAD signs shall be fully covered and the FLANGE signs shall be 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 intended for work on the highway shall be placed in front of the work area and the one channelizing device directed to the side of the work area may be omitted provided vehicles in the work area have high-intensity rotating, flashing, oscillating, or strobe lights operating.

6. Discontinuation of extended buffer space will not occur until the queue length plus 300' is reached.

7. If the queueing of vehicles across active railroads cannot be avoided, a uniformed traffic control officer or flagger shall be provided at the highway-railgrade crossing to prevent vehicles from stopping within the highway-railgrade crossing, even if automatic warning devices are in place.

8. For general TCZ requirements and additional information, refer to Index No. 600.

DURATION NOTE

1. ROAD WORK AHEAD and the BE PREPARED TO STOP signs may be omitted if all 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 railroad crossings

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.)
- Orange Flag and Type B Light
- Channelizing Device (See Index No. 600)
- Work Zone Device
- Flag
- Lane Identification = Direction of Traffic

Table 1 - Device Spacing

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Spacing (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 mph or less</td>
<td>200 200 200 100</td>
</tr>
<tr>
<td>45 mph</td>
<td>300 300 300 125</td>
</tr>
<tr>
<td>50 mph</td>
<td>500 500 500 250</td>
</tr>
<tr>
<td>&gt;50 mph</td>
<td>1060 1060 1060 500</td>
</tr>
</tbody>
</table>

# The ROAD WORK AHEAD sign may be used as an alternate to the ROAD WORK AHEAD sign.
# 500' beyond the ROAD WORK AHEAD sign or midway between signs whichever is less.
# BE PREPARED TO STOP sign may be omitted for speeds of 45 MPH or less.
1. Maintain two-lane two-way traffic over existing pavement. Construct new roadway within the proposed 4-lane limits, excluding the friction course. Sign as shown if roadway construction area falls within 100 feet of existing pavement edge. When the construction area falls more than 100 feet from the existing pavement edge, traffic shall be controlled in accordance with Index No. 60.5 or 502.

2. Construct shoulder pavement to provide two-lane two-way traffic over shoulder and existing pavement during Phase II roadway construction. For lane width requirements see Index No. 600. Signing as shown, with the near 1500 feet modified in accordance with Index No. 605, to be in place prior to shoulder pavement construction.

**SYMBOLS**

- **Sign with 18" x 18" (Min.)**
  - Orange Flag and Type II Light
- **Channelizing Device** (See Index No. 600)
- **Work Zone Sign**
- **Lane Identification + Direction of Traffic**

**LEGEND**

- Phase I Construction
- Phase II Construction
- Phase III Construction

**CONVERTING TWO LAKES TO FOUR LANES**

**DIVIDED, RURAL**

**SPEED LIMIT XX**

**ROAD WORK END**

**ROAD WORK 1 MILE**

**ROAD WORK 1500 FT**

**ROAD WORK 1000 Feet**

**NEXT X MILES**

**ROAD WORK**

**SPEED LIMIT XX**

**PRESENT SPEEDING FINES DOUBLED WHEN WORKERS**

**PRESENT**

**SPEEDING FINES DOUBLED WHEN WORKERS**

**PRESENT**
1. Remove temporary markings from the existing pavement and temporary shoulder pavement. Work pavement, install warning devices and resign as shown. Traffic to 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 course over pavement constructed in Phases I and II.

**GENERAL NOTES**

1. Existing signs and pavement markings that conflict with 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 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. 503 and 607. Minimum width for the temporary shoulders is 6'.

3. Within the transition sections, 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, 30-40 MPH: 50 for 45 MPH or greater.

The maximum spacing between warning devices used for delineation 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 "Equipment In Work Zones", see Index No. 600.

5. For speed sign applications, see "Regulatory Speed In Work Zones" Index No. 600.

6. For reflectorized raised pavement marker applications, see "Pavement Markers Index No. 600 and Index No. 1752.

7. Additional barricades, signing lighting or other traffic control 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 TTC 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.

**LEGEND**

- Phase I Construction
- Phase II Construction
- Phase III Construction

**SYMBOLS**

- Sign With 18" x 18" Min. Orange Flag and Type B Light
- Channelizing Device (See Index No. 600)
- Type III Barricade
- Work ZONE Sign
- Lane Identification/Direction of Traffic
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 615. Channelizing devices shall be in conformance with 'Drop-Offs in Work Zones', Index No. 600. When work extends through an intersection, temporarily reroute the traffic to other cross streets. Where 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.
When other construction or maintenance operations occur within 1 mile, signs to be placed and signing to be coordinated in accordance with Index No. 600.

When workers present, begin with the following:

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 On" in Work Zones at 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.

SYMBOLS
- Sign with 18" x 18" (Min.1)
- Orange Flag and Type II Light
- Channelizing Device (See Index No. 600)
- Type III Barricade
- Work Zone Sign
- Stop Bar
- Lane Identification + Direction of Traffic

LEGEND
See Sheet 3 for General Notes.

PHASE II

1. Road Work Ahead
2. Speeding fines doubled when workers present
3. Speeding fines doubled when workers present
4. Speeding fines doubled when workers present
5. Speeding fines doubled when workers present
6. Speeding fines doubled when workers present
7. Speeding fines doubled when workers present
8. Speeding fines doubled when workers present
9. Speeding fines doubled when workers present
10. Double Yellow ReflectORIZED Pavement Markings
11. White ReflectORIZED Pavement Markings
12. Temporary Guide Lines
13. STOP Sign and Install
14. (Removable) Stop Bar Marking
15. Remove Existing STOP Sign and Restroom While Through Lane Reopened To Traffic.

2010 FDOT Design Standards
CONVERTING TWO LANES TO FOUR LANES
DIVIDED, URBAN
1. Align, 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. in width. When one-lane one-way operations are necessary, a minimum width of 10 ft. 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 control 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.
Required Only When Construction Zone
Speed Reduced Below Existing Posted
Speed Prior To Construction

Diversion Connection To Existing Pavement To Be
Constructed Under TCC Plan (Q Index No. 603 (Same For Opposite Connection)

Limits Of Construction

Temporary Diversion

Temporary Structure

Required For Projects >2 miles

SPEED LIMIT XX

LEGEND

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 float activities are within
   15' of the existing pavement edge.

Existing Structure (To Be Replaced)

PHASE II

1. Realign and mark as shown in Phase II plan.
2. Route traffic to diversion and maintain two-way traffic on
   diversion. Install Type III barricades.
3. Construct proposed structure or reconstruct or resurface
   existing approaches.

PHASE III and General Notes (See Sheet 2 of 2)

SYMBOLS

Sign with 18" x 18" (Min.):
Orange Flag And Type B Light
Channelizing Device (See Index No. 600)
Type III Barricade
Work Zone Sign

Required Only When Construction Zone
Speed Reduced Below Existing Posted
Speed Prior To Construction

When Other Construction Or
Maintenance Operations Occur
Within 1 Mile (Signs) To Be
Deleted And Signing To Be
Coordinated In Accordance
With Index No. 600.
PHASE III

1. Paracne traffic to New Alignment and maintain two-way traffic.

2. Remove all temporary construction items.

GENERAL NOTES

1. All signs, 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.

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) L.F.

5. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.

6. Only temporary crush cushions approved by the Department shall be used unless specified devices called for in the plans.

7. Where the temporary crush cushion 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 17352.

9. For general TC2 requirements and additional information, refer to Index No. 600.
TRAFFIC PACING GUIDE

Traffic pacing is a traffic control technique to slow but not stop traffic to facilitate short duration work operations without an elaborate and difficult detour or diversion. Traffic Control Officers pace or slow the traffic to a speed that provides approximately 20-30 minutes to perform the overhead construction. The Department has frequently used this technique for setting bridge beams, overhead sign structures and replacing overhead sign panels.

The traffic pacing begins with approval of the exact date of the activity that shall be made two weeks in advance. The District Public Information Office, the District Traffic Operations Engineer, Local Emergency Management Agencies and Project Personnel shall be notified at the location, date and time. Advance notification to the public shall begin at least one week in advance by using Changeable Message Signs.

The day of the traffic pacing operation, the Changeable Message Sign messages shall be revised to indicate the activity will occur that night or day. The traffic pacing operation begins with a Traffic Control Officer Supervisor at the work site initiating the pacing operation in accordance with pacing details shown on Sheet 2. The intent is to keep traffic moving unless there is an emergency.

NEW CHANGEABLE MESSAGE SIGNS
(Typical Placement and Messages)

Symbols

- Changeable Device (See Index No. 600)
- Work Area
- Median
- 1 MILE
- 55 MPH
- SLO
- 55 MPH
- 1/2 MILE

1. Length of Traffic Pacing Operation

CHANGEABLE MESSAGE SIGN MESSAGE
(MAINLINE AND RAMPS)

<table>
<thead>
<tr>
<th>ONE WEEK PRIOR TO PACING OPERATION</th>
<th>EXPECT DELAYS ON</th>
<th>ROAD WORK</th>
<th>EXPECT DELAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM: 00-06 AM</td>
<td></td>
<td>NIGHT</td>
<td></td>
</tr>
<tr>
<td>MM: 06-12 AM</td>
<td></td>
<td>DAY</td>
<td></td>
</tr>
<tr>
<td>MM: 12-00 AM</td>
<td></td>
<td>DURING</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PACING</td>
<td></td>
</tr>
</tbody>
</table>

CHANGEABLE MESSAGE SIGN MESSAGE
(MAINLINE AND RAMPS)

<table>
<thead>
<tr>
<th>DURING DAY OF PACING OPERATION</th>
<th>ROAD WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERMINAL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DURING PACING OPERATION</th>
<th>SLOW TRAFFIC AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABORT</td>
<td>BE PREPARED TO STOP</td>
</tr>
</tbody>
</table>

TRAFFIC PACING GENERAL NOTES

1. Install ROAD CLOSED (920-3) signs approximately 1000' prior to the work area. These signs shall remain covered until the pacing operation begins and covered when the pacing operation has ended.

2. Prior to requesting that the traffic control officer supervisor initiate the pacing operation, the contractor shall ensure that the necessary equipment is properly positioned (off the roadway) for the construction activity requiring the traffic pacing operation.

3. Truck-mounted attenuator(s) with changeable message sign(s) are required to protect workers and/or equipment positioned in a travel lane(s) at the work area during the pacing operation from an errant vehicle. If no workers and/or equipment are positioned in a travel lane(s) at the work area, truck-mounted attenuator(s) are not required.

4. A traffic control officer supervisor stationed at the work area continuously throughout the pacing operation to ensure radio communications between the contractor and/or the project administrator, and all police vehicles involved in the pacing operation.

5. When more than one pacing operation is required in one work period the contractor shall allow sufficient time between pacing operations to permit traffic to return to normal speeds and flow. Additional time may be required between pacing operations to allow traffic to resume normal speeds and flow upstream of the work area as determined by the project administrator or traffic control officer supervisor.

TRAFFIC CONTROL PLANS OR TECHNICAL SPECIFICATION

1. The specific activities and locations, along with allowable times of day and days of the week, when pacing will be allowed should be clearly detailed in the traffic control plans or technical specification. If there are specific holiday or special event dates that due to anticipated traffic congestion, pacing operations should not be allowed, these dates should also be noted in plans or specifications. When detailing the specific activities and locations of pacing activities, identify the minimum number of traffic control officers needed for each function and location of the pacing operation. If there are certain work activities that need to be completed prior to the contractor starting the work anticipated during the pacing operation, the activities should be clearly detailed in the plans or technical specification.

2. When developing a pacing plan, false or "stop points" should be identified for those work operations in which a construction problem could create a condition that could not be immediately cleared. A false stop point is the last safe egress from the highway facility prior to traffic coming upon the work that is being performed. In the unlikely event the work is not completed during the time estimated for the pacing, the plans or specification should direct the traffic to not proceed past the false stop point until the highway is cleared. In the event of major construction problem that cannot be immediately cleared, traffic can then be diverted off the facility.

3. The traffic control plans or technical specification should require the contractor to submit a pacing plan in advance of the operation. The pacing plan should outline the contractor's expected equipment and personnel, detail the operation, and include a contingency plan should any of the contractor's equipment break down. The plan should include a damage recovery clause. The traffic control plan or technical specification should be clear that the damage recovery applies to the pacing plan operation as well.

4. Changeable message signs shall be displayed one week prior to work using messages described in the traffic pacing plan. The number and location of changeable message signs shall be called out in the traffic control plans.
MAINLINE PACING DETAILS

STAGE ONE
1. Four police vehicles located upstream of the work area at the beginning of the traffic pacing operation with flashing blue lights off.

STAGE TWO
1. Once the police vehicles are in place and the traffic control officer supervisor at the work area notifies all officers to begin the traffic pacing operation, the last three police vehicles shall turn on their flashing blue lights. The first three police vehicles shall enter the travel lanes with the second and third police vehicles immediately forming a side-by-side "pacing operation" of all lanes behind the lead police vehicle flashing blue lights off.

STAGE THREE
1. The two pace setting police vehicles shall begin to slow to the pacing speed (20 mph is preferred, 10 mph minimum), for the duration of the traffic pacing operation.

2. The lead police vehicle (Washing blue lights off) shall match the speed of the last vehicles ahead of the pacing vehicles and continue following traffic until a point approximately 500' in advance of the work area. The lead police vehicle shall then come to a complete stop on the right shoulder and turn off its flashing blue lights. If required, the crash truck(s) with rear mounted impact attenuator(s) and changeable message sign(s) shall move into the travel lanes approximately 200' upstream of the work area with the impact attenuators down and operating; once traffic has cleared the work area.

STAGE FOUR
1. When the pace setting police vehicles are within approximately two miles of the work area they shall notify the onsite traffic control officer supervisor who will immediately inform the contractors on site supervisor of their location. Once the contractors on site supervisor has notified the pacing vehicles location, the contractors shall begin to clear the travel lanes of all equipment and debris in order to reopen travel lanes.

2. In case of emergency, the pace setting police vehicles shall come to a complete stop once they reach the lead police vehicle. If no emergency is encountered, the crash truck(s) shall move from the travel lanes and the two pace setting police vehicles shall clear the work area and immediately move to the right shoulder or an area designated by the traffic control officer supervisor and turn off the flashing blue lights. Once the two pace setting police vehicles pass the work area, the traffic control officer supervisor shall instruct the lead and last police vehicles to turn off their flashing blue lights.

RAMP PACING DETAILS

ONE LANE RAMP

TWO LANE RAMP

RAMP CLOSURE DETAIL

1. Once notified by the on site traffic control officer supervisor to begin the traffic pacing operation each police vehicle at the indicated ramp shall turn their flashing blue lights on and position the vehicle across the ramp lane to close ramp access.

2. Once the pacing operation passes the closed on ramp, the police vehicle on the ramp shall turn off the flashing blue lights and move from the ramp lane to allow traffic to enter the mainline pacing operation.

GENERAL NOTES

1. Each Traffic Control Officer shall have a marked vehicle with flashing blue lights, for the pacing operation. The location and number of officers at each location will be as follows:

<table>
<thead>
<tr>
<th>No. of Traffic Control Officers with Vehicles</th>
<th>Function</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min</td>
<td>Supervisor</td>
<td>Work Area</td>
</tr>
<tr>
<td>1 Lead Vehicle</td>
<td>Varies</td>
<td>Mobile operation</td>
</tr>
<tr>
<td>1 for each travel lane</td>
<td>Pacing</td>
<td>Mobile operation beginning x miles upstream and terminating at the work area</td>
</tr>
<tr>
<td>1 stationed at the beginning of pacing operation</td>
<td>Advanced Warning to Motorists</td>
<td>Stationed at the Beginning of Pacing Operation</td>
</tr>
<tr>
<td>1 for each entrance ramp</td>
<td>Entrance Ramp Roadblocks</td>
<td>One at each of the entrance ramps upstream of the work area</td>
</tr>
</tbody>
</table>
DESIGN CONSIDERATIONS:
The design shall evaluate the actual distance required for the pacing operation based on site-specific features such as roadway geometries, pacing speeds, regulatory speeds, interchange pacing, work duration, availability of traffic control officers, traffic volumes and maximum queue length.

The starting point of a traffic pacing operation must consider the following factors: the speed of the pacing vehicles, the location of entrance ramps, horizontal and vertical alignment of the facility.

In some instances, it may be necessary to close a lane at the work site to position a crane(s) and the materials to be lifted.

All materials to be installed shall be on-site before the traffic pacing operation begins.

It may be necessary to install temporary barrier walls to protect pre-positioned and assembled materials in the right of way.

The minimum speed allowed for a pacing operation is 10 mph with 20 mph the preferred speed.

The maximum allowed work duration is 1/2 hour (30 min).

The maximum practical pacing operation length is 10 miles.

\[ S_p = \text{Regulatory speed (mph)} \]

\[ S_p = \text{Pacing speed (mph)} \]

\[ t_w = \text{Work duration (min)} \]

\[ L = \text{Total pacing distance in miles} \]

\[ L = \frac{S_p}{S_p - \alpha} \]

\[ L_w = \text{distance paced vehicles must travel before the vehicles at regulatory speed have cleared the work zone} \]

\[ L_w = \left( \frac{S_p}{S_p - \alpha} \right) \]

\[ L_w = \text{distance paced vehicles travel while work is performed} \]

\[ L_w = \left( \frac{S_p}{S_p - \alpha} \right) \]

\[ S_v = \text{Heavy Vehicle Factor} \]

\[ S_v = 1 + \left( \frac{S_p}{100} \times 0.5 \right) \]

\[ F = \% \text{ Trucks} \]

<table>
<thead>
<tr>
<th>( S_p ) (mph)</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>2.1</td>
<td>4.7</td>
<td>7.0</td>
<td>9.1</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>65</td>
<td>2.4</td>
<td>4.8</td>
<td>7.2</td>
<td>9.6</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>60</td>
<td>2.5</td>
<td>5.0</td>
<td>7.5</td>
<td>10.0</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>55</td>
<td>2.6</td>
<td>5.2</td>
<td>7.5</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>50</td>
<td>2.8</td>
<td>5.6</td>
<td>8.5</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
</tbody>
</table>

NOTES FOR TABLE:
\( t_w \) is the total time allowed for work activity in minutes. This time starts just after the last vehicle traveling at the pre-pacing regulatory speed clears the work area and ends just as the pacing operation reaches the work area. \( t_w \) must include the time required to clear the roadway of equipment, materials, and personnel.

Demand volume may not exceed 1,750 pphpd (passenger car per hour per lane) without a specific design traffic count can be obtained from the Office of Planning, or you may need to collect traffic counts. Hourly directional traffic volumes must be converted to pphpd using the following:

\[ \text{phppd} = \left( \frac{\text{Hourly Directional Volume}}{2 \text{ Lanes} \times \text{Traffic Direction}} \right) \times \text{Heavy Vehicle Factor} \]

For additional guidance for site-specific designs refer to the Plans Preparation Manual, Volume I, Chapter 10.
GENERAL NOTES

1. Only the signs controlling pedestrian flows are shown. Other work zone signs white needed to control traffic on the streets.

2. For spacing of traffic control devices and general TTC 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 channeling devices separating the work area from vehicular traffic.

5. Pedestrian traffic signals display controlling closed crosswalks shall be covered or deactivated.

6. Post Mounted Signs located near or adjacent to a sidewalk shall have a 3' 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. Temporary walkway surfaces and ramps shall be stable, firm, slip resistant, and kept free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials, etc.

10. Temporary ramps 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 of Traffic, Lump Sum.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE SIDEWALK FOR A PERIOD OF MORE THAN 60 MINUTES.
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 500 ft. of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.

4. Access openings shall be constructed directly opposite temporary median crossovers or within 500 ft. of temporary median crossovers.

5. Access openings 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's acceptable for roadway surfacing.

6. Any motorists or CalBoxes 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, CalBoxes shall be returned to their previous location. Temporary relocation and restoration of CalBoxes 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 precautions necessary to ensure against entrance by livestock or unauthorized persons or vehicles.

9. The contractor shall not vary from the plan details 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 this provision may be cause for terminating use of all openings. Upon notification by the Engineer, the contractor shall cease hauling and begin restoration of affected areas. Under this condition, expansion of removal, restoration, and 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, I.S.
SPEEDING FINES DOUBLED WHEN WORKERS PRESENT

DEDICATED LANE(S) IN CENTER

DEDICATED LANE(S) ON INSIDE (SINGLE LEFT LANE CLOSURE)

SYMBOLS

Work Area
- Sign with 18" x 18" (Min.)
- Orange Flag and Type B Light
- Channelling Device (See Index No. 600)
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Identification + Direction of Traffic
- Advance Warning Vehicle Equipped with Advance Warning Arrow Panel and Truck Mounted Attenuator
- Portable Changeable (Variable) Message Sign

PCMS DISPLAY A
MESSAGE 1: SUNPASS
MESSAGE 2: USE LANES
CASH LANES

PCMS DISPLAY B
MESSAGE 1: SUNPASS
MESSAGE 2: CLOSED ONLY AT PLAZA

PCMS DISPLAY C
MESSAGE 1: SUNPASS
MESSAGE 2: KEEP LEFT/RIGHT LANES

Table 1
<table>
<thead>
<tr>
<th>Dedicated Lane Location</th>
<th>Number of Dedicated Lanes</th>
<th>Number of Lanes Closed</th>
<th>Taper Length (Feet)</th>
<th>PCMS Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center</td>
<td>1</td>
<td>1</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>150</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>150</td>
<td>B</td>
</tr>
<tr>
<td>Inside</td>
<td>1</td>
<td>1</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>150</td>
<td>A</td>
</tr>
</tbody>
</table>

GENERAL NOTES
1. This Plan is to be used at Mainline Plazas Only.
2. This Plan is for Lane Closures that exceed three hours.
3. Plaza components which have existing CMS signs on the plazas shall display the message "LANE CLOSED" for the duration of this closure.
4. Aerial work requires the use of a truck mounted attenuator.
5. Lane use control lights, signs, or signals over toll lanes shall be switched to the appropriate symbol, message, or correct color prior to the start of any lane closure. They should also be switched at project completion.
6. At least 48 hours prior to any closure, other than emergencies, the plaza manager shall notify the traffic control operator.

DEDICATED LANES

TOLL PLAZA TRAFFIC CONTROL STANDARDS
**MESSAGE 1:** SUNPASS LANE
**MESSAGE 2:** USE LANES
CLOSED

**BEGINNING OF PLAZA WORK AREA**

**WORK AREA**

- Sign with 24" x 18" (600)
- Orange Flag and Type B Light
- Channelizing Device (See Index No. 500)
- Work Zone Sign
- Advance Warning Arrow Panel
- Advance Warning Vehicle Equipped with Advance Warning Arrow Panel and Truck Mounted Attenuator
- Portable Changeable (Variable) Message Sign

**BEGINNING OF PLAZA THROAT OPENING**

**TWO OR MORE DEDICATED LANE CLOSURE**

- Left Lane Closed 1000 ft
- Plaza Work 1 mile
- Speeding Fines Doubled When Workers Present

**GENERAL NOTES**

1. This Plan is to be used at Mahline Plazas Only.
2. This Plan is for Lane Closures that exceed three hours.
3. Plaza canopies which have existing IMS signs on the canopies shall display the message "LANES CLOSED" for the duration of this closure.
4. Aerial work requires the use of a truck mounted attenuator.
5. See INDEX 667 sheet 1 for Two or More Inside Dedicated Lanes Single Left Lane Closed Configuration.
6. Lane use contralights, signs, or signals over toll lanes shall be switched to the appropriate symbol, message, or correct color prior to the start of any lane closure. They should also be switched at project completion.
7. At least 48 hours prior to any closure, other than emergencies, the plaza manager shall be notified for security and staffing.

**INSIDE DEDICATED LANES**

**PCMS DISPLAYS**

- For Center Dedicated Lane Closure
- For Right Dedicated Lane Closure
**Temporary Speeding Fines Doubled** sign only if there is not an existing permanent “Speeding Fines Doubled Through Toll Plaza” sign or an existing “Speeding Fines Doubled When Workers Present” sign in place.

*** Inverted for Inside Open Road Tolling Lanes Configuration

** SYMBOLS **
- Work Area
- Sign With 18" x 18" (Mini) Orange Flag And Type B Light
- Channelizing Device (See Index No. 650)
- Work Zone Sign
- Advance Warning Arrow Panel
- Advance Warning Vehicle Equipped with Advance Warning Arrow Panel and Truck Mounted Attenuator
- Portable Changeable (Variable) Message Sign
- Type III Barricades w/ Flashing Lights and "RAMP CLOSED" sign

** PCMS DISPLAYS **

** PCMS DISPLAY PRIOR TO CLOSURE **
MESSAGE 1: SUNPASS MESSAGE 2: CLOSED
ONLY LAKES

** PCMS DISPLAY DURING CLOSURE **
MESSAGE 1: SUNPASS MESSAGE 2: USE CLOSED LAKES CASH

---

** GENERAL NOTES **

1. This Plan is to be used at Mainline Plazas Only.
2. This Plan is for lane closures of any time length.
3. Plaza canopies which have existing SMS signs on the canopies shall display the message "LANE CLOSED/" for the duration of this closure.
4. For planned lane closure, a portable changeable message sign shall be placed and shall display the message shown at a minimum of one week prior to closure. If planned lane closure is less than one week, place portable changeable message sign immediately using "prior to closure" messages.
5. Aerial work requires the use of a truck mounted attenuator.
6. Lane closure configurations applicable to 2 or 3 lane open road tolling plazas.
7. At least 48 hours prior to any closure, other than emergencies, the plaza manager shall be notified for security and staffing.

---

** OUTSIDE OPEN ROAD TOLLING LANES **
**If there is no room in the median for the PCMS sign, then locate it on the outside of the roadway only.**

**Install temporary Speeding Fines Doubled sign only if there is not an existing permanent “Speeding Fines Doubled Through Toll Plaza” sign or an existing “Speeding Fines Doubled When Workers Present” sign in place.**

**LEFT LANE CLOSED 1/2 MILE**

**LEFT LANE CLOSED 1000 FT**

**PLAZA WORK 1 MILE**

**SPEEDING FINES DOUBLED WHEN WORKERS PRESENT**

---

**GENERAL NOTES**

1. This Plan is to be used at Mainline Plazas only.

2. This Plan is for lane closures of any time length.

3. Plaza canopies which have existing DMS signs on the canopies shall display the message “LANE CLOSED” for the duration of this closure.

4. For planned lane closure, a portable changeable message sign shall be placed and shall display the messages shown at a minimum of one week prior to closure. If planned lane closure is less than one week, place portable changeable message sign immediately using “prior to closure” messages.

5. Airlift work requires the use of a truck mounted attenuator.

6. Lane closure configurations applicable to 2 or 3 lane open road tolling plazas.

7. At least 48 hours prior to any closure, other than emergencies, the plaza manager shall be notified for security and staffing.
**DEDICATED, CASH, OR MIXED-USE LANES IN CENTER — ONE LANE CLOSED**
(This same plan can be used for any non-dedicated lane even if they are not in the center of the plaza)

---

**EXHIBIT A**

---

**EXHIBIT B**

**DEDICATED LANE INSIDE OR OUTSIDE — ONE LANE CLOSED**
(Outside Lane Closure is a Mirror Image of this Exhibit)

---

**GENERAL NOTES**

1. This Plan is for lane closures that exceed three hours.
2. If the closed lane is a dedicated lane, Exhibit A shall be used at ramp plazas only. If the closed lane is a cash or mixed-use lane, Exhibit A may be used at ramp or mainline plazas.
3. Aerial work requires the use of a truck mounted attenuator.
4. Exhibit B shall be used at ramp plazas only.
5. Lane use control lights, signs, or signals over toll lanes shall be switched to the appropriate symbol, message, or color prior to the start of any lane closure. They should also be switched at project completion.
6. At least 48 hours prior to any closure, other than emergencies, the plazo manager shall be notified for security and staffing.

---

**SYMBOLS**

- Work Area
- Sign 18" x 18" (Min.)
- Orange Flag and Type B Light
- Channelizing Device (See Index No. 650)
- Work Zone Sign
- Lane Identification + Direction of Traffic
- Advance Warning Vehicle Equipped with Advance Warning Arrow Panel and Truck Mounted Attenuator
WORK DONE WITHIN TRAVEL LANE - ONE LANE CLOSED

WORK NOT DONE WITHIN TRAVEL LANE - ONE LANE CLOSED

GENERAL NOTES

1. This Plan is for lane closures that are three hours or less.

2. This Plan is to be used at Ramp or Mainline Plazas.

3. This plan can be used for any lane, with appropriate modifications, even if it is not in the center of the Plaza.

4. Lane use control lights, signs, or signals over toll lanes shall be switched to the appropriate symbol, message, or color prior to the start of any lane closure. They should also be switched at project completion.

5. At least 48 hours prior to any closure, other than emergencies, the plaza manager shall be notified for security and staffing.

6. A Truck Mounted Attenuator is required for all aerial work operations (lift truck). For non-aerial operations, the Truck Mounted Attenuator or additional devices may be required by the Engineer based on the work being performed.

SHORT-TERM CLOSURES
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. For two-lane roadways, 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 on 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 lanes open to traffic.

4. When work is performed in the median lane on divided highways, the barricading plan is inverted and left lane closed and lane reduction signs substituted for the right lane closed and lane reduction signs.

5. When work is being performed on a multilane undivided roadway, the signs and traffic control devices normally placed in the median (as shown) shall be omitted.

6. 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 travelway. See Index No. 612 for shoulder taper formulas.

7. For general TCZ requirements and additional information, refer to Index No. 610.

CONDITIONS

The MAS shall be used if at all the following conditions exist:

MULTILANE 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
TABLE A
MINIMUM RECOVERABLE TERRAIN (ft)

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Travels &amp; Multi Lane Ramps</th>
<th>Auxilary Lanes &amp; Single Lane Ramps</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 45</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>45</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>50</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>55</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>36</td>
<td>24</td>
</tr>
</tbody>
</table>

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 a primarily a curbed facility.
4. The distance from the face of curb to the U/I line is less than the value obtained in STEP 2.

BEGIN

START

STEP 1
Obtain the design speed.

STEP 2
Select the minimum recoverable terrain from Table A based on the lane type and design speed.

STEP 3
Does the facility meet all the restricting conditions in Table B?

Yes
STEP 4A
As shown in Figure 1, determine the clear zone.

No
STEP 4B
Select the horizontal clearance requirement from the restricted column of Table C based on the object, obstruction, or condition.

STEP 5
Select the horizontal clearance requirement from non-restricted column of Table C based on the object, obstruction, or condition.

END

ROADSIDE TERRAIN
FIGURE 1

Clear Zone
is the relatively flat unobstructed area that is to be provided for safe use by errant vehicles, and must be wide enough so that the sum of all of the recoverable terrain within is equal to or greater than the value obtained in STEP 2. Recoverable terrain provided beyond non-recoverable terrain must be a minimum of 10 feet. Areas beyond non-recoverable and hazardous terrain cannot be used as recoverable or non-recoverable terrain.

Non-recoverable terrain includes all surfaces along the roadway other than travel lanes, auxiliary lanes, and ramps. For the purpose of establishing clear zones and horizontal clearance requirements, roadside terrain is defined as recoverable, non-recoverable, non-traversable, and hazardous as follows:

Recoverable: when it is safely traversable and on a slope that is 1:4 or flatter.
Non-recoverable: when it is not safely traversable or on a slope that is steeper than 1:4 but not steeper than 1:3.
Non-traversable: when it is not safely traversable or on a slope that is steeper than 1:3.
Hazardous: when a slope is steeper than 1:3 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.

PROCESS FOR DETERMINING HORIZONTAL CLEARANCE REQUIREMENTS AND CLEAR ZONES
<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>GENERAL</td>
<td></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>1</td>
<td>Above ground fixed hazards; All roadside 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></td>
</tr>
<tr>
<td>2</td>
<td>AECDOT 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 a roadside slope steeper than 1:5 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 no less than 22 feet from the traveled way.</td>
</tr>
<tr>
<td>4</td>
<td>Median boxes not shown in Design Standard 532.</td>
<td>Not to be used.</td>
</tr>
<tr>
<td>5</td>
<td>Median boxes 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.</td>
<td>Outside roadways: Locate no less than 4 feet from face of curb 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.</td>
<td>Locate in accordance with Design Standard 546.</td>
</tr>
<tr>
<td>8</td>
<td>Cables behind guardrail.</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.</td>
<td>Locate as close to the Right Of Way as practical and not less than 40 feet from the traveled way.</td>
</tr>
<tr>
<td>DRAINAGE</td>
<td>Culvert wing wall, endwall, retaining walls and flared ends 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 wing wall, endwall, retaining walls and flared ends sections 6 feet and greater in depth.</td>
<td>Treat as drop-off hazards: See Item No. 3.</td>
</tr>
<tr>
<td>12</td>
<td>Utilities and sections.</td>
<td>Locate as shown in Design Standards 272 and 273.</td>
</tr>
<tr>
<td>TRAFFIC CONTROL DEVICES</td>
<td>Permanent sign supports.</td>
<td>Locate no less than 4 feet from face of curb and in accordance with Design Standard 17302.</td>
</tr>
<tr>
<td>13</td>
<td>Overhead sign supports and other non-removable signs.</td>
<td>Locate no less than 4 feet from face of curb.</td>
</tr>
<tr>
<td>14</td>
<td>Signal controller cabinets, signpoles, strain poles and mast arms.</td>
<td>Locate no less than 4 feet from face of curb and in medians.</td>
</tr>
<tr>
<td>LIGHTING</td>
<td>Conventional lighting (removable and non-removable).</td>
<td>Locate no less than 4 feet from face of curb and not in medians.</td>
</tr>
<tr>
<td>15</td>
<td>Highmast lighting.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>STRUCT.</td>
<td>Bridge piers and abutments: Above ground vertical structures.</td>
<td>Locate not less than 16 feet from edge of travel lane.</td>
</tr>
<tr>
<td>16</td>
<td>Fire hydrants with bases no higher than 4 inches above the ground.</td>
<td>Locate not less than 2 feet from face of curb.</td>
</tr>
<tr>
<td>UTILITIES</td>
<td>Utility installations: Above ground fixed objects.</td>
<td>Locate 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>
<tr>
<td>RAILROADS</td>
<td>Railroad crossing traffic control devices.</td>
<td>Locate in accordance with Design Standard 17382.</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 in TABLE C, the object, obstruction or condition must be mitigated, possibly by shielding. Otherwise, the Plans Preparation Manual, Volume 4, Chapters 2, 4, 21 and 25, or Chapters 5 and 9 of the Utility Accommodation Manual must be researched to determine viable alternatives. The minimum 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 a Utility Exception has been approved in accordance with Chapter 13 of the Utility Accommodation Manual.
FENCING TERMINALS AT BRIDGE ENDS
(ROADWAY)

FENCING TERMINALS AT BRIDGE ENDS
(STREAM CROSSING)

FENCING TERMINALS AT BOX CULVERTS
(For Heights Of Headwall Greater Than 4')

FENCING DETAIL AT CULVERT
(For Heights Of Headwall 4' Or Less.)

Note: When height of headwalls 4' or less (draining pipe 36" or less) the fence shall not be tied to the headwall, but shall span the lateral ditch.
FENCING TERMINALS AT RURAL INTERCHANGES

**NOTE:** LA R/W along the crossroad will extend a minimum 300' beyond the end of the acceleration or deceleration taper, with the taper must remote from the project establishing the end for both sides of the roadway. In the absence of a 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.

**APPLICATIONS TO BRIDGE OVER CROSSROAD AND CROSSROAD OVER FREEWAY (BRIDGE OVER CROSSROAD SHOWN)**

**FENCING TERMINALS AT URBAN INTERCHANGES**

**Note A:** The indicated distance shall be sufficient to provide satisfactory sight distance for the traffic from the ramp.

**Note B:** The indicated distance shall be identical to the above noted dimension, if practical.

**FENCING TERMINALS AT RETAINING WALLS**
GENERAL NOTES

1. 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 A426, No. 9 wire, with Class 3 zinc coating, or aluminum coated steel, meeting the requirements of ASTM A594, No. 9 wire, with a minimum coating weight of 0.40 oz./ft.

3. Fence shall be installed with wire side to private property except on horizontal curves greater than 3° the fence shall be installed so as to pull against posts.

4. Posts may be either timber, steel, recycled plastic or concrete. Unless a specific post material is called for in plans, the Contractor may elect to use either a single material or a combination of timber, steel, recycled plastic, or concrete materials. Line posts of a single material may be used with corner, pull and end posts assemblies of a different material. The posts of one material shall be fabricated between corner and end posts assemblies. Within individual corner and end post assemblies only one material shall be permitted.

5. Timber posts shall meet the material requirements of Specification Section 954. Timber line posts are to be minimum 4" diameter. Timber corner, pull and end posts are to be a minimum 5" diameter. Timber posts shall be spaced to be minimum 4" diameter.

6. Steel, posts and braces shall be standard steel posts, galvanized at the rate of 2 oz./ft. together with necessary hardware and wire clamps and meeting the requirements:

   - Line posts: 8" long, 1.33 lbs./ft. rolled-formed stud in anchor plate attached (23 in. ft.)
   - Approach posts: 105" long, 8" long for attaching brace with necessary hardware, clamps, etc.
   - Pull and end corner posts: 255" long, 1.54 lbs./ft. 8" long, 1.54 lbs./ft. for attaching brace with necessary hardware, clamps, etc.
   - Braces: 2"x2"x1/8" angles with necessary hardware and fabricated for attaching to post.
   - The pull, corner, approach and end posts are to be set in concrete as per detail (See also General Note 15).

7. Recycled plastic posts shall meet the material requirements of Specification Section 977 and be one of the products included on the Qualified Products list current at the time of installation. Line posts shall have a minimum section of 4" round or 4" square. Plastic posts shall not be used as corner, pull and approach posts unless such use specifically detailed in the plans. Plastic posts shall be set by either dig, and tamp backfill or by driving into full depth preformed holes 4" to 5" smaller than cross section of post. Staples for fabric and barbed wire connection to plastic line posts shall be the same size, count and location as that for timber posts.

8. The Contractor, at its option, may use any suitable precast or prestressed concrete posts; however, approval by the Engineer, of such posts shown on this index, will be required prior to the use of the precast. Precast posts shall be Class II concrete. Prestressed posts shall be Class III concrete. Lengths of concrete post to be as indicated for timber posts.

9. Aluminum posts, braces and accessory framing hardware shall not be used unless the plans specifically detail their application or the Engineer specifically approves their incorporation in the fence construction or repair. Aluminum framed gates are permitted as described in General Note 19.

10. The woven wire shall be attached to steel and concrete posts by a minimum of five tie wires. The single wire ties shall be applied to the top, bottom and three intermittent line wires. The ends of each tie wire shall have a minimum of two tight turns around the line wire. The tie wires shall be steel wire not less than 0.250" diameter, 304 stainless steel, Class 3, 40 ksi yield, in accordance with ASTM A 416.

11. Steel or barbed wire can be either of the following types:

   - Type I This type shall conform to the requirements of ASTM A 422, with two strands of 255" gage wire, four-point barbs, wire size 14 gauge, twisted around both line wires and Class 3 coating.

   - Type II This type same as Type I but the two strand wires are twisted in alternating directions between consecutive barbs. Aluminum Barbed Wire shall be fabricated of two strands of 0.110" inch wire 0.098-inch diameter four-point barbs spaced at approximately 56°, at a maximum spacing of 61°. The wire for the strands and for the barbs shall be of a material and finish as specified in 6014M Alloy 5052-H328 or equal.

12. The woven wire shall be stretched. Within the tension curbs has been pulled out of the line wires.

13. Posts to be set by driving or digging. If digging, the posts shall be set at the center of the hole and the stake placed so that it is securely held in place.

14. Longer posts than those indicated above may be required by the plans or for deeper installations.

15. Concrete bases for angular steel posts (pull, corner, end and approach) shall be Class NS as specified in Section 4547. Materials for Class NS concrete may be proportioned by volume and/or by weight.

16. Pull post assembly shall be installed at approximately 310° centers except that this maximum interval may be reduced by the Engineer on curves where the radius is less than 310°.

17. Corner post assemblies to be installed at either 1.25 times or 1.25 times in fence of 15° or more.

18. A maximum length of 1.25" of wire may be installed as a unit for pull-ups and pull-out assembly. The fabric shall be spliced by crimping the wires only. Pulls through a corner post assembly shall be permitted.

19. Unless otherwise agreed to in the plans, gates shall be commercially available metal swing gates assembled and installed in accordance with the manufacturer's specifications as approved by the Engineer. Chain link swing gates in accordance with Index No. 802 may be substituted for metal swing gates approved as approved by the Engineer. Gate size is following guidelines for the use of single leaf or double leaves. Payment for gates shall include the gate, single or double, accessories necessary for 1" and any additional length and size for the opening. Gates shall be paid for under the contract unit price for Gates Fencing LE.

20. For construction purposes, assembles are defined as follows: End post assemblies shall consist of one end post and one approach post, two braces, four diagonal tension wires and all necessary fittings and hardware. Pull post assembly shall consist of: one pull post, two braces, four diagonal tension wires and all necessary fittings and hardware. Corner post assemblies shall consist of: one corner post, two approach posts, four braces, eight diagonal tension wires and all necessary fittings and hardware.

21. All posts, braces, tension wires, fabric tie wires, Class NS concrete, and all miscellaneous fittings and hardware to be included in the cost for Fencing LE. Fencing shall be inclusive of the lengths of pull, end and corner post assemblies, but exclusive of gate widths.
Design Note

This index details fencing that is constructed with form fabric 5055° (47° nominal) in height and with specific ground clearance and specific barbed wire spacings. For fencing of different height or installation details, the fence shall be fully detailed in the Contract plans.
FASTENER FOR CONCRETE POST AND BRACES

FASTENER FOR TIMBER POST AND BRACE

ALTERNATE CONCRETE POSTS AND BRACES

CORNER POSTS

END AND PULL POSTS

Each horizontal wire to be wrapped around corner and end pullposts and tied to same wire. See General Notes 5 and 17. Timber post illustrated. These methods also apply to steel and concrete post illustrations.

SPLICES
1. This fence to be used generally in urban areas.

2. For supplemental information refer to Section 550 of FDOT Standard Specifications.

3. Chain link fabric, post, stays rods, tension wire, tie wire, stretcher bars, gates and all-mirrors are fitting and hardware shall meet the requirements of AASHO and ASTM signatory current reference.

4. Fence Component Options:

A. Line post options:

1. Galvanized steel pipe, Schedule 40- 1½" nominal dia. zinc galvanized at the rate of 1.8 oz./ft².

2. Aluminum coated steel pipe: ASTM A5.3, X 2: Trafalgar: Schedule 40- 1½" nominal dia., 19.00 GDI coated at the rate 0.40 oz./ft², AASHTO M111.

3. Aluminum alloy pipe: 2" nominal dia., ASTM B224 or B225, Alloy 6063, 76.

4. Stainless steel pipe: 1½" x 1½" x 1/8" wall, stainless steel, AISI 304L, 0.9 oz. wt./ft².

B. Corner, end, and pull post options:

1. Galvanized steel pipe, Schedule 40- 2" nominal dia. zinc galvanized at the rate of 1.8 oz./ft².

2. Aluminum coated steel pipe: ASTM A5.3, X 2: Trafalgar: Schedule 40- 2" nominal dia., 2.375 GDI coated at the rate 0.40 oz./ft², AASHTO M111.

3. Aluminum alloy pipe: 2" nominal dia., ASTM B224 or B225, Alloy 6063, 76.

4. Resistance welded steel pipe: 50,000 psi, yield strength ASTM A569/A699M, 65.5/65.5M or undepressed stock of discontinuous A446/A446M base materials: ASTM F689 Group IV (Alternative Design: fence industry 1560, 30, 3/4", 1/4", 11.600 dec. equiv., 0.150 min. wall thick and min. wt. 228 lb./ft² with ASTM F1043 metric equivalent internal coating Types A, B, C, or D and external coating Types A, B, C, or D; the chrome conversion coating at external Type B shall have a thickness of 15μg/m², and the polymer Fim topcoat shall have a thickness of 0.0033 in. Internal and external coatings are not restricted to the combinations of Table 2, ASTM F1043.

C. Pole options:

1. Galvanized steel pipe, Schedule 40- 1½" nominal dia. zinc galvanized at the rate of 1.8 oz./ft².

2. Aluminum coated steel pipe: ASTM A5.3, X 2: Trafalgar: Schedule 40- 1½" nominal dia., 1.600 GDI coated at the rate 0.40 oz./ft², AASHTO M111.

3. Aluminum alloy pipe: 1½" nominal dia. ASTM B224 or B225, Alloy 6063, 76.

4. Resistance welded steel pipe: 50,000 psi, yield strength ASTM A569/A699M, 65.5/65.5M or undepressed stock of discontinuous A446/A446M base materials: ASTM F689 Group IV (Alternative Design: fence industry 1560, 30, 3/4", 1/4", 11.600 dec. equiv., 0.150 min. wall thick and min. wt. 228 lb./ft² with ASTM F1043 metric equivalent internal coating Types A, B, C, or D and external coating Types A, B, C, or D; the chrome conversion coating at external Type B shall have a thickness of 15μg/m², and the polymer Fim topcoat shall have a thickness of 0.0033 in. Internal and external coatings are not restricted to the combinations of Table 2, ASTM F1043.

D. Chain link fabric options (12" mesh with twisted and barbed selvage top and bottom, all options except as described in Note No. 11):

1. A446/A511 M111 Type I 1/2" Zinc Coated Steel, No. 9 gauge (coated wire diameter), coated at the rate of 1.8 oz./ft². (M20 Class 2.0 oz./ft², modified 1.8 oz./ft².)

2. A446/A511 M111 Type II 1/2" Aluminum Coated Steel, No. 9 gauge (coated wire diameter), coated at the rate of 1.4 oz./ft².

3. A446/A511 M111 Type IV Polyvinyl Chloride (PVC) Coated Steel, No. 9 gauge (coated core wire diameter), core wire-zinc coated steel, PVC coating M111 Class 4 (either extruded or extruded and bonded or Class II bonded). See table right. Unless the pens color for M20 standard colors medium green, dark green or black the coating color shall suit gray matching that of No. 39424 of Federal Standard 595.

E. Tension wire options:

1. Steel wire No. 7 gauge zinc galvanized at the rate of 1.2 oz./ft². AASHTO M81.

2. Aluminum alloy wire with a diameter of 0.1875" larger conforming to the requirements of ASTM B221, Alloy 5056 Temper H38, or, Alcan Alloy 5056 Temper H38.

3. Aluminum coated steel wire No. 7 gauge coated at the rate of 0.40 oz./ft². AASHTO M81.

F. Tie wire and hog ring options:

1. Steel wire No. 9 gauge zinc galvanized at the rate of 1.2 oz./ft².

2. Aluminum alloy wire with a diameter of 0.1443" or larger conforming to the requirements of ASTM B221, Alloy 5056 Temper H38, or, Alcan Alloy 5056 Temper H38.

3. Aluminum coated steel wire No. 7 gauge coated at the rate of 0.40 oz./ft².
5. Unless a specific material is called for in the plans, the Contractor may elect to use either a single type of material or a combination of material types from the component options listed in note 4. Combinations of optional materials are restricted as follows:
(a) Only one fabric optional material will be permitted between corner and/or end post assemblies.
(b) Only one line post optional material will be permitted between corner and/or end post assemblies.
(c) Pull post assemblies shall be optional materials identical to either the line post optional material or the corner and end post assembly optional material but, pull post assemblies shall be the same optional material between any set of corner and/or end post assemblies.

6. Concrete for bases shall be Class NS concrete as specified in Section 347 of the Standard Specifications or a packaged, dry material meeting the requirements of a concrete under ASTM C-279. Materials for Class NS concrete may be proportioned by volume and/or by weight.

7. Line post shall be 8'-6" long (Standard). Line post are to be set in concrete as described above or by the following methods:
(a) In accordance with special details and/or as specifically described in the contract plans and specifications.
(b) In accordance with ASTM F567 Subsections 5.4 through 5.10 as approved by the Engineer.
(c) Post mounted on concrete structure or solid rock shall be mounted in accordance with the base plate detail "Fence Mounting On Concrete Endwalls And Retaining Wall", Sheet 3-1, or, by embedment in accordance with ASTM F567 Subsection 5.5.

End, pull and corner post assemblies shall be in concrete as detailed above for all soil conditions other than solid rock. Posts within assemblies that are located on concrete structures or solid rock shall be set by base plate or by embedment as prescribed under (b) above for the post.

Line and assembly post set in concrete bases shall be set an additional 3" in depth for each 1' of fence height greater than 6'.

8. Pull post shall be used at breaks in vertical grades of 15' or more, or at approximately 350' centers except that this maximum interval may be reduced by the Engineer on courses where the curve is greater than 3'.

9. Corner post are to be installed at horizontal breaks in fence at 15' or more and as required at vertical breaks over 15' as determined by the Engineer.

10. When fence has an installed top of fabric height less than 6' knuckled top and bottom selvages shall be used unless the plans specifically identify locations for twisted selvage fabrics.

11. Unless sliding gates or special gates are called for in the plans, all gates shall be chain link swing gates meeting the material requirements described and approved by the Engineer. Payment shall include the gates, single or double, all necessary hardware for installation and any additional length or size for posts at the opening. Gates shall be paid for under the contract unit price for Fence Gates, EA.

12. For construction purposes corner post assemblies shall consist of one corner post, two braces, two truss rod, and all necessary fittings and hardware as detailed. End post assemblies shall consist of one end post, one brace, one truss rod and all necessary fittings and hardware as detailed.

13. All post, tension wires, chain link fabric, tie wires, Class NS concrete, and all miscellaneous fittings and hardware to be included in the cost for Fencing, LP.
FENCE MOUNTING ON CONCRETE ENDWALL AND RETAINING WALLS

FENCE TYPE B

2010 FDOT Design Standards

Revision 802

Sheet No. 3 of 3
1. When approved by the Engineer the Contractor may substitute any cantilever slide gate from the fencing systems on the Qualified Products List.

External, rolled or formed components that provide equal strength and stability may be used in lieu of the pipe components shown and, external rollers may be used in lieu of the external roller units shown.

Gate components shall meet or exceed the protective coatings specified on Index No. 802.

2. Stile/gate frame shall be fabricated prior to galvanizing, except that truss rods may be fabricated following frame galvanizing provided surfaces damaged during welding are galvanized in accordance with Section 24 of AASHTO M185; or, fabricated from pipe components with protective coating meeting the requirements of Index No. 802, that are tolerant of welding (low burn back), and a protective coating applied to the weld and damaged pipe surfaces that is equivalent to the protective coating of the fabricated pipe stock.

3. All fabric shall be knuckled top and bottom selvages.

4. Concrete for bases shall be either Class NS concrete as specified in Section 547 of the Standard Specifications or a packaged, dry mix material meeting the requirements of a concrete under ASTM C-557. Materials for Class NS concrete may be proportioned by volume and/or by weight.

5. Cost of all gate components shall be included in the contract unit price for Sliding Fence Gate (Cantilever) EA.

DETAIL A

DETAIL B

TYPICAL FRAME - 24' Opening
TYPICAL FRAME - 12', 16' & 20' Opening
ELEVATION OF OUTSIDE FACE OF BARRIER
(Traffic Railing Barrier Shown, Concrete Parapet Similar (See Note 3))

NOTES:
1. A Pull Post Assembly is required at maximum intervals of 50'-0". See Sheet Nos. 3 of 4 or 4 of 4.
2. Braces are only required for vertical fence installations on Traffic Railing Barriers.
3. Provide horizontal rails for vertical fence installations on Concrete Parapets in lieu of tension wire.
   Locate horizontal rails as shown in the Typical Section for Concrete Parapets at right.

FENCING NOTES

FENCE INSTALLATION:
Install posts plum (within a tolerance of ± 1/8") and 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 367 as applicable.

TRAFFIC RAILING BARRIER DETAILS:
See Superstructure Details for Traffic Railing Barrier details.

CONCRETE PARAPET DETAILS:
See Index No. 820 - Pedestrian/Bicycle Railing for Concrete Parapet details. Provide fencing in lieu of aluminum bullet railing as shown on Index No. 820.

LIMITS OF FENCING:
Limits of fencing are from beginning 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 H. Payment includes posts, horizontal and expansion rails, brace rails and bands, rail ends, combination rail ends, boulevard clamps, chain link fabric, tension wire, hies, hag rings, tension bars and bands, post and loop caps, pipe clamps, base plates, anchor rods, bolts, nuts, washers, shim plates, spacers, reinforcement, 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-A and Detail "A" see Sheet No. 2 of 4.
For Pull Post Assembly Detail for Traffic Railing Barriers see Sheet No. 3 of 4.
For Pull Post Assembly Detail for Concrete Parapets and Detail "B" see Sheet No. 4 of 4.
PULL POST ASSEMBLY DETAIL FOR TRAFFIC RAILING BARRIERS

PIPE CLAMP CONNECTION DETAIL
(Connect without spacer shown, Connection with spacer similar)

PIPE CLAMP DETAIL

EXPANSION ASSEMBLY DETAIL
(Required only at expansion joint locations where total movement exceeds 5")

NOTES:
1. For treatment at bridge ends, see Sheet No. 1 of 4.
2. The 3-3/8" 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".

PIPE CLAMP DETAILS
(Must be manufactured from an incompressible material; i.e., steel or aluminum)
PULL POST ASSEMBLY DETAIL FOR CONCRETE PARAPETS

EXPANSION ASSEMBLY DETAIL

(Cross reference: For location of detail "B" see Sheet No. 1 of 4.)

EXPANSION RAIL DETAIL

VARNISH

NOTE:

1. For treatment at bridge ends, see Sheet No. 1 of 4.
2. The 5'-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 ½". 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 5". 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 nut thread on the outside of the nut to prevent loosening.
FENCING NOTES:

FENCE APPLICATION:
This bridge fence can only be used on sidewalk installations separated from traffic by a traffic rolling 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. 830 - Pedestrian/Bicycle Rolling for Concrete Parapet details. Provide fencing in lieu of aluminum bullet railing as shown on Index No. 820.

LIMITS OF FENCING:
Limits of fencing are from the beginning 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, rail ends, combination rail ends, boulevard clamps, chain link fabric, ties, tension bars, and bands, post and loop cap, base plates, anchor rods, bolts, nuts, washers, shim plates, rebar end pads, miscellaneous fence fittings and hardware and all incidental materials and labor required to complete installation of this fence.

CROSS REFERENCE:
For Table of Fence Components and Rail 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 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 36</td>
<td>3/8&quot; Steel</td>
</tr>
<tr>
<td>Shim Plates</td>
<td>A-709 Grade 36 or B-209 Alloy 6061-70</td>
<td>Plate thicknesses as required. Holes in shim plates with 3/4&quot; Ø.</td>
</tr>
<tr>
<td>Adhesive Anchor Rods</td>
<td>F-1554 Grade 36</td>
<td>Fully threaded Headless Anchor Rods = 3/8&quot; Ø x 14-1/2&quot;</td>
</tr>
<tr>
<td>CIP Anchor Rods</td>
<td>F-1554 Grade 36</td>
<td>Hex Head Anchor Rods = 3/8&quot; Ø x 14-1/2&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>Post Washers for Base Plate Connections</td>
</tr>
<tr>
<td>Neoprene Rods</td>
<td>-</td>
<td>In accordance with Specification Section 932</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 975.
  - **ADHESIVE-IMBEDDED ANCHORS AND WASHERS:**
    - Adhesive Bonding Material Systems for Anchors and Dowels will comply with Specification Section 917 and be installed in accordance with Specification Section 418. Cutting of reinforcing steel is permitted for drilled hole installation.

- **Welding:**
  - All welding in accordance with the American Welding Society Structural Welding Code (Steel ANSI/AWS D1.1; current edition). Weldment welds are 56GXX or 25XX. Post-tensioning anchorage at welds is not required.

---

**CROSS REFERENCE:**
For location of Detail "A" see Sheet No. 1 of 3.
FENCING NOTES

FENCE INSTALLATION

Install posts plumb (within a tolerance of ± 1/2") 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. 820 — Pedestrian/Bicycle Railing for Concrete Parapet details. Provide fencing in lieu of aluminum bullet railing as shown on Index No. 820.

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 A. Payment includes posts, horizontal and expansion rails, brace bands, roll ends, combination roll ends, boulevard clamps, chain link fabric, tension wire, ties, hog rings, tension bars and bands, pipe clamps, base plates, anchor rods, bolts, nuts, washers, shim plates, spacers, neoprene pads, miscellaneous fence fittings and hardware and all incidental materials and labor required to complete installation at the fence.

CROSS REFERENCE:

For Table of Fence Components and Table of Post Attachment Components see Sheet No. 2.
For Full Post Assembly Detail, View A-4 and Detail "B" see Sheet No. 3.
For Detail "B" and "C" see Sheet No. 4.
### 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 (3.500&quot; Outside Diameter, 0.215&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Horizontal Rails and Internal Sleeves</td>
<td>F 1083</td>
<td>Galvanized Steel/Pipe - 2 5/8&quot; NPS, Schedule 40 (2.875&quot; Outside Diameter, 0.253&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Expansion Rails</td>
<td>F 1083</td>
<td>Galvanized Steelpipe - 2 1/4&quot; NPS, Schedule 40 (2.375&quot; Outside Diameter, 0.254&quot; Wall Thickness)</td>
</tr>
<tr>
<td>Chain Link Fabric (2&quot; mesh with knurled bottom slat)</td>
<td>A 392</td>
<td>Zinc Coated Steel - No. 9 gauge (coated wire diameter), Class 2 Coating</td>
</tr>
<tr>
<td></td>
<td>A 491</td>
<td>Aluminum Coated Steel - No. 9 gauge (coated wire diameter)</td>
</tr>
<tr>
<td></td>
<td>F 668</td>
<td>Polyvinylchloride (PVC) Coated Steel - No. 9 gauge (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 827</td>
<td>Type II (Zinc Coated Steel Wire) - No. 7 gauge, Class 4 Coating</td>
</tr>
<tr>
<td>Tie Wires</td>
<td>F 826</td>
<td>Zinc Coated Steel Wire - No. 9 gauge</td>
</tr>
<tr>
<td>Hug Rings</td>
<td>F 826</td>
<td>Zinc Coated Steel Wire - No. 12 gauge</td>
</tr>
<tr>
<td>Brace Bands</td>
<td>F 826</td>
<td>No. 12 gauge (min. thickness) x 3/8&quot; (min. width) Steel Bands (Blended or Heavy)</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>F 826</td>
<td>3/16&quot; (min. thickness) x 3/8&quot; (min. width) x variable Weight Steel Bars - Weight = Tangent or Hoop Length = Barrier or Parapet Height = 2&quot; max.</td>
</tr>
<tr>
<td>Tension Bands</td>
<td>F 826</td>
<td>No. 14 gauge (min. thickness) x 3/8&quot; (min. width) Steel Bands</td>
</tr>
<tr>
<td>Miscellaneous Fencing Components</td>
<td>F 826</td>
<td>Zinc Coated Steel - Includes horizontal rails, combination rails, boulevard clamps and all other miscellaneous fittings and hardware</td>
</tr>
<tr>
<td>Posts</td>
<td>A 307</td>
<td>5/8&quot; x 4 1/2&quot; Hex Head Bolt 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>

**LEGEND:** NPS = Nominal Pipe Size

### TABLE OF POST ATTACHMENT COMPONENTS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM DESIGNATION</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
</table>
| Pipe Clamps                      | A 36 or A 709 Grade 36 | ½" Steel 8
| Base Plates                      | A 36 or A 709 Grade 36 | ¾" Steel 8 |
| Shim Plates                      | A 36 or A 709 Grade 36 or B 209 Alloy 6061-T6 or B 221 Alloy 6063-T6 | Plate thicknesses as required. Holes in shim plates will be ⅜" Ø |
| Spacers                          | -                | ⅜" Ø for all materials |
| Adhesive Anchor Rods             | F 1554 Grade 36  | Fully threaded Headless Anchor Rods ~ 5/8" Ø x 6" (no spacer) or 5/8" Ø x 7/8" (with spacer) |
| CDP Anchor Rods                  | F 1554 Grade 36  | Hex Head Anchor Rods ~ 5/8" Ø x 6" (no spacer) or 5/8" Ø x 7/8" (with spacer) |
| CDP Anchor Rods                  | F 1554 Grade 36  | Fully threaded Headless Anchor Rods ~ 5/8" Ø x 145º |
| Bolts                            | A 307            | 5/8" Ø x 4 1/2" Hex Head Bolts for Pipe Clamp Connections to Posts |
| Nuts                             | A 563            | Hex Nuts for Pipe Clamp and Base Plate Connections |
| Washers                          | F 436            | Flat Washers for Pipe Clamp and Base Plate Connections |
| Neoprene Plates                  | -                | In accordance with Specification Section 932 |

**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 anchor with a galvanizing compound in accordance with Specification Section 975.

COATING:


ADHESIVE BONDED ANCHORS AND DWELLS:

Adhesive Bonding Materials for Anchors and Dwells 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:

Welding will be in accordance with the American Welding Society Structural Welding Code (Steel AWS D1.1 Current edition). Weld metal welds EW2XX or E7XX. Nondestructive testing of welds is not required.
ELEVATION OF INSIDE FACE OF TRAFFIC RAILING WITH PEDESTRIAN/BICYCLE BULLET RAILING

NOTES:
RAD. AND POST DETAIL: For Post, Rail, and Rail Expansion Joint fabrication and Installation Details and Notes see Index No. 822.

TRAFFIC RAILING DETAIL: For Traffic Railing Details, Reinforcement and Notes see Index No. 420.

INSTRUCTIONS TO DESIGNER:
This railing is intended for use when a Bicycle Lane is required and a raised pedestrian sidewalk is not provided. See Index No. 622 and 423 for railings on a raised pedestrian sidewalk.
NOTES

RAIL & PICKETS & POSTS:
Pipe Rails and Pickets shall be in accordance with ASTM A53 Grade B for standard weight pipe (Schedule 40) or ASTM A36. Structural Tube Posts shall be in accordance with ASTM A500 Grade A, B, C, or D, or ASTM A36. Posts and End Rails shall be fabricated and installed in accordance with the tolerances measured at 3-1/2" above the top. Pickets shall be fabricated parallel to the posts. Corners and changes in turnouts with a change in alignment shall be made continuous with a 0° bend radius or terminate at an adjoining section with mitered ends sections when handrails are not required. For changes in tangential/longitudinal alignment greater than 45°, posts shall be positioned at a maximum distance of 2-1/2" each side of the corner and the rail shall be located at the corner angle. For curved longitudinal alignments the top and bottom rails and handrails shall slope down bent to match the alignment radius.

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; x 4&quot; Rectangular Tube</td>
<td>2.00&quot; x 4.00&quot;</td>
<td>0.086&quot;</td>
</tr>
<tr>
<td>Rails</td>
<td>2&quot; NPS (Std. 40)</td>
<td>2.375&quot;</td>
<td>0.156&quot;</td>
</tr>
<tr>
<td>Handrail/Splice Sleeves</td>
<td>2-1/8&quot; NPS (Std. 40)</td>
<td>2.125&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrail/Splice Sleeves</td>
<td>1-1/4&quot; NPS (Std. 40)</td>
<td>1.250&quot;</td>
<td>0.135&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>2&quot; Round Bar</td>
<td>1.000&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Pickets</td>
<td>3/8&quot; NPS (Std. 40)</td>
<td>0.846&quot;</td>
<td>0.100&quot;</td>
</tr>
<tr>
<td></td>
<td>5/8&quot; Round Bar</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 A36 or ASTM A709 Grade 36.

SWM PLATES:
Shim Plates shall be aluminum in accordance with ASTM B209, Alloy 5056 or 6063. Shim plates shall be used for foundation height adjustments greater than ¾" and localized irregularities greater than ½". Field trim Shim plates when necessary to match the contours of the foundation. Beveled shim plates shall be used in lieu of trimmed shim plates. Beveled shim plates shall be provided for anchorage and stability against overturning. For unusual sites or conditions, a site specific riling system is to be designed by the responsible engineer. The riling shown on these drawings requires a foundation height or height from the rails shall be modified to the requirements of the American with Disabilities Act (ADA). Refer to FDOT Plans Preperation Manual (Volume 1) Chapters 4 & 8, for the definition of vehicle, pedestrian and bicyclist “drop off hazards”.

ALTERNATE DESIGN:
Manufacturers seeking approval of proprietary riling systems for inclusion on the Qualified Products List of pre-approved alternate designs must submit application along with design documentation showing the proprietary riling system is designed to meet the design life, load, geometry, and safety requirements specified herein. Approved joints are to be either welded or commercially designed fixed joints systems. Each field section of riling is identified with a permanent affixed label with the manufacturer’s name and the FDOT QPL approval number. Labels shall be mounted on the post rail of fixed joint at a point within the field section. Specific procedures for QPL approved riling systems are contained in Section 139-02, Drawings.

PAYMENT:
Rail shall be paid for per linear foot (Item No. 51502-22bbs). Payment will be based on quantity measured as the length along the center line of the top rail, and includes rails, posts, splices, 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 riling.

Steel Pedestrian/Bicycle Picket Railing

2010 FDOT Design Standards

Sheet No. 850

1/21/09

1 of 5

Steel Pedestrian/Bicycle Picket Railing

2010 FDOT Design Standards
ELEVATION

SHOWING OUTSIDE FACE OF RAILING

TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%

NOTES:

# Picket Spacing based on the optional-picket members shown. If an alternate design is used, maintain a minimum clear opening of 3½".
# End Rails vary for Rails on grades steeper than 2.4%.
NPS = Nominal Pipe Size

STRUCTURES EXPANSION JOINTS NOTE:

# Keyed construction joints in Index No. 520 Gravity Wall are not considered to be expansion joints.

See Plans for construction or termination limits of railing.

EXPANDED ELEVATION AT CORNERS

DETAIL FOR NON-CONTINUOUS RAILING AT CORNERS

CROSS REFERENCE:

For Details "C", "D" and "E", see Sheet 4 of 5.

RAMP REQUIREMENTS

For slopes greater than 5%:
Max ramp slope = 8.33%
Max ramp cross-slope = 2.0%

LANDING REQUIREMENTS

Max landing slope = 2X
Max landing cross-slope = 2X

RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%

STEEL PEDESTRIAN/BICYCLE PICKET RAILING
RAILING CONTINUATION BEYOND STEPS OR STAIRS
(Bottom shown, Top similar)

Concrete sidewalk to extend 6” min. behind rail.

RAILINGS ON STEPS & STAIRS

STEEL PEDESTRIAN/BICYCLE PICKET RAILING
VIEW F-F
TOPO RAIL CONNECTION
(Base Plate Not Shown for Clarity)

SECTION A-A
(Top of Picket Connection)

SECTION B-B
(Handrail Connection)

SECTION C-C
(Bottom of Picket connection)

BASE PLATE & BOTTOM RAIL CONNECTION

ALTERNATE
BASE PLATE DETAIL
(Recommended for Top of Step Cheekwalls)

DETAIL "C" - RAIL CONNECTIONS
(Showing Outside Face of Structure and Railing, Pickets and Handrail Not Shown for Clarity)

SHIM PLATE DETAIL

DETAIL "B" - RAIL AND HANDRAIL
(Showing Sloped Condition for Stairs or Ramps)

DETAIL "D" - EXPANSION JOINT
(FIELD SPLICE SLIP JOINT SIMILAR)

DETAIL "E" - CONTINUITY FIELD SPlice

CROSS REFERENCE:
For locations of Details "C", "D" and "E", see Sheet 2 of 5.

2010 FDOT Design Standards
STEEL PEDESTRIAN/BICYCLE PICKET RAILING

Sheet No.
Index No.
2010 FDOT Design Standards
Revision
01/01/08
4 of 5

Last Updated: 01/01/08

RAIL, PICKETS & POSTS:  
Structural tube, pipe and bar shall be in accordance with ASTM B291 or ASTM B429, Alloy 6061-T6. End Rail 90° bends and corner bends with maximum 4°-0 post spacing may be Alloy 6063-T6. Posts and End Rail shall be fabricated and installed per plans and specifications. Picket shall be fabricated parallel to the posts. Corners and changes in tangential/longitudinal alignment shall be made consistent with a 9° bend radius or terminate at adjacent sections and locations where tight radii are not required. For changes in tangential/longitudinal alignment greater than 45°, posts shall be positioned 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 handrails shall be bent to match the alignment radius.

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; x 4&quot; Rectangular Tube</td>
<td>2.00&quot; x 4.00&quot;</td>
<td>0.250&quot;</td>
</tr>
<tr>
<td>Roll Joint/Sleeves</td>
<td>½&quot; NPS (Soc. 40)</td>
<td>2.375&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Mandrel Joint/Sleeves</td>
<td>⅜&quot; NPS (Soc. 40)</td>
<td>1.900&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrail</td>
<td>⅜&quot; NPS (Soc. 40)</td>
<td>1.900&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>⅜&quot; Round Bar</td>
<td>1.000&quot;</td>
<td>⅛&quot;</td>
</tr>
<tr>
<td>Pickets</td>
<td>⅜&quot; NPS (Soc. 40)</td>
<td>1.000&quot;</td>
<td>⅛&quot;</td>
</tr>
</tbody>
</table>

BASE PLATE & POST CAPS:  
Base plates and post cap plates shall be in accordance with ASTM B209, Alloy 6061-T6.

SHIM PLATES:  
Shim plates shall be aluminum in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be used for foundation height adjustments greater than ¼" and localized irregularities greater than ⅛".

FIELD PLATES:  
Field plates shall be used when necessary to match the contours of the foundation. Beveled shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of ⅛", unless otherwise specified.

ANCHOR BOLTS:  
Anchor bolts shall be in accordance with ASTM F2494 Grade 56. Neadless anchor bolts for Adhesive anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. Expansion Anchors are permitted. Anchor bolts shall have single self-locking hex nuts. Threaded rod at the nut to the anchor bolt may be used as a self-locking nut. Anchors shall be in accordance with ASTM A563 or ASTM A491. Flat Washers shall be in accordance with ASTM F436 and Plain Washers (for long shank bolts only), shall be in accordance with ASTM A578 or ASTM A570 Grade 16. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galinging compound in accordance with the manufacturer’s instructions.

RESILIENT AND NONRESILIENT POSTS:  
Resilient and nonresilient posts shall be in accordance with Specification Section 912 except that flexibility of the finished pads shall not be required. Nonresilient pads shall be durometer hardness 60 or 70.

ANCHOR:  
All fixed joints shall be welded end-around and ground smooth. Expansion joints shall be spaced at a maximum 25°-0. Field plates shall be inserted into the groove joint. Anchors shall be in accordance with ASTM A491 or ASTM A578 Grade 16. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galinging compound in accordance with the manufacturer’s instructions.

ANCHOR BOLTS:  
Anchor bolts shall be in accordance with ASTM F2494 Grade 56. Neadless anchor bolts for Adhesive anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. Expansion Anchors are permitted. Anchor bolts shall have single self-locking hex nuts. Threaded rod at the nut to the anchor bolt may be used as a self-locking nut. Anchors shall be in accordance with ASTM A563 or ASTM A491. Flat Washers shall be in accordance with ASTM F436 and Plain Washers (for long shank bolts only), shall be in accordance with ASTM A578 or ASTM A570 Grade 16. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galinging compound in accordance with the manufacturer’s instructions.

ANCHOR:  
All fixed joints shall be welded end-around and ground smooth. Expansion joints shall be spaced at a maximum 25°-0. Field plates shall be inserted into the groove joint. Anchors shall be in accordance with ASTM A491 or ASTM A578 Grade 16. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galinging compound in accordance with the manufacturer’s instructions.

ANCHOR BOLTS:  
Anchor bolts shall be in accordance with ASTM F2494 Grade 56. Neadless anchor bolts for Adhesive anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. Expansion Anchors are permitted. Anchor bolts shall have single self-locking hex nuts. Threaded rod at the nut to the anchor bolt may be used as a self-locking nut. Anchors shall be in accordance with ASTM A563 or ASTM A491. Flat Washers shall be in accordance with ASTM F436 and Plain Washers (for long shank bolts only), shall be in accordance with ASTM A578 or ASTM A570 Grade 16. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galinging compound in accordance with the manufacturer’s instructions.
**ELEVATION**

**TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%**

- **NOTES:**
  - *Picket Spacing of 4 1/2" centers is based on 3 1/2" NPS. An alternate design is used to maintain a minimum clear opening of 3 1/2".*
  - *EndRailhead varies for Railings on grades greater than 2 1/2%.*
  - 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:**
  - See Details "C", "D", and "E", see Sheet 4 of 5.

- **Handrail required for ramps:**
  - Handrail = 2 1/2" NPS Sch. 40
  - Handrail = [2 1/2" NPS Sch. 40]

- **See Plans for continuation or termination limits of railing.
  - Top of Sidewalk or Bridge

**EXPANDED ELEVATION AT CORNERS**

**DETAIL FOR NON-CONTINUOUS RAILING AT CORNERS**

- **LANDING REQUIREMENTS**
  - Max. landing slope = 2X
  - Max. landing cross slope = 2X

**RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%**

**RAMP REQUIREMENTS**

- For slopes greater than 5%:
  - Max. ramp slope = 8.33%
  - Max. ramp cross slope = 2.0%
RAILING CONTINUATION BEYOND STEPS OR STAIRS
(Bottom shown, Top similar)

Concrete sidewalk to extend 6" min. behind & railing

See "Typical Railing Details", Sheet 2 of 5 for post, rail & picket details

See Index No. 521 or Contract Plans for Step Details

1-1/2" Min. Handrail Extension

Equal to one tread length

Varies = Equal spacing

5'-0" Max. on Steps

6'-0" Post

1/4" @ Top Rail Cap

3/8" @ Bottom Rail Cap

ELEVATION
(At-Grade Steps shown, Elevated Stairs similar)

EASEMENT

8'-6" Min. Handrail Extension

See Index No. 521 or Contract Plans for Step Details

Bottom of cheekwall

9" (Min.) Wide cheekwall both sides

Length of Landing

5'-0" Min.

9" (Min.) Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

Bottom Rail Termination, see Detail "L"

2'-0"

1'-6"

4'-6"

9" Min. Handrail Extension

Top Rail Termination

See Detail "L"

3/8" @ Bottom Rail Cap

2" Wideerin-

ALTERNATE END TREATMENT DETAILS

ALTERNATE END TREATMENT
TYPICAL SECTION ON CONCRETE SIDEWALK
(Case I)

TYPICAL SECTION ON RETAINING WALL
(Case II)

DETAIL "F" (OPTIONAL SHIMMING DETAIL)
FOR CROSS SLOPE CORRECTION
(Used in lieu of Beveled Shim Plates)

DETAIL "A" (Cast-In-Place Anchor Bolts shown, Adhesive Anchors similar)

ANCHOR BOLT TABLE

<table>
<thead>
<tr>
<th>CASE</th>
<th>STRUCTURE TYPE</th>
<th>DIMENSIONS</th>
<th>ANCHOR LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>6&quot;</td>
<td>1&quot;-2&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>IIa</td>
<td>Reinforced Concrete</td>
<td>4&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>IIIb</td>
<td>Gravity Wall</td>
<td>4-5/8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>III</td>
<td>Step Cheekwall</td>
<td>4-5/8&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

* Embedment length "C" may be reduced to 9" for the 3-6" height railings for Case IIb, when the post spacing does not exceed 5'-0".
**ALTERNATE REINFORCING (WELDED WIRE REINF.) DETAILS**

**NOTE:** Place wire cages to minimize the end overhang. End overhangs greater than \( \frac{3}{4} \) are not permitted.

**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

**BILL OF REINFORCING STEEL**

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>4</td>
<td>2”-0”</td>
</tr>
<tr>
<td>S</td>
<td>4</td>
<td>4X Req.</td>
</tr>
</tbody>
</table>

**SPICE DETAIL**

(Welded Wire Reinforcement (WWR))

**BAR 4P**

**PLATE WASHER DETAIL**

**CURL REINFORCING STEEL NOTES:**
1. All dimensions in the bending diagrams are to be used.
2. The reinforcing for the curl on a retaining wall shall be the same as detailed for an "A" deck.
3. All reinforcing steel at the open joint shall have a 2” minimum cover.
4. Bars 4S may be continuous or spliced at the construction joints.
5. For splices for Bars 4S shall be a minimum of 1-1/2".
6. At the point 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 A497.

**ESTIMATED CONCRETE CURB QUANTITIES (SCHEME 2)**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>CY/CF</td>
<td>0.0124</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>LF/CF</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**SCHEME 2 - CONCRETE CURB DETAILS**

**DETAIL "A" - SECTION AT INTERMEDIATE OPEN JOINT**

**NOTE:** At Intermediate Open Joints, the lower 5" portion of the open joint shall be plugged by kings it with mortar in accordance with Section 400 of the Specifications.

**SCHEME 3 - SIDE MOUNTED SUPPORT BRACKET DETAILS**

**BRIDGE PICKET RAILING NOTES:**

**APPLICATION:** Bridge Picket Railing is limited to use on bridges with an expansion joint thermal movement 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. 860, except that railing shall be fabricated and installed normal to the Profile Grade Longitudinal and vertically transversely.

**CONCRETE CURB (Scheme 2):** Construct concrete curb vertical with the top surface finished level transversely. Concrete curb shall be the same as the bridge deck.

**SIDE MOUNTED SUPPORT BRACKET (Scheme 3):**

- **Shute and Shelf Plate shall be in accordance with ASTM B629, Alloy 6061-T6.**
- **Welding shall be in accordance with the American Society for Testing and Materials (Aluminum A312/A312M 01.2 (current edition)).**
- **Plates shall be either B0183, B0185, or B01556.**
- **Nondestructive testing of welds is not required.**

**PAYMENT:** Railing shall be paid per linear foot (Item No. 5.05-2) for both aluminum railing and includes the cost of support brackets (Scheme 3). Concrete and reinforcing steel quantities for the concrete curb (Scheme 2), while included in the bridge deck plan quantity pay items. Payment will be plan quantity measured as the length along the centerline 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.
NOTES

PIPE RAILING & POSTS
Structural Tube Pipe and Bar shall be in accordance with ASTM B221 or ASTM B429, Alloy 6061-T6. End Rail Rods' bends and corner bends with maximum 4-5" post spacing, may be Alloy 6063-T6. Posts and End Rails shall be fabricated and installed plumb ± 1" tolerance when measured at 3-5° above the foundation. Corners and changes in tangential/longitudinal alignment, may be made continuous with a 5° bend radius or terminated at adjoining sections with a standard end cap when required. For changes in tangential/longitudinal alignment greater than 4.5°, posts shall be positioned at a maximum distance of 2°-6" each side of the corner and shall be located at the corner apex for curved longitudinal alignments. The top and bottom rails and handrails shall be bent to match the alignment radius.

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>2.377&quot;</td>
<td>0.156&quot;</td>
</tr>
<tr>
<td>Rails</td>
<td>2&quot; NPS (SCH 40)</td>
<td>2.377&quot;</td>
<td>0.156&quot;</td>
</tr>
<tr>
<td>Rail Joint/Splice Sleeves</td>
<td>1½&quot; NPS (SCH 40)</td>
<td>1.900&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrails</td>
<td>1½&quot; NPS (SCH 40)</td>
<td>1.430&quot;</td>
<td>0.115&quot;</td>
</tr>
<tr>
<td>Handrails</td>
<td>1½&quot; NPS (SCH 40)</td>
<td>1.430&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>1&quot; Round Bar</td>
<td>1.000&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

BASE PLATE
Base Plates shall be in accordance with ASTM B209, Alloy 6061-T6.

SHIM PLATES
Shim Plates shall be aluminum in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be used for foundation height adjustments greater than 4⅛" and localized irregularities greater than 4⅛".

All shim plates shall be used when necessary to match the contours of the foundation. Released shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of ⅛", unless longer anchor bolts are provided for the exposed thread length.

ANCHORING

ANCHOR (803-D)
Anchor bolt shall be in accordance with ASTM F1554 Grade 56. Neatless anchor bolt for Adhesive Anchors shall be threaded full length. Capping of reinforcing shank is permitted for drilled hole installation.

ANCHOR (803-D)
Anchor bolt shall be in accordance with ASTM F1554 Grade 56. Neatless anchor bolt shall have self-locking hex nuts. Tapped welding of the nut to the anchor bolt may be used in lieu of self-locking nuts. All nuts shall be in accordance with ASTM A563 or ASTM A294. Flat Washers shall be in accordance with ASTM 823 and Plate Washers (not long slotted holes only) shall be in accordance with ASTM F435 or ASTM F479. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a gavanizing compound in accordance with the Specifications.

RESISTENT AND NEOPRENE RUBBER
Resistent and Neoprene pads shall be in accordance with Specification Section 932, except that testing at the finished pads shall not be required. Neoprene pads shall be durometer hardness 60 or 70.

JOINTS
All fixed joints are to be welded all around and ground smooth. Expansion Joints shall spaced at a maximum of 50-75'. Field splice similar to the expansion joint detail may be approved by the Engineer to facilitate shipping and handling, but rails must be continuous across a minimum of two posts. Only use the Continuity Field Splice (Detail 21) to make the railing continuous for unforeseen field adjustments.

Welding
All welding shall be in accordance with the American Welding Society Structural Welding Code (Aluminum) AWS/AWS A5.9 (1981 edition) filler metal shall either E4043, E5043, E5056. Nondestructive testing of welds is not required.

SWING RAILS
Complete details addressing project specific geometry (pipe & 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
Guidorail shall be paid for under the contract unit price for Pipe Guidorail (Aluminum), LP (Item No. 255.1-2). Payment for the Guidorail will be plan quantity measured as the length along the center line of the top rail and includes rails, posts, rail splice assembly, base plates and anchor bolts, nuts, washers, resistent or neoprene pads and all incidental materials and labor required to complete installation of the Guidorail.
ELEVATION

**ELEVATION (Showing Inside Face of Railing)**

**RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%**

**RAMP REQUIREMENTS**
For slopes greater than 5.25%:
- Max. ramp slope = 8.33%
- Max. ramp cross-slope = 2.0%

**LANDING REQUIREMENTS**
Max. landing slope = 2%
Max. landing cross-slope = 2%

**NOTES:**
- **NPS** = Nominal Pipe Size
- **SCH** = Schedule
- **40** = Schedule 40

**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.
SECTION B-B
(Handrail Connection)

SECTION C-C
BASE PLATE DETAIL

ALTERNATE BASE
PLATE DETAIL
(Recommended for Top of Step Cheekwalls)

SHIM PLATE
DETAIL

PLATE WASHER
DETAIL

DETAIL "C" - RAIL CONNECTIONS
(Handrail Not Shown)

DETAIL "D" - EXPANSION JOINT
(FIELD SPLICE SLIP JOINT SIMILAR)

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)

DETAIL "F" (OPTIONAL SHIMMING DETAIL)
FOR CROSS SLOPE CORRECTION
(Used in lieu of Beveled Shim Plates)

OPTIONAL SIDEWALK ANCHORAGE DETAIL

NOTES:
** 2 - 3/8" 6 x 8" Steel Anchors:
Galvanized Steel Bolts (As Shown) (C-1-9P); Galvanized U-Bolts Permitted (C-1-9P); 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 in accordance with Specification Section 917 and installed in accordance with Specification Section 416. The minimum embedment is 6".

ALUMINUM PIPE GUARDRAIL
PIPE RAILING & POSTS

Pipe Rails and Posts shall be in accordance with ASTM A53 Grade B for standard weight pipe and ASTM A500 (Grade B, C, or D) or ASTM A502 for structural tube. Bars for handrail supports shall be ASTM A36. Posts and End Rails shall be fabricated and installed plumb. ± 1” tolerance when measured at 3-4’ above the foundation. Corners and changes in tangential/longitudinal alignment may be made continuous with a 90° bend radius or terminated at adjacent sections without welds where handrails are not required. For changes in tangential/longitudinal alignment greater than 45°, posts shall be positioned at a maximum distance of 2’-6” each side of the corner and shall be located at the corner of the lane. For curved longitudinal alignments the top and bottom rails and handrails shall be bent to match the alignment radius.

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” NPS (Sch. 40)</td>
<td>2.375”</td>
<td>0.156”</td>
</tr>
<tr>
<td>Rolls</td>
<td>2” NPS (Sch. 40)</td>
<td>2.375”</td>
<td>0.156”</td>
</tr>
<tr>
<td>Rail Joint/Splice Sleeves</td>
<td>1” NPS (Sch. 40)</td>
<td>1.900”</td>
<td>0.156”</td>
</tr>
<tr>
<td>Handrail Joint/Splice Sleeves</td>
<td>1” NPS (Sch. 40)</td>
<td>1.900”</td>
<td>0.156”</td>
</tr>
<tr>
<td>Handrails</td>
<td>1” Round Bar</td>
<td>1.000”</td>
<td>0.145”</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>1” Round Bar</td>
<td>1.000”</td>
<td>0.145”</td>
</tr>
</tbody>
</table>

BASE PLATES

Base Plates shall be in accordance with ASTM A36 or ASTM A709 Grade 36. SMD PLATES:

Shim Plates shall be aluminum in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be provided for foundation height adjustments greater than 0.5” and localized irregularities greater than 0.25”.

Field trim shim plates when necessary to match the contours of the foundation. Beveled shim plates may be provided in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of 0.5” unless longer anchor bolts are provided for the exposed thread length.

COATTAILS:

The railing shall be hot-dip galvanized after fabrication in accordance with Section 962 of the Specifications. All nuts, bolts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications. ANCHORS (0317):

Anchor bolts shall be in accordance with ASTM F1554 Grade 36. Threaded anchor bolts for Adhesive Anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. Anchor bolts shall have single self-locking hex nuts. Track welding of the nut to the anchor bolt may be used in lieu of self-locking nuts. All nuts shall be in accordance with ASTM A563 or ASTM A294. Flat Washers for long slotted holes only shall be in accordance with ASTM A563 or ASTM A709 Grade 36. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Unthreaded threads and welds shall be coated with a galvanizing compound in accordance with the Specifications.

RESILIENT AND NEOPRENE RAILS:

Resilient and Neoprene pads shall be in accordance with Specification Section 932, except that testing of the finished pads shall not be required. Neoprene pads shall be dimension hardness 60 or 70.

JOINTS:

All fixed joints are to be welded all around and ground smooth. Expansion Joints shall be spaced at a maximum of 50’-0”. Field splices similar to the expansion joint detail may be approved by the Engineer to facilitate handling and delivery, but rails must be continuous across a minimum of two posts. Only use the Continuity Field Splice (Detail 277) to make the railing continuous for unforeseen field adjustments.

WELDING:

All American Welding Society Structural Welding Code (Steel) AWS/D1.1AWS S1.1 (current edition). Weld metal shall be E60XX or E70XX. Nondestructive testing of welds is not required.

SNOW CLEARANCE:

Complete details addressing project specific geometry, fiber and grading showing past 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:

Guiderails shall be paid for under the standard unit price for Pipe Guiderails (Steel), LP (Item No. 515-1-1). Payment for the Guiderails plan quantity measured as the length along the centerline of the top rail, and includes rails, posts, 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 Guiderails.

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STEEL PIPE GUIDERAIL
ELEVATION

TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%

Rail expansion joints to be located in panels above structure expansion joints = (30'-0" maximum spacing).

RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%

LANDING REQUIREMENTS
Max. landing slope = 2%
Max. landing cross-slope = 2%

ELEVATION
(Showing Inside Face of Railing)

RAMP REQUIREMENTS
For slopes greater than 5.25%
Max. ramp slope = 8.33%
Max. ramp cross-slope = 2.0%
RAILING CONTINUATION BEYOND STEPS
(Bottom shown, Top similar)

Concrete sidewalk to extend 6" min. behind "rail"}

See "Typical Rail Details", Sheet 2 of 5 for post & rail details

Steel Handrail required for three or more steps
(Handrail and cheekwall continuous at landings)
Handrail = 1 5/8" NPS (Sch 40)

Handrail Termination
See Detail "A" (Typ.)

Handrail Continuous

Varies = Equal spacing
6'-0" Max. on Steps

Bottom of cheekwall
5' = 0" Min.
Length of Landing

9" Min. Wide cheekwall both sides

See Index No. 521 or Contract Plans for Step Details

ELEVATION
(At-Grade Steps)

ALTERNATE END TREATMENT
TYPICAL SECTION ON CONCRETE SIDEWALK

DETAIL "F" (OPTIONAL SHIMMING DETAIL FOR CROSS SLOPE CORRECTION)
(Used in lieu of Beveled Shim Plates)


TYPICAL SECTION ON GRAVITY WALL
(Other Retaining Walls Similar)

NOTES:
### 2- 3/8" x 8" Steel Anchors:
Galvanized Steel Bolts (A153) C-1 Permitted
Galvanized U-Bolts Permitted
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 in accordance with
Specification Section 9.17 and installed in accordance with
Specification Section 416. The minimum embedment is 6".
NOTES

DESIGN SPECIFICATIONS:

MATERIALS:
All reinforcing steel shall conform to ASTM A 615 Grade 60.

SURFACE FINISH:
A Class S 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 Skiried Pattern shown when approved by the Engineer. Concrete required for Architectural Treatment is not included in the quantities.

TRAFFIC RAILING (BARRIER):
If there is a Traffic Railing Barrier on the wall, Wall Joints and Barrier V-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 456.

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 (Filing Walls) (CY) and Reinforcing Steel (Retaining Walls) (LBS). Retaining Wall quantities shall not include concrete nor pipe steel for Traffic Railings. Traffic Railing (including Bars 5V) shall be paid for under Concrete Traffic Railing (Bridge).

TYPICAL SECTION

VIEW A-A

(Shear key not shown)

NOTE:
Shear Key is required only when specified by the Engineer.

BENDING DIAGRAM

NOTE:
All dimensions are out-to-out.
NOTES

A. DESIGN SPECIFICATIONS:

B. DESIGN CRITERIA:
The Prestcast Sound Barriers are pre-designed and based on the criteria in the Plans Preparation Manual, Volume I and the following soil conditions: soils with soil type SP between values of 10 and 40.

C. CONCRETE AND GROUT:
1. Concrete Class and Compressive Strength:
   - a. Cast-In-Place Columns: Class IV (f'c = 5500 psi)
   - b. Precast Panels, Columns and Post Caps: Class IV (f'c = 5500 psi)
   - c. Post Class IV (f'c = 5500 psi)
2. Grout for Auger Cast Placing:
   - a. Maximum Working Compressive Strength = 2200 psi
   - b. Minimum 28 Day Strength = 5500 psi

3. Minimum Compressive Strength for Trim Removal and Wending of Panels and Fiber Reinforced 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.

D. REINFORCING STEEL:
1. Reinforcing steel shall conform to ASTM A 416, Grade 60.
2. Welded Wire Reinforcement shall conform to ASTM A 586 (smooth wire) or ASTM A 497 (deformed wire).
3. Concrete Cover shall be provided, unless otherwise noted.
4. Post and pile stirrups shall conform to the requirements of Specification Section 820.3.1 for post and pile stirrups at the following locations as a minimum:
   - a. Post Stirrups = T 6 at four corner bars and at every third interior bar intersection.
   - b. Pile Stirrups = Tie to the main vertical reinforcing at alternate intersections for circular configurations and for rectangular configurations at the four corners and at every third interior bar intersection.

E. SURFACE FINISH:
Provide a Class 5 finish in accordance with Specification Section 400, unless otherwise shown on the Wall Control Drawings. See Index No. 5200 for texture finish options.

F. WELDING:
Construct Auger Cast Placing in accordance with the Plans and Specification Section 455.

G. UTILITIES:
Field verify the locations of the overhead and underground utilities shown in the Wall Control Drawings.

H. REINFORCED PAWS AND REINFORCED POSTS:
1. Neoprene Pads and Panel Bearing Points: Between the Stacked Panels:
   - The Neoprene pads for panel bearing points shall be Plain Pads, Grade 50 ductility hardness in accordance with Specification Section 932-2.1.
   - Neoprene Pads for Column Bearing Points:
   - Neoprene pads shall be Fiber Reinforced Pads, Grade 50, 60 or 70 ductility hardness in accordance with Specification Section 932-2.1. Plain pads may be substituted for Fiber Reinforced pads when sufficient bearing area is available on the concrete columns.
   - a. 10 post spacing 4" x 4" x 4" = 15" Plain Pads, Grade 50 ductility hardness.
   - b. 20 post spacing and 8" x 8" x 8" = 25" Plain Pads, Grade 50 ductility hardness.
   - c. 20 post spacing and 12" x 12" x 12" = 25" Plain Pads, Grade 50 ductility hardness.
2. Castings:
   - a. PRS 1000 D-900 (1000 D-900) PC.
   - b. PRS 1000 D-900 (1000 D-900) PC.

J. SMOOTHNESS:
Surface Smoothness for Type "A" smooth Surface Texture Option: +/- 1/4" along a 10 ft. straightedge.
TYPICAL PANEL ELEVATION

* In lieu of utilizing the pick up points below, panels may be cast vertically or cast horizontally then tilted upright using bit-rakes 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
(Panels shall be rotated about long axis only)
**SPECIAL POSTS FOR 90° CORNERS FOR PILE/POST CONNECTION OPTIONS A, B & E**

Collars for Special Posts shall be 3' - 6" Ø

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**WEB HOLE & SHEAR CONNECTOR SPACING DETAIL**

Concrete not shown for clarity. For limits of concrete see Index No. 5205, Sheet No. 4 of 7.

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**NOTES:**

1. See Table of Reinforcing Steel Sizes, see Index No. 5206.
2. For Pile/Post Connection Options A through E, see Index No. 5205.
3. For Post & Plate Lengths, see Index No. 5206.

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**2010 FDOT Design Standards**

**PREFACE SOUN**

**PREFACE PANELS AND POSTS**

---
TYPICAL FORMING DETAIL
(Front Face Panel Texture Type "H" Shown.)

NOTES:
1. Broom finish 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.

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 ELEVATION
(Textured Finish not Shown for Clarity)
(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 PANEL ELEVATION

* In lieu of utilizing the pick up points below, panels may be cast vertically or cast 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" (4s=0.08 in.²/ft.).

REQUIRED PICK UP POINTS FOR PANELS
(Panels shall be rotated about long axis only)
SPECIAL POSTS FOR 90° CORNERS FOR PILE/POST CONNECTION OPTIONS A, B & E

Collars for Corner Posts shall be 3'-6" Ø

SPECIAL POSTS FOR 90° CORNERS FOR PILE/POST CONNECTION OPTIONS C & D

Collars for Corner Posts shall be 3'-6" Ø

WEB HOLE & SHEAR CONNECTOR SPACING DETAIL
(Concrete not shown for clarity. For limits of concrete see Index No. 5205, Sheet No. 4 of 7.)

NOTE: The shop drawings shall include specific pivoting point details at locations where the deflection angle (ϕ) between panels exceeds 20°.
TYPICAL FORMING DETAIL
(Front Face Panel Texture Type "H" Shown.)
(Back Face Panel Texture Type "D" Shown.)

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 Wall Control Drawings for project specific texture and graphic requirements.

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 LG–3 Shown.)
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

SECTION G–G
(Flush Panel Option Shown
Recessed Panel Option Similar)

PLUG DETAIL

DRAINAGE HOLES TYPES A, B, C & D
(Front Face of Wall Shown)
(Flush Panel Option Shown
Recessed Panel Option Similar)
NOTE: Place double rut of welded wire reinforcement in bottom 3/8" 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.

SECTION H–H
(Flush Panel Option Shown
Recessed Panel Option Similar)

GRATING DETAIL

NOTES:
Grating shall be ASTM A 36 steel and shall be hot dip galvanized after assembly in accordance with ASTM Specification A 123.
Expansion anchors shall be in accordance with ASTM A 307 (Galvanized).
Welding shall be in accordance with the current edition of the ANSI/AWS D1.1 Welding Code.
POST IN AUGERED HOLE
(Cast-In-Place Collar Shown, Precast Collar Similar)

POST & WALL
Front Face Post
(Priming)

Roadway face of wall
Top Face Post Texture (Formed)

NOTES:
1. For Post and Pile Lengths, see Index No. 5206.
2. For Table of Reinforcing Steel Sizes and ODM 'A', see Index No. 5206.
3. For Precast Collar Option, see Sheet 2.

SECTION B-B
SECTION C-C

SECTION D-D
(H Section)

SECTION A-A
(H Section)

SECTION E-E
(Modified H Section)

SECTION F-F

PILE/POST CONNECTION OPTION A
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 A, see Sheet No. 1 of 7.
# Extend Post 2" above top of high side wall and 2" below when post caps are shown in plans.

**SECTION A-A**

(Post Assembly)

**SECTION B-B**

**SECTION C-C**

**TOP ASSEMBLY DETAIL**

**WEB HOLE SPACING DETAIL**

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**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 vertically or horizontally 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 Pile and Pile Lengths, see Index No. 5205.

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**PILE/POST CONNECTION OPTION C**
CONSTRUCTION REQUIREMENTS: The Traffic Railing/Sound Barrier and joints shall be constructed plumb, they shall not be constructed perpendicular to the roadway surface. Slope forming is not permitted.

CONCRETE AND REINFORCING STEEL: For Railing/Sound Barrier on bridges see General Notes. For Wall and footing mounted Railing/Sound Barrier, concrete shall be Class II for slightly aggressive environments and Class IV for moderately or extremely aggressive environments. All reinforcing steel shall be Grade 60.

NAME DATE AND BIDGNUMBERS: For Railing/Sound Barrier on bridges, the Name and Date Number shall be placed on the Traffic Railing so as to be seen on the driver's left side when approaching the bridge. The Date shall be placed on the bottom of the name. The name shall be placed as shown in the General Notes in the Structural Plans. 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 3" in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by 3/4" V-grooves. V-Grooves shall be formed by preferred letters and figures.

MARKERS: For Railing/Sound Barrier on bridges, Markers shall be placed on top of the Traffic Railing/Sound Barrier or Bridge Deck at the end joints, 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 Traffic Railing/Sound Barrier.

REFLECTIVE RAILING MARKERS: Reflective Railing Markers shall meet Specification Section 993. Install markers 2'-4" above the railing surface at the spacing shown in the table below. Reflective color (white or yellow) shall match the color of the traffic signs. The cost of the reflective markers shall be included in the Contract Unit Price for the Traffic Railing/Sound Barrier.

DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT

NOTE: At Intermediate Open Joints, the lower 3" portion of the open joint shall be replaced with Nailing 1" with mortar in accordance with Section 400 of the Specifications.

ESTIMATED TRAFFIC RAILING/SOUND BARRIER QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Railing)</td>
<td>CY/LF</td>
<td>0.104</td>
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<tr>
<td>Concrete (Sound Barrier)</td>
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<tr>
<td>Rebar Reinforcing Steel (Typical)</td>
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<td>76.07</td>
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<tr>
<td>Additional Nailing @ Open Joint</td>
<td>LB</td>
<td>4.50.24</td>
</tr>
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</table>

(The above quantities are based on the bridge mounted typical section, 2% (deck cross slope and railing on low side of deck.)

TYPICAL SECTION

FIRE HOSE ACCESS DETAIL

NOTE: Fire hose access holes are required at the rear fire hydrant locations. Field cut reinforcement as required to maintain 2" minimum cover or access holes. Locate the hose access holes a minimum of 10'-0" from 3/4" open joints when possible.

SECTION THRU RECESS "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

CROSS REFERENCE: For locations of detail B, see Sheet 1.
ELEVATION OF RAILING/SOUND BARRIER REINFORCING STEEL
(INTERMEDIATE OPEN JOINT SHOWN, DECK JOINT SIMILAR)
(Bars 5S1 in Barrier not shown for clarity)

NOTES:

# Field Cut Bars 5R & 5S1 to maintain clearance.
## Terminate 3/8" V-groove at construction joint & cast top of railing with End Taper.
### Bar spacing shown for Bars 5V applies only to bridge mounted Railing/Sound Barrier. See Index No. 5212 for spacing of Bars 5V in junction slabs and Index Nos. 5213 (T-Shaped), 5214 (L-Shaped) or 5215 (Trench) for Bars 5V spacing in footings.
INSTRUCTIONS TO DESIGNER:

For Bridge decks up to a maximum thickness of 9", the two bars S51 placed in the Bridge Deck may substitute for longitudinal, anchor steel located within the limits of Bars S5V, provided that the total area of longitudinal, anchor 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 S51 and End Bar S5V are not present in L-Shape, (Index No. 5214) or Trench, (Index No. 5219) Footings. For Bridge Mounted installations, see the Superstructure Sheets for Deck Steel. Unit Bars S51, if not specifically shown on the Superstructure Sheets.

CROSS REFERENCE:
For locations of Section A-4 see Sheet 1.
For location of View B-B see Sheet 5.

SECTION A-4
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/three beam terminal connector to ensure placement of guardrail bolt holes. Pair Bars 5H 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. Shim bars locally where conflicts occur.
2. For Guardrail connection details see Design Standards Appendix No. 400.
3. Door Railing End Transition if a 32'-0" F-Shape Traffic Rail is used beyond the End Taper. See the Plan Sheets. If Railing End Transition is omitted, space Bars 5P, 5R & 5V at 6" as shown above (Typ.).
4. For L-Shaped (Index No. 5224) and Trench (Index No. 5225) 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.
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

<table>
<thead>
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<th>LENGTH</th>
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</tr>
<tr>
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<tr>
<td>VG</td>
<td>5</td>
<td>8-1/2&quot;</td>
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<td>Lw</td>
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<td>7-3/4&quot;</td>
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<td>4-1/2&quot;</td>
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<tr>
<td>U2</td>
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<tr>
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<td>1&quot; Ø Smooth Bar</td>
<td>2'-0&quot;</td>
</tr>
</tbody>
</table>

REINFORCING STEEL NOTES:

1. Altar dimensions in the bending diagrams are cut to cut.
2. All reinforcing steel at the open joints will have a 2" minimum cover.
3. Lap splices for Bars 5B will 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 ASTM A 497.

BARS 5A, 5B & 5C

1" Ø DOWEL

1'-255"

2'-0"

1'-255"

5'-8"

3'-2"

2'-0"

2'-0"

1'-255"

BAR 5S3

BAR 5L

BAR 5U1

BAR 5U2

DETAIL "A"

(Showing Locations of ½" V-Grooves and ¾" Preformed Expansion Joint Filter)

PARTIAL END VIEW OF RAILING END TRANSITION FOR GUARDRAIL ATTACHMENT

(Showing Bars 5V and Bars 5S1)

NOTE: See Index No. 5210, Detail "A" for details.

ESTIMATED JUNCTION SLAB QUANTITIES

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<td>lb</td>
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(The above concrete quantities are based on a super-elevation of 6.25%.)

NOTES:

1. Match Cross Slope of 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 as required to match roadway super-elevation.
3. Actual location & width vary depending on type of Retaining Wall used.
4. See Index No. 5210 for Bars 5V and 5S1.

CROSS REFERENCE

For location of Section B-B, see Sheet 1.

TYPICAL SECTION THRU JUNCTION SLAB AND RETAINING WALL

SECTION B-B
SPREAD FOOTING ADJACENT TO SKewed APPROACH SLAB AND WITH BARRIER WALL INLET

NOTES:

1. CONSTRUCTION REQUIREMENTS: Construct the Spread Footing level transversely and expansion joints plum do not construct the spread footing perpendicular to the roadway surface. Slip forming is not permitted.

2. CONCRETE: Use Class II concrete for lightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 3.4.

3. REINFORCING STEEL: Provide Grade 60 reinforcing steel in accordance with Specification Section 9.2. DownLoad Transfer Devices will be ASTM A.36 smooth round bar and hot-dip galvanized in accordance with Specification Section 9.2. Install DownLoad Transfer Devices in accordance with Specification Section 9.2.

4. Construct 1\(\frac{3}{4}\)" Expansion Joints plumb and perpendicular or radial to Gutter Line. Provide at 90° maximum intervals as shown.

5. Provide and Install Fireproof Expansion Joint Filler in accordance with Specification Section 9.3.

6. Construct 1\(\frac{3}{4}\)" V-Grooves plumb and provide at 30° - 90° maximum intervals as shown. Space V-Grooves equally between 1\(\frac{3}{4}\)" Expansion Joints and/or Begin and End Spread Footing. V-Groove locations are to coincide with V-Groove locations in the Railing/Sound Barrier.

7. FD, REDUCED FD: Shoulder or roadway pavement or FD is required on top (90°) minimum of the entire length of the spread footing on both sides of the Railing/Sound Barrier. See Section B-B for details.

8. See Index No. 5210 for Bars 5V and 5S.

9. Place 6 - Bars 5V inside Stirrup Bars 5V as shown.

10. Spacing shown is along the Gutter Line.

11. Work this Standard Drawing with one or both of the following:
   a. Index No. 5210 + Traffic Railing/Barrier (14°-0'),
   b. Index No. 5211 + Traffic Railing/Barrier (18°-0').

12. For Section B-B and Detail "A": see Sheet No. 2.

SECTION A - A

SECTION THRU SPREAD FOOTING AND BARRIER WALL INLET
(Bars 5P, 5R and 5S in Traffic Railing/Sound Barrier not shown for clarity)

CROSS REFERENCE:

For Section B-B and Detail "A": see Sheet No. 2.
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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<td>U</td>
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<tr>
<td>DOWEL</td>
<td>1&quot; Ø Smooth Bar</td>
<td>2'-0&quot;</td>
</tr>
</tbody>
</table>

BAR 5A & 5B

1" Ø DOWEL

BAR 5U

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. Lap splices for Bars 5B will have a minimum of 2'-0".
4. The Contractor may use welded wire fabric when approved by the Engineer.
Welded wire fabric will conform to ASTM A 497.

SECTION B-B
TYPICAL SECTION THRU SPREAD FOOTING
(Bars 5P, 5R and 5S1 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 5S1.

ESTIMATED T-SHAPED SPREAD FOOTING QUANTITIES

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<td>Reinforcing Steel (Typical)</td>
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<td>37.39</td>
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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

(OPTION A: Similar)

NOTES:

1. CONSTRUCTION REQUIREMENTS: Construct the Spread Footing level transversely and expansion joints plumbed. Do not construct the spread footing perpendicular to the roadway surface. Slot 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.

4. Install/Download Transfer Devices in accordance with Specification Section 963. Install/Download Transfer Devices in accordance with Specification Section 959.

5. Construct V-Groove Joint and perpendicular or radius to Gutter Line. Provide at 90°-0" maximum interval as shown.

6. Provide and Install Preformed Expansion Joint Filter in accordance with Specification Section 932.

7. Spacing shown is along the Gutter Line.

8. Spacing shown is along the Gutter Line.

9. Work this Standard Drawing with one or both of the following:
   a. Index No. 5210 - Traffic Railing/Sound Barrier (6'-0")
   b. Index No. 5211 - Traffic Railing/Sound Barrier (14'-0")

CROSS REFERENCE:
For Detail 'A', see Sheet 3.
For Section 4-A and Estimated Quantities, see Sheet 4.
TYPICAL SECTION THRU SPREAD FOOTING - OPTION A
(Bars 5P, 5R and 5S1 in Traffic Railing/Sound Barrier not shown for clarity)

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 5D ~ Bars 5P inside Bars 5S1 as shown.
3. For reinforcing steel spacing, see Typical Section Thru
   Spread Footing - Option A this Sheet.
4. Provide 3" ip when optional construction joint is used.
TYPICAL SECTION THRU SPREAD FOOTING - OPTION B
(Bars 5P, 5R and 5S1 in Traffic Railing/Sound Barrier not shown for clarity)

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 10'-0" Bars 5B inside Bars 5U2 as shown.
3. Provide 3" lip when optional construction joint is used.

EXPANSION JOINT DETAIL
(Spread Footing expansion joints are required at ½" open joints in Traffic Railing/Sound Barrier)

DETAIL "A"
(Option A Shown, Option B Similar)
(Showing Locations of ½" V-Grooves and ½" Preformed Expansion Joint Filler)

1" @ Dowel Load Transfer Devices (See Typical Section for details)

Approved metal or fiber cap (Typ.)

½" Preformed Expansion Joint Filler
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
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<td>C</td>
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<td>S3</td>
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<td>3-10&quot;</td>
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<tr>
<td>S4</td>
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<td>V</td>
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<td>3-10&quot;</td>
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</table>

DOWEL: 1" ø Smooth Bar 2-0"

SECTION A-A
TYPICAL SECTION THRU SPREAD FOOTING AND BARRIER WALL INLET - OPTION B
(Bars 5V, 5R and 5S1 in Traffic Railing/Sound Barrier not shown for clarity)

NOTES:
1. Place 10 ~ Bars 5B inside Bars 5U as shown.
2. For Reinforcing Steel spacing, see Typical Section Thru Spread Footing = Option B on Sheet 3.
3. Provide 3" sp when optional construction joint is used.

ESTIMATED L-SHAPED SPREAD FOOTING QUANTITIES

<table>
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<th>ITEM</th>
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(Credit 19.69 ft² from typical reinforcing steel quantity shown on Index No. 5220 to account for the absence of Trench Bars 5V and 5S1 in L-Shaped Spread Footings.)

CROSS REFERENCE:
For location of Section A-A, see Sheet 1.

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are cut to suit.
2. Reinforcing steel at the open joints will have a 2" minimum cover.
3. Lap splices for Bars 5H will be a minimum of 2-3".
4. Lap splices for Bars 5T and 5V with 5U will be a minimum of 2-3".
5. The Contractor may use Welded Wire Fabric when approved by the Engineer. Welded Wire Fabric will conform to ASTM A 497.

2010 FDOT Design Standards
TRAFFIC RAILING/SOUND BARRIER
L-SHAPED SPREAD FOOTING

Sheet No. 37/4/05
5214
NOTES

SPECIFICATIONS:
1. General Specifications:
   a. Florida Department of Transportation “Standard Specifications for Road and Bridge Construction”, Current Edition and Supplements as Amended.
   b. Design Specifications:

DESIGN CRITERIA:
1. Design is based on the assumption that the material contained within the reinforced soil volume, methods of construction and quality of the prefabricated materials are in accordance with Specification Section 546 and the reinforced backfill is free of any subsurface drainage of water (leakage).
2. It is the responsibility of the Engineer of Record to determine that the maximum factored bearing pressure shall be for the wall does not exceed the factored bearing resistance of the foundation for that specific wall location.
3. The Wall Company is responsible for internal stability of the wall. External stability design, including foundation and slope stability, is the responsibility of the Engineer of Record.

SOIL PARAMETERS:
1. See Wall Control Drawings for soil characteristics of foundation material to be used in the design of the wall system. The Contractor will supply design parameters for backfill material based on the actual soil characteristics utilized at the site. Provide the values of unit weight, cohesion and internal friction angle in the Shop Drawings.

MATERIALS:
1. Concrete class and minimum compressive strength (ksi):
   a. Except for precast wall facing panels and leveling pads, use Class II concrete for slightly aggressive environments and Class IV concrete for moderately or extremely aggressive environments. Provide all-concrete, except for precast wall facing panels and leveling pads in accordance with Specification Section 546. Provide concrete for precast wall facing panels and leveling pads in accordance with Specification Section 546.
   b. For precast wall facing panels only, see Wall Control Drawings.
2. Provide reinforcing steel for systems with non-metallic soil reinforcement and provide metallic soil reinforcement over the 100 year flood elevation in accordance with Specification Section 546. For reinforcing steel requirements for systems with metallic soil reinforcement below the 100 year flood elevation see Wall Control Drawings.
3. Provide soil reinforcement in accordance with Specification Section 546.
4. Payment for Dowel Bars 40 used with precast or CIP coping will be made under Retaining Wall System (RWS) drawings for foundation wall and concrete.
5. For additional instructions see Wall Company General Notes.

CONSTRUCTION:
1. Walls built in accordance with Specification Section 546 and the Wall Control Drawings.
2. For location and alignment of retaining walls, see Wall Control Drawings.
3. If present, consider in design and analysis and locate manholes and drain inlets as shown on wall sections.
4. Refer to Wall Control Drawings for individual walls for minimum reinforcement strip/mesh length, factored bearing resistance, minimum wall embankment and anticipated long term and differential settlements.
5. The Contractor is responsible for water retention as needed during construction.
6. 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/mesh may be skewed (5° maximum) to avoid the post locations if authorized by the Engineer. No curving of soil reinforcement is allowed unless shown on Shop Drawings and approved by the Engineer. Any damage done to the soil reinforcement will be repaired by the Contractor at the Contractor's expense. Repair method will be approved by the Engineer.

SHOP DRAWING REQUIREMENTS:

4. Provide general notes and design parameters on the Shop Drawings. Include design soil characteristics and other pertinent notes required for design and construction of the wall. Provide factored bearing resistances and factored bearing pressures for each wall height to be taken.
5. Specify the sizes of soil volume (see Typical Sections at right for details).
6. Show complete details of precast wall facing panel, spand panel and all other concrete elements incorporated in the wall. Include reinforcing bar size and spacing, complete panel bending diagrams and required embedments.
7. Show complete details of leveling pads and/or footings, including all steps in leveling pad.
8. Show complete details for construction of wall around obstructions. Show details for placement of soil reinforcement at acute corners and at intersections with temporary walls.
9. Show complete details describing all soil reinforcement, precast concrete facing panels and embedments in the reinforced soil volume. Provide full details of railings, coping, sign supports, light pole plinths, acute corners, etc.
10. Show complete details where walls of different types intersect/influence one another.
11. Provide full detailed design calculations for each wall height increment detailed in the Shop Drawings. Sign Shop Drawings and calculations with amendments and seal by a Professional Engineer registered in the State of Florida.

QUALIFIED PRODUCTS LIST:
1. Manufacturers seeking approval of proprietary retaining wall systems for inclusion on the Qualified Products List as pre-approved wall systems must submit a QPL Pre-Approval Evaluation Application form to the Florida Division of State Architectural Services. Wall system construction manual and other information as required in the following Wall System QPL Acceptance Criteria showing the proprietary wall system is designed to meet all specified requirements. Project specific Shop Drawings are required for QPL approved wall systems (see Shop Drawing Requirements below).

SHOP DRAWING REQUIREMENTS:

1. The successful bidder will submit the final design of the wall for review as Shop Drawings. Details and Design Criteria shown on Shop Drawings shall not deviate from those shown on the approved QPL Vendors Drawings. The Shop Drawings will include detailed design computations and all details, dimensions and quantities necessary to construct the wall. The design and fully detailed plans will be prepared as required by current FDOT standards at time of bidding and will include, but not be limited to, presentation or required information as follows:
2. Provide an elevation view showing the overall plan indicating:
   a. Elevations/Profiles/sections at top of wall, top of leveling pad or footing and bottom of footing for Vertical/Wall system.
   b. Elevations/Profiles/sections at top of wall, top of leveling pad or footing and bottom of footing for Horizontal/Retaining Wall systems in vertical alignment, all walls, and every 25 foot station increments.
   c. Elevations/Profiles/sections at top of wall, top of leveling pad or footing and bottom of footing for Horizontal/Retaining Wall systems in horizontal alignment.
3. Provide a plan view detailing the horizontal and offsets from the horizontal control (as is) to the exterior face of the wall.
4. Show in plan view all temporary, permanent, light pole plinths, drainage structures, structural work, etc. that affect the wall.
5. Locate in the plan view all pipes for construction, including those for future widening, as shown on Foundation Layout Drawings.

GENERAL NOTES

2010 FDOT Design Standards
1 of 19
Sheet No. 1
1/10/07
5300
PERMANENT RETAINING WALL SYSTEMS
TABLE OF FDOT WALL TYPES

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<td>Type 2C</td>
<td>Yes</td>
<td>MSE Walls</td>
<td>3&quot;</td>
<td>I</td>
</tr>
<tr>
<td>Type 2D</td>
<td>Yes</td>
<td>MSE Walls</td>
<td>3&quot;</td>
<td>I</td>
</tr>
<tr>
<td>Type 2E</td>
<td>Yes</td>
<td>Temporary Walls</td>
<td>n/a</td>
<td>metal</td>
</tr>
<tr>
<td>Type 2F</td>
<td>Yes</td>
<td>Temporary Walls</td>
<td>n/a</td>
<td>plastic</td>
</tr>
</tbody>
</table>

TYPICAL RETAINING WALL SECTION WITH A TRAFFIC RAILING

(MSE Wall Type Shown, Others Similar)
(Showing Limits of the Reinforced Soil Volume)

Concrete Gutter
Limit of Class 5 Applied Finish Coating
Concrete Coping
Soil Reinforcement (Typ.)
Surface treatment when required
(See Construction Note 20)
Proposed Final Ground Line
Interior Face of Concrete Facing Panels
Concrete Leveling Pad

TYPICAL RETAINING WALL SECTION WITHOUT A TRAFFIC RAILING
(Counterfort Wall Type Shown, Others Similar)
(Showing Limits of the Soil Volume)

Concrete Facing
Proposed Final Ground Level
Top of Footing
Limits of Soil Volume
4'-0" Min.
1'-0" Min.
PRECAST AND C.I.P. COPING DETAILS

PRECAST COPING - PARTIAL ELEVATION VIEW

SECTION A-A
C.I.P. COPING

SECTION B-B
PRECAST COPING

For Slightly and Moderately Aggressive environments.

For Extremely Aggressive environments.

 Bars 4U @ 1'-6" sp. (Top with Dowel Bars 4D)

Top of Retaining Wall Panel (Typ.) (See Note 1)

Dowel Bars 4D (Typ.)

Clearance Varies

Bars 4U @ 1'-4" sp. (Typ.)

Top of Precast Coping

C.I.P. Coping - Partial Elevation View

Bars 4U2 @ 1'-0" Typical Precast Coping (1'-0" Min.)

Additional Joint Spacing - 30'-0" Typical (10'-0" Min.)

& 1/2" Open Joint

& 1/2" Open Joint

& 3/8" Open Joint

& 3/8" Open Joint

& 1/4" Open Joint

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.

PERMANENT RETAINING WALL SYSTEMS
REINFORCING STEEL BENDING DIAGRAMS - PRECAST AND C.I.P. COPINGS

REINFORCING STEEL NOTES:
1. All dimensions in the bending diagrams are cut to cut.
2. All reinforcing steel at the open joints will have a 3" minimum cover.
3. Bars 4A may be continuous or spliced at the construction joints. Lap splices for Bars 4A will be a minimum of 1'-0".
4. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement shall conform to ASTM A 497.

- S = Slightly Aggressive
- M = Moderately Aggressive
- E = Extremely Aggressive

BARS 4A & 4B
Dowel Bar 4D
BAR 4U1
BAR 4U2
BAR 4U3

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.
PARTIAL END VIEW OF TRAFFIC RAILING END TRANSITION (SHOWING BARS 5V AND BARS 5S) (PRECAST COPING SHOWN, C.I.P. COPING SIMILAR)

NOTE: SEE INDEX NO. 420 AND INDEX NO. 425, DETAIL "A" FOR DETAILS.

ESTIMATED QUANTITIES FOR PRECAST COPING

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
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<tbody>
<tr>
<td>Concrete (Precast Coping)</td>
<td>CY</td>
<td>0.921</td>
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<tr>
<td>Concrete (C.I.P. Junction Slab)</td>
<td>CY/FT</td>
<td>0.370</td>
</tr>
<tr>
<td>Reinforcing Steel (Precast Coping) excluding Bars 5V and 5S (Typ.)</td>
<td>LB</td>
<td>282.04</td>
</tr>
<tr>
<td>Reinforcing Steel (C.I.P. Junction Slab) (Typ.)</td>
<td>LB/FT</td>
<td>56.68</td>
</tr>
<tr>
<td>Additional Rein. &amp; Expansion Joints (Typ.)</td>
<td>LB</td>
<td>42.72</td>
</tr>
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</table>

(The above concrete quantities are based on a superimposition of 6.25% and a 5" wide retaining wall system, beneath a 32" F-Shape Traffic Railing. 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 5V/40 NOTES:
1. Match Cruise of Traffic Lane or Shoulder.
2. The minimum dimension of 6" corresponds to a superimposition of 6.25%. For superimpositions exceeding 6.25%, increase this dimension (i.e., shift control points down) as required to match roadway superimposition.
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. The Precast Coping width is based on a minimum 625" wide Retaining Wall Panel. If the Retaining Wall Panel is wider than 625", increase the width by the difference between the two Retaining Wall Panel widths. Increase the length of Bars 5A & 5C as required when the coping is increased and adjust spacing of Bars 5B as required to maintain 2" minimum cover.
6. Increase the width (2 to 26") of Bars 6A2 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 be spaced 125% of the bar yield strength.

PRECAST OR C.I.P. COPING WITH C.I.P. JUNCTION SLAB DETAILS (F-SHAPE TRAFFIC RAILINGS)
PLAN VIEW

(Skewed Approach Slab shown, Perpendicular Approach Slab similar)
(Traffic Railing reinforcement not shown, except for Bars 7P1 & 4V1)

CROSS REFERENCES:
1. For "Notes" see Sheet 6 of 19.
2. For "Expansion Joint Detail" see Sheet 5 of 19.
3. For "Junction Slab Notes" see Sheet 5 of 19.

PARTIAL PLAN VIEW OF GUARDRAIL TRANSITION AT BEGIN OR END RETAINING WALL
(Precast Coping shown, C.I.P. Coping similar)
(Traffic Railing reinforcement not shown, except for Bars 7P1 & 4V1)

PARTIAL PLAN VIEW OF COPING WITH CURB
(Precast Coping shown, C.I.P. Coping similar)
(Traffic Railing reinforcement not shown, except for Bars 4P5, 4R3, 7P1 & 4V1)

PRECAST OR C.I.P. COPING WITH JUNCTION SLAB (CORRAL SHAPE TRAFFIC RAILING)
PARTIAL END VIEW OF TRAFFIC RAILING END TRANSITION FOR GUARDRAIL ATTACHMENT

(Showing Bars 5½, 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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
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<tr>
<td>Concrete (Precast Coping)</td>
<td>CY</td>
<td>1136</td>
</tr>
<tr>
<td>Concrete (C.I.P. Raised Sidewalk)</td>
<td>CY/ft.</td>
<td>0.424</td>
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<tr>
<td>Reinforcing Steel (Precast Coping) excluding Bars 5T, 5X and 5S (Typ.)</td>
<td>lb.</td>
<td>269.96</td>
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<tr>
<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.  @ Expansion Joints</td>
<td>lb.</td>
<td>37.58</td>
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(The above concrete quantities are based on a 5½" wide retaining wall panel and a Type D Concrete Curb (See Note 2). The above Precast Coping quantities are based on one 10-½" Precast Coping segment.)

TYPICAL SECTION THRU PRECAST COPING WITH C.I.P. RAISED SIDEWALK AND RETAINING WALL AT EXPANSION JOINTS

1. Actual widths vary depending on type of Retaining Wall used.
2. Match roadway curb shape (Typical) and height. See Roadway Plans and Index No. 300. 5½-11½" dimension is based on a 3½" Vertical Shape: 3" Tapered, with a Type D curb adjacent to a 6-0½" 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 5½, 5T & 5X and Bullet Railing details. Adjust vertical dimension of Bars 5T and 5X, see Reinforcing Steel Note 5.
4. Increase the width (1-½") of Bars 5½ as required to maintain 2" minimum cover when recessed with 8¾"
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 100% of the bar yield strength.
6. Trim end of Bars 5½ and 5X to clear construction joint for Vertical Shape: Traffic Railing.

PRECAST OR C.I.P. COPING WITH C.I.P. RAISED SIDEWALK DETAILS (VERTICAL SHAPE TRAFFIC RAILINGS)
LIGHT PILASTER NOTES:

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
     - Windload Moment about Longitudinal Axis (X) = 28.30 kip-ft
     - Windload Moment about Transverse Axis (Y) = 40.60 kip-ft
   - Deadload Moment about Longitudinal Axis (X) = 1.890 kip-ft
   - Deadload Moment about Transverse Axis (Y) = 1.350 kip-ft
   - Tension about Pole Axis = 3.660 kip-ft
   - Y-axis refers to Bridge Axis.

2. Provide grout in accordance with Specification Section 834.
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 fit 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. Inspect anchor bolts prior to grouting.
5. For conduit pull box and expansion/demotion fitting details, see Utility Conduit Detail Drawings.
6. 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 labor, concrete and reinforcing steel required for construction of the pilasters, grout pads, pull box 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.
7. Field Cut Bars #2 at required to maintain clearance.
8. Anchor Bolt pattern orientation will be as shown.
9. The FRP material for 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 Slab and Raised Sidewalks (Bars 5A and 5B). Omit Junction Slab Bars 6A and Raised Sidewalk Bar 6A within light pole pilaster limits.

11. Use this Sheet with the following as appropriate:
   - Sheet Nos. 2 thru 16 of 19 – Precast or C.I.P. Coping with C.I.P. Junction Slab Details
   - Sheet Nos. 11, 12, and 13 of 19 – Precast or C.I.P. Coping with C.I.P. Raised Sidewalk Details
   - Sheet Nos. 14 and 15 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.
TYPICAL SECTION AT LIGHT POLE PILASTER
(Traffic Railing Shown, Concrete Parapet Similar)
(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 5'-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 4" are only required when pilasters 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.

C.I.P. LIGHT POLE PILASTER DETAILS

2010 FDOT Design Standards

PERMANENT RETAINING WALL SYSTEMS
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. Minimum clearance between leveling nut and top of pilaster shall not exceed anchor bolt diameter.

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are not to cut.
2. Lap splices for Bars 4GL, 4G2 & 4G3 where a minimum of 1'-6". Lap splices for Bars 4G4 & 4G5 where a minimum of 1'-9".
3. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement will conform to ASTM A 497.

ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
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</thead>
<tbody>
<tr>
<td>Concrete (Plaster)</td>
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<td>Concrete (Thickened Junction Slab)</td>
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<tr>
<td>Reinforcing Steel</td>
<td>lb</td>
<td>43.65</td>
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(The quantities above are for one C.I.P. Light Pole Pilaster. The concrete quantity for the thickened junction 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.)
REINFORCING STEEL BENDING DIAGRAMS - DRAINAGE

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
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<tbody>
<tr>
<td>S2</td>
<td>5</td>
<td>VARIES</td>
</tr>
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<td>U2</td>
<td>6</td>
<td>VARIES</td>
</tr>
<tr>
<td>U3</td>
<td>5</td>
<td>19-2&quot;</td>
</tr>
</tbody>
</table>

REINFORCING STEEL NOTES:
1. All dimensions in the bending diagrams are out to out.
2. After reinforcing steel at open joints tie each a 2" minimum cover.
3. See Sheet Nos. 3 thru 5 of 9 (for Bars 55, 5S2 and 6U2) for details.
4. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded Wire Reinforcement will conform to ASTM A 497.

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)

NOTES:
1. Spacing shown is along the Gutter Line. Spacing shown is for C.I.P. Junction Slab. For C.I.P. Raised Sidewalks or Sidewalks, match bar spacing and size shown in typical sections (e.g., U = Bars 552 and 5S2 @ 6" spacing for Raised Sidewalks).
2. Dimensions shown are for junction slabs. The 2"-6" dimension must be a minimum of 1"-6" for raised sidewalks.
3. Actual location & width vary depending on type of Retaining Wall used.
4. See Index No. 420 for Bent 6" Spacing & 5S2 for Bars 5V and 55.
5. 1" Continuous Neoprene Strip (Top) & Expanded Polystyrene shown hatched ("X" Each Side).
6. Locate & Barrier Wall Inlet a minimum of 10'-0" away from Expansion Joints in Juctions Slab, Raised Sidewalk or Sidewalk, C.I.P. Coping and Traffic Railing or Concrete Parapet.
7. 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, 12, 13 of 19 - Precast or C.I.P. Coping with C.I.P. Raised Sidewalk Details
   Sheet Nos. 14 and 15 of 19 - Precast Coping/Parapet or C.I.P. Coping with C.I.P. Sidewalk Details

C.I.P. DRAINAGE DETAILS

PERMANENT RETAINING WALL SYSTEMS

2010 FDOT Design Standards

Sheet No. 19 of 19
NOTES

SPECIFICATIONS:
1. General Specifications:
   a. The Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", Current Edition and Supplements as Amended.
2. Design Specifications:

DESIGN CRITERIA:
1. Design is based on the assumption that the material contained within the reinforced soil volume, methods of construction and quality of prefabricated materials are in accordance with Specification Section 548.
2. It is the responsibility of the Engineer to determine that the factored bearing pressure shown for the walls  is not greater than the factored bearing resistance of the foundation for that specific wall location.
3. The Wall Company is responsible for internal stability of the wall. External stability design, including foundation and slope stability, is the responsibility of the Engineer.

SID PARAMETERS:
1. See wall control drawings for soil characteristics of foundation material to be used in the design of the wall. The Contractor must provide soil parameters for base/subgrade material based on the actual soil characteristics utilized at the site. Provide the values of unit weight, cohesion and internal friction angle in the Shop Drawings.

MATERIALS:
1. Provide soil reinforcement in accordance with Specification Section 548.
2. For additional material notes, see Wall Company General Notes.

CONSTRUCTION:
1. Walls must be constructed in accordance with Specification Section 548 and the Wall Company’s Instructions.
2. For location and alignment of retaining walls, see Wall Control Drawings.
3. If present, consider in 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/mesh length, factored bearing resistances, minimum wall 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 a wall, a strip/mesh of reinforcement is required at the wall. The Contractor must be notified by the Contractor on the Contractor’s expense. All required methods must be approved by the Engineer.
6. If 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 must notify the Engineer to determine what course of action should be taken.
7. The Contractor is responsible for gradually deflecting upper layers of reinforcement 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 soil mixing are anticipated.

CONSTRUCTION (CONT’D):
8. Piles within the soil volume must be driven prior to construction of the retaining wall. The portion of the soil volume must be wrapped with polyethylene sheathing in accordance with Specification Section 542. Drive piles located within soil volume prior to construction of the retaining wall according to the specifications of the retaining wall contractor, unless a method to protect the structure acceptable to both the Engineer and Wall Company is proposed and approved in writing.
9. A structural extension of the connection of the retaining wall panel to soil reinforcement must be used whenever necessary to avoid cutting or excessive shearing (greater than 15°) of the soil reinforcement around obstructions (i.e., piles, pipes, etc.).

QUALIFIED PRODUCTS LIST:
1. Manufacturers seeking approval of proprietary retaining wall systems for inclusion on the Qualified Products List as pre-approved wall systems should submit a QPL Product Evaluation Application along with detailed design documentation, vendor drawings and system construction manual and other information as required in the Retaining Wall System QPL Acceptance Criteria. The proprietary wall system is designed to meet all specified requirements. Project specific Shop Drawings are required for each QPL approved system (see Shop Drawing Requirements below).

SHOP DRAWING REQUIREMENTS:
The successful bidder shall submit the final detail of the wall for review as Shop Drawings. Details and Design Criteria shown on the Shop Drawings must not deviate from those shown on the approved QPL. All Shop Drawings for the Shop Drawings must be submitted by the Contractor. The Shop Drawings must include detailed design computations and all drawings, dimensions and quantities necessary to construct the wall. The design and details of wall must be prepared as required by FDOT Specification Section 548 and must include, but not be limited to, presentation of required information as follows:

1. Provide an elevation view of the wall indicating:
   a. Elevations/Station at the top of each section of walls, or End Retaining Wall, at breaks in vertical alignment, all wall stations and every 30 ft. for each section.
   b. Length, size and designation of soil reinforcement in elevation view.
   c. Location of the proposed final ground line.
   d. Provide a plan view showing the horizontal alignment and offsets from the horizontal control lines to the exterior face of the wall.
   e. Provide plan and elevation views of wall, drainage structures, drainage pipes, etc. that affect the walls. Locate in the plan view deflections within the reinforced earth volume, as shown on Foundation Layout Drawings.
   f. Provide elevation and alignment and other pertinent notes required for construction of the walls. Provide the factored bearing resistance and factored bearing resistance for each wall height increment.
   g. Provide the limits of the reinforced soil volume.
   h. Show complete details addressing conflicts between soil reinforcement and embankments in the reinforced soil volume.
   i. Show complete details where walls of different types intersect and influence one another.
   j. Provide fully detailed design calculations for each wall height increment.

TYPICAL RETAINING WALL SECTION
(Showing Limits of the Reinforced Soil Volume)

GENERAL NOTES AND DETAILS

2010 FDOT Design Standards

TEMPORARY RETAINING WALL SYSTEMS

GENERAL NOTES AND DETAILS

TEMPORARY TRAFFIC RAILING PLACEMENT DETAIL

Vary of (See Index No. 415

TYPE T Temporary Traffic Railing
(See Index No. 414

For Details)
TYPICAL ELEVATION

Note: If the sign panels are deeper than 30", a horizontal panel splice is allowed at an interior 2" bar support. Shop drawings shall be required. Minimum panel section width 2", 67°.

BACKING STRIP DETAILS

NUMBER OF WIND BEAMS FOR GIVEN DEPTH & WIND

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<th>No. of Beams</th>
<th>Max. Depth</th>
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<tr>
<td>10 g</td>
<td>4</td>
<td>6 - 10&quot;</td>
</tr>
<tr>
<td>15 g</td>
<td>3</td>
<td>10 - 15&quot;</td>
</tr>
<tr>
<td>20 g</td>
<td>2</td>
<td>15 - 20&quot;</td>
</tr>
<tr>
<td>30 g</td>
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<td>20 - 30&quot;</td>
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</tr>
<tr>
<td>100 g</td>
<td>0.125</td>
<td>&gt; 75&quot;</td>
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SIDE VIEW

Z TYPE WIND BEAM

DESIGN WIND SPEEDS BY COUNTY


*Note: Beams are Aluminum; No Steel Equivalent Available. Designation gives (Member Depth)x (Flange Width)x (Length).*
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 all upright heights.
   b. Foundation elevations necessary to ensure minimum vertical clearances as per traffic plans.
   c. Anchor bolt orientation with respect to centerline of truss and the direction of traffic.
   d. Uplift chord splice a minimum distance of 2 truss panel lengths apart. "00" Panel from upright in the closest panel in which a chord splice may be used. See plans for Cantilever Sign Structure Data Table. Uplift 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.
   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, 8".
   b. Steel Angles: ASTM A 369, Grade B, 8".
   c. Steel Plates: ASTM A 369, Grade B, 8".
   d. Weld Metal: E70XX.
   e. Bolts: ASTM A355 Type 1, (Installer Specification Section 7001) with single, self-locking nuts.
   f. Anchor Bolts: ASTM F1554, Grade 55 with ASTM A271 Grade A heavy hex double nuts.
   g. Install all nuts per manufacturer’s instructions.
   h. Bolt hole diameters equal to the bolt diameter plus \( \frac{V}{2} \).
   i. Anchor bolt hole diameters equal to the bolt diameter plus \( \frac{V}{4} \).
6) Sign Panels: Aluminum. See Elevation drawing for sizes and locations.
7) Foundation Materials:
   a. Reinforcing Steel: ASTM A4165, Grade 60.
   b. Concrete: Class IV, minimum 5.5 ksi/compressive strength at 28 days for all environmental classifications for Spread Footing. Class IV (Drilled Shafts), minimum 6.0 ksi/compressive strength at 28 days for all environmental classifications for Drilled Shafts.
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) After placement of the upright and prior to installation of the truss, adjust the leveling nuts beneath the base plate to achieve the back rake shown on the Camber Diagram.
11) Place backrake above the footing prior to installation of the sign panels. Do not remove or reduce in height without prior approval of the Engineer.
12) Install sign panels as shown on the Elevation drawing.
13) Payment Allowances associated with the Sign Structure, Sign Panels, Foundation and all incidental items will be paid for under the Sign Structure pay item.
14) Verify CSD, access tube locations with anchor bolt installation before excavating the shaft. When CSD, access tube locations conflict with anchor bolt locations, move the CSD access tube location + two inches along the inner circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSD access tube locations cannot be moved out of conflict with anchor bolt locations.

NOTE: See Plans for Cantilever Sign Structure Data Table.
SECTION D-D

NOTE: Only 6 Bolts shown for clarity

Maximum Gap Between Pipes is 1/4".

1 3/4" for 1 1/2" Od Bolts
1 5/8" for 1 1/4" Od Bolts
1 7/8" for 1 1/8" Od Bolts

Splice

SPICE CONNECTION DETAIL

UPRIGHT-TRUSS CONNECTION DETAIL
(Web Members from back Truss Chord omitted for clarity)

NOTE:
- Abbreviation: OD = Outside Diameter

SECTION F-F, SECTION G-G SIMILAR
(With Gusset Plate & Angles omitted for clarity)
View J-J

Similar to Detail M

Truss Web Angles (Typ.)

Span Length, comprised of N Equal Panels

Section I-I

Similar to Detail P

Truss Web Angles (Typ.)

Panel Length (Typ.)

NOTE:
Abbreviation
OD = Outside Diameter

CANTILEVER SIGN STRUCTURE
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 ensure 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.
4) It is necessary, disassemble and secure components for shipment.
5) Sign Structure Materials:
   a. Upright and Chords (Steel Pipe): API 5L-X42 (42 ksi yield) or ASTM A500, Grade B.
   b. Steel Angles: ASTM A 709, Grade 36.
   c. Steel Plates: ASTM A 709, Grade 36.
   d. Weld Metals E70XX.
   e. Bolts: ASTM A325 Type 1 (Install per Specification Section 700) with single, self-locking nuts.
   f. Anchor Bolts: ASTM F2219, Grade 5S, with ASTM A563 Grade 4 heavy-heel double nuts.
   g. Install all nuts per manufacturer's instructions.
   h. Bolt hole diameters equal to the bolt diameter plus 1/8".
   i. Anchor bolt hole diameters equal to the bolt diameter plus 1/8".
   j. Galvanization: Nuts, bolts and washers: ASTM F2329. Other steel items: ASTM A325
6) Sign Panels: Aluminum. See Elevation drawing for sizes and locations.
7) Foundation Materials:
   a. Reinforcing Steel: ASTM A416, Grade 60.
   b. Concrete Class IV (Graded Stuff), minimum 4.0 kips compressive strength at 28-days for all environmental classifications.
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 this 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 costs will be paid for under the Sign Structure pay item.
14) Verify CSL access tubos are within the required anchor bolt locations before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location by two inches along the inner circumference of the reinforcing cage; notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.

NOTE: See Plans for Span Sign Structure Data Table.
See Upright Cap Detail

1 1/2" x 4" OD

Do Not Provide Returns On Fillet Welds
Seal Weld completely around (Typ.)

2 Equal Rows
of Bolts

Gusset Plates

L/4" or W/4"

1/4" Plate Washer

1/2" or W/4" Plate

10" for Truss Depth less than 7'-0"

1-1/2" for Truss Depths 7'-0" or greater

VIEW A-A

PLAN VIEW
BASE PLATE

RIGHT UPRIGHT-TRUSS CONNECTION DETAIL
(LEFT UPRIGHT = TRUSS CONNECTION SIMILAR)

Web Members from Back Truss Chord Omitted For Clarity

SECTION A-A

SECTION C-C

2010 FDOT Design Standards
SPAN SIGN STRUCTURE

NOTE:
Abbreviation
OD ~ Outside Diameter

2 5/8" or W5/8" Hex Head Bolts of Soft-Mounting Nuts
1/4" or W1/4" Bolts

2 5/8" or W5/8" Hole in Diameter

1/4" Anchor Bolt

L/4" or W/4"

4 1/4" Washer

Double Nuts

L/4" or W/4"

Wire Screen
see Spec. 649-6

4 1/4" Washer

4 1/4" Sq. (Typ.)

1 1/2" Bolt, Left Upright

"A" Bolt, Right Upright

L/4" or W/4"

Gusset Plate

Gusset Plate

4 1/4" Sq. (Typ.)

2 5/8" or W5/8" Hole in Diameter

LEVELING NUTS

Drilled Shaft...
See Plug Detail (Typ.)

'D' E Panels

See Detail M

'G' Truss Web Angles (Typ.)

Similar to Detail H

VIEW F-F

VIEW G-G Similar

(Out-of-Plane Members not shown for clarity)

'Top Truss Chord'

'G' Upright Pipe

Span Length, 'A', comprised of 'D' Equal Panels

1/2 The Number Of Panels - For An Even Number Of Panels

1/2 The Number Of Panels Rounded Down To The Closest

Whole Number For An Odd Number Of Panels

1/2 Span (Even Number of Panels)

1/2 Span (Odd Number of Panels)

1/2 Span (Odd Number of Panels)

SECTION E-E

Front of Truss Elevation

(Back Truss Chord and attached Angles not shown for clarity)

2 3/8" x 3/8" Bolts (Typ.)

1/2" U-Bolt w/ Self-Locking Nuts (Typ.)

1/2" U-Bolt (For attachment of Luminaire Support)

4" Aluminum Zee Sign Hanger

Attach Luminaire to angle with

4 ~ 1/2" bolts at each location

where required

Provide this Detail for Back Mounted Signs

on all Sign Hanger Locations

NOTE: See Index No. 11300.

NOTE: Abbreviation

OD ~ Outside Diameter

Back-Side Sign Mounting Detail

2010 FDOT Design Standards

Span Sign Structure
DETAIL H
Truss Web Angles (Typ.)

DETAIL I
Pitch Chord (Typ.)

DETAIL J
Upright

DETAIL K
Centroids of Angles and Chords Intersect (Typ.)

DETAIL L

DETAIL M
Plate is skewed to plane of view

SECTION N-N

SECTION D-D
Showing Cap plate only

UPRIGHT CAP DETAIL

NOTE:
Abbreviation
OD – Outside Diameter
1) DESIGN WIND SPEED: See 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 2.

6) SIGN PANELS: 0.08 inches min. thick Aluminum Plate with all corners rounded.

7) ALUMINUM BOLTS, NUTS, AND LOCK WASHERS:
   a. Aluminum bolts ASTM F469, Alloy 2042-T4 with at least 0.0002 inches thick anodic coating and chromate sealed.


10) BREAKAWAY SUPPORTS REQUIREMENTS: Instal non-removable aluminum column (post) (larger than 3/4") with breakaway supports as shown on Sheet 9 at A. Signs shall be shielded by barrier wall or guardrails do not require breakaway support.

11) GPL: Manufacturers seeking approval to alter aluminum round tube, such as steel-channel and steel-square tube single post ground sign assemblies for inclusion on the Product Listed Items (PLI) program must submit a DPR application, design calculations, detailed drawings and design tables showing the product meets all the requirements.

---

### ALUMINUM COLUMN (POST) SELECTION TABLE
(WIND SPEED = 130 MPH)

<table>
<thead>
<tr>
<th>Size</th>
<th>W (FT)</th>
<th>h</th>
<th>L</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
<th>C9</th>
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</thead>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For WIND SPEED = 130 MPH

W = 11 FT, Area = 16 FT²

- Refer to the 130 mph Column (Post) Selection Table, as copied from Sheet 8 and shown here.
- Using the 16 FT² area on the left hand side of the table, go across to the 11 FT height and find the cellmarked with X.
- The symbol indicates that the design requires a 4.0" diameter and 0.25" thick aluminum Column (Post) and a 2.0 diameter and 4.0 deep concrete foundation.

---

### COUNTY:

- Design and use the centroid and areas 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 8.
- Determine the net height from groundline for the individual sign or the cluster.
- Select the appropriate Column (Post) Selection Tables by Wind Speed and find the intersection point.
- 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. For sign posts with signs oriented in two directions, only the sign with the largest area should be analyzed to determine the post requirements.

---

NOTES AND EXAMPLE:
For 'A' & 'B' see Index No. 17502 and Roadway Plans.

NOTE:
No sign or sign cluster area shall exceed 30 SF nor shall any sign or sign cluster have a total/width exceeding 60 inches.
ALUMINUM COLUMN (POST) SELECTION TABLE
(WIND SPEED = 110 MPH)

ALUMINUM COLUMN (POST) SELECTION TABLE
(WIND SPEED = 130 MPH)

ALUMINUM COLUMN (POST) SELECTION TABLE
(WIND SPEED = 150 MPH)

NOTES:
All cantilever sign installations shall comply with Standard Index 17302.

POST AND FOUNDATION TABLE

<table>
<thead>
<tr>
<th>Post Size</th>
<th>Foundation Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (in)</td>
<td>Wall (in)</td>
</tr>
<tr>
<td>(in)</td>
<td>without Soil Plate</td>
</tr>
<tr>
<td>2.0</td>
<td>4.5</td>
</tr>
<tr>
<td>2.5</td>
<td>8.5</td>
</tr>
<tr>
<td>3.0</td>
<td>12.5</td>
</tr>
<tr>
<td>3.5</td>
<td>16.5</td>
</tr>
<tr>
<td>4.0</td>
<td>20.5</td>
</tr>
<tr>
<td>4.5</td>
<td>24.5</td>
</tr>
<tr>
<td>5.0</td>
<td>28.5</td>
</tr>
<tr>
<td>6.0</td>
<td>32.5</td>
</tr>
<tr>
<td>8.0</td>
<td>36.5</td>
</tr>
</tbody>
</table>

# INSTALLING Movable 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 preformed holes backfilled with suitable material tampered in layers not thicker than 6" to provide adequate compaction or filled with Washable Fiber Bagged concrete.

** See Note 5 on Sheet 1 of 8.

ALUMINUM SOIL PLATE DETAILS

NOTES:
1. Align Soil/Plate bottom at 2/3 of foundation depth.
2. Slot up to 1/8" long is allowed to accommodate various post sizes.

CANTILEVER SIGN

$ = IF CANTILEVER SIGN configuration (see Cantilever Sign Details) falls in this region, use next larger post size than that indicated.
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.

For signs with either dimension of sign size greater than 30". (See Sheet No. 6 thru 8 of 8 for sign sizes)

Z Bracket Wind Beam

STOP

YIELD

RECTANGLE
(Use only one Wind Beam at L Sign for sign height up to 12")

RAILROAD

SCHOOL

SHIELD

DIAMOND

COUNTY

VIEW A-A

ALIGN TOP OF SIGNS

Z Bracket Connection

Sign Face

Sign Face

Sign Face

Sign Face

Aluminum Column (Post)

Aluminum Column (Post)

Aluminum Column (Post)

Aluminum Column (Post)

OFFSET SIGNAGE DETAIL

VIEW A-A

CONNECTON AND WIND BEAM

SINGLE COLUMN GROUND SIGNS
SLIP BASE NOTES:

1. Use sleeves with an inside diameter (I.D.) no more than \( \frac{3}{4} \)" larger than the outside diameter (O.D.) of the column.
2. Sleeve bolts: ASTM A-307, \( \frac{5}{8} \)" galvanized steel bolts (with lock nuts) or Alloy 2024-T4 or 6061-T6 (ASTM B-221).
4. Base plates may have either single or double beveled slots.
5. An alternate cast base plate of aluminum alloy T656 and T6 temper in
   <new of the fabricated base plate may be submitted for approval>
   <if a cast base plate is used, the stub must be the same size as the column
   and will be bolted to the casting.>
6. Assemble the slip base connection in the following manner:
   a. Connect column to sleeve using two \( \frac{5}{8} \)" machine bolts.
   b. Assemble 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 keepers plates go between the base plates.
   c. Use shim stock as required to align the column.
   d. Tighten all bolts to the maximum possible with a \( 12 \)" to \( 15 \)" wrench.
   (This will allow the washers and shims and clear the bolt threads.)
   e. Loosen each bolt one turn and using a calibrated wrench tightening
      to the prescribed torque (see table) under the supervision of the
      Project Engineer.
   f. Burr threads at junction with nut using a center punch to prevent nut
      loosening.
7. Use galvanized steel bolts to obtain a tight fit between the column face
   and the sleeve. Place shims at equal distances between the \( \frac{5}{8} \)" 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.

SLIP BASE AND FOOTING DETAIL IN CONCRETE
(non-frangible post in crossovers, medians, & sidewalks)

DRIVEN POST DETAIL IN CONCRETE
(frangible post in crossovers, medians, & sidewalks)

SLIP BASE DETAILS

<table>
<thead>
<tr>
<th>Column Size</th>
<th>Sleeve I.D. (Max)</th>
<th>Sleeve Height H</th>
<th>Weld Length L</th>
<th>Base Plate Length B</th>
<th>Base Bolt Thread Length T</th>
<th>Base Plate Diameter D</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; x 4&quot;</td>
<td>4.5&quot;</td>
<td>6</td>
<td>8</td>
<td>1.5&quot;</td>
<td>29</td>
<td>345</td>
</tr>
<tr>
<td>4.5 x 4.5</td>
<td>4.5&quot;</td>
<td>6</td>
<td>8</td>
<td>1.5&quot;</td>
<td>29</td>
<td>345</td>
</tr>
<tr>
<td>4.5 x 5.5</td>
<td>5.5&quot;</td>
<td>9</td>
<td>8</td>
<td>1.5&quot;</td>
<td>29</td>
<td>345</td>
</tr>
<tr>
<td>4.5 x 6.5</td>
<td>6.5&quot;</td>
<td>9</td>
<td>8</td>
<td>1.5&quot;</td>
<td>29</td>
<td>345</td>
</tr>
</tbody>
</table>

Note: Unless noted otherwise, all dimensions are in inches.
<table>
<thead>
<tr>
<th>Size</th>
<th>Area</th>
<th>Total Area</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>30x10</td>
<td>4.69 SF</td>
<td>6.69 SF</td>
<td>16.2 Ft</td>
</tr>
<tr>
<td>24x12</td>
<td>2.00 SF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30x10</td>
<td>4.69 SF</td>
<td>6.69 SF</td>
<td>16.2 Ft</td>
</tr>
<tr>
<td>24x12</td>
<td>2.00 SF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36x16</td>
<td>6.75 SF</td>
<td>10.0 SF</td>
<td>2.06 Ft</td>
</tr>
<tr>
<td>30x10</td>
<td>4.69 SF</td>
<td>6.69 SF</td>
<td>16.2 Ft</td>
</tr>
<tr>
<td>24x12</td>
<td>2.00 SF</td>
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<td></td>
</tr>
<tr>
<td>36x16</td>
<td>6.75 SF</td>
<td>10.0 SF</td>
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</tr>
<tr>
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<td>4.69 SF</td>
<td>6.69 SF</td>
<td>16.2 Ft</td>
</tr>
<tr>
<td>24x12</td>
<td>2.00 SF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36x16</td>
<td>6.75 SF</td>
<td>10.0 SF</td>
<td>2.06 Ft</td>
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<tr>
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<td>6.69 SF</td>
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<tr>
<td>24x12</td>
<td>2.00 SF</td>
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<tr>
<td>36x16</td>
<td>6.75 SF</td>
<td>10.0 SF</td>
<td>2.06 Ft</td>
</tr>
<tr>
<td>30x10</td>
<td>4.69 SF</td>
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</tr>
<tr>
<td>24x12</td>
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<td>36x16</td>
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<td>16.2 Ft</td>
</tr>
<tr>
<td>24x12</td>
<td>2.00 SF</td>
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<td></td>
</tr>
<tr>
<td>36x16</td>
<td>6.75 SF</td>
<td>10.0 SF</td>
<td>2.06 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

GENERAL NOTES


SHEETS AND PLATES: Material used shall meet the requirements of Aluminum Association Alloy 6061-T6 and ASTM B209.

MATERIALS: 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 B209, extruded shapes B221 and standard structural shapes B105.

ALUMINUM BOLTS, NUTS & LOCK WASHERS: Aluminum bolts shall meet the requirements of the Aluminum Association Alloy 2024-T4 (ASTM F468). The bolts shall have anodic coating of at least 2000" thick and be chromate sealed. Lockwashers shall meet the requirement of Aluminum Association Alloy T701-T6 (ASTM B221). Nuts shall meet the requirement of Aluminum Association Alloy 5261-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 Median.

CASE II
For Use In All-Rural/Roads And On Freeway And Expressway Ramps.

CASE III
For Use On All-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 Or Curbed Median

CASE IX (MILE POST MARKER)
For More Information Refer To Part 20-46
Of The Manual On Uniform Traffic Control Devices

GENERAL NOTES:
1. The typical sections shown here serve as a guide for locating the traffic signs required under various roadside conditions. For size and details of sign construction and footing, refer to the appropriate standard index drawing for roadside sign.

2. It shall be the CONTRACTORS 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 or 90 degrees away from the traffic flow (see illustration). Shoulder mounted signs shall be rotated counterclockwise and medallion 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 lane if required for visibility in business or residential sections with no curb and speed of 30 MPH or less.

5. The mounting heights are measured from the bottom of the sign panel to a horizontal line extended from the edge of the driving lane. If the sign standards cannot be met, the minimum height are as follows:

Expressway & Freeway Systems
Other Roadway Systems
Urban (excluding residential with parking and / or pedestrian activity)
Rural

If a secondary sign is mounted below the major sign, the major sign shall be at least 8 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 breaksway feature.

7. Sign supports shall not reduce the accessible route (continuous passage to less than 4" in clear width as required by the Americans with Disabilities Act (404) Accessibility Guideline.)

For Median Installation:
If Median Width Does Not Allow Std. Offset
From Both Roadways, Center Sign In Median.

14" Horizontal Clearance Standard On All Freeway And Expressway Ramps.

Ramp
Travel Way

24" Min

Travel Way

12" Min

24" Min

14" Min

(Ramp) Travel Way

Travel Way

Travel Way

Guardrail

Travel Way

24" Min

Curbed Median
or Island

Travel Way

10" Min

Center Sign Column On Island

Sign Face

Angle From Center
Of Roadway

NOTE
4.4

4.4
1. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A SIGNALIZED INTERSECTION

Note:
Special speed restrictions are not normally applicable to these two cases.

2. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A STOP CONTROLLED INTERSECTION

Notes:
Signs shall be erected in accordance with index No. 17302.
When computing pavement messages quantities do not include transverse lines.
School crosswalk widths at intersections shall be 6' minimum 10' standard without public sidewalk curb ramps 10' minimum with public sidewalk curb ramps.
For additional marking information, see Index 17346, Sheet 2.

"No Right Turn On Red" Signs may be erected as deemed necessary by the local traffic engineers.

### Table: Approach Speed (MPH) vs. Distance (FT)

<table>
<thead>
<tr>
<th>Approach Speed (MPH)</th>
<th>Distance (FT)</th>
</tr>
</thead>
<tbody>
<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>
6. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS (4 LANES UNDIVIDED-2 WAY TRAFFIC) (MIDBLOCK OR ON THRU STREET AT AN INTERSECTION)

7. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD OR GROUND MOUNTED FLASHING BEACON SPEED LIMIT SIGNS (4 LANES DIVIDED-2 WAY TRAFFIC)

NOTE: CONDITION 7:
Where engineering judgement determines the overhead structure is not suitable or cannot be installed due to site restrictions, SS-1 with flashing beacons on each side of the road may be substituted for the overhead structure.
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.

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. size 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.
Flasher unit and cabinet to be placed on the strain pole supporting overhead sign assembly or on service pole. The flasher unit is not to overhang private property or sidewalk.
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 should be avoided.

Note:
Existing ground mount 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: Reflective pavement markers are installed adjacent to the edge line.

NORMAL TAPERED EXIT
(TWO THRU LANES)

NOTE: In advance of lane drops at exit ramps a special marking pattern may be used to distinguish the lane drop situation from a normal exiting ramp or auxiliary lane. A typical special marking for lane drops consists of 8" wide by 3'-long white stripes separated by 9' gaps. If used, this special marking should begin 5' in advance of the theoretical gore point. Where lane changes may cause conflicts, an 8" wide solid white channelizing line may be extended 300' upstream from the theoretical gore. (MUTCD Section 3B.05).
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. Wrong Way Arrow To Be Placed At
   The Physical/Centerline Or 100' From
   Theoretical Centerline.

3. Yellow-Red Reflective Markers (Every 40')
   Along The Left Edge Line Of The Ramps

4. Wrong Way Arrow To Be Placed At
   End Of Yellow

5. End Yellow-Red Reflective Markers
   At End Of Yellow Edge Line

6. Wrong Way Arrow

7. Begin Yellow-Red Reflective Markers At Beginning Of Yellow Line

8. Yellow-Red Reflective Markers (Every 40')

9. Terminate White-Red Markers At The H.T.

10. Wrong Way Arrow To Be Placed At
    The Physical/Gore Or 100' From
    Theoretical Gore.

11. End 6" Yellow

12. Wrong Way Arrow

13. Begin Yellow-Red Reflective Markers
    At Beginning Of Yellow Line

14. Yellow-Red Reflective Markers (Every 40')

15. White Post Mounted
    Delineator (40' Spacing)

16. White Arrow White
    White-Red Reflective Markers

17. 23-6"
### PAVEMENT ARROW AND MESSAGE DETAILS

#### TYPES OF PERMANENT LONGITUDINAL LINES

- **Solid Yellow Edge Line**
- **2' Skip 4" Gap Dotted Line (Turning Solid Line)**
- **Two-Lane Passing Prohibited (Yellow)**
- **Double Solid Yellow (Or White)**
- **10' Skip 30" Gap Yellow Centerline**
- **Solid White Edge Line or Lane Line**
- **6" Skip 10' Gap Extension of Edge Line Through Cross-Over Area**
- **Solid White Channelizing Line**
- **3' Skip 9" Gap Lane Drop Markings At Interstate Ramps**

**DIMENSIONS ARE WITHIN 1" ±**

---

**NOTE:** When arrow and pavement message are used together, the arrow shall be located downstream of the pavement message and shall be separated from the pavement message by a distance of 25 (base of the arrow to the base of the message). Stop message shall be placed 25” from back of stop line.

**CONTRAST MARKINGS**

- **10" White Skip With Block Contrast, 10" White Skip With 10" Block Contrast and 20" Gaps**

**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.**
PAVEMENT MARKINGS AND DELINEATORS FOR MEDIAN CROSS-OVER

PLACEMENT OF EDGE LINES

NOTE:
Markings applied to median lanes shall be yellow in color.

PAVEMENT MARKINGS FOR INTERSECTIONS WITH MAJOR AND MINOR ROADS
**SCHEME ONE**

Use stop bar at signalized intersection only.

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.

**SCHEME TWO**

For use in rural/suburban areas where adequate storage lane length can be specifically determined.

(WITH SINGLE LANE LEFT TURN CHANNELIZATION)

TWO WAY LEFT TURN LANE

**TYPICAL CROSSWALK MARKINGS FOR CURB RAMPS**
These markings may be used for locations with restricted left turn lengths, only when called for in plans.

12" White Crosswalk Lines
24" White Stop Line
6" Yellow
6" White
18" White Chevrons
10' center to center spacing
6" White
6" White Skip
120" Max
100" Min

RIGHT TURN LANE DROP AND ISLAND DETAILS
LEFT TURN LANE DROP IS MIRROR IMAGE

TYPICAL INTERSECTION 2 THRU LANE
PLUS LEFT TURN LANE, WITH CROSSWALK

6" Dbl/Yellow
6" White

100' Minimum or as determined by L-W-I-S

\[ L = \frac{W \cdot S}{60} \cdot 45 \text{ mph} \]

W is the lateral offset in feet and S 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.

24" White Stop Line

STOP BARS, CROSSWALKS AND DOUBLE CENTER LINE DETAILS

12" White
24" White Stop Line
Varies
Varies
Varies

NOTES:
1. When public sidewalk curb ramps are present, refer to Index 17344 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.

TYPICAL INTERSECTION 2 THRU LANE
PLUS LEFT TURN LANE, WITH CROSSWALK

6" Dbl/Yellow
6" White
**DIVIDED HIGHWAY**

NOSE WIDTHS UNDER 30'

NOSE WIDTHS 30' AND GREATER

---

**FIGURE 1**

**FIGURE 2**

**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.

**PAVEMENT MARKINGS FOR TRAFFIC CHANNELIZATION AT GORE**

(Traffic Flows in Same Direction)

**PAVEMENT MARKING FOR TRAFFIC SEPARATION**

(Traffic Flows in Opposing Directions)

---

**SPECIAL MARKING AREAS**

---

2010 FDOT Design Standards

Sheet No. 17348
NOTES:

1. Messages shall meet requirements of Specification Section 971-7 and Section 711.

2. The thickness of the preformed message shall be 1/64 in.

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 LPH.

4. The "EXIT NUMBER" position remains the same (11'-6") from the beginning of taper regardless of the number of lines of information.

MESSAGE SIZE AND SPACING

MAT DIMENSIONS
**RAILROAD CROSSING AT 2-LANE ROADWAY**

- **The Railroad Traffic Control Device**
  Is to be located a minimum of 12' from the railroad centerline. See Index No. 17862 for protection devices.

- **RR-X**
  For use near signalized intersections

- **24" White**
  6' Double Yellow

See notes 3, 4 & 5 for sign placement.

**TYPICAL PAVEMENT MARKINGS FOR R/R CROSSING**

- Width may vary according to lane width.
- Pavement message white

- 89 ft. does not include 24" bars.

**RAILROAD CROSSING AT 4-LANE ROADWAY**

- **The Railroad Traffic Control Device**
  Is to be located a minimum of 12' from the railroad centerline. See Index No. 17862 for protection devices.

- **RR-X**
  For use near signalized intersections

- **24" White**
  6' Double Yellow

See notes 3, 4 & 5 for sign placement.

**NOTES:**

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. 17862.

3. Placement of sign RR-1 in a residential or business district, where low speeds are prevalent, the RR-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 RR-1 sign and additional pavement message should be used.

4. Recommended location for FTP-61:06 or FTP-62:06 sign 100' urban & 300' rural in advance of the crossing.

5. A portion of the pavement marking symbol should be directly opposite the RR-1 sign.

**PAVEMENT MARKINGS FOR TERMINATION OF TWO WAY LEFT TURN AT R/R CROSSINGS**

- **NOTE:** Pavement Markings symmetrical about centerline

**SPECIAL MARKING AREAS**
GENERAL NOTES

1. For traffic and pedestrian signal installation, refer to Index No. 17721 through 17890.

2. For public sidewalk curb ramps, refer to Index No. 304.

3. For pavement marking and sign installation, refer to Indexes 1200 through 17306.

4. Crosswalk minimum width: Intersection Crosswalk 6'
   Midblock Crosswalk 10'

5. All crosswalk markings shall be white.

6. Longitudinal lines in Special Emphasis Crosswalk shall be 24" wide and spaced to avoid the wheel path of vehicles as shown in detail. The minimum space between markings shall not exceed 60". A longitudinal marking shall be centered at each lane line. Additional longitudinal markings shall be placed at the center of each lane (1/2W).

Where the Crosswalk is skewed to the lane line, the Special Emphasis longitudinal lines should be parallel to the lane line.
SPECIAL MARKING AREAS

1. Plans shall indicate which crosswalk scheme is to be used.
2. The details shown do not depict the signing and markings for multi-lane roadways with divided medians. For these applications, additional signs shall be installed on the median side.
3. All mid-block crosswalks shall use high emphasis crosswalk markings.
4. Crosswalk marking should utilize preformed marking materials.

<table>
<thead>
<tr>
<th>APPROACH SPEED LIMIT (MPH)</th>
<th>A-SUGGESTED DISTANCE (FT)</th>
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</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 Vase Radii/Point Dr., When A Stop Bar Is Required, From The Stop Bar.

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Clearance Distance L1</th>
<th>Brake To Stop Distance L2</th>
<th>Total Decel Distance L3</th>
<th>25'</th>
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<td>35</td>
<td>70'</td>
<td>75'</td>
<td>145'</td>
<td>10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>80'</td>
<td>80'</td>
<td>185'</td>
<td>80'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>85'</td>
<td>90'</td>
<td>185'</td>
<td>135'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>105'</td>
<td>120'</td>
<td>240'</td>
<td>240'</td>
<td>120'</td>
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<td>125'</td>
<td></td>
<td>225'</td>
<td>350'</td>
<td>185'</td>
<td>290'</td>
</tr>
<tr>
<td>60</td>
<td>145'</td>
<td></td>
<td>260'</td>
<td>465'</td>
<td>230'</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>150'</td>
<td></td>
<td>290'</td>
<td>465'</td>
<td></td>
<td>270'</td>
</tr>
</tbody>
</table>

**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 grass 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.

**DOUBLE LEFT TURN MARKINGS**

Through Lane Becomes Exclusive Left Turn

The ONLY pavement marking is required for turn lanes, where the thru lane becomes turn lane.
GENERAL NOTES (Signalized & Nonsignalized)

1. For entrances to a one-way street, the downstream restriction may be reduced to 20'.
2. Parking shall not be allowed within 20' at a crosswalk.
3. All parking lane markings shall be 6' wide.
4. Parking lane lines shall be broken at driveways.
5. Refer to Chapter 106, Fl. 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 of parking lane, but desirable the lane width should be in addition to that of the gutter pan.

TYPE I
- No Parking Zone - Yellow Curb (Optional)
- Min. 22' to 26' to All Spaces
- 22' Min. & 26' Max.

TYPE II
- No Parking Zone - Yellow Curb (Optional)

TYPE III
- No Parking Zone - Yellow Curb (Optional)

MINIMUM PARKING RESTRICTION FOR NONSIGNALIZED INTERSECTIONS

MINIMUM PARKING RESTRICTION FOR SIGNALIZED INTERSECTION

NOTES:
1. Distances measured longitudinally along the street from driver location at 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 should 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

NOTES:
1. Dimensions are to the centerline of markings.
2. An Access Aisle is required for each accessible space when angle parking is used.
3. Criteria for pavement markings only, not public sidewalk curb ramp locations.
4. Ramp locations refer to plans.
5. Blue pavement markings shall be painted to match shade 15880 of Federal Standards 595a.
6. The FTI-22-06 panel shall be mounted below the FTI-21-06 sign.
1. The Contractor Shall Adjust The Maintenance Of Traffic During Installation To Provide Sufficient Time For The Markings To Be Visible.

2. The Height Of The Transverse Bar Markers Shall Be 0.45 To 0.55 Inches Above The Pavement Surface At The Edge Of The Marking.

3. Transverse Bars Shall Be Equally Spaced In The Marking At Intervals Of 30 Inches Center To Center.

4. The Transverse Bar May Have A Drainage Channel On Each Bar. The Width Of The Drainage Channel May Not Exceed 0.25 Inches At The Bottom Of The Channel.

5. Audible And Vibratory Markings Shall Only Be Installed On Centerline Markings Of Two Lane Roads When Shown In The Plans.

6. When Raised Pavement Markers Conflict With The Installation Of The Centerline Markings, The Contractor Shall Be Responsible For Removing And Replacing The Raised Pavement Markings. The Additional Expenses Associated With The Raised Pavement Markings Shall Be Included In The Cost Of The Marking.


8. The Specifications Allow The Audible Markings To Utilize A Flat Base Line Or An Inverted V Profile Base Line.
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. 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.
MAJOR INTERSECTION WITH SEPARATE RIGHT
TURN LANE URBAN TYPICAL SECTION (CURB
AND GUTTER)

MAJOR INTERSECTION, NO RIGHT TURN
LANE PLUS BUSBAY URBAN TYPICAL
SECTION (CURB AND GUTTER)

MAJOR WITH LOCAL STREET
INTERSECTION, NO RIGHT
TURN LANE, ON STREET
PARKING URBAN TYPICAL
SECTION (CURB AND GUTTER)
"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 retroreflective panel of the same size.

CASE II  End of Road Markers shall consist of nine red reflectors mounted on a red reflective background or consist of a retroreflective panel of the same size.

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, sign panel, material, and bolts, nuts, and washers see Index Nos. 1960.
4. Case I Installation - The arrow panels and object markers shall be located approximately 20', but not less than 15' from the edge of the traveled 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 specialized conditions require its use.

Object markers shall be installed on 2" x 1/4" Aluminum Round Post. 1-1/2" Aluminum Button Head Bolt with Nut and Lockwasher or 1-1/2" Stainless Steel Button Head Bolt with Nut. Post foundation shall be installed in accordance with Index No. 1960.
**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. Symbols for motorists shall always appear in the following order reading from left to right and top to bottom: Gas, Food, Lodging, Phone • Hospital, Camping.
   
   The phone symbol shall not be shown whenever any Gas, Food, Lodging or Camping symbol appears.

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 "A" breakaway or Index 11860 for Type "C" Fragility.
Note: Roadway not drawn to scale.
Distances shown are adequate for driver communication
but may be altered slightly if conditions require.

Tourist Information Center
NEXT RIGHT

Note: Sign FTP-14-06 shall be used as a supplemental guide sign at
interchanges which have a Tourist Information Center approved
for such signage (locate half-way between normal guide signal)

Notes:
1. Signs and sign structures shall be erected in accordance
   with the details shown on Index No. II2500.
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. Sign FTP-10-06, 11-06, 12-06 shall be located as limited
   access highways only.
4. Alleged to be Series E.
5. See Index No. 17355 for sign details.
**Notes:**

1. Signs and sign structures shall be erected in accordance with the details shown on Index D1200.

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-154-06 or 150-06 should be used depending on speed, roadside development & geometric conditions.
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. A/RPM's shall be offset 1' from solid lines.

4. These spacings may be reduced for sharp curves if required.

5. A/RPM's shall be class "B".
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)

**PLACE 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 17.340.

PLACE OF RPM'S AT INTERSECTIONS
3 or 4 DIGITS

1 or 2 DIGITS

INDEPENDENT USE OTHER THAN FREeway

3 OR MORE DIGITS

1 OR 2 DIGITS

GUIDE SIGN USE

Notes:
1. Florida marker shall have Black Legend with White Background.
2. Stroke width of Styls outline to be 1" for independent use and 1/2" for Guide Sign.
3. Numbers are series D.

FLORIDA ROUTE MARKER
FTP-17-06

Notes:
1. All Legend Series "D".
2. Color: Yellow Legend and Border on Blue Background.
3. When used on a guide sign, marker must be overlaid on a rectangular Yellow Background as shown in chart 4-4.

MI-6 COUNTY ROUTE MARKER DETAIL
FTP-18-06
TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE

TYPICAL SPAN WIRE INSTALLATION

SIGN MOUNTING DETAIL

ADJUSTABLE HANGER FOR SIGN MOUNTING

DETAIL OF OPPOSING SIGNS SPAN WIRE MOUNTED

TWO POINT ATTACHMENT

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 12". 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 36" 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 A2/T308 series, commercial grade, type 316.
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:
   No passing zone should be extended 1570' in advance of narrow bridge.

3. If the bridge or the approach is on a curve, delineators shall be installed for a distance of 1570' in advance of narrow bridge on the outside portion of the roadway. Spacing shall be 100' between delineators. Delineators are to be placed not less than 2' or not more than 8' outside the outer edge of pavement.

4. Object markers and delineators on both sides of roadway shall face traffic approaching bridge.

5. The DM-50 & DM-51 object markers shall be installed 4' above the roadway edge. These panels may be post mounted at the bridges.

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**INERT A**

- **Length (4' and 5' shoulder):** 1/2
- **Length (3' shoulder):** 1/4
- **Length (2' shoulder):** 1/2

**INERT B**

- **Length (4' and 5' shoulder):** 1/2
- **Length (2' shoulder):** 1/4

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*For Limited Access Highways, Including Ramps
**L.S.5** For Other Highways With Shoulder Pavement
4' Or Wider*
NOTES:

1. Barrier wall or bridge mounted poles: The wiring shall be in accordance with Section 992 of the Standard Specifications.

Provide cable length to remove fuselholders from transformer base, pole base or pullbox for maintenance. Remove block from the luminaire cable to provide tension on the fuselholders if the pole breaks away. Pull excess cable into pullbox, tighten strain relief fittings or cable clamps at both ends of conduit to prevent cable from slipping.

Breakaway fuselholders with solid copper slugs. Slugs to be same size as 10 Amp FNG fuse.

1 #12 AWG insulated (TW Green) stranded CU bond wire connecting Luminaire with grounding lug at base of pole.

Breakaway fuselholders on Neutral side with solid copper slug (Line To Neutral Service). Slugs to be same size as 10 Amp FNG fuse.

1 #6 AWG insulated (TW Green) stranded CU bond wire connecting Luminaire with grounding lug at base of pole.

Breakaway fuselholders with solid copper slugs. Slugs to be same size as 10 Amp FNG fuse.

1 #2 AWG insulated (TW Green) stranded CU bond wire connecting Luminaire with grounding lug at base of pole.

Strain relief fittings.

Ground lug located opposite handle.

Edge of traveled pavement or face of curb.

U.L. approved Ground Rod ¾” diameter 20’ long copper clad with approved ground connection (41 all pullboxes)

METAL POLE WIRING DETAIL

Length of Bracket Arm

Pole setback 20’

unless otherwise noted on plans

CONVENTIONAL LIGHTING

2010 FDOT Design Standards

Sheet No. 17500

of 3
REINFORCEMENT LAYOUT

SLAB DIMENSIONS

SECTION A-A

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 A185.
3. Concrete shall be Class NS with a minimum strength at 28 days of Fc=2.5 ksi.
4. Outside edges of slab shall be cast against formwork.
5. The pullbox shown is 2'-3" x 1'-7" others approved under Section 8.35 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 and reinforcing for slabs around poles and pullboxes shall be included in the price for pullbox or pole.
8. The ½" 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 INTERMEDIATE PULLBOX LOCATIONS
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 Class NS with a minimum strength at 28 days of 2,500 psi.
4. Outside edges of slab shall be cast against forms.
5. The pullbox 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 and reinforcing for slabs around poles and pullboxes shall be included in the price for pullbox or pole.
8. The ½" thick expansion joint between the pole shaft and slab and the pull box and slab shall be sealed with a hot poured elastomeric joint sealer.
1) All grounding system connections shall be extruding-welded. This includes all cables, ground electrode and arrays. Do not extruding-weld grounding electrode to grounding electrode. Method of Measurement and Basis of Payment as per Section 620 of the Standard Specifications.

2) The contractor shall provide the drawing of all utility companies prior to any underground work. The utility company will indicate and identify their facilities.

3) Contractor shall determine the service required date for the power company transformer installation at the pre-construction conference.

4) The power company reserves the right to install the riser, switch gear and weatherhead on power company poles at the expense of the contractor. Contact the power company for cost or for authorization for an alternate procedure.

5) Any damaged portions of galvanized steel poles and bracket arms shall be painted in accordance with Section 562 of the Standard Specifications.

6) Poles and bracket arms shall be designed in accordance with the design criteria, as indicated in the plans and using the applicable equations found in the AASHTO ‘Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals’ and FDOT Structures Manual. The calculations shall be based on the actual projected area of the luminaire or 3.0 square feet whichever is greater.

7) 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 plan, lamp rating, (position of luminaire), E.I.S. light distribution with this lamp in the position specified, input voltage and power factor. Luminaire photoelectric sensors required.

8) Before final acceptance, contractor shall provide 2 sets of full-size as built plans to the maintaining agency.

9) Conduit routing shall be pole to pole, maintaining pole setback distance from edge of pavement. Any cable routing in locations where guardrail is proposed shall be 2' in front of the standard guardrail position.

10) Pole positions and conduit routing may be adjusted, as approved by the Engineer, to prevent conflicts with utility and drainage structures not indicated, and prevent guardrail to pole conflict with underground lighting circuits.

11) Where guardrail is constructed, the poles shall be placed a minimum of 4' behind the face of the guardrail.

12) Install pole foundations in accordance with Section 715 of the Standard Specifications.

13) All splice box made in pull boxes or the pole base. No splice boxes shall be made inside the conduit. The wires of pull boxes shall have sufficient length to completely remove connectors to the outside of pull boxes remove connectors to the outside of pull boxes to make connectors accessible for changing fuses and trouble shooting the system.

14) Neutral wires to have white insulation. Do not use white or green insulated wires for ungrounded conductors.

15) Unless otherwise specified, all cable shall be single conductor, 98 percent conductivity stranded copper, with THWN or THW(N) insulation.

16) All exposed or surfaced mounted conduct 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 expansion. All metal conduit shall be grounded. Steel conduit shall be hot-dipped galvanized.

17) All conduit that will remain empty as spaces shall be mandrel fashioned, welded inside and both ends capped. Leave the corrosion resistant pull up wire and place pullboxes to mark the location of the ends of the conduit.

18) Pullboxes shall be located at each conduit crossing roadways, and as necessary for the completion of the project.

19) These plans represent minimum acceptable criteria. The inspection per these drawings represent the minimum base of acceptance.

20) All materials, unless otherwise specified, shall be Underwriters Laboratory approved.

21) Pullboxes shall meet the requirements of Section 655 of the ‘Standard Specifications For Road And Bridge Construction’ and Section 655 of the ‘Minimum Specifications For Traffic Control Signals And Devices’.

22) A pullbox shall be installed at each pole location. Pullboxes should be located 2' max from pole unless otherwise directed by the project engineer. Metal pullbox covers shall be grounded. See General Requirements Section 653 of the Standard Specifications for Road and Bridge Construction.

23) All pullboxes and pole bases, ends of conduit shall be sealed per Section 653 of the Standard Specifications for Road and Bridge Construction.

24) Luminaire shall be supplied with a regulator type ballast mounted on a hinged door or panel. The unit shall swing open to provide access to the ballast assembly by release of captive screws. The electrical connector shall be a quick disconnect plug. The unit shall be easily removed from the luminaire after release of captive screws and disconnect plug.

25) Armoring heights are 2'-6" unless otherwise noted in plans.

26) A handhole is required in all poles. Handhole should be located opposite approaching traffic with cover fastened with Stainless Steel Screws. The handhole opening shall be at least 20 square inches.

27) The luminaire and arm on joint use pole shall be grounded.

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**BREAKAWAY FEATURE**

All conventional mounting height poles shall be mounted on a flange-attachment. The post shall be one piece and be designed to breakaway without the aid of any slipping or sliding surfaces. The design of the breakaway feature shall be in accordance with the breakaway performance requirements of the AASHTO ‘Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals’.

The contractor (supplier) shall submit copies of test reports as evidence the breakaway feature meets the above specifications and calculations to verify the design will meet the AASHTO wind loading specified in the contract plans. No poles are to be installed prior to approval of submittal data.

Any substantial remains of a breakaway support, when it is broken away, should not project more than 4" as discussed in Section 7 of the above AASHTO Specifications, and Chapter 4, Section 4.2.1 of the AASHTO ‘Highway Design Guide’.

Poles behind bridge rail or barrier wall, mounted, shall be non-breakable.

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**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 10,000 occurrences.

2. The unit shall respond in less than 50 nanoseconds and within this time have a peak clamping voltage better than 1,100 Volts.

3. The maximum allowable voltage that can pass continuously through the hot leg of the protector must be less than 500 Volts.

4. The current drain shall be less than 100 microamps.

5. The unit shall be insulated 600 V to ground and shall be weatherproof.

6. The unit shall not allow holdover current or conduction to ground after the surge ends.

7. Protection shall be achieved for both the 480 V and neutral conductors with the surge being passed to ground and NPT to neutral.

8. There shall be discharge in the protection of the 480 V conductor over the neutral conductor.

9. Underwriters Laboratory approval 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. Parkable power unit (1 per project)

The head frame unit shall gently rotate the top of the pole to the head frame platform. The platform with its associated sleeves, etc. shall be covered and raintight. The head frame structure shall be Zn coated steel, attached to the pole by means of a steel shackle. Head frame shall encompass six (6) nominally flexible cable sleeves grooved to the exact cable diameter, for 180° cable bearing surface. The sheave shall be Zn electroplated to ASTM A544 and dipped in yellow chromeate for corrosion resistance. Cables and cable keepers shall have permanent lubrication. Three (3) stainless steel 7 x 19 aircraft cables of 56 kpsi or greater diameter shall be provided.

The pole cables shall be attached to the luminaire ring with a waterproofer connector capable of withstanding the pull of the weight of the pole cable. Where the wire ropes are required to be bent over sheaves or over the winch drum, the maximum working stress in the outer fibers of wire rope shall not exceed 25% of the wire rope manufacturer’s rated ultimate stress.

Drum design shall cause load on the winch drum. The power cord shall travel on sheaves (6) 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 jumping 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 computer to lower or raise the locking cables. Locking at luminaire ring shall be secured by indicators visible from ground. All moving parts of the latch mechanism shall be serviceable from the ground. Each of the three latches shall have a strong enough, by itself, to support twice the weight of the ring and all the luminaires. Latching mechanisms which depend primarily upon spring operation or contain dissimilar metals are not acceptable. The latching mechanism shall not require adjustment after the original installation.

The luminaire ring shall be constructed of a minimum of 6” x 2” x 7 gauge steel channel galvanized in accordance with ASTM A36 Class “B” steel channel with the appropriate number of 2” steel pipes mounting arms. The luminaire ring shall be provided with Type “B” or specially reinforced Type “C” power cable with suitable conductor layout and size for proper operation and Type “A” distribution wiring with insulation suitable for at least 105° C. All power cables shall be attached to the luminaire weightlight wiring chamber with weatherlight cables connectors. A 600 volt terminal block completely provided shall be included in the weatherlight wiring chamber. A weatherlighting means shall be provided on the luminaire ring to allow testing of the luminaire while in the lowered position. The power panel shall face away from the pole for easy access. Raising speed of the luminaire shall be a minimum of 12 per minute.

The ultimate support of the luminaire ring shall be dependent upon the lowering and raising cables.

The system shall be provided with a circuit breaker assembly with a lighting arrester on the circuit breaker enclosure. A lightning cord and receptacle shall be supplied from the circuit breaker assembly. The receptacle on the pole shall be of drop from construction. The receptacle shall be a push button switch which controls the plug to the receptacle and when secured shall provide an NEMA 3R rating. The plug and receptacle shall UL/CSA switch rated.

The winch shall be a reversible worm gear self-locking type with an integral low-speed drum brake to prevent repositioning. The winch shall be designed for hand operation or for operation by means of a 1/2” heavy duty reversing electric winch motor, remote controlled to enable the operator to stand 20’ from the pole. Stainless steel 7 x 19 aircraft cables of 56 kpsi or greater diameter shall be supplied on the winch. The winch shall be provided with keepers above the drum to force the cable away from the ends of the drum for spooling. The drum shall have a 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 connectors may be reached and worked on by a person more than arm’s length away. Drum contact spring-loaded centering arms shall be provided to center the luminaire ring while ascending or descending the pole.

The rollers for the centering arm shall be built of a water resistant nonmarking composition material. All rollers shall be of stainless steel. The rollers shall be in contact with the pole at all times. The centering arm shall be interconnected and loaded with stainless steel springs to uniformly apply equal centering force from the arms.

LUMINAIRE SPECIFICATIONS

The reflector with its aluminum cover shall be firmly attached to a cast ring. This ring shall have keystone slots for the support bolts. The ram part of the reflector/trimmer assembly may be readily attached to or detached from the luminaire bracket entry and support assembly without completely removing the support bolts.

Each luminaire shall contain an integral auto-regulator type ballast connected for 480 volts input — 100 or a power factor of more than 0.95. The luminaire shall be equipped within an aluminum housing which integrally attaches to the luminaire bracket entry and 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 support assembly. The luminaire shall include a inside weather-resistant enclosure. 4 luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans. Each luminaire shall have an ANSI Z256.15 light fixture as indicated in plans.
See legend for number of luminaires, lamp wattage and light distribution.

Luminaires

2" slip fitter
Luminaire support ring

Cover

Lift cable sheaves
Lift cables (3/8" stainless steel aircraft cable) 3 minimum

Head plate

Supply cable receptacle

120V Receptacle

Remote control switch

Ground

Lift Cable Terminator

600 Volt rated Pole Cable with 4AWG Stranded Copper Conductors size of conductors to be determined by luminaire load.

Mole Inlet

3/8" hex drive 3/8" round shaft

Spring supported centering arms provided to center the luminaire ring.

Luminaire support ring

2" slip fitter eyes (equally spaced around ring)

Centering guide pins (3 minimum)

Pole Cable

Covered receptacle to power luminaires when in the lowered position with Mole Inlet.

Winch cable (1/4" stainless steel/aircraft cable)

Winch

Hand hole

Lock nuts

Base plate

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.

600 Volt rated Pole Cable with 4AWG Stranded Copper Conductors size of conductors to be determined by luminaire load.

All hardware for mounting heavy duty drill to pole shall be Stainless Steel.

1/2" heavy duty reversible drill 120 Volts (1) per project

Portable drill

1.5 KVA dry type transformer mounted in NEMA 3R portable enclosure, provide 120V grounded receptacle for electric drill & receptacle for supply cable. (see schematic)

Slip clutch

Power Cord With Mole Inlet

25' minimum remote control cable same as Pole Cable.

Remote control switch
HIGHMAST LIGHTING NOTES:

1) High Mast materials:
   a. Pole: ASTM A417G Grade 50, 55, 60 or 65 (less than ⅜") or ASTM A572 Grade 50, 55, 60, or 65 (⅜" and over) or ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   b. Steel Plate: ASTM A709 Grade 36 or ASTM A36.
   c. Weld Metal: E70XX.

2) Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A heavy hex nuts and ASTM F436 Type 1 washers.

3) Handhole: ASTM A709 Grade 36 or ASTM A36 Frame with ASTM A36 cover.

4) Caps: ASTM A417G Grade 50, 55, 60 or 65 or ASTM A369.


6) Stainless Steel Screws: AISI Type 316.

7) Reinforcing steel: ASTM A615, Grade 60.

8) Concrete: Class IV (Graded Shaft) with a minimum 4,000 psi compressive strength at 28 days for all environmental classifications.


10) Galvanization:
   b. Other Items (Including Pole): ASTM A123.

11) Hole diameters for anchor bolts not greater than the bolt diameter plus ⅜".

12) Poles: Tapered with the diameter changing at a rate of 0.14 inch per foot with a minimum 16-sided pole shaft and only one longitudinal seam weld. Circumferentially welded pole shaft butt splices and laminated pole shafts are not permitted. Longitudinal seam welds between 6 inches at pole base must be complete penetration welds. Longitudinal seam welds at telescopic field joints must be complete penetration welds for the splice length plus 6 inches.

13) One hundred percent of full-penetration groove welds and a random 25 percent of partial-penetration groove welds shall be inspected. Full-penetration groove weld inspection shall be performed by nondestructive methods of radiography or ultrasonics.

14) Furnish each pole with a 2"x4" metal/aluminum identification tag. Submit detailed approval. Secure to pole with 0.124" stainless steel rivets or screws. Locate identification tag on the inside of pole and visible from handheld. Include the following information: Financial/Project ID, Pole Mounting Weight, Manufacturer’s Name, Certification Number and QPL Number.

15) Manufacturers seeking approval of a Highmast Lighting structural assembly (exclude power system) for inclusion on the Qualified Products List must submit a OPL Production Evaluation Application along with drawings showing the product meets all specified requirements of this document.

16) Verify CSL access tubes will not interfere with anchor bolt installation before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location ⅞ two inches along the linear circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.
### Pole Design Table

<table>
<thead>
<tr>
<th>Design Wind Speed</th>
<th>Pole Overall Height (Ft)</th>
<th>Minimum Splice Length (Ft)</th>
<th>Base Dia. (Ft)</th>
<th>Length (Ft)</th>
<th>Wall Thk (Ft)</th>
<th>Base Dia. (Ft)</th>
<th>Length (Ft)</th>
<th>Wall Thk (Ft)</th>
<th>Base Dia. (Ft)</th>
<th>Length (Ft)</th>
<th>Wall Thk (Ft)</th>
<th>Base Dia. (Ft)</th>
<th>Length (Ft)</th>
<th>Wall Thk (Ft)</th>
<th>Base Dia. (Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 mph</td>
<td>80 ft 42* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>5.513&quot;</td>
<td>11.319&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>5.513&quot;</td>
<td>11.319&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td></td>
</tr>
<tr>
<td>120 ft 44* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>6.230&quot;</td>
<td>12.531&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>6.230&quot;</td>
<td>12.531&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
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<td></td>
</tr>
<tr>
<td>130 mph</td>
<td>80 ft 42* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>5.513&quot;</td>
<td>11.319&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>5.513&quot;</td>
<td>11.319&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td></td>
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<tr>
<td>120 ft 44* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>6.230&quot;</td>
<td>12.531&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>6.230&quot;</td>
<td>12.531&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td>30* 0&quot; 0.250&quot;</td>
<td>10.375&quot;</td>
<td>16.000&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 mph</td>
<td>80 ft 42* 3&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>7.281&quot;</td>
<td>13.219&quot;</td>
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<td>2&quot;</td>
<td>7.281&quot;</td>
<td>13.219&quot;</td>
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<td>10.375&quot;</td>
<td>18.000&quot;</td>
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<tr>
<td>120 ft 44* 3&quot; 0.250&quot;</td>
<td>2&quot;</td>
<td>8.186&quot;</td>
<td>16.325&quot;</td>
<td>40* 0&quot; 0.250&quot;</td>
<td>3&quot;</td>
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<td>10.375&quot;</td>
<td>18.000&quot;</td>
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<tr>
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<td>3&quot;</td>
<td>12.406&quot;</td>
<td>28.838&quot;</td>
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<td>12.406&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 (Ft)</th>
<th>Base Plate Diameter (Ft)</th>
<th>Base Plate Thickness (Ft)</th>
<th>&quot;TW&quot; (Ft)</th>
<th>&quot;BW&quot; (Ft)</th>
<th>Bolt Circle (Ft)</th>
<th>No. of Bolts</th>
<th>Bolt Diameter (Ft)</th>
<th>Bolt Embedment (Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 mph</td>
<td>80 ft 30.0&quot;</td>
<td>2.500&quot;</td>
<td>0.375&quot;</td>
<td>0.168&quot;</td>
<td>23.0&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
<td>39.0&quot;</td>
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</tr>
<tr>
<td>120 ft 36.0&quot;</td>
<td>2.750&quot;</td>
<td>0.375&quot;</td>
<td>0.166&quot;</td>
<td>26.5&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
<td>42&quot;</td>
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<td></td>
</tr>
<tr>
<td>130 mph</td>
<td>80 ft 30.0&quot;</td>
<td>2.500&quot;</td>
<td>0.375&quot;</td>
<td>0.250&quot;</td>
<td>30.0&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
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<tr>
<td>120 ft 34.0&quot;</td>
<td>2.750&quot;</td>
<td>0.438&quot;</td>
<td>0.250&quot;</td>
<td>27.0&quot;</td>
<td>8</td>
<td>1.75&quot;</td>
<td>50&quot;</td>
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<tr>
<td>150 mph</td>
<td>80 ft 32.0&quot;</td>
<td>2.750&quot;</td>
<td>0.500&quot;</td>
<td>0.250&quot;</td>
<td>35.0&quot;</td>
<td>8</td>
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<tr>
<td>120 ft 39.0&quot;</td>
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<td>30.0&quot;</td>
<td>8</td>
<td>2.00&quot;</td>
<td>52&quot;</td>
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<tr>
<td>150 mph</td>
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<td>0.565&quot;</td>
<td>0.313&quot;</td>
<td>37.0&quot;</td>
<td>10</td>
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<td>120 ft 46.0&quot;</td>
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</table>

### Shaft Design Table

<table>
<thead>
<tr>
<th>Design Wind Speed</th>
<th>Pole Overall Height (Ft)</th>
<th>Shaft Diameter (Ft)</th>
<th>Shaft Length (Ft)</th>
<th>Longitudinal Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 mph</td>
<td>80 ft 4* 0&quot; 0.250&quot;</td>
<td>25.0&quot;</td>
<td>14 - E II</td>
<td></td>
</tr>
<tr>
<td>120 ft 4* 6&quot; 0.250&quot;</td>
<td>25.0&quot;</td>
<td>16 - E II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>130 mph</td>
<td>80 ft 4* 0&quot; 0.250&quot;</td>
<td>14.0&quot;</td>
<td>14 - E II</td>
<td></td>
</tr>
<tr>
<td>120 ft 4* 6&quot; 0.250&quot;</td>
<td>14.0&quot;</td>
<td>16 - E II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 mph</td>
<td>80 ft 4* 0&quot; 0.250&quot;</td>
<td>16.0&quot;</td>
<td>14 - E II</td>
<td></td>
</tr>
<tr>
<td>120 ft 4* 6&quot; 0.250&quot;</td>
<td>16.0&quot;</td>
<td>16 - E II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 mph</td>
<td>80 ft 5* 0&quot; 0.250&quot;</td>
<td>20.0&quot;</td>
<td>16 - E II</td>
<td></td>
</tr>
<tr>
<td>120 ft 5* 6&quot; 0.250&quot;</td>
<td>20.0&quot;</td>
<td>16 - E II</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### POLE DESIGN TABLES
Twistlock disconnects, Receptacle/Plug with push button load break to rest position, with 1 quarter turn to allow total disconnect from power source. Shall be resistant to impact, corrosion, and harsh environmental conditions (NE4A 3R). Shall have solid nickel contact surfaces, stainless steel hardware, and shall meet UL682/CSA C22.2 No. 682.1 Lighting.

Circuit Breaker Panel Box with removable face plate (Corner Screw) with Surge Arrester mounted to Top of Circuit Breaker Panel Box for easy access. Service entrance fittings shall be used on all conductors entering Circuit Breaker Panel Box.

NOTES:

1. 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. Slides to be placed around all Poles and Pullboxes.

3. For Pullboxes between Poles refer to Index 17500.

WIRING DETAILS
NOTES:
1. Use clean free flowing 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 Class NS with a minimum strength of f’c=2.5 ksi.
4. Outside edges of slab shall be cast against formwork.
5. The pull box shown is 3'-1" x 3"-3”; others approved under Section 635 of the Standard Specifications may be used.
6. Slabs to be placed around poles and pull boxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plane.

7. Concrete and reinforcing for slabs around poles and pull boxes shall be included in the price of pole or pull box.
8. The 4" 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.
NOTE
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.

Concrete Pole, Prestressed
Type P-II, 38' Long

Concrete Pole, Prestressed
Type P-II, 10' Long

Service Conductors Shall Be Stranded
Copper Single Conductor Cable Type NHW
A minimum length of 10' shall be
Provided From The Weatherhead For
Each Conductor

#6 AWG Insulated Copper Ground Wire
In ½" Rigid Galvanized Steel Conduit

#6 AWG Insulated Copper Ground Wire
In ½" Rigid Galvanized Steel Conduit

Conductor Weatherhead Height As
Required By Power Company

Meter As Required
Height Specified
By Power Company

Main Disconnect
P.E. Controller
when required

Rigid Or Intermediate
Galvanized Steel Conduit On All
Above Ground Installations

#6 AWG Insulated Copper Ground Wire
In ½" Rigid Galvanized Steel Conduit

Rigid Or Intermediate
Metal Conduit On All
Above Ground Installations

Grade

12" Bed Of Pea Gravel Or
Crushed Stone For Drainage

U.L. Approved Ground Rod,
¾" Dia. 40' Long Copper
Cable (40 Service Points)

U.L. Approved Ground Rod,
¾" Dia. 40' Long Copper
Cable (40 Service Points)

DETAIL A
AERIAL FEED

DETAIL B
UNDERGROUND FEED

SERVICESPECIFICATIONS

1. The main disconnect shall be NEMA 3R, pole mounted.

2. The enclosure door shall be lockable by padlock and four keys provided
by the maintaining agency. The door shall have a minimum of three latches
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 ampereage.

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.

NOTES:
1. Photo Electric Controls as required.
2. All neutral wires to have White insulation, do not use
White or Green insulated wires for ungrounded conductors.
3. A Pull Box is required at each service point.

PHOTO ELECTRIC CONTROLLER DETAIL

Cut a 2" hole in the bottom of the main disconnect box for the operation
and mounting of the P.E. controller. Use plexiglass and a clear silicone sealant
to cover hole, install P.E. Controller.
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 signing contractor.

The signing 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 plans shall include pay item numbers to furnish and install conductors, pull box, luminaires and service point equipment. The signing plans shall indicate the location of the service point equipment and circuit runs. The signing 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 1' below the bottom edge of the sign face.
3. Luminaires from manufacturers who recommended their fixture be tiled shall be mounted on a bracket which provides the recommended tilt.
4. Photometric data for the production luminaire proposed for sign lighting shall be submitted for approval to the District Lighting Engineer, Florida Department of Transportation.

Use 3/4" Liquid Tight Flexible Conduit From Junction Box To Ballast And From Junction Box To Tee In Luminaires Bracket. Conduit Shall Be Of Sufficient Length To Allow Return Of Luminaire Bracket 30" In Either Direction.

Ballast Shall Be Mounted To Sign Chord With Stainless Steel Band. Bracket For Ballast To Be Fabricated From Galvanized Steel Plate For Steel Sign Structures And Aluminum Plate For Aluminum Sign Structures. (Submit Data Required)

60" Min.

4" x 4" x .125 (Min.) Weatherproof Cast Aluminum Junction Box Mounted On Sign Chord.

1" Conduit To Weatherhead Height As Required By Power Company

U.L. Approved Ground Rod .09" 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

**EXTERNAL LIGHTING FOR SIGNS**

---

*Figure details:*
- **Sign Face:** Diagram showing the placement of luminaires.
- **Conduit:** 1" conduit to weatherhead height as required by power company.
- **Ground Lug Attached To Metal Sign Structure:** Grounding mechanism for metallic signs.
- **Nema 3R Waterproof Enclosure With 30 Amp Breaker:** Enclosure for electrical components.
- **Ballast Mounting:** Ballast mounted on sign chord with stainless steel band.
- **1/2" x 1 1/2" Galvanized Rigid Steel Conduit:** Conduit for electrical wiring.
- **2" - 10 AWG THW OR THEN IN 1/4" Galvanized Rigid Steel Conduit:** Wiring conduit specifications.

---

*Legends and Annotations:*
- **Index No.:** 17505
- **Sheet No.:** 1 of 2
- **Revision:** 07/01/09
- **2010 FDOT Design Standards**
- **Description:** Placement and installation details for sign lighting.
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". Steelpipe shall meet the requirements of A36 and bolts, nuts and washers shall meet the requirements of ASTM A307.

5. All steel shall be hot dip galvanized after fabrication in accordance with the requirements of ASTM A53 and/or A53.

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.
ALUMINUM LIGHT POLE GENERAL NOTES

2) All hables were developed assuming the following Luminaires properties: Effective Projected Area of 1.55 ft.² (includes wind drag coefficient) and 75 pounds (max.)
4) See Standard Index No. 17150 for grounding and wiring details.
5) Light Pole Specifications:
   c. Finish For pole and arm: 50 grid atom rubbished finish.
   e. Aluminum Caps and Covers: ASTM B-261:319-F.
   f. Weld material: EN204:43.
   g. Stainless Steel Fasteners and Hardware: AISI Grade 304.
   h. Aluminum alloy 6063-T4 condition and heat treated in accordance with ASTM B594 to T6.
6) Provide "J", "S" or "C" hook at top of pole for electrical cable.
7) Furnish each pole with a 2"x4" (max) aluminum identification tag. Submit details 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 - Project Name, Pole Weight, Manufacturer’s Name, Certification number and P&L Number.
8) Manufacturers seeking approval of a Standard Roadway Aluminum Lighting Pole assembly for inclusion on the Qualified Products List must submit a QPL 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 calculations 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 FWA required AASHTO Frangibility Requirements, tested under NCHRP Report 350 Guidelines.
   b. For Median Barrier Mounted Aluminum Light Pole design, provide test results showing that pole will not buckle at pole shape transition area. Demonstrate in the tests that the poles will achieve all ultimate maximum load capacity of 10 k-ft in the strong axis and 30 k-ft in the weak axis respectively for the 0.250" thick poles, and 44 k-ft in the strong axis and 37 k-ft in the weak axis respectively for the 0.313" thick poles. Submit complete details and calculations for the reinforced 4"x6" (min) handhole located 1-4" above the base plate.
   c. For Alternate foundations: Include design calculations and drawings showing that the project meets the requirements of this index, FDOT Structures Manual Specification T16.

ROADWAY ALUMINUM LIGHTING NOTES

1) Foundation Materials:
   a. Reinforcing Steel: ASTM A615, Grade 60.
   b. Concrete: Class F.
   c. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A453 Grade DW nuts and ASTM F436 Type 1 washers (gallvanized in accordance with ASTM F2129).
2) Pole Base and Frangible/Breakaway Transformer Base Castings Specifications:
   c. Pole Base Connection Bolt: ASTM A193 Type 1 with ASTM A453 Grade DW nuts and ASTM F436 Type 1 washers (gallvanized in accordance with ASTM F2129).
3) 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 shall be held constant at 10" and 6" respectively to simplify fabrication.
   b. Transverse walls 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.

NOTES

STANDARD ALUMINUM LIGHTING

MEDIAN BARRIER MOUNTED ALUMINUM LIGHT POLE

1) Foundation Materials:
   a. Reinforcing Steel: ASTM A615, Grade 60.
   b. Concrete: Class F.
   c. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A453 Grade DW nuts and ASTM A436 Plate Washer or ASTM F436 Type 1 washers (gallvanized in accordance with ASTM F2129). Coupler shank in accordance with AASHTO S11.5.3.2.
2) Base Connection Materials:
   c. Bearing Plate for Anchor Bolts: ASTM A453 Grade 36 or ASTM A436.
3) Pole Notes:
   a. Tapered as required to provide a 6" (0.046") round top with a 1½" x 7" (0.046") oblong base. Portions of the shaft near the base and at the arm connections may be held constant at 1½" diameter and 6" round respectively to simplify fabrication.
   b. Transverse walls 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.

FOUNDATION NOTES

The foundations for Standard Roadway Aluminum Light Poles are pre-designed and are based upon the following conservative soil criteria which covers the majority of soil types found in Florida:

- Classification = Cohesionless (Fine Sand)
- Friction Angle = 30 degrees (18°)
- 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 need to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

PULL BOX NOTES

1. Fabricated pullboxes from ASTM A 36 steel and hot-dip galvanized in accordance with ASTM A 153 after fabrication. All seams shall be continuously welded and ground smooth. Provide watertight cover with neoprene gasket and secure cover with galvanized screws.
2. Completed pullbox and conduit risers are incidental to the cost of concrete barrier wall.
### ARM CONNECTION DETAIL

**ARM SECTION**

- **2-5/8" O.D. Pipe Size**
  - Slighter (2-5/8" O.D.) for Luminaire Attachment
- **Level**
  - See Arm Connection Detail
- **2-5/8" 0.0" x 3" Bar Each Side of Arms, Extruded Saddle, or Other Acceptable Connection**
- **Upper Arm Tube**
  - See Arm Section Above
- **Lower Arm Tube**
  - See Arm Section Above

**Provide 1/2" O D Stainless Steel Bolts with Hex Nuts and 2-5/8" O.D. Flat Washers Each Side of Pole where Shown.**

**Provide 2" O Wiring Hole in Connection Extrusion at Base of Upper Arm Only**

**Connection Extrusion Supplied by Vendor**

**SECTION A-A**

(Connection at Low Arm Similar)

**ARM TUBE EXTENSIONS NOTES:**

- At the pole connections, provide arm tube extensions with dimensions as shown in the ARM SECTION and as tabulated in the ARM DATA Tables. Uniformly transition elliptical sections to a cylindrical section at the arm connection.

The fabricator may substitute elliptical cross sections other than those tabulated, provided the section properties about the vertical axis and area of the section equal or exceed that of the required section, and provide minimum wall thickness of 5/16" nominal and within the Aluminum Association Tolerances.

The outside diameter about the minor axis should be held at 2-5/8" at the upper and lower arms.

**ARM ELEVATION**

**2-5/8" O.D. Pipe Beyond This Point - See Arm Tube Extension Note**

**2-5/8" Minimum Radius**

**3-0" (8' and 10' Fixture Arm Lengths)
5-6" (12' Fixture Arm Lengths)**

**Strut = 1/2" O.D. x 0.125" (Min.)**

**Provide 1/2" (Min.) Drill Holes in Underside of Arm Tubes 1/2" From the Base Weld**

**Pole Connection Extrusion (Typical) - See Note on Sheet 2 for Material Specification.**

**ARMS TABLE**

<table>
<thead>
<tr>
<th>WIND SPEED</th>
<th>ARM LENGTH</th>
<th>UPPER ARM</th>
<th>LOWER ARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPH</td>
<td>FT</td>
<td>0.0&quot; (IN)</td>
<td>0.0&quot; (IN)</td>
</tr>
<tr>
<td>110</td>
<td>6</td>
<td>2.58</td>
<td>0.188</td>
</tr>
<tr>
<td>110</td>
<td>10 &amp; 12</td>
<td>4.63</td>
<td>0.188</td>
</tr>
<tr>
<td>130</td>
<td>6 &amp; 12</td>
<td>3.63</td>
<td>0.188</td>
</tr>
<tr>
<td>130</td>
<td>12</td>
<td>4.63</td>
<td>0.188</td>
</tr>
<tr>
<td>150</td>
<td>6</td>
<td>3.63</td>
<td>0.250</td>
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<td>4.63</td>
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</tr>
<tr>
<td>175</td>
<td>6</td>
<td>4.63</td>
<td>0.313</td>
</tr>
</tbody>
</table>

* Increase Member Wall Thickness as Necessary to Meet Minimum Requirements of the Welding Code for the Connection Weld Sizes Shown in the Arm and Pole Tables.
### STANDARD ALUMINUM LIGHTING

#### BASE DETAILS FOR ROADWAY ALUMINUM LIGHT POLE

**POLE BASE ELEVATION**

- **CONCRETE**
  - *2* Anchor Bolt, Connection Bolt, Washer and Split Locknut as Required by Approved Breakaway Transformer Base Manufacturer (Typ.)
- **CONDUIT**
  - Minimum Conduit
  - *4* AWG Bare Ground Wire Cast in Concrete or Placed in Conduit
  - *6* AWG Bare Ground Wire Cast in Concrete or Placed in Conduit

**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 WALL (In.)</th>
<th>LOWER WALL (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>8, 10, 12 &amp; 15</td>
<td>50</td>
<td>0.125</td>
<td>0.125</td>
<td>0.125</td>
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<td>110</td>
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<td>8, 10, 12 &amp; 15</td>
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<td>0.156</td>
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<tr>
<td>130</td>
<td>8, 10, 12 &amp; 15</td>
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<td>0.189</td>
<td>0.189</td>
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<td>140</td>
<td>8, 10, 12 &amp; 15</td>
<td>50</td>
<td>0.250</td>
<td>0.250</td>
<td>0.250</td>
</tr>
<tr>
<td>150</td>
<td>8, 10, 12 &amp; 15</td>
<td>50</td>
<td>0.303</td>
<td>0.303</td>
<td>0.303</td>
</tr>
</tbody>
</table>

**FOUNDATION TABLE**

<table>
<thead>
<tr>
<th>WIND SPEED (MPH)</th>
<th>DESIGN MOUNTING HEIGHT (Ft.)</th>
<th>TOTAL DEPTH (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>110</td>
<td>40 &amp; 50</td>
<td>8</td>
</tr>
<tr>
<td>120</td>
<td>50</td>
<td>9</td>
</tr>
<tr>
<td>130</td>
<td>40 &amp; 45</td>
<td>9</td>
</tr>
<tr>
<td>150</td>
<td>50</td>
<td>10</td>
</tr>
</tbody>
</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 tapered walls may be used provided the minimum Aluminum Association thicknesses are not violated.

---

1. Shop-weld assemblies of foundation stripup reinforcing bars are permitted in reinforced concrete foundation provided that:
   - a. The reinforcing bars conform to ASTM Specification A706/706M.
   - b. The bonding wire conform to ASTM Specification A82 or A496.
   - c. The shop welding is performed by machines under a continuous, controlled process, approved by the Engineer.
   - d. Quality control tests are performed on shop-welded specimens and the test results are available upon request to the Engineer.

2. *12"* bars @ 12" centers (max.) or 12G (for W20) spiral @ 6" pitch, 3 flat turns top and 1 flat turn bottom.
Foundation Table

<table>
<thead>
<tr>
<th>Wind Speed (mph)</th>
<th>Mounding Height (ft)</th>
<th>Foundation Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>40</td>
<td>9</td>
</tr>
<tr>
<td>110</td>
<td>40</td>
<td>9</td>
</tr>
<tr>
<td>175</td>
<td>20</td>
<td>9</td>
</tr>
</tbody>
</table>

NOTE: For Base Plate details, Bearing Plate detail and detail 4' see Sheet 5

For reinforcing steel above foundation see Design Std Index No. 410

1" Exp. Jt Material with rigid pavement only

1" Chamfer

4 Bars (Typ.)

For Roadway Concrete Barrier Wall design Std Index No. 410

Min 10' from approaches and guardrail

Elevation

(For Roadway Concrete Barrier Wall reinforcing steel see Design Std Index No. 410)

NOTE: 2" @ Conduit to avoid cylindrical foundation.

Cylindrical Foundation Details for Median Barrier Mounted Aluminum Light Pole

SECTION C-C

VIEW B-B

1. Shop-weld assemblies of foundation strip, reinforcing bars are permitted in reinforced concrete foundation provided that:
   a. The reinforcing bars conform to ASTM Specification A706/A706M
   b. The holding wires conform to ASTM Specification A482 or A496
   c. The Shop welding is performed by machines under a continuous, controlled process approved by the Engineer.
   d. Qualify test results are performed on shop-welded specimens and the test results are available, upon request, to the Engineer.

END VIEW

2. Tie Bars @ 12" centers (max.) or 12" (for WD) spiral @ 6" pitch, 3 flat turn top and 1 flat turn bottom.

For Roadway Concrete Barrier Wall reinforcing steel see Design Std Index No. 410
INSTRUCTIONS TO DESIGNER:
In order to minimize vibration of light poles due to traffic, locate light poles near substructure supports.

PLAN
(Reinforcing steel not shown)

ELEVATION
(Longitudinal and transverse deck reinforcing steel not shown)

NOTES:
1. For Base Plate Details, Bearing Plate Details and Detail A' see sheet 5.
2. See Design Standard Index No. 421 for details of Traffic Railing (Median 32" F Shape) and angles QA and QB.

DETAILS FOR TRAFFIC RAILING (MEDIUM 32" F SHAPE) MOUNTED ALUMINUM LIGHT POLE
TYPICAL MOTORIST AID CALL BOX TERMINAL

See Sheet 3 of 3 for Concrete Pad Details.

CalBox/Mile Marker
Sign 24" X 42". Sign 4 of 9 as called for in Plans. See Index 17355
For Sign Details and
Index 15600 for Type **
Sign Bracket Details.

CALL BOX
MILE XXX
FTP-63-06
SIGN A

CALL BOX
MILE XXX
FTP-64-06
SIGN B

BASE PLATE & BOLT PATTERN

5" Aluminum Pole
Base Plate
Load Concentrating Couplers
Gusset
Foundation

16" Wide Strip of
White Type "D"
Reflectors
Sheeting Applied to the Pole
Above the Sign
and 24" Below the
Sign at all Roadside
Terminals as Incidental
to Bid Items Provided.

70-76 MHz Antenna
Antenna Adapter

3" x 4" Panel
No Sharp Edges
1\4" Dia.

Welded Base Plate

Panel 1

3" Rod, Beveled

Panel 2
Panel 3

Panel 4

Panel 5

Panel 6
MOTORIST AID CALL BOX HOLE FOUNDATION
TO BE USED ONLY BEHIND GUARDRAIL

- 3`-6" Minimum
- Concrete with Double Reinforcement

MOTORIST AID CALL BOX HOLE FOUNDATION
TO BE USED ONLY BEHIND GUARDRAIL

- Concrete with Double Reinforcement

ELECTRIC GROUND INSTRUCTION:
- 2010 FDOT Design Standards
- 07/01/09
- Sheet No. 17600
- Index No. 2 of 3
- Revision

NEW E-911 MUTTAN
- Rear guard and guardrail pole to pole
- Room and guardrail area with guardrail
- Room and guardrail area with guardrail
- Room and guardrail area with guardrail

MOTORIST AID CALL BOX
- 30`-0" Max.
- 22`-0" Min.
- 28`-0" Min.
- 11`-0" Min.
Motorist Aid Call Box Concrete Pad Quantities

Concrete: 3.5 c.y. (each)
Reinforcing Steel: 243 lb (each)

General Notes

2. Concrete: Concrete strength shall be Class I (fc=1,000 psi).
3. Reinforcing Steel: Reinforcing steel shall conform to ASTM A615, Grade 60.
4. Payment: Concrete Pad and Foundation shall be included in the contract unit price of call box assembly or terminal. It 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 15" 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.
**PULLBOX ENTRY OF CONDUIT UNDER SIDEWALKS**

**FIGURE A**

Note:
Ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications for Road and Bridge Construction.

**FOR USE UNDER RAILROADS**

**FIGURE C**

- Note: 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.

**UNDER SIDEWALK**

**UNDER ROADWAY**

**UNDER NONTRAFFIC BEARING SURFACE**

**FIGURE B**

- Note: One run of conduit (between pullboxes) shall not contain more than 360° of bend including pullbox bends.
STEEL STRAIN POLE NOTES


2. Perform all welding in accordance with the American Welding Society Structural Welding Code (AWS D1.1, current edition). No Field welding is permitted on any part of the pole.

3. See Standard Index No. 17727 for grounding and span wire details.

4. Foundation Materials:
   b. Concrete: Class IV, (Dredged Sand 4,050 psi (40%)) minimum Compressive Strength at 28-days for all environmental classifications.
   c. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade 4 hex-nuts and ASTM F436 Type 1 washers (galvanized in accordance with ASTM F2359).

5. Strain Pole Specifications:
   a. Pole: ASTM A4101 Grade 50, 55, 60 or 65 (less than 4") or ASTM A572 Grade 50, 55, 60, or 65 (4" and over) or ASTM A595 Grade A (55 ksi yield) or Grade B (60 ksi yield).
   b. Steel Plates: ASTM A36.
   d. Bolts: A235, Type 1, Male Diameter: Bolt diameter plus 3/8".
   e. Base Plates: Pole Diameter: anchor bolt diameter plus 3/8".
   f. Hardware: Frames: ASTM A709 Grade 36 or ASTM A36.
   g. Anchor Bolts: ASTM A563, Grade 55, 50, 60, or 65.
   h. Aluminum Caps and Covers: ASTM B-209 (319-F).
   i. Stainless Steel Screws: ASTM F2324 Type 316.

5. Galvanization: Anchor bolts and washers: ASTM F2329, All other steel ASTM A423.

6. Pole Notes:
   a. See the Signalization Plans for clamp spacing, cable sizes and forces, signal sign mounting locations and details.
   b. Tapered with the diameter changing at a rate of 0.14 inch per foot.
   c. Transverse welds 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 2"-inch wire entrance pipe.
   f. Furnish each pole with a 2"x4" aluminum identification tag. Submit details for approval.
   g. Secure to pole with stainless steel fasteners or screws. Locate identification Tag on the inside of pole and visible from handhole. Include the following information:
      Manufacturers' Name & Certification number and QPL number.

7. One hundred percent of full-penetration groove welds and a random 25 percent of partial-penetration groove welds shall be inspected. Full-penetration groove weld inspection shall be performed by non-destructive methods of radiography or ultrasonics.

8. Manufacturers seeking approval of a steell strain pole assembly for inclusion on the Qualified Products List must submit a QPL Product Evaluation Application along with drawings showing the product meets all specified requirements of this Standard.

9. Verify CSL access tubes w/roof interface with anchor bolt installation before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location 2-2 1/2 inches along the inner circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.

ELEVATION AND NOTES

Identification Tag - See Note 6.

Wire screen see Spec. 649-6

Top of Finished Grade
(Prime Drilled Shaft, Rush with adjacent concrete slab, use appropriate expansion joint filler)

Anchor Bolt Hole Diameter: Bolt plus 3/8".

2-6"
TABLE OF STRAIN POLE VARIABLES

<table>
<thead>
<tr>
<th>POLE TYPE</th>
<th>MAXIMUM ALLOWABLE MOMENT (lb-ft)</th>
<th>J (in.)</th>
<th>K (in.)</th>
<th>No. of Bolts</th>
<th>BA (in.)</th>
<th>BB (in.)</th>
<th>BC (in.)</th>
<th>BR (in.)</th>
<th>BS (in.)</th>
<th>DE (in.)</th>
<th>DF (in.)</th>
<th>DB (in.)</th>
<th>No. of Bars</th>
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</thead>
<tbody>
<tr>
<td>PS-7</td>
<td>303.4</td>
<td>0.350</td>
<td>0.150</td>
<td>14</td>
<td>8</td>
<td>7</td>
<td>2.25</td>
<td>1.75</td>
<td>9/16</td>
<td>5/8</td>
<td>3/4</td>
<td>15/16</td>
<td>15.0</td>
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<tr>
<td>PS-9</td>
<td>220.8</td>
<td>0.312</td>
<td>0.150</td>
<td>16</td>
<td>10</td>
<td>2.50</td>
<td>2.00</td>
<td>1.75</td>
<td>9/16</td>
<td>5/8</td>
<td>3/4</td>
<td>15/16</td>
<td>20.5</td>
</tr>
<tr>
<td>PS-11</td>
<td>158.5</td>
<td>0.312</td>
<td>0.150</td>
<td>18</td>
<td>12</td>
<td>2.50</td>
<td>2.00</td>
<td>1.75</td>
<td>9/16</td>
<td>5/8</td>
<td>3/4</td>
<td>15/16</td>
<td>20.5</td>
</tr>
<tr>
<td>PS-13</td>
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<td>14</td>
<td>2.50</td>
<td>2.00</td>
<td>1.75</td>
<td>9/16</td>
<td>5/8</td>
<td>3/4</td>
<td>15/16</td>
<td>17.0</td>
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<tr>
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<td>1.75</td>
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<td>1.75</td>
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<td>3/4</td>
<td>15/16</td>
<td>18.0</td>
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<td>1.75</td>
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<td>3/4</td>
<td>15/16</td>
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<td>5/8</td>
<td>3/4</td>
<td>15/16</td>
<td>16.5</td>
</tr>
</tbody>
</table>

FOUNDATION NOTES:
The foundations for Steel Strain Poles are designed based on the following conservative soil criteria which covers the great majority of soil types found in Florida:

- Cohesionless (Silt Sand)
- Friction Angle = 30 Degrees (30°)
- Unit Weight = 100 lbs./cu. ft. (assumed saturated)
- Only in cases where the Designer considers the soil types of 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.

BASE AND FOUNDATION DETAILS AND TABLE OF VARIABLES

STEEL STRAIN POLE
**Round poles require the same taper as square poles and top diameter not less than 1.4 times the top width (dimension "T") of a square pole.**

---

**TYPE P-II PEDESTAL POLE**

- 6" x 6"
- 5 Gauge Spiral @ 6"
- 1½" x 5½" Galvanized Threaded Nut
- 1-0" No. 6 Ground Wire
- 3" x 5½" Handhole With Base
- 2" Galv. Nipple

---

**TYPE P-II SERVICE POLE**

- 6" x 6" 6 Gauge Spiral @ 6"
- 1½" x 5½" Galvanized Threaded Nut
- 1-0" No. 6 Ground Wire
- 3" x 5½" Handhole With Base
- 2" Galv. Nipple

---

**TYPE P-III LIGHTING AND TRAFFIC MONITORING POLES TYPES P-IV THROUGH P-VIII STRAIN POLES**

*Do not apply these items to Type P-III Lighting and ITS Poles. Establish bolt hole locations, ground wire location and conduit location as shown in the plan. For Installation, refer to Roadway and Traffic Design Standard, Index No. 17504*

Ref. Index 17500 and Sec. 744 for modifications to Type P-III poles used at traffic monitoring sites.
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.

Attach ground wires to the reinforcing steel in the pole as necessary to prevent the ground wire from being displaced during concrete operations.

Identify ground poles as to pole manufacturer, Department's pole type, length and Qualified Product List Qualification number by inserting numerals "1" in height inscribed on the same face of the pole as the handhole and ground wire.

Provide a Class 3 Surface Finish as specified in Section 400.15.2.4 of the Standard Specifications.

Provide a minimum cover of "1".

Provide all poles with a total taper of 0.102 IN/FT.

**Table I**

<table>
<thead>
<tr>
<th>MINIMUM REQUIRED ALLOWABLE SERVICE MOMENT CAPACITY (Mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE OF STRAIN POLE</strong></td>
</tr>
<tr>
<td><strong>H (feet)</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>22</td>
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<tr>
<td>44</td>
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<tr>
<td>46</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>50</td>
</tr>
</tbody>
</table>

Table I shall be used for checking allowable stress in concrete for Dead Load. Mn = MOL, where MOL = moment due to dead load only.

**Table II**

<table>
<thead>
<tr>
<th>MINIMUM REQUIRED ULTIMATE MOMENT CAPACITY (Mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE OF STRAIN POLE</strong></td>
</tr>
<tr>
<td><strong>H (feet)</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>22</td>
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<tr>
<td>24</td>
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<tr>
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<td>30</td>
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<td>40</td>
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<td>42</td>
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<td>44</td>
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<tr>
<td>46</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>50</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 (Mn) multiplied by Strength Reduction factor (K = 0.9)

Mn = 2 Mw + 1.5 (MOL-MWR), where MOL = moment due to dead load, and MWR = moment due to wind load.

**Table III**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>TYPE OF STRAIN POLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-I (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-II (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-VI (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-VII (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-IV (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-III (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-I (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-II (k-ft)</td>
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<tr>
<td></td>
<td>P-VI (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-VII (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-IV (k-ft)</td>
</tr>
<tr>
<td></td>
<td>P-III (k-ft)</td>
</tr>
</tbody>
</table>
**REMODEL INSTALLATION**

Note: Clamp location shall be adjusted to compensate for reduced sag and vertical clearance to bottom of signal head.

- Use a Split Clamp on Steel Poles
- Automatic Compression Type Clamp Passed Through Dead End
- No. 6 Copper Ground Wire Min (of #10 Bare Pigtails)
- No. 12 Copper Ground Wire Pigtails
- Automatic Compression Type Clamp (Passed Through Dead End)
- Tether Wire (If Required)
- Locking Cable Tie Off Lasting Wire
- Catenary Wire
- Service Head See Note No. 1

**PRESTRESSED CONCRETE POLE NEW CONSTRUCTION**

- The load face of pole shall be perpendicular to load.

**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. Lashing wire should normally be used for distances of 12' or greater.

3. All hardware for signal attachment shall be stainless steel.

4. Meet all grounding requirements of Section 620 of the Standard Specifications.
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. Lashing wire should normally be used for distances of 12'-0" 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.
FIGURE A
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT FIGURE "B"

FIGURE B
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT MESSENGER WIRE WITH CLAMPS

Notes:
1. The messenger wire of the interconnect cables shall be grounded to the copper ground wire at 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" (max) from that tie. 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.

5. The Main Disconnect shall be lockable by padlock and four keys provided to the maintenance agency. The door shall have a minimum of three hinges and be lockable. No screws to be used to attach door.

6. The Main Disconnect shall be Nema 3N or better.
# 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>
<th>D7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Type</td>
<td>S1 &amp; S2 Lum</td>
<td>S2 &amp; S22 Lum</td>
<td>S3 &amp; S23 Lum</td>
<td>S4 &amp; S54 Lum</td>
<td>S6 &amp; S66</td>
</tr>
</tbody>
</table>

# Pole Selection Table - Double Arm - Without Luminaire

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>D1 - D1</th>
<th>D3 - D1</th>
<th>D5 - D9</th>
<th>D6 - D2</th>
<th>D4 - D4</th>
<th>D5 - D4</th>
<th>D5 - D5</th>
<th>D6 - D5</th>
<th>D6 - D5</th>
<th>D6 - D5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Type</td>
<td>S1</td>
<td>S2</td>
<td>S3</td>
<td>S4</td>
<td>S5</td>
<td>S4</td>
<td>S4</td>
<td>S4</td>
<td>S4</td>
<td>S5</td>
</tr>
</tbody>
</table>

Arm 1 is listed first.

## 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>D1</td>
<td>36°-0°</td>
<td>36.86</td>
<td>14 0.073</td>
<td>0.025 0.351</td>
</tr>
<tr>
<td>D2</td>
<td>46°-0°</td>
<td>36.86</td>
<td>14 0.073</td>
<td>0.025 0.351</td>
</tr>
<tr>
<td>D3</td>
<td>56°-0°</td>
<td>36.86</td>
<td>14 0.073</td>
<td>0.025 0.351</td>
</tr>
<tr>
<td>D4</td>
<td>66°-0°</td>
<td>36.86</td>
<td>14 0.073</td>
<td>0.025 0.351</td>
</tr>
</tbody>
</table>

Arm Camber Angle = 2 degrees

## Pole, Connection and Shaft Design Table - Single & Double Arm

| Pole Type | UAM/100' | UAM/100' | UAO/100' | UAO/100' | No. Boats | RA | RB | BC | BD | BB | BF | HT | F/S | F/S | F/S | F/S | F/S | F/S | F/S | F/S | F/S | F/S | RA | RB | DR/100' |
|-----------|-----------|-----------|-----------|-----------|-----------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----------|
| S1        | 24 | 12.64 | 16 | 0.375 | 6 | 30 | 1.75 | 1.75 | 0.375 | 0.375 | 36 | 20 | 25 | 0.75 | 0.438 | 15.5 | 1 | 2 | 8 | 0.438 | 13 | 3.5 | 14 |
| S2        | 24 | 14.04 | 18 | 0.375 | 6 | 32 | 1.75 | 1.75 | 0.375 | 0.375 | 36 | 20 | 25 | 0.75 | 0.438 | 15.5 | 1 | 2 | 8 | 0.438 | 13 | 4 | 14 |
| S3        | 24 | 17.64 | 21 | 0.375 | 6 | 37 | 1.75 | 2 | 0.375 | 0.375 | 40 | 30 | 36 | 0.75 | 0.438 | 22 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4 | 14 |
| S4        | 24 | 22.64 | 26 | 0.375 | 6 | 42 | 1.75 | 2 | 0.375 | 0.375 | 40 | 30 | 36 | 0.75 | 0.438 | 22 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4 | 14 |
| S5        | 24 | 23.64 | 27 | 0.375 | 6 | 45 | 1.75 | 2.25 | 0.375 | 0.375 | 45 | 30 | 36 | 0.75 | 0.438 | 22 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4.5 | 16 |
| S6        | 24 | 21.64 | 25 | 0.375 | 6 | 41 | 1.75 | 2 | 0.375 | 0.375 | 40 | 30 | 34 | 0.75 | 0.438 | 22 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4.5 | 16 |
| S2 Lum    | 39 | 20.54 | 18 | 0.375 | 37 | 30 | 1.75 | 1.75 | 0.375 | 0.375 | 40 | 20 | 25 | 0.75 | 0.438 | 15.5 | 1 | 2 | 8 | 0.438 | 13 | 3.5 | 16 |
| S22 Lum   | 39 | 22.54 | 18 | 0.375 | 37 | 32 | 1.75 | 1.75 | 0.375 | 0.375 | 40 | 20 | 25 | 0.75 | 0.438 | 15.5 | 1 | 2 | 8 | 0.438 | 13 | 3.5 | 16 |
| S23 Lum   | 39 | 15.54 | 21 | 0.375 | 37 | 37 | 1.75 | 2 | 0.375 | 0.375 | 40 | 30 | 36 | 0.75 | 0.438 | 15 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4 | 14 |
| S24 Lum   | 39 | 20.54 | 26 | 0.375 | 37 | 42 | 1.75 | 2 | 0.375 | 0.375 | 40 | 30 | 36 | 0.75 | 0.438 | 17 | 2.5 | 2.5 | 12.5 | 0.438 | 13 | 4.5 | 16 |

## Drilled Shaft Data

## Luminaire and Luminaire Connection

<table>
<thead>
<tr>
<th>Lum/100'</th>
<th>Lum/100'</th>
<th>Lum/100'</th>
<th>Lum/100'</th>
<th>Lum/100'</th>
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<th>Lum/100'</th>
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<th>Lum/100'</th>
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</thead>
<tbody>
<tr>
<td>40</td>
<td>10</td>
<td>0.25</td>
<td>0.5</td>
<td>8</td>
<td>0.5</td>
<td>0.75</td>
<td>0.25</td>
<td>0.25</td>
<td>1</td>
<td>8</td>
<td>0.25</td>
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<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
</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 Pans Preparation Manual.
3. Design Speed = 150 mph with Signal/Backplackets
### Pole Selection Table - Single Arm - With & Without Luminaire

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>F1</th>
<th>F3</th>
<th>F5</th>
<th>F6</th>
<th>F7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Type</td>
<td>W1 &amp; W2 Lum</td>
<td>W2 &amp; W22 Lum</td>
<td>W3 &amp; W23 Lum</td>
<td>W4 &amp; W24 Lum</td>
<td>W5</td>
</tr>
</tbody>
</table>

### Pole Selection Table - Double Arm - Without Luminaire

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>F1 - F1</th>
<th>F3 - F1</th>
<th>F5 - F1</th>
<th>F6 - F1</th>
<th>F7 - F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole Type</td>
<td>W1</td>
<td>W2</td>
<td>W3</td>
<td>W4</td>
<td>W5</td>
</tr>
</tbody>
</table>

### 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&quot;</td>
<td>36.0 0.1793</td>
<td>29 0.25</td>
<td>0.25 0.25</td>
</tr>
<tr>
<td>F2</td>
<td>36'-0&quot;</td>
<td>36.0 0.1793</td>
<td>29 0.25</td>
<td>0.25 0.25</td>
</tr>
<tr>
<td>F3</td>
<td>46'-0&quot;</td>
<td>36.3 0.1793</td>
<td>29 0.25</td>
<td>0.25 0.25</td>
</tr>
<tr>
<td>F4</td>
<td>46'-0&quot;</td>
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### Pole, Connection and Shaft Design Table - Single & Double Arm

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### Drilled Shaft Data

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### Luminaire and Luminaire Connection

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### Notes

1. Use this Index with Index No. 17745.
2. Standard Mast Arm "F" Assemblies are designed to Loading Trees as indicated in Plans Preparation Manual.
3. Design Speed is 110 mph with Signal/Backplates or 130 mph without Signal/Backplates.

"F" Mast Arms

2010 FDOT Design Standards

STANDARD MAST ARM ASSEMBLIES

17743
### Mast Arm Assemblies General Notes

#### 1) Signal Structure Materials shall be as follows:

- **Poles & Mast Arms**
  - ASTM 4011 Grade 50, 55, 60 or 65 (less than 1/2") or
  - ASTM 4579 Grade 50, 55, 60 or 65 (.787" and over) or
  - ASTM 4595 Grade A (.555" keyway) or Grade B (.600" keyway)

- **Steel Plates**
  - ASTM A36

- **Weld Metal**
  - AWS A307

- **Bolts (except Anchor Bolts)**
  - ASTM A325 Type 1

- **Anchor Bolts**
  - ASTM A325 5/8" Grade 55 ksl

- **Nuts for Anchor Bolts**
  - ASTM A4563 Grade A Heavy Hex

- **Washers for Anchor Bolts**
  - ASTM F436 Type 1

- **Handhole Frame**
  - ASTM A709 Grade 50, 55, 60 or 65 ksl

- **Handhole Cover**
  - ASTM A4141 Grade 50, 55, 60 or 65 ksl

- **Cable**
  - ASTM A411 Grade 50, 55, 60 or 65 ksl

- **Nut Covers**
  - ASTM A325 (Grade 55)

- **Stainless Steel Screws**
  - AWS A307 Type 316

- **Fasteners/Seals**
  - ASTM A325 or ASTM A307

#### 2) Reinforcment Steel/Alloy ASTM A15 Grade 60 ksl.

#### 3) Concrete shall be Class IV (Drilled Shaft) with a minimum 28-day compressive strength of 4,000 psi for all environmental classifications.

#### 4) All welding shall conform to American Welding Society Structural Welding Code (Steel) AWS1/AWS 0.1 (current edition).

#### 5) All steel items galvanized as follows:

- Articles, Bolts, Washers and threaded fasteners
- ASTM F117

#### 6) Locate handhole 180° from arm on single arm poles or 240° from first arm of double arm poles or see special instructions on Mast Arm Tabulation Sheet.

#### 7) Except for anchor bolts, all bolt diameters shall equal the bolt diameter plus 0.04", prior to galvanizing. Hole diameters for anchor bolts shall not exceed the bolt diameter plus 0.045".

### Typical Elevation Notes

- **Top of Finished Grade**

- **Base Plate Connection and Handhole, See Sheet 2 of 5**

- **Drilled Shaft**

**NOTE:** Contractor shall verify this dimension prior to fabrication of Pole.

---

#### MAST ARM ASSEMBLIES

- **Standard Design**
  - Financial/Project ID
  - Pole Type
  - Arm Type
  - Manufacturer's Name
  - QPL No.

- **Special Design**
  - Financial/Project ID
  - Pole Base Diameter (in.)
  - Pole Wall Thickness (in.)
  - Arm Diameter at Pole (in.)
  - Arm Wall Thickness (in.)

- **Manufacturer's Name**
NOTE:
1. Details shown on this sheet are for I2 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 match marked to ensure proper assembly.
NOTE: 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 match marked to ensure proper assembly.
OPTION 1
(For Span Wire Assembly)

OPTION 2
(For Mast Arm Assembly)

NOTES:
1. Free-swinging, internally-illuminated street signs shall only be installed on the signal pole for span wire assemblies. For mast arm assemblies the street sign may be installed on the arm or pole.

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 submitter of structural calculations and Shop Drawings that have been prepared by and sealed by the Specialty Engineer.
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. Toscribe tube for taper, wrap template around tube such that points are 3\(\frac{3}{4}\)" from top of tube.
4. Verify all clearances, tolerances and dimensions before fabrication.
5. After welding, not dip galvanize all items except screws, bolts, and nuts noted to be stainless steel zinc plated and the spring (Part 4). Galvanize bolts, nuts and washers in accordance with ASTM A325/Galvanize all other items in accordance with ASTM A353.
6. Install spring with 2\(\frac{1}{8}\)" separation from bottom of pipe to weight at rest.
Adaptor, post top center mount, 2 parts 108

4" steel/pedestal

4" steel/pedestal

4" Steel Pedestal

Transformer base

Concrete pedestal

Ground wire

Pedestrian signal assembly

Top bolt for grounding

Grade

Bushing

Anchor bolts

1/2" X 20" grounding electrode

6" Min.

24" 1/2" X 20" grounding electrode

18"

1/2" X 20" grounding electrode

14"

Pedestrian signal assembly, two-way adjustable

Pedestrian signal assemblies, two-way adjustable

1/2" arm assembly

Prestressed concrete strain pole

Wood pole

Metal 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 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.
**ALTERNATIVE 1**

Drill a hole through the curb at the point where the required saw-cut depth is obtained just prior to cutting the top inside edge of the curb. Slide a section of flexible conduit at least 6" into the hole from the back side of the curb but not within 2" of the top of the hole. The conduit shall be snug within the drilled hole. Fill the top of the hole with loop sealant to the level of the curb surface. A nonmetallic material should be used to prevent excessive loop sealant from entering the flexible conduit.

**ALTERNATIVE 2**

Drill a hole ½" to 2" larger in diameter than the rigid conduit to be used through the roadway asphalt or concrete surface and base at an appropriate angle to intercept the trench or pull-box hole. Place a predetermined length of rigid conduit in the hole and drive the conduit into the trench or hole. Install a molded bushing (nonmetallic) on the roadway end of the rigid conduit. The top of the rigid conduit shall be approximately 2" below the roadway surface. Fill the hole with loop sealant to the level of the roadway surface. A nonmetallic material should be used to prevent excessive loop sealant from entering the rigid conduit.

**GENERAL NOTES**

1. If the loop lead-in is 75' or less from the edge of the loop detector to controller cabinet, continue the twisted pair to the cabinet. If the loop lead-in is greater than 75', continue the twisted pair to the specified pull-box, splice to shielded lead-in wire and continue to the controller cabinet.

2. The width of all saw cuts shall 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, shall be 1" standard with a maximum of 4".

3. On resurfacing or new roadway construction projects, the loop wires and lead-in cables shall be placed 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 pair of loop lead-in wire is 6" from the loop to 12" from the pavement edge or curb.

6. Splice connections in pull-boxes with UL listed, watertight, insulated enclosures. Place one enclosure at the end of each conductor and place a second 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.
Loops To Pullbox. Pullbox Specified Under Separate Pay Items.

Note: Loop conductors must follow saw-cut to bottom forming stack section at joint.

CONCRETE PAVEMENT EXPANSION JOINTS

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 loop.

6. The leading edge of loop Types A, C, D & E 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 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.
FIGURE A
POLE MOUNTED DETECTOR STATION

Concrete Strain Pole
Pedestrian Actuated Signal Sign
(Push Button)

PUSH BUTTON TO CROSS ST. NAME

Concrete Pedestal
4" Steel Pedestal
Push Button

TF 25-06, or FT$ 26-06, or FT$ 684-06, or FT$ 686-06

Notes:
1. Signs shall be mounted above detectors, explaining their purpose and use.
2. The positioning of pedestrian push buttons 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.
5. A 30"x48" landing is required centered on each push button.

Note To Designers:
The designer should ensure the distance to the Push Button in Figure A & B is maintained. This distance can vary depending on post or pedestal type or whether a triangle base is used and sidewalk configuration. This is specified to meet Americans with Disabilities Act.
CASE I
POLE PARALLEL TO CURBLINE
ALTERNATE TO FIGURE F

CASE II
POLE DIAGONAL TO CURBLINE

NOTE:
1. Refer to the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES figure 20-18 Pedestrian Signs,
The STANDARD 4WAYWAY SIGNS MANUAL (English) Sign R10-3 for Text Size, Spacing and Symbol size. Also see DESIGN STANDARDS Index 17355 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.

- It holes for cabinet mounting require relocation, original holes shall be filled in with concrete or covered with a noncorrosive cover plate.

Notes:
1. The number, size, and orientation of conduit swags will vary according to site condition or locations. Two spare 2" PVC conduits shall be provided in all boxes. The spare shall exit the direction of the center rear of the cabinet base, into a pullbox and capped with a weatherproof fitting. If instructions 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 conduit will have to be approved by the project engineer. A spare conduit 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 4876-1 of the Minimum Specifications for Traffic Control Signal Devices (MSTCS).

Existing controller cabinets to be retrofitted shall meet the requirements of Section 4876-16 of the Minimum Specifications for Traffic Control Signal Devices (MSTCS).

The signalized intersection controller cabinet retrofit installation procedures are located at http://www.dot.state.fl.us/TrafficOperations/DocumentLibrary/GeneratorPowerforSignalizedIntersection
**Advance Warning for R.R. Crossing**

**Passive State**
- Train Circuit Not Actuated

**Active State**
- Train Circuit Actuated

**Location of the Advance Warning Sign**
- Speed (Mph) vs Distance (Feet)
  - 30: 75
  - 40: 125
  - 50: 250
  - 60: 325

**Typical Plan**
- RR Control Cabinet
  - To Contain Normally Closed Relay
  - Furnished by RR

**Functional Block Diagram**
- Pull Boxes
  - 200 Nominal Spacing
- Power Service

**Note:**
- "Stop Ahead" is standard and preferred sign message. Another message may be approved when appropriate for specific situations.
SIGNAL PLACEMENT AT RAILROAD CROSSING
(2 - LANE DESIGN)

Gang Type
Highway Crossing Bell
(1 Minimum Per Crossing)

Back-To-Back Flasher Units

Crown Of Roadway
Travelway

Paved Shoulder

TYPE I

Gang Type
Highway Crossing Bell
(1 Minimum Per Crossing)

Back-To-Back Flasher Units

Crown Of Roadway
Travelway

Paved Shoulder

TYPE II

Gang Type
Highway Crossing Bell
(1 Minimum Per Crossing)

Back-To-Back Flasher Units

Crown Of Roadway
Travelway

Paved Shoulder

TYPE III

Gang Type
Highway Crossing Bell
(1 Minimum Per Crossing)

Back-To-Back Flasher Units

Crown Of Roadway
Travelway

Paved Shoulder

TYPE IV

General Notes
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 controller
      III. Flashing signals with gate
      IV. Flashing signals with controller & 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

Note:
Two separate foundations may be required (one for signal, one for gate), depending on type of equipment used.

* When 10' is deemed impractical the control device can be located as close as 2' from the edge of a paved shoulder but not less than 6' from the edge of the near traffic lane.
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, this 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 F70-61-06 or F70-62-06 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 minimum of 4'.

   For one-way or divided sections:
   The gate shall be of sufficient length such that the distance from the
   gate tip to the inside edge of pavement is a maximum of 4'.
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)
TYPICAL BRIDGE MOUNTS

TYPE I
TO BE USED WHERE BRIDGE OPERATIONS ARE FULL TIME OR A DAILY BASIS.

# Field conditions may require adjustment of this standard distance.

LEGEND
1. TRAFFIC SIGNALS
2. DRAWBRIDGE SIGNAL
3. DRAWBRIDGE SIGNAL WITH YELLOW FLASH CRACK BEACON
4. STOP HERE ON RED SIGN WITH RED FLASHING BEACONS
5. ENTRANCE GATE
6. EXIT GATE
7. 24" THERMOPlastic STOP BAR

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 beginning of flashing yellow on "Drawbridge Ahead" sign and the clearance of traffic signal is 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. Beginning of operation of drawbridge gates shall not be less than 15 seconds after steady red or 20 seconds after flashing red (Actual time may be determined by the bridge tender).
5. Time of gate lowering and raising is dependent upon gate type.
6. Time of bridge opening is determined by the bridge tender.
7. Each gate shall be operated by a separate switch.
8. In 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 alternate circuit.
9. A Drawbridge Ahead signal is required for both types of signal operation. However a flashing beacon shall be added to the sign when physical conditions prevent a driver traveling at the 85th percent approach speed from having continuous view of at least one signal indication for approximately 10 seconds.
10. Requirements on gate installation are contained in Section 41 of the "Manual on Uniform Traffic Control Devices".
11. "In accordance with Traffic Engineering Manual (Topic Number 750-000-005) Section 2 1. 'SLIPPERY WHEN WET' SIGNS shall be placed in advance of all MOBILE AND NONMOBILE STEEL DECK BRIDGES."

SEQUENCE CHART

Gates

NOMENCLATURE

Variable Time (See Note No. 57)
BLACK OPAQUE LEGEND AND BORDER 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 according to length of the gate arm.
2. 16" alternate diagonally reflectorized red and white stripes.

TYPICAL LAMP PLACEMENT
Equipment Cable, 5 ft
Long. Furnished
Separately
(Ref. Sheet No. 4)

J1 Recept. With Alum.
Mtg. Bracket
For Lanes 1 To 4 *

Cabinet Cable

 surge suppressors
(Furnished Separately)

Veh. Speed/
Class. Unit

Adjustable Shelf

Note:
Bracket shall be fabricated
of 0.090 - 0.125 inch thick
aluminum.
Dimensions may vary depending
on the manufacturer of the
J1 receptacle being furnished.
The cabinet manufacturer
will construct the mtg. bracket
to fit the receptacle.

1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf (elevated as shown)
   B. One backplane assy.
   C. One J1 receptacle with mounting bracket
   D. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips
   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.

CABINET LAYOUT DETAIL (For Up To Four Lanes)
CABINET LAYOUT DETAIL (For More Than Four Lanes And Up To Eight Lanes)

1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf.
   B. Two backplane assemblies (equipped as shown).
   C. Two J1 receptacles with mfg. brackets.
   D. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips.
   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.

---

Legend:
- J1 Receptacle
- Backplane
- Loop Terminals
- Solar Panels
- Battery Terminals
- Surge Suppressors
- 12 Volt Storage Battery
- Equipment Cable
- Veh Speed/Class. Unit
- Adjustable Shelf
EQUIPMENT CABLE DETAIL

J1 Receptacle Pinout
26 Recessed Male Pins
4 Loop Ja (5a) yellow
5 Loop Jb (5a) purple
C Loop Ja (5b) grey
D Loop Ja (5b) pink
E Loop 2a (6a) brown
F Loop 2a (6a) blue
G Loop 2b (6b) orange
H Loop 2b (6b) tan
J Loop 3a (7b) white
K Loop 3a (7a) green
L Loop 3b (7b) red
M Loop 3b (7b) black
N Grid
P Loop 4a (8a) w/yellow
R Loop 4a (8a) w/purple
S Loop 4b (8b) w/grey
T Loop 4b (8b) w/brown
U Plug 1 (5) (+) w/blue
V Plug 1 (5) sh w/orange
W Plug 2 (6) (+) w/green
X Plug 2 (6) sh w/red
Y Plug 2 (7) (+) w/back
Z Plug 2 (7) sh w/red/bk
a Plug 4 (8) (+) red/green
b Plug 4 (8) sh red/yellow
d Grid red/black

J1 Equipment Cable Plug
26 Female Pin Slots
4 Loop Ja (5a)
5 Loop Ja (5b)
6 Loop Ja (6a)
7 Loop Ja (6b)
8 Loop Ja (7a)
9 Loop Ja (7b)
10 Loop Ja (8a)
11 Loop Ja (8b)
12 Loop Ja (9a)
13 Loop Ja (9b)
14 Loop Ja (10a)
15 Loop Ja (10b)
16 Loop Ja (11a)
17 Loop Ja (11b)
18 Loop Ja (12a)
19 Loop Ja (12b)
20 Loop Ja (13a)
21 Loop Ja (13b)
22 Loop Ja (14a)
23 Loop Ja (14b)
24 Loop Ja (15a)
25 Loop Ja (15b)

PI Equipment Cable Plug
26 Female Pin Slots
4 Loop Jb (5a)
5 Loop Jb (5b)
6 Loop Jb (6a)
7 Loop Jb (6b)
8 Loop Jb (7a)
9 Loop Jb (7b)
10 Loop Jb (8a)
11 Loop Jb (8b)
12 Loop Jb (9a)
13 Loop Jb (9b)
14 Loop Jb (10a)
15 Loop Jb (10b)
16 Loop Jb (11a)
17 Loop Jb (11b)
18 Loop Jb (12a)
19 Loop Jb (12b)
20 Loop Jb (13a)
21 Loop Jb (13b)
22 Loop Jb (14a)
23 Loop Jb (14b)
24 Loop Jb (15a)
25 Loop Jb (15b)

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/Class. Unit and separate equipment cable connecting to a second J1 receptacle or
2. A single Vehicle Speed/Class. 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

Lead-In

Sensor Cable Connection (Bolt)

Edge Stripe

Sawcut the Sensor Slot Long Enough To Include the Sensor Cable Connection.

The Connection Will Be Embedded In The Bonding Agent With The Sensor Element

End Of Sensor Mounts Even With Inside Edge Of Stripe

Over Size

1.25-Inch To 2-Inch On Opening Defined To Loop Depth
(Smooth, No Rough Edges)

Loop

12 In.

Loops Are 6 ft X 6 ft
And Centered In The Lane

Note:
Loop slots shall be 0.25 inches wide (max.) by 1.5 inches to 2 inches deep.
Four turns of #2 AWG, type 304stranded copper wire shall be placed in the slot. Nickel 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 pullbox with three feet of spare length coiled in the pullbox.

The contractor shall be responsible for contacting the FDOT office for lane number information and verification. Alidade shall be placed with permanent marker to indicate their lane number and position. For example, the leading loop in lane 1 is marked as "14". The trailing loop (if present) is marked as "18". The axle sensor (if present) is marked as "PI". 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.

SIDE VIEW

SENSOR ELEMENT BONDING AGENT

ROADWAY SURFACE

SHOULDER

SENSOR ELEMENT

TOP VIEW

OVER SIZE

SIDE VIEW

SENSOR ELEMENT BONDING AGENT

ROADWAY SURFACE

SHOULDER

SENSOR ELEMENT

END VIEW

LOOP WIRE / HOMERUN CABLE SPLICES

3M Part No. 357DG (Or Equal)
Scotchcast Insulating Resin
Electrical Splice Kit Pouch

3M Part No. S-31 (Or Equal)
Closed End Electrical
Sleeve

Loop Leads
(Twisted Pair)
From Roadway

Shielded Homerun Cable
To Cabinet

LOOP AND PIEZOELECTRIC VEHICLE SENSOR DETAIL
The Unit Must Be Capable Of Detecting Up To Eight Lanes Of Traffic (On Either Or Both Directions) When Mounted Perpendicular To The Roadway.

Coverage Area Of The Unit Is Affected By The Roadway Geometry, Distance From The Travellines, 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.

**TYPE II VEHICLE SENSOR MICROWAVE RADAR**

**Traffic Monitoring Site**
SOLAR POWER POLE
WITH POLE MTD. CABINET

Pole placement shall be in accordance with section 195.4 and 195.8.2 of the Standard Specifications.
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.

TYPE A

TYPE B

24’

12’

12’

Existing Grade

Cabinet

Travel Lane

Travel Lane

Shoulder

4’ Min

Guardrail
1/2" ETP Alloy 110 Copper Air Terminal (Class II)
Bond #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 Lighting Conductors Per NFPA 780 And A Minimum Wall Thickness Of 1/8" Or Greater.

Bond #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 Paint Or Protective Coating Where Attaching Lug. Bond #4 Wire To #2 Ground Wire.

#2 AWG Tin-Plated Bare Solid Copper Wire, Clamp To Concrete Pole @ 3' Intervals.
Bond To Air Terminal And Ground Rod With Exothermic Weld.

3/4" 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.

CCTV Cabinet As Required Per Plans

Grout Pad Optional
Finished Grade
Concrete

STEEL POLE

CONCRETE POLE

1/2" PVC Conduit For Grounding 6' Minimum
2" PVC Conduit For Fiber Optic Cable
1/2" Conduit For Power
1/2" Diameter By 20' Long
Copper-Clad Steel Ground Rods Driven Into Undisturbed Earth

Dome Type CCTV Camera

Dome Type CCTV Camera

CCTV Cabinet As Required Per Plans

Grout Pad Optional
Finished Grade
Concrete

1/2" PVC Conduit For Grounding 6' Minimum
2" PVC Conduit For Fiber Optic Cable
1/2" Conduit For Power
1/2" Diameter By 20' Long
Copper-Clad Steel Ground Rods Driven Into Undisturbed Earth

Dome Type CCTV Camera

Dome Type CCTV Camera

CCTV Cabinet As Required Per Plans
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-964.
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.

GROUND ROD PLACEMENT DETAIL
(Typical Each Pole)

ORIENTATION OF CONDUITS AND DEVICES ON POLE

Not To Scale
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.

SIDE VIEW

FRONT VIEW

Power Distribution Assembly
Service Entrance, Breaker, Primary AC Power Filter, Ground Busbar
Number Of Outlets - Project Specific

GEI Protected Convenience Outlet
For Portable Tools

TVSS Surge Protection
Video, Data, Power

Area To Remain Clear For Full Width And Depth

Ethernet Switch, Video Encoder And Terminal Server

Area To Remain Clear For Full Width And Depth

Preterminated Fiber Optic Patch Panel

CCTV Interface Panel

Area To Remain Clear For Full Width And Depth

Sliding Drawer

Area To Remain Clear For Full Width And Depth

TVSS Protected Outlets For Equipment

Power Distribution Assembly
Service Entrance, Breaker, Primary AC Power Filter, Ground Busbar
Number Of Outlets - Project Specific

19" EIA Rack With Tapped 10-32 Threaded Holes

Air Vent

Dual Fans
GENERAL NOTES:

1. Contractor shall splice fiber optic cables in cabinet to preterminator 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 in conduits for network communications between the pullbox 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 predetermined 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 pullbox 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 drillmotor 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 kip 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 1½” Standard NPT Pipe Thread.

6. Use air terminal extension when the pole top junction box is wider than top of pole.

CAMERA LOWERING DEVICE

Not To Scale
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 630 of the Standard Specifications.

ELEVATION (CCTV POLE)
WITH FIXED MOUNTING BRACKET

SECTION AA
WITH LOWERING DEVICE

WITHOUT LOWERING DEVICE

DETAIL 1

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Handhole Shall Be Sized To Accommodate Lowering Device Equipment

For Lowering Device Details (See Index 18110)

Air Terminal (See Index 18102)

Pole

Interior Conduit

Handhole

Lowering Device Arm

For Conduit

Top Of Drilled Shaft

Top Of Grade

See Index 18108

Cap Plate

Drilled Shaft (Typ.)

Double Nuts (Typ.)

\( \frac{1}{8} \) Shaft / Pole

12" min

Top Of Grade

Sheet No. 18111

2010 FDOT Design Standards

Revision 18111

01/01/09

1 of 2

STEEL CCTV POLE

Not To Scale
**Design Notes:**


Maximum 1" deflection in 40mph wind (3 second gust).

Manufacturers seeking approval for inclusion on the Qualified Products List must submit a GPL Production Evaluation Application along with design documentation and drawings showing pole and foundation meet all specified requirements of this Standard.

Perform all welding in accordance with the American Welding Society Structural Welding Code (Steel) ANSI/AWS D1.1 (current edition).

**Foundation Materials:**

Reinforcing Steel: ASTM A615 Grade 60
Concrete: Class V Special or Class VI with 4 ksi minimum strength at transfer.
Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A hot-dip nuts.
ASTM F436 Type 1 washers.
ASTM F2329 galvanization.

Foundation design based upon the following soil criteria:

- Classification = Cohesive (Fine Sand)
- Friction Angle = 30 Degrees (30°)
- Unit Weight = 50 lbf/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:**

- Round or I6 sided.
- Tapered 0.14 inches per foot.
- Transverse welds only allowed at the base.
- Two or more sections with overlapping splices not permitted.
- No laminated tubes.
- Only one longitudinal seam weld permitted.
- Longitudinal seam welds within 6" of complete penetration pole to base welds shall be complete penetration welds.

Identification tag:
- Aluminum, secured to pole with stainless steel screws.
- Locate inside pole and visible from handhole.
- Provide Financial Project ID, pole height, manufacturer's name & certification number, and GPL number.

**Pole Specifications:**

- ASTM A441 Grade 50, 55, 60 or 65 (less than 0.14")
- ASTM A572 Grade 50, 60 or 65 (greater than 0.14")
- ASTM A585 Grade A (55 ksi yield) or Grade B (60 ksi yield).
- Steel plates and pole cap: ASTM A36.
- Weld Metal: E70XX.
- Bolts: ASTM A325, Type 1.
- Handhole frame: ASTM A709 Grade 36 or ASTM A36.
- Handhole cover: ASTM A441 Grade 50, 55, 60 or 65.
- Stainless steel screws: ASTM Type 316.
- Galvanization:
  - Nuts, bolts and washers: ASTM F2329.
  - All other steel: ASTM A233.

One hundred percent of full-penetration groove welds and a random 25% of part-penetration groove welds shall be inspected. Full-penetration groove weld inspection shall be performed by nondestructive methods of radiography or ultrasonics.

**Installation Notes:**

- Cable Supports: Electrical Cable Guides and Eyebolts.
- Locate top and bottom electrical guides within the pole aligned with each other.
- Position one cable guide 2" below the handhole.
- Position other cable guide 1" directly below the top of the tenon.
- Position eyebolts 2-3/4" below the top of the handhole.
- Install pole plumb.

**Lowering Device Installation Notes:**

- Design tenon dimensions to facilitate lowering device component installation. Locate slots parallel to the pole centerline for mounting the lowering device. Bolt a tenon to the pole top with mounting holes and slot as required for the mounting of the lowering device.
- Place all electrical wire in interior conduit to prevent them from interfering with or being damaged by the lowering cable that moves within the pole.
- Mount lowering arm perpendicular to the roadway or as shown in the plans.
- Position CCTV pole so that the camera can be safely lowered without requiring lane closures.
- Include a lowering device (including top J-box), mounting hardware, lowering cable, contact block, waterproof electrical connectors, camera J-box and housing.
DESIGN NOTES:


Manufacturers seeking approval for inclusion on the Qualified Products List must submit a QPL Product Evaluation Application along with design documentation and drawings showing the product meets all specified requirements of this Standard.

Place prestressing symmetrically about both axis.

Use Class V Special Concrete or Class VI Concrete with 4 ksi minimum strength at transfer.

Use A615 Grade 60 reinforcing steel. Provide a minimum of non-prestressed reinforcement equal to 0.33% of the concrete area.

Use A416 Grade 270 stress relieved or low-lax prestressing strands.

One turn required for spiral splices and two turns required at the top and bottom of poles. Manufacture spirals from cold-drawn ASTM A62 steel wire.

Identify poles as to manufacturer, length, QPL qualification number by inset numerals 1" in height inscribed on the same face of the pole as the handhole and ground wire.

Provide a Class 3 surface finish.

Provide a 1" minimum cover.

Foundation design based upon the following soil criteria:

- 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 type 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.

LOWERING DEVICE INSTALLATION NOTES:

Place all electrical wire in interior conduit to prevent them from interfering with or being damaged by the lowering cable that moves within the pole.

Mount lowering arm perpendicular to the roadway or as shown in the plans. Position the CCTV pole so that the camera can be safely lowered without requiring lane closures.

Include a lowering device (including top J-box), mounting hardware, lowering cable, contact block, waterproof electrical connectors, camera J-box and housing.

SPECIFICATIONS:

Pole Top: 8½" Dia.
Pole Butt: (0.2 X L) + 8 ½"
Pole Taper: 0.2 in./ft. nominal
Defl. Spac: 1" Max. in 40 mph wind (3 second gust)
Max. Camera Elevation: 5.60 Sq. ft. Total
Max. Camera Wgt: 240 lbs. Total

<table>
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<th>L (ft)</th>
<th>W (ft)</th>
<th>D (ft)</th>
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</tr>
<tr>
<td>80</td>
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</tbody>
</table>

Not To Scale
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 materials and compact the soil uniformly 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 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
**GENERAL NOTES:**

1. Fiber optic boxes shall not be installed in roadways or driveways.
2. 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.
3. Fiber optic boxes shall be installed flush with the finished grade surface.
4. Fiber optic box length (long side) shall be parallel to the roadway.
5. A pull wire shall be installed in the empty conduits for future use.
6. 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.
7. 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” deep concrete aprons sloped away from box. Apron is to be included in the cost of each box.
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.

Not To Scale
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.
GENERAL NOTES:

1. Cabinet layout is for pole or base mounted installations.

2. All dimensions are approximate.

3. The minimum DMS cabinet dimensions shall be 36"W X 24"H 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 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:

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 ELEVATION VIEW
DMS WITH CANTILEVER STRUCTURE

---

TYPICAL ELEVATION VIEW
DMS WITH TRUSS STRUCTURE

---

TYPICAL PLAN VIEW
DMS CANTILEVER STRUCTURE

---

TYPICAL PLAN VIEW
DMS 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.
GENERAL NOTES:

1. Conductors for grounding shall be connected to steel framework that have been cleaned to base metal, by use of banding 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 ATSC, 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.
Dynamic Message Sign (DMS)

Catwalk

I-Beam

Ground Lug

Finished Grade

5" Minimum

Exothermic Weld

To Ground Rod C

To Ground Rod B

To Electrical Service

Main Ground Rod To Be Placed Immediately Adjacent To Pole

Ground Rod B

1/4" Diameter By 20' Long Copper-Clad Steel Ground Rods Driven Into Undisturbed Earth

See Note 3

 Finished Grade

See Index 10102

1/2" ETP Alloy 110 Copper Air Terminal (Class III)

Base Attached To Web At Top Of I-Beam. See Detail A

Solid Copper 48" Air Terminal (1/2" Diameter) With Copper Flat Surface Base Attached To Top Of Upright. See Detail B

#2 AWG Tin-Plated Bare Solid Copper Ground Wire Bond To All Air Terminals And Ground Rod With Exothermic Weld In 1/2" RGS Conduit.

6 AWG Tin-Plated Bare Solid Copper Ground Wire To Structure Grounding Conduit (1/2" PVC)

6 AWG Tin-Plated Bare Solid Copper Wire To Electrical Service Ground

Not To Scale

DMS GROUNDING DETAILS
GENERAL NOTES:

1. All grounding materials shall meet the requirements of Section A620 of the current Minimum Specifications For Traffic Control Signal Devices (MSTCSD), 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 RS-232 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 [18]02 for ground rod placement detail.

Not To Scale
**INSTRUCTIONS TO DESIGNER:**

To limit verticating forces in the webs of beams, the maximum prestress force at the beam ends from fully bonded strands must be limited to the following:

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No losses shall be applied when calculating the Bonded Prestress Force. The reinforcing in the ends of the lower flange shall be provided without the concrete being cold. See accompanying SHEET 20110.  

**PLAN SECTION THRU BEAM WEB AT INSERT FOR DIAPHRAGM REINFORCING**

(When Intermediate Diaphragms are Required by Design)
BILL OF REINFORCING STEEL FOR ONE BEAM ONLY

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<td>21</td>
<td>See Table</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>4</td>
<td>10</td>
<td>See Table</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>4</td>
<td>26</td>
<td>6-8</td>
</tr>
<tr>
<td>M1</td>
<td></td>
<td>4</td>
<td>16</td>
<td>See Table</td>
</tr>
<tr>
<td>M2</td>
<td></td>
<td>4</td>
<td>16</td>
<td>See Table</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>5</td>
<td>12</td>
<td>7-8</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>5</td>
<td>12</td>
<td>7-8</td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td>5</td>
<td>12</td>
<td>7-8</td>
</tr>
</tbody>
</table>

BENDING DIAGRAMS (See Note 1)

ELEVATION AT END OF BEAM (Flanges Not Shown For Clarity)

NOTES:
- Work this Index with Index No. 20101 - Typical AASHTO and AASHTO V Beam Details and Notes and the AASHTO Type V Beam - Table of Beam Variables in Structures Plans.
- For referenced notes, see Index No. 20101.
- For Dimensions L, R, Vh thru V, and number of spaces S1 thru S4, see AASHTO Type V 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. The predicted cambers based on field measurements differ more than 1/4" from the theoretical "Net Beam Camber @ 120 Days" shown in the Data Table, obtain approval from the Engineer to 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 24 days prior to casting.

DIM "A" includes the weight of the Stay-In-Place Formwork.

**BUILD-UP DIAGRAM FOR TANGENT SPANS (ALONG & BEAM) (CASE 1)**

**BUILD-UP DIAGRAM FOR SAG VERTICAL CURVE SPANS (ALONG & BEAM) (CASE 2)**

**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS - CONTROL AT & SPAN (ALONG & BEAM) (CASE 3)**

**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS - CONTROL AT BEGIN OR END SPAN (ALONG & BEAM) (CASE 4)**

**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 Table for AASHTO and Build-T Beams in Structures Plans.
CONDITION 1

P = 0.0

Concrete face may be sloped with a maximum 1/24 draft to facilitate formwork removal.

CONDITION 2

SCHEMATIC END ELEVATIONS OF BEAMS

(Showing Vertical Level of Beam End)

CONDITION 3

SCHEMATIC PLAN VIEWS AT BEAM ENDS

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 V (Girder Strands) shall be either ASTM A416 Grade 250 or Grade 270, seven-wire strands 3" or 0.8 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 the option of the Contractor and with the Engineer’s approval, deformed welded wire reinforcement may be used in lieu of bars A416, A422, 50 ksi, 60 ksi, 52 ksi, 60 ksi, 52 ksi, 60 ksi, and 52 ksi except as noted below. The wire sizes and spacing of those shown on the Standard Beam Details sheets for these bars. Welded wire reinforcement shall be conform to ASTM A497.
5. Place 2½" x 5" x 5" PVC Sch. 40 Safety Sleeve with cap in both top flanges spaced at 2'-0" (Max) centers. Shift bars 5X & 5X locally to allow placement.
6. Bars shall be free of dirt and water prior to casting deck.
7. Welded wire reinforcement shall not be used for the end reinforcement (Bars 38 ksi, 45 ksi, 52 ksi, 60 ksi, 52 ksi, and 60 ksi) for beams with skewed end conditions or vertically banded end conditions when "QDM B" exceeds 1.0. Bars 52 ksi and the first bar 4.5 and 5.5 shall be placed parallel to the end of the beam. The other bars 4.5 and 5.5 shall be placed parallel to the end of the beam. No bars shall be placed parallel to the end of the beam. The remaining bars 4.5 and 5.5 shall be placed parallel to the end of the beam.
8. Welded wire reinforcement shall not be used for the end reinforcement (Bars 38 ksi, 45 ksi, 52 ksi, 60 ksi, 52 ksi, and 60 ksi) for beams with skewed end conditions or vertically banded end conditions when "QDM B" exceeds 1.0. Bars 52 ksi shall be placed parallel to the fully bonded strands in the bottom row (see "BOND PATTERN" in Structures Plans).
9. Strand protection at beam ends shall consist of a 2" deep recess formed around all strands (including dermat) or strand groups. Extend recess to face at web and bottom of flange for bottom row of strands. After detensioning, cut strands 2½" from recessed surface and fill the recess with a Type F-1 or O Epoxide Compound in accordance with Section 926 of the Specifications.
10. The Contractor shall use size No. 67 maximum size aggregate.
11. Stay-in-place metal-deck forms shall be used inside the beams.
12. The Contractor shall evaluate the need for temporary bracing 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. 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.
13. For referenced Dimensions, Angles and Case Numbers see Table of Beam Variables in Structures Plans.

INSTRUCTIONS TO DESIGNER:
To limit vertical splitting forces in the ends of beams, the maximum prestress force at beam ends from fully bonded strands shall be limited to the following:

Max. Bonded Prestress Force

<table>
<thead>
<tr>
<th>Beam Type</th>
<th>Prestress Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida U48 &amp; U54</td>
<td>2900 Kips</td>
</tr>
<tr>
<td>Florida U63 &amp; U72</td>
<td>3070 Kips</td>
</tr>
</tbody>
</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.
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” 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. 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 slipped with a maximum 1/24 draft to facilitate formwork removal.

TOP VIEW OF END DIAPHRAGM
(Bars 3D1 and 3D2 Not Shown For Clarity)

FLORIDA U 46 BEAM - STANDARD DETAILS
**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>NO. REPD.</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>6</td>
<td>4</td>
<td>6'</td>
</tr>
<tr>
<td>A2</td>
<td>4</td>
<td>10</td>
<td>6'</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>12</td>
<td>5'-1&quot;</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>16</td>
<td>5'</td>
</tr>
<tr>
<td>D1</td>
<td>3</td>
<td>22B</td>
<td>1'-6&quot;</td>
</tr>
<tr>
<td>D2</td>
<td>3</td>
<td>38</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>24</td>
<td>5'-3&quot;</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>20</td>
<td>6'-2&quot;</td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>See Table</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>H</td>
<td>4</td>
<td>See Table</td>
<td>4'-3&quot;</td>
</tr>
<tr>
<td>K</td>
<td>5</td>
<td>20</td>
<td>1'-6&quot;</td>
</tr>
<tr>
<td>M</td>
<td>4</td>
<td>See Table</td>
<td>3'-11&quot;</td>
</tr>
<tr>
<td>N</td>
<td>3/8&quot;</td>
<td>Strand</td>
<td>2</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Drains shall be placed adjacent to each web at each intermediate diaphragm (two drapes per intermediate diaphragm). Union Pipe shall be 2" Nominal Pipe Size, Schedule 60 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 shaped with a maximum 1:24 draft to facilitate formwork removal.
3. Intermediate diaphragms must be cast and concrete released strength obtained prior to removing beam from casting bed.

**FLORIDA U 48 BEAM - STANDARD DETAILS**
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL FOR ONE BEAM ONLY

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>NO. REQ'D</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>6</td>
<td>4</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>A2</td>
<td>4</td>
<td>12</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>12</td>
<td>4'-7&quot;</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>20</td>
<td>5'-3&quot;</td>
</tr>
<tr>
<td>D1</td>
<td>3</td>
<td>228</td>
<td>1'-6&quot;</td>
</tr>
<tr>
<td>D2</td>
<td>3</td>
<td>48</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>20</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>20</td>
<td>6'-6&quot;</td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>See Table</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>H</td>
<td>4</td>
<td>See Table</td>
<td>4'-9&quot;</td>
</tr>
<tr>
<td>K</td>
<td>5</td>
<td>See Table</td>
<td>8'-6&quot;</td>
</tr>
<tr>
<td>L</td>
<td>5</td>
<td>24</td>
<td>10'-2&quot;</td>
</tr>
<tr>
<td>M</td>
<td>4</td>
<td>See Table</td>
<td>3'-11&quot;</td>
</tr>
<tr>
<td>N</td>
<td>¾&quot; 9 Strand</td>
<td>2</td>
<td>DIM L = 3&quot;</td>
</tr>
</tbody>
</table>

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 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.
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 3" 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. 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 1:204 gradient to facilitate formwork removal.

TYP VIEW OF END DIAPHRAGM
(Bars 301 And 302 Not Shown For Clarity)

TOP VIEW OF SKEWED END DIAPHRAGM
AND STIRRUP TRANSITION ZONE
(Bars 302 Not Shown For Clarity)
**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 Data Table, obtain approval from the Engineer to modify the build-up dimensions as required. When the measured beam cambers create a conflict with the bottom most of deck steel, notify the Engineer a minimum of 22 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.

**DEAD LOAD DEFLECTION DIAGRAM**

(Along Flange, Along Beam)

**NOTE:**

Work this Index with the Build-Up and Deflection Data Table for Florida U Beams in Structures Plans.
BEAM NOTES

1. All bar dimensions are out-to-out.

2. Place two (2) bars $\frac{1}{2}$ at each end, and then one (1) bar 4K each location as detailed in the table of beam locations for each bar size and location.

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 beam. Bending should be with the supplier.

4. Caution should be used with bars 4L in the ends of cantilever beams to ensure the bent portion of the bar is properly oriented so that the bar will be embedded in the deck beam concrete.

5. Strand N shall be either ASTM A416, Grade 250 or Grade 270, seven-wire strands 3/8" or larger, stressed to 10,000 lbs.

6. Unless otherwise noted, the minimum cover for reinforcing steel shall be 2".

7. At option of the Contractor, welded deformed wire reinforcement may be used in lieu of bars 30, 4L, and 4I, except as noted below for skewed end conditions. The wire shall conform to ASTM A416, Grade 250 and 270. See Table 25.3.2 for details.

8. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

9. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

10. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

11. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

12. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

13. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

14. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used in the ends of beams within the limits of bars 30, 4L, and 4I. In general, bars shall be placed within the limits of the spacing for bars 30, 4L, and 4I. The spacing of bars 30, 4L, and 4I shall be determined by the designer, and the spacing shall be in accordance with the provisions of this section.

INSTRUCTIONS TO DESIGNER:

To limit vertical splitting forces in the webs of beams, the maximum prestress force at beam ends from fully bonded strands is limited to 320 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.

TYPICAL INVERTED-T BEAM DETAILS AND NOTES

FOR LONG BRIDGES INCREASE DECK THICKNESS IN ACCORDANCE WITH THE STRUCTURES DESIGN GUIDELINES.

FOR DECK THICKENING BENEATH TRAFFIC RAILINGS.

SCHEMATIC PLAN VIEWS AT BEAM ENDS

SCHEMATIC SECTIONS FOR DECK THICKENING BENEATH TRAFFIC RAILINGS

2010 FDOT Design Standards

TYPICAL INVERTED-T BEAM DETAILS AND NOTES

20310
SECTION THRU BULKHEAD
(Showing Plastic Filter Fabric)

DETAIL "A"
(Section Taken Above Dimension "X")

NOTE: Detail "A" shows a Part-Plan View of an assumed bulkhead. See Bulkhead plans for actual Plan View.

DETAIL "A"
(Section Taken Below Dimension "X")

PILE STORAGE AND TRANSPORTATION SUPPORT DETAILS

PILES
0.21 L

2 Point Pick-up, Tie Down and Support Points

0.58 L

Single Point Pick-up

0.21 L
2010 FDOT Design Standards

TYPICAL PILE

STARTER PILE

<table>
<thead>
<tr>
<th>STRAND DIA (in)</th>
<th>MAXIMUM L (ft)</th>
<th>n</th>
<th>D (in)</th>
<th>TOTAL # OF STRANDS</th>
<th>SECTION MODULUS (ksi)</th>
<th>STRESS (ksi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>30'-0&quot;</td>
<td>7</td>
<td>2-3/4</td>
<td>16</td>
<td>720</td>
<td>1100</td>
</tr>
<tr>
<td>0.6</td>
<td>30'-0&quot;</td>
<td>5</td>
<td>4</td>
<td>12</td>
<td>720</td>
<td>1160</td>
</tr>
</tbody>
</table>

# Unit Prestress after losses.

NOTES:
1. Work this Standard with Index No. 20400.
2. Intermediate Prestress Strands not shown in Elevation and Sections.
3. Width 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 Bar shown.
7. For Dimensions L and X see Sheet No. 0000 Data Table in Structures Plans.
**STIRRUP DIMENSIONS**

<table>
<thead>
<tr>
<th>#</th>
<th>T (in)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>9&quot;</td>
<td>4%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9&quot;</td>
<td>7&quot;</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>

**BAR BENDING DIAGRAMS**

**STIRRUPS S**

**BARS A**

**SHEET PILE DIMENSIONS**

<table>
<thead>
<tr>
<th>T (in.)</th>
<th>10</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y (in.)</td>
<td>3%</td>
<td>4%</td>
</tr>
</tbody>
</table>

1. Work this standard with index No. 20440.
2. All bar dimensions are out-to-out.
3. Bars A are #3 and Bars S are #2.
4. This drawing includes information for prestressed Corner Piles for 10" and 12" thick Sheet Pile systems. The details apply to both thicknesses but the bar configurations change slightly according to the thickness values used.
5. If Type "C" pile is used as a Starter Pile show tongue on both sides of pile from Dim. "X" down. Show dimensions for Bars S2, S3, S4 & S5 in shop drawings.
6. It tongue must be on opposite side (Groove Side) from that shown, all dimensions and reinforcement shall follow the corresponding Tongue or Groove side.
7. For Dimensions L and X see Sheet Pile Data Table in Structures Plans.

**NOTES:**

**SECTION A-A**

* This Bar A4 shall be 1"-2" shorter than other A4 bars for T = 12".

**SECTION B-B**

**SECTION C-C (T=10" or 12")**

**SECTION D-D (T=12")**

**2010 FDOT Design Standards**

**PRECAST CONCRETE SHEET PILE**

**TYPE "C" - RIGHT ANGLE CORNER PILE**

**INDEX No. 20440**

**Sheet No. 1 of 1**
1. Work this sheet with the BEVELED BEARING PLATE DATA TABLE in the plans.

2. Beveled Bearing Plates B with Embedded Bearing Plates A are required for beams only as scheduled in the "TABLE OF BEAM VARIABLES" on Beam Sheets.

3. Hot-dip galvanized bearing plates A & B after fabrication except Galvanized C's may be welded in place after hot-dip galvanizing. Grillbearing Plates A and B as an assembled unit, thread bearing Plate A only. Drill and thread holes perpendicular to the bottom of plate B and prior to plates being galvanized (ASTM A 123).

4. Provide Electroplated Flat Countersunk Head Cap Screws in accordance with ASTM F 835 Electroplating shall be ASTM F 835, Type 2. Provide screws long enough to maintain a 3/8" minimum embedment into Embedded Bearing Plates A and Galvanized Cap. Provide steel/Galvanized Caps with 3/8" min. to 1/2" max. Height and nominal 1" 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 Structure Plans. For Dimensions A, H1, and H2, see "TABLE OF BEAM VARIABLES" on Beam Sheets.

7. All details and dimensions shown are along & Beam for single bearings or & Plate parallel to & Beam for double bearings, except for dimensions in 3/4" dia. screws and 5/8" dia. x 3/8" Anchor Studs, which are along & Screws or & Anchor Studs. Positive Slope shown, Negative Slope similar.

8. When Skew = 0°, dimensions for Embedded Bearing Plates A are D x C x 9/16" and for Beveled Plate B are D x C x 5/8" Min.
PRESTRESSED CONCRETE PILE NOTES:

**DESIGN SPECIFICATIONS:**

**DESIGN PARAMETERS:**
- Square Prestressed Concrete Section: Designed for 1,000 psi uniform compression after stress losses without loads.
- Pick-up, Storage, and Transportation: 0.0 psf 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 spirals spaced.

**CONCRETE CLASS:**
- Concrete for piles shall be Class V (Special) except designated High Capacity Piles shall be Class VI.
- Concrete for the High Capacity Ceiling Splice shall be Class V (Special).

See "GENERAL NOTES" in Structures Plans for any specific locations where the use of Silica Fume is required.

**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.

**SPIRE BONING MATERIAL:**
- The material to fill the spaces 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.

**PICK-UP POINTS:**
- Piles shall be marked at the pick-up points to indicate proper points for attaching handling lines.

**REINFORCING STEEL:**
- All reinforcing steel shall be Grade 60, except that spirals shall be manufactured from cold-drawn steel wire meeting the requirements of ASTM A416.

**PRESTRESSING STEEL:**
- Prestressing steel shall be seven-wire strand, Grade 270 or 250 as noted.
- SR = Stress Relieved Strand
- LRS = Low Relaxation Strand

**TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS**

<table>
<thead>
<tr>
<th>D = Square Pile Size (inches)</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>24</th>
<th>30</th>
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<tr>
<td>Maximum Pile Length (Feet)</td>
<td>48</td>
<td>52</td>
<td>56</td>
<td>62</td>
<td>68</td>
<td>87</td>
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<td>69</td>
<td>75</td>
<td>85</td>
<td>89</td>
<td>98</td>
<td>124</td>
<td>2.5</td>
<td>3.0</td>
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<td>99</td>
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<td>178</td>
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<table>
<thead>
<tr>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
<tr>
<td>3 or 4 point</td>
<td>3 Point</td>
</tr>
</tbody>
</table>

**TYPICAL PILE SHAPE FOR MOLD FORMS**

**DETAIL SHOWING TYPICAL COVER**
NOTES:
1. For Sections D-0, E-E, & F-F see Index Nos. 20612, 20614, 20624, 20620, 20624 or 20630 for applicable concrete pile size.
2. Prestressing strands, spirals, etc. 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 Splices contained in the Qualified Products List (QPL) may also be used.
4. When preformed dowels are utilized, the 1" 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.
Provide one (1) $\frac{1}{4}$" vent hole (Configuration A or B) on two (2) opposite faces of pile.

Antenna (centered over Top Gauge)

Head of Pile

Tip of Pile

30" Pile only

11'-6"

19" Void
(30" Pile only)

1'-0"

30" Pile only

11'-6"

ELEVATION

SECTION A-A
(Strand Pattern with odd number of strands per face)

Tip Gauge

Top Gauge

Antenna

D/2

SECTION A-A
(Strand Pattern with even number of strands per face)

Tip Gauge

Top Gauge

Antenna

D/2

1" Cover
(Typ.)

19" Void

SECTION B-B
(30" Pile only)

Tip Gauge

Top Gauge

Antenna

D/2

1" Cover
(Typ.)

Attach Tip Gauge extension cable to underside of strand pile down from top corner strand using nylon wire ties every 6' maximum.

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 TOP VIEW

ANTENNA SIDE VIEW

ANTENNA END VIEW

Work this sheet with
Index No. 20614 for 18" square piles,
Index No. 20624 for 24" square piles,
Index No. 20630 for 30" square piles.
ALTERNATE STRAND PATTERNS

4 ~ 0.68", Grade 270 LRS, at 44 kips
6 ~ 1.25", Grade 270 LRS, at 23.3 kips
8 ~ 1.7", Grade 250 SB, at 24.1 kips
12 ~ 2.25", Grade 270 LRS, at 17.2 kips
16 ~ 3", Grade 270 SK, 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 equably spaced between the corner strands.
The total strand pattern shall be concentric with the nominal
concrete section of the pile.

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.
ALTERNATE STRAND PATTERNS

8 - 0.6" Ø, Grade 270 LPS, at 35.2 kips
8 - 1/2" Ø, Grade 270 (Spec) LPS, at 34.6 kips
8 - 5/8" Ø, Grade 270 LPS, at 31.6 kips
12 - 3/8" Ø, Grade 270 SR, at 22.6 kips
12 - 5/8" Ø, Grade 250 SR, at 22.6 kips
16 - 3/8" 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 Detail)

SECTION E-E

(See Drivable Unforeseen Prestressed Precast Splice Detail)

PILE SPlice REINFORCEMENT DETAILS

NOTE:

Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20614 - Square Prestressed Concrete Pile Splices.
**ELEVATION**

**See Note No. 4 on Index No. 20601**

---

**ALTERNATE STRAND PATTERNS**

- 12 = 0.6" Ø, Grade 270 LRS, at 38.4 kips
- 12 = 0.6" Ø, Grade 270 (Spec) LRS, at 34.0 kips
- 12 = 0.6" Ø, Grade 270 SR, at 35.1 kips
- 16 = 0.6" Ø, Grade 270 SR, at 28.8 kips
- 20 = 0.6" Ø, Grade 270 SR, at 21.8 kips
- 20 = 0.6" Ø, Grade 270 LRS, at 21.1 kips
- 24 = 0.6" Ø, Grade 270 LRS, 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.

---

**SECTION A-A**

See Alternate Strand Patterns

---

**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.

---

**SECTION D-D**

(See Non drivable Unforeseen Reinforced Precast Splice Detail)

- 8 = No. 10 Dowels

**SECTION E-E**

(See Drivable Prestressed Precast Splice Detail)

- 8 = No. 10 Dowels

**SECTION F-F**

(See Drivable Preplaned Splice Detail)

- 8 = No. 9 Bars

(Shift as required to clear strands)

---

**PILE SPLICE REINFORCEMENT DETAILS**
ELEVATION

** See Note No. 4 on Index No. 20600

ALTERNATE STRAND PATTERNS:

- 12 ~ 0.6" Ø, Grade 270 LRS, at 44 kips
- 16 ~ 3/8" Ø, Grade 270 LRS, at 31.0 kips
- 16 ~ 3/8" Ø, Grade 270 Spec ASTM, at 34.0 kips
- 20 ~ 5/16" Ø, Grade 270 Spec, at 26.5 kips
- 24 ~ 5/32" Ø, Grade 270 LRS, at 21.7 kips
- 24 ~ 5/32" Ø, Grade 270 Spec, 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 Pipe Splices.

SECTION D-D

(See Nondrivable Unforeseen Reinforced Precast Pipe Splice Detail)

SECTION E-E

(See Drivable Prestressed Precast Pipe Splice Detail)

SECTION F-F

(See Drivable Preplanned Pipe Splice Detail)

PILE SPlice REINFORCEMENT DETAILS
ALTERNATE STRAND PATTERNS

16 ~ 0.6" Ø, Grade 270 LPS, at 44 kips
20 ~ 0.66" Ø, Grade 270 (Spec) LPS, at 34.0 kips
20 ~ 0.68" Ø, Grade 270 SR, at 34.0 kips
20 ~ 0.68" Ø, Grade 270 (Spec) SR, at 37.1 kips
24 ~ 0.62" Ø, Grade 270 LPS, at 31.0 kips
24 ~ 0.64" 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 Splice.
**Spiral Tie Spacing**

16 Turns @ 2" Pitch

**Conical End Fitting (Typ.)**

**Tie**

1" x 1" Chamfer or
$\frac{1}{2}$" x $\frac{1}{2}$" Chamfer

W4.0 Spiral Ties

8" =

11/2" Solid Section

---

**ELEVATION**

**SECTION D-D**

(See Non-drivable Unforeseen Reinforced Precast Pile Splice Detail)

**SECTION E-E**

(See Drivable Preplanned Precast Pile Splice Details)

**SECTION F-F**

(See Drivable Preplanned Pile Splice Detail)

---

**SECTION C-C**

(See Pile Splice Reinforcement Details)

**SECTION B-B**

(See Pile Splice Reinforcement Details)

---

**Alternate Strand Patterns**

**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 piles shall be connected by 2" Ø holes (1). 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.

   - CONTRACTOR OPTION: The 30" pile may be cast 50.10 by omitting the 18" Ø void and the 2" Ø vent hole. In this event, the Contractor shall submit calculations for approval and 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.

**Alternate Strand Patterns**

- 20 ~ 3/8", Grade 270 (Spec) LRS, at 39.7 kips
- 20 ~ 5/8", Grade 270 LRS, at 56.0 kips
- 20 ~ 0.6", Grade 270 LRS, at 41 kips
- 24 ~ 5/8", Grade 270 (Spec) LRS, at 34.4 kips
- 24 ~ 3/4", Grade 270 SR, at 35 kips
- 24 ~ 5/8", Grade 270 (Spec) SR, at 35.2 kips
- 26 ~ 5/8", Grade 270 LRS, at 39.0 kips
- 26 ~ 3/4", Grade 270 (Spec) SR, at 30.2 kips

---

**PILE SPICE DETAILS**

2010 FDOT Design Standards

Sheet No. 20630

1 of 1
### ELEVATION

**Design Specifications:**

**Design Parameters:**
- Prestressed Cylinder Concrete Section: 1,000 psi minimum compressive strength after prestress losses without loads.
- Pick-up, Storage, and Transportation: 0.6 psi tension x 1.5 times pile self weight.

**Special Notes:**
- 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 diaphragm shafts: Class V (Special).
  - Concrete for pile splices: Class IV. See "GENERAL NOTES" in Structures Plans for specific locations where the use of Silica Fume is required.

**Concrete Strength:**
- The cylinder strength shall be 6,000 psi minimum at time of transfer of the Prestressing Force.

**Steel Splicing 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 internal pile surfaces shall be a Type B 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:**
- Pilings shall be marked at the pick-up points to indicate proper points for attaching handling lines.

**Reinforcing Steel:**
- All reinforcing steel shall be Grade 60, except that smooth steel wire (HWI) spirals and longitudinal spacers and W20 tie bars shall be manufactured from cold drawn steel wire meeting the requirements of ASTM A576.

**Prestressing Steel:**
- Prestressing tendons shall be made up of two seven-wire strands. Prestressing strands shall be 0.25" @ Spec.
- Grade 270 low relaxation, at 33.8 kips.

**Pile Driving After Splicing:**
- Pile splices shall reach a minimum strength 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>119</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>179</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
</tbody>
</table>

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**NOTES**

- Provide one (1) 3/8" @ vent hole (10 g Fillet) on two (2) opposite faces of pile (Typ. each Pile Section).
- Provide one (1) 3/8" @ vent hole (10 g Fillet) on two (2) opposite faces of pile (Typ. each Pile Section).
Detailed Precast/Post-Tensioned Pile Section

DRIVABLE UNFORESEEN FIELD SPlice DETAIL
(Cast in Place Plug)

1' - 0" @ Voids, open top and bottom to allow through venting of sections

Roughened inside surface of 54" Ø Pile to 1/4" amplitude for Spliced Pile Section

Closed No. 4 Bars or W20 Wire Tie @ 1'-0" @ (Typ.)

1/2" Full Epoxy Compound joint around cylinder pile wall only (See Detall "A")

24 ~ No. 4 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

SECTION A - A

4 ~ Longitudinal Spacers
No. 3 Bars or W11 Wire for Spiral Ties & Equal Spaces

3' - 0" Ø Void

24 ~ 1 1/6" Ø Formed Holes for Tendons @ Equal Spaces

1 1/6" Ø Formed Hole (1 Tendon per hole)
2 ~ 1/8" Ø (Spec.) strands per tendon shown as (●) Grout per Specification 938

SECTION B - B

4 ~ Longitudinal Spacers Bars
No. 3 Bars or W11 Wire for Spiral Ties & Equal Spaces

W11 Wire Spiral Tie

1' - 0" Ø Void

24 ~ No. 11 Bars @ Equal Spaces

W11 Spiral Wire Tie

3" Min. Cover (Typ.)

1 1/6" Min.

Cover (Typ.)

24 ~ 1 1/8" Ø Formed Holes for Tendons @ Equal Spaces

Form to retain epoxy compound

Temporary Blocking/ Form to retain epoxy compound

Gasket

Outside Pile Wall

Full epoxy compound joint
*The 45° Ø Void in the pile shall be positively vented to water or air after the final pile installation. If the 3½") Ø vents are included in the pile cut-off section, then venting shall be provided by the use of a 1") Ø PVC conduit through the substructure cap or column.

**PILE PICK-UP DETAILS**

**STORAGE AND TRANSPORTATION SUPPORT DETAILS**

**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>

**NOTES**

- **DESIGN SPECIFICATIONS**:

- **DESIGN PARAMETERS**:
  - Prestressed Cylinder Concrete Section: 1,000 psi minimum uniform compression after prestress losses without loads.
  - Pick-up, Storage, and Transportation: 0.0 extension w/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 splices shall be Class V (Special). Concrete for pipe 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 4,000 psi minimum at time of transfer of the Prestressing Force.
  - **SPICE BINDING MATERIAL**:
    - The materials 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 internal pile surfaces shall be a Type B 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. Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.
  - **PICK-UP POINTS**:
    - Plate shall be marked at the pick-up points to indicate proper points for attaching handling lines.
  - **REINFORCING STEEL**:
    - All reinforcing steel shall be Grade 60, except that smooth steel wire (Wi) spirals and #20 ties shall be manufactured from cold drawn steel wire meeting the requirements of ASTM A606.
  - **PRESTRESSING STEEL**:
    - Prestressing steel shall be 0.6" Ø seven-wire strand, Grade 270 low relaxation, at 44.0 kips.
  - **PILE DRIVING AFTER SPACING**:
    - Pile splices shall be in minimum grade of 5500 psi before driving is resumed.
GENERAL NOTES

1. SURFACE TREATMENT: Apply a Class 4 Finish (Grooved) to all riding surface from begin or end slab to begin or end bridge. See Mid Item Notes. Apply a blemished finish to sidewalk areas.

2. (UTILITY): If required, see Structures Plans, Utility Conduit Detail Sheet 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 (θ) > 0°. Relevant details also apply to CASE 2.

5. The plan view for CASE 2 applies when the skew angle (θ) < 0°. 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 shown similarly. The shown reinforcement shall be utilized, and Doweled shall be provided in accordance with FDOT No. 310 and 316.

6. Railings, parapets and traffic barriers shall be provided as shown in Structures Plans. Payment shall be included in the pay item for the required items. Robed sidewalks shall be provided as shown in Structures Plans. Payment shall be included in the pay item for approach slab concrete and reinforcement. Welded Wire Reinforcement for the approach Slabs on retaining walls is not included in the estimated quantity for reinforcing steel and is considered incidental to the work. Welded Reinforcement shall conform to ASTM A485.

7. PROFICIENCY: The profile requirements apply, planning may be required. The permitted construction joint shown in Section 2-A will facilitate the placement of the expansion joint.

8. Approach slabs shown in Plan View Cases 1 and 2 represent typical approach slabs with edge barriers and no sidewalks. See additional approach slab sheets for sidewalk and other specific details.

9. CONCRETE: Provide Class II (Bridge Deck) concrete for approach slabs.

CROSS REFERENCES

For Section B-B, Longitudinal Construction Joint Details and Approach Slab Details see Index No. 20910, Sheet 2.

For Estimated Quantities see Structures Plans.

INSTRUCTIONS TO DESIGNER:

These Indexes shall be supplemented in Structures Plans with additional sheets showing at a minimum a Plan View with geometry and pertinent information not covered by these Indexes e.g., Survey Lines, Panel, Direction of Shalglining, Phase Construction Joint, Raised Sidewalks and any other information necessary to accurately complete detailing of the Approach Slabs. Approach Slab Finish Grade Elevations shall be included with the Bridge Finish Grade Elevations in the Structures Plans.

Reinforcing bars are to be shown in the Reinforcement Steel List as straight bars (Types 1 and 2). Bars 5/8" are 20" long.
TYPICAL SECTION THRU STRIP SEAL EXPANSION JOINT

(Begin or End Concrete Girder Bridge shown, Intermediate Supports and Steel Girder Bridge similar, Reinforcing Steel and Girder details not shown for clarity.)

GENERAL NOTES:


2. Furnish solid steel Edge Rolls in accordance with ASTM A779, Grade 36, 50 or 50W, that are extruded, hot rolled and machined. Furnish Edge Rolls with a minimum mass of 19.1 lb/ft. Excluding studs, a minimum height of "8", a minimum thickness of "12" and a maximum top surface (riding surface) width of 2". Shape of Edge Roll shown is representative, minor variations depending on manufacturer are permitted. Edge Rolls manufactured from bent plate or built-up pieces are not acceptable.

3. Furnish Anchor Studs in accordance with ASTM A408. Electric arc weld Anchor Studs with complete fusion. Anchor Studs may be piggy backed to achieve required lengths.

4. When required, furnish 1/2" thick slip resistant steel Sidewalk Cover Plates in accordance with ASTM A779, Grade 36 or 50, with a minimum coefficient of friction on the top surface of 0.8 in a dry condition as determined by ASTM F1677 or ASTM F1677 (respectively) that incorporate an anti-slip steel surface consisting of a random, hatch matrix or other suitable pattern. 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 F593, Group 1 Alloy 304 for attaching Sidewalk Cover Plates. Install Sleeve Anchors in accordance with manufacturers recommendations.

5. Recess the Edge Roll below the concrete surface in accordance with Specification Section 458.

6. Refer to Specification 458 and the Expansion Joint Data Table in the Structures Plans for installation and fabrication requirements and adjustments to Dimension "A".

7. Manufacturers seeking approval of Strip Seal 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. Include installation details consisting of temporary or sacrificial support brackets, bolts, clamps, etc. that are compatible with decks constructed with or without setbacks.
PARTIAL PLAN VIEW OF SKEWED JOINTS

PARTIAL PLAN VIEW OF NONSKEWED JOINTS

PARTIAL SECTION ALONG & JOINT

JOINT TREATMENT AT HIGH SIDE OF DECK
WITH SLOPE 2% OR LESS
(Sidewalk Cover Plate where applicable not shown for clarity)

JOINT TREATMENT AT LOW SIDE OF DECK & HIGH SIDE OF DECK WITH SLOPE < 2% (Sidewalk Cover Plate where applicable not shown for clarity)

UPTURN DETAIL
(TYPICAL AT TRAFFIC BARRIERS AND PARAPETS)

PARTIAL SECTION ALONG & JOINT AT FIELD BUTT JOINT LOCATION
(CROWED DECK OR SLAB SHOWN)
GENERAL NOTES:
1. Furnish Poured Joint With Backer Rod Expansion Joint Systems in accordance with Specification Section 458 and 932. Furnish joint systems consisting of Poured Joint Material, Foam Backer Rods, Sidewalk Cover Plates (as required) and all associated miscellaneous components.
2. When required, furnish 1/4" thick slip resistant steel Sidewalk Cover Plates in accordance with ASTM A779, Grade 36 or 50, with a minimum coefficient of friction after galvanizing on the top surface of 0.8 in a dry condition as determined by ASTM F1677 or F1679 and 0.58 or 0.63 in a wet condition as determined by ASTM F1677 or ASTM F1679 (respectively) that incorporate an anti-slip steel surface consisting of a random hatch matrix or other suitable pattern. Do not use diamond plate or surface applied slip resistant tapes, film, nonmetallic coatings or other similar materials. Furnish flat head Stainless Steel Sleeve Anchors in accordance with ASTM F593 Group I Alloy 304 for attaching Sidewalk Cover Plates, Metal Sleeve Anchors in accordance with manufacturer's recommendations.
3. Hot-dip galvanize Sidewalk Cover Plates after shop fabrication in accordance with Section 962 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 or pre-approved designs must submit application along with design documentation showing the expansion joint meets the specification, geometric and material requirements specified herein.
6. Refer to Specification Section 458 for installation and construction requirements.
7. Refer to the Structures Plans, Poured Expansion Joint Data Table for Dim. "A" @ 70°F.

INSTRUCTIONS TO DESIGNER:
Allow for a minimum (fully closed) opening of 50% of Dimension "L" and a maximum opening of 3" (measured in the direction of travel).

TYPICAL SECTION THRU JOINT

PARTIAL SECTION ALONG & JOINT JOINT TREATMENT AT TRAFFIC SEPARATOR

PARTIAL SECTION ALONG & JOINT JOINT TREATMENT AT HIGH SIDE OF DECK WITH SLOPES 2% OR GREATER

PARTIAL SECTION ALONG & JOINT JOINT TREATMENT AT LOW SIDE OF DECK OR HIGH SIDE UP DECK WITH SLOPES < 2%

Poured Joint Material

Bridge Deck, Approach Slab, Raised Sidewalk or Traffic Separator

Foam Backer Rod (to be sized for opening per manufacturer's recommendations)

Bridge Deck, Approach Slab, Raised Sidewalk or Traffic Separator

Form Material (if present) removed to accommodate joint installation
TYPICAL SECTION AT LIGHT POLE PILASTER FOR APPROACH SLAB OR BRIDGE DECK THICKNESS LESS THAN 1'-1/2".

**PLAN VIEW**
(Anchor Plate not shown for clarity)

1. **Top of Traffic or Pedestrian/Bicycle Railing**
2. **Riding Surface**
3. **See Details**
4. **1'-0" Conduits**
5. **2'-0" Conduits**
6. **Bars 4F3 (pairs)**
7. **Bars 4F4 (pairs)**
8. **Bars 4F5 (pairs)**
9. **Bars 4H (pairs)**

**ELEVATION VIEW**
(Bars 4G not shown for clarity)

- **Bars 4G (Top & Bottom)**
- **Bars 4F1 (Pairs)**
- **Bars 4F2 (Pairs)**
- **Bars 4F3 (Pairs)**
- **Bars 4F4 (Pairs)**
- **Bars 4F5 (Pairs)**
- **Bars 4H (Pairs)**

**Traffic or Pedestrian/Bicycle Railing Reinforcing not shown for clarity**

**TYPICAL SECTION AT LIGHT POLE PILASTER FOR APPROACH SLAB OR BRIDGE DECK THICKNESS 1'-1/2" OR GREATER**

**NOTE:** Anchor Bolt, Nuts, Washers and Anchor Plate are dashed for clarity.
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

REINFORCING STEEL NOTES:

a. When Plaster is attached to Pedestrian/Bicycle Railing - Index No. 820 and the Bridge Deck or Approach Slab thickness is less than 1-1/2", Bars 4F1 shall have leg length and bar length shown in parentheses.

b. The number of bars shown in parentheses is for Bars 4F2 when Plaster is attached to Pedestrian/Bicycle Railing - Index No. 820, and the Bridge Deck or Approach Slab thickness is less than 1-1/2".

c. Lap Splices for Bars 4F1, 4F2 & 4F3 shall be a minimum of 1'-4". Lap Splices for Bars 4F4 & 4F5 shall be a minimum of 1'-6".

d. Allbar dimensions in the bending diagrams are out to out.

INSTRUCTIONS TO DESIGNER:

In order to minimize vibration of Light Poles due to traffic, locate plasters near substructure supports. Locate Plaster minimum 1'-10" away from Traffic Railing Open Joint and design of additional Bridge Deck Reinforcement is based on the minimum transverse top slab reinforcing specified by Structural Design Guidance provided in 2010 FDOT Design Standards.

Provide 3/4" @ all location sash cord as weep hole wire. Prior to grouting, attach cord to interior of the upright such that the end extends beyond the grout. Locate in plan, midway between anchor bolts.

CONCRETE 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 Plaster is attached to. Grout shall comply with Specification Section 930.

2. Light Pole Pilaster may be used with the following:
   - Index No. 420 - Traffic Railing (32" F Shape)
   - Index No. 422 - Traffic Railing (42" Vertical Shape)
   - Index No. 423 - Traffic Railing (32" Vertical Shape)
   - Index No. 424 - Traffic Railing (Corrals 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 (32" F Shape), or
   - Index No. 520 - Traffic Railing (Round Barrier Bridge)

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 = 1,560 kip
   - Torsion about Pole Axis = 3,560 kip-ft

4. Materials:
   - Anchor Bolts: ASTM F1554 Grade 55
   - Note: ASTM A4503 Grade 50 is Heavy-Duty.
   - Washers: ASTM F436 Type 1.
   - All Nuts, Bolts and Washers shall be galvanized by ASTM F2329.

5. For Conduct, PullBox, Expansion, Deflection Fitting and adjacent Reinforcing Steel details, see Utility Conduit Detail Sheets.

6. Anchor Bolts shall 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 Plaster, Grout, Poles, PullBoxes, and Miscellaneouse 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 Plaster is attached to.

BILL OF REINFORCING STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>NO. REOQ.</th>
<th>LENGTH</th>
<th>NOTES</th>
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<tr>
<td>F1</td>
<td>4</td>
<td>16</td>
<td>5'-8&quot;</td>
<td>c</td>
</tr>
<tr>
<td>F2</td>
<td>4</td>
<td>4</td>
<td>4'-8&quot;</td>
<td>c</td>
</tr>
<tr>
<td>F3</td>
<td>4</td>
<td>4</td>
<td>4'-2&quot;</td>
<td>(3'-6&quot;) g, c</td>
</tr>
<tr>
<td>F4</td>
<td>4</td>
<td>10</td>
<td>8'-5&quot;</td>
<td>b, c</td>
</tr>
<tr>
<td>F5</td>
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<td>4</td>
<td>7'-5&quot;</td>
<td>c</td>
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<tr>
<td>G</td>
<td>2</td>
<td>16</td>
<td>6'-8&quot;</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>4</td>
<td>2</td>
<td>19'-8&quot;</td>
<td></td>
</tr>
</tbody>
</table>

ESTIMATED LIGHT POLE PILASTER QUANTITIES PER LIGHT POLE PILASTER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Per Pilaster Thick.</td>
<td>CY/m.</td>
<td>0.040</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>lbf.</td>
<td>244.16 (233.19)</td>
</tr>
</tbody>
</table>

(The Reinforcing Steel quantity shown in parentheses is for a Plaster attached to Pedestrian/Bicycle Railing - Index No. 820 with Bridge Deck or Approach Slab thicker than 1-1/2")
UTILITY CONDUIT DETAILS

UNITY 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 NEMA TC-2 and UL Standard 452 and Fittings in accordance with NEMA TC-5 and UL Standard 458. Furnish conduit and fittings with UL labels: Conduit — on each 10 foot length: Fittings — stamped or molded on each fitting. Connect Conduit and Fittings using solvent cement in accordance with manufacturer's recommendations.

3. Furnish and install NEMA Type 4X non-metallic or galvanized steel Pull Boxes sized in accordance with NEC requirements and the maximum limits shown. Provide gasketed weatherproof covers for the Pull Boxes. Permanently label the covers of the Pull Boxes to indicate the number of conduits contained within. Letters and symbols shall be a minimum of 0.5" tall and may be stamped or molded into Pull Box covers. Install Pull Boxes adjacent to begin and end bridges and end retaining walls and at additional locations as required. Unit Pull Boxes at beginning and end retaining walls adjacent to bridges. Position Pull Box openings as shown, do not place Pull Box openings on the traffic face of Traffic Railings.

4. Furnish and Install Expansion/Fitting details in the Plans. Certify that Expansion/Fitting details used 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. Certify that Expansion/Deflection Fittings used at a given location are rated to accommodate a minimum rotation of 30 degrees and the anticipated movement at the 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 dowels to permanently locate ends as shown unless otherwise shown in the Plans.

7. Shift vertical orientation of frames symmetrically to provide vertical clearances to Pull Boxes. Specify shift vertical orientation of frames to provide vertical clearances to Pull Boxes and provide supplemental working drawings as shown. Shift a maximum of 1" but do not cut rolling reinforcement to facilitate conduit. Expansion Fitting and Expansion/Deflection Fitting placement. Do not bundle conduits or conduit and horizontal reinforcement.

8. Unless otherwise shown in the Plans, the cost of furnishing and installing Conduits and Pull Boxes, Expansion and Expansion/Deflection Fittings and all associated hardware required to complete the installation in the cost for the Traffic Railings or Pedestrian Railings (Parapet) that the conduit is installed in.

INSTRUCTIONS TO DESIGNER:

Confirm 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 supplemental designs, notes, details, design diagrams, and design specifications in the Plans. To be used in the Plans.

Specify the type of conduits that the Pull Boxes required Pull Boxes — multiple raceways. Generally, multiple raceway Pull Boxes can be used where utilities contained within individual raceways (conduct) can share a common Pull Box. Single raceway Pull Boxes should be used where it is desirable or required that utilities contained within individual raceways (conduct) be isolated from each other.

Specify the type of fittings required at Expansion Joint locations on bridges or Expansion Fitting or Expansion/Deflection Fitting. Generally, Expansion Fittings can be used for bridges on tangent or large radius curves. Small movements 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 THHN or SHC conductors only.
NAVIGATION LIGHTS SYSTEM SCHEMATIC
FOR SINGLE BRIDGE WITH FENDERS

NAVIGATION LIGHTS SYSTEM SCHEMATIC
FOR DUAL BRIDGES WITH FENDERS

NAVIGATION LIGHTS SYSTEM SCHEMATIC
FOR SINGLE BRIDGE WITHOUT FENDERS

NAVIGATION LIGHTS SYSTEM SCHEMATIC
FOR DUAL BRIDGES WITHOUT FENDERS

NAVIGATION LIGHT NOTES:
1. Provide Navigation Light System in compliance with Specifications Section 520.

NOTE:
Size conductors per NEC requirements.
Do not use conductor smaller than \( \frac{1}{4} \)".

TYPICAL ELECTRICAL SCHEMATIC DIAGRAM

POWER CONDUCTORS

<table>
<thead>
<tr>
<th>DISTANCE (feet)</th>
<th>VOLTS</th>
<th>CONDUCTOR</th>
<th>TRANSFORMER</th>
</tr>
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<tbody>
<tr>
<td>0 - 75</td>
<td>120</td>
<td>#2 AWG</td>
<td>N/A</td>
</tr>
<tr>
<td>75 - 500</td>
<td>240</td>
<td>#2 AWG</td>
<td>N/A</td>
</tr>
<tr>
<td>500 - 1000</td>
<td>240</td>
<td>#2 AWG</td>
<td>N/A</td>
</tr>
<tr>
<td>1000 - 2000</td>
<td>480</td>
<td>#4 AWG</td>
<td>2 KVA</td>
</tr>
<tr>
<td>2000 - 5000</td>
<td>480</td>
<td>#4 AWG</td>
<td>2 KVA</td>
</tr>
<tr>
<td>Over 5000</td>
<td>480</td>
<td>#4 AWG</td>
<td>2 KVA</td>
</tr>
</tbody>
</table>

LEGEND

LC: Lighting Contactor
PC: Photoscel 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.

INSTRUCTIONS TO DESIGNER:
1. Provide design of GCL locations, configurations and its supporting structures.
2. Provide design of RFL locations and configurations in Fender System drawings if applicable.
3. 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 1, Part 118.
4. Provide automatic lock positions for service and operating.
5. Specify Service Chain mounting location.
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 pullbox dimensions & locations.
BOX GIRDERS MAINTENANCE LIGHTING NOTES:

1. Submit shop drawings to the Engineer detailing the layout of the maintenance lighting system for the entire structure. The shop drawings must include, but not be limited to, the following items:
   a. Conduit layout and installation details through diaphragms, around post-tensioning (PT) ducts, lateral bracing and cross frames as necessary.
   b. Conduit access through box girder and diaphragms with minimum 1” clearance in all directions.
   c. Conduit expansion fitting details.
   d. Fastener details for the interior electrical system.
   e. Single line diagram showing mini-power centers, switches, contactors, timers, etc.
   f. Mini-power center details including circuit breaker details.
   g. Mini-power center mounting details if required.
   h. Feeder schedule.

2. Ensure installation meets all requirements of the latest edition of the National Electrical Code (NEC) and local ordinances. Install grounding in accordance with NEC Article 250. Maintain separation between 480V and 250V conductors / conduits throughout.

3. Furnish all labor, equipment, materials, and incidentals required for a complete and functional installation.

4. Use only new, unused and Underwriters Laboratories (UL) listed equipment and materials for outdoor use.

5. Furnish and install polyvinyl chloride (PVC) conduit in conformance with UL Section 651, NEC Section 347 and NEC Type TC-U, UV-resistant and sched 80. Bend conduits as necessary to connect to loads.

6. Provide PVC sleeve 2” bigger in diameter than conduit to accommodate construction tolerances.

7. Install UL labeled expansion fitting for specified PVC conduit at structure expansion joints. Provide certification that the expansion fitting meets the following minimum requirements: Compatibility with the connected conduits, water proof, UV protected and allows longitudinal movement equal to that of the Expansion Joint.

8. Use only Alloy 316 stainless steel supporting hardware. Provide minimum 3/8” & 1/2” fasteners. For concrete or SPF form mounting, provide anchor bolts (expansion, drop-in or adhesive) suitable for dynamic loading (due to vibration caused by traffic). Install fasteners to avoid conflicts with reinforcing steel and PT ducts. For structural steel mounting, do not attach fasteners to main members, i.e. webs and flanges.

9. Furnish power distribution at 480V AC, 1 phase, with single-phase 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 mini-power center will provide power to no more than 1000’ of bridge, preferably 500’ on each side of the mini-power center. A 480V top feed, 250V bottom feed to maintain separation.

10. Furnish and install lighting contactors to switch the 480V AC feed to the mini-power centers.

11. Furnish and install cooper conductors, Type THHW. Do not use any conductor larger than #4 AWG.

12. Provide enough slack in all terminations to allow for minor shifting at the structure.

13. Furnish and install National Electric Manufacturers Association (NEMA) Type 4X (non-metallic) surface mounted boxes sized in conformance with the NEC.

14. Furnish and install 120V duplex receptacles (GFI, NEMA Type 5–20R), in non-metallic outlet boxes at 50’ maximum on centers. Provide each receptacle with a gasketed weather-resistant outdoor plate. Maximum wire size to connect to receptacles is #12 AWG.

15. Furnish and install surface mounted, fully enclosed, incandescent light fixtures with gasketed clear globes and wire guards at 50’ maximum on centers. Provide 100 watt 120 volt vibration resistant and brass base incandescent lamps.

16. Locate switches at each end of each span and at every access door.

17. Provide two four reset timers for each circuit to turn off the lighting system automatically.

18. Include the cost of the box maintenance lighting system in the pay item for Lighting – Inside Box Girder.

Tabulate items in the plans.

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. Coordinate all lighting fixtures and equipment locations with the Structure Plans.

2. Tabulate in the plans and include in the THDOC/PORT, for bid purposes, the pay items for the maintenance lighting system such as conductors, conduit, electrical work, etc.

CROSS REFERENCES:
1. Refer Maintenance Light Details, see Sheet 2.
2. For actual bridge section, see Structures Plans.
CONCRETE BOX GIRDER BRIDGE SECTION THRU END BENTS

LITING DETAILS FOR CONCRETE BOX GIRDER BRIDGE

SECTION A-A

SECTION B-B

SECTION C-C

CROSS REFERENCE:
1. For Box Girder Maintenance Lighting Notes see Sheet 1.

STEEL BOX GIRDER BRIDGE SECTION THRU END BENTS

LITING DETAILS FOR STEEL BOX GIRDER BRIDGE

(Cross Frame section shown, other Transverse Stiffener sections similar)
NOTE: Type 17 bars used in Superstructures shall be tilted to obtain Minimum cover.

NOTE: For Bar Dimensions See REINFORCING BAR LIST sheet(s) in Structures Plans.

2010 FDOT Design Standards
STANDARD BAR BENDING DETAILS

Sheet No. 21300
Sheet No. 1 of 1

Revised 07/01/05

Bar Size
D

180° Hooks
A or G
J
90° Hooks
A or G

3 254" 5" 3" 6"
3 185" 10" 7" 8"
3 156" 12" 4" 10"
5 129" 16" 8" 12"
5 126" 14" 6" 16"
7 8" 16" 12" 20"
7 12" 20" 16" 24"
9 16" 24" 30" 28"

Bar
D

90° Stairups (Ties Similar)

Tie Hook Dimensions

Bar
D

90° Hooks

A or G

135° Hooks

A or G

5" 254"
4" 185"
4" 156"
10" 129"
12" 126"
16" 8"
16" 12"
20" 16"
20" 12"
24" 10"
24" 16"
30" 16"

Spines may be accomplished by taping 15 turns. Cost of Channel/Spacers and Spines shall be included in the Contract Unit Price for Rein. Steel (Substructure).

# Dimension is approximate.
*Hook Styles Detailed on this sheet for Illustration Only.

# Actual Hook Style for any particular bar will be shown under A or G Heading on REINFORCING BAR LIST sheet(s) in Structures Plans.

Variations of these dimensions may be necessary to fit the reinforcement in precast or pre-stressed members as the member is fabricated.

2010 FDOT Design Standards
STANDARD BAR BENDING DETAILS

Sheet No. 21300
Sheet No. 1 of 1

Revised 07/01/05
GENERAL NOTES:

Work this Standard with Index Nos. 2150, 21620 and 22530.

STRUCTURAL STEEL:

Steel Notes and Rated Sections shalbe 450 & 709 Grade 50.
Pipe piles shalbe 450 & 252 Grade 30, Fy = 35 ksi.

RISERS, LAG SCREWS AND THREAD2D RIST SCREWS:

Furnish high strength bolts in accordance with 45M A325. Furnish threaded
stock in accordance with 45M A490. Furnish Lag Screws in accordance with 45M A577.
Furnish steel washers and nuts compatible with bolts, Threaded Stock and Lag Screws.

TINNING AND LAGGING:

Tin the and Lagging shalbe No. 1 Southern Yellow Pine.

BACKWALL BENT PILES:

Timber Pile:

10. Minimum Embankment into compacted backfill to soil having a blue count greater than 6. (RCS).
Ultimate Capacity greater than 20 tons.
Splices are not allowed on any timber piles.

H-Piles:

10. Minimum Embankment into compacted backfill to soil having a blue count greater than 6. (RCS).
Ultimate Capacity greater than 20 tons.
Splices are not allowed on any timber piles.

Timber piles are admisible between backwall pile and cap.
Test piles are not required for backwall piles.

EXPANSION JOINTS:

Inspect the FTFE (Terion) layer and stainless steel plate prior to installation.
Do not use any bearing that has a severely damaged or unbranded FTFE layer.
Clean FTFE of all grit and grime prior to installation.
Clean stainless steel plate of all grit and grime prior to installation and finish to a smooth
buffed surface.

DISTRIBUTING BEAMS:

Longitudinal stops restraining the distributing beams may be lengthened or shortened to
Center the distributing beam bearing on the cap beam.
The longitudinal stops are to be on the distributing beams and frame.

EXPANSION JOINT SETTING:

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.

STORAGE FACILTY:

Cantilever:

Flott Statewide Aluminum Shop
2590 Camp Rd.
Divide, Fl.
45777-8507
For shipping weights and dimensions of Temporary Bridge elements.

SHIPPED WEIGHTS AND DIMENSIONS:

Cantilever:

Type | Length | Width | Weight (lbs.)
--- | --- | --- | ---
CurT | 3' | 6'-3" | 800
CurT | 10' | 6'-3" | 1420
CurT | 15' | 6'-3" | 2500
CurT | 20' | 6'-3" | 2800
NonCurT | 5' | 5'-3" | 650
NonCurT | 10' | 5'-3" | 1000
NonCurT | 15' | 5'-3" | 1600
NonCurT | 20' | 5'-3" | 2800

Shipping weights and dimensions of other bridge components can be
referred to in "Arrow Panel Bridging, Series 300, Technical Handbook".

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 Transom as shown in the
"Arrow Panel Bridging Technical Handbook".

- Variation in span lengths in increments of 10’
- 30’ minimum span length
- 60’ maximum span length
- For continuous spans the ratio of the end span length to the adjacent span length
  shall not be less than 1:1 to prevent the shorter span from lifting off its bearings
  under live load
- Limit continuous length of bridge to 300’

Specify distributing beams for all span lengths. Details presented assume use of
continuous spans.

Design the pile cap connection to pile assuming the truss reaction with a minimum of 1”
clearance. Design of this connection details the responsibility of the Engineer of Record.
Select the pile type considering the driving capacity requirements of the production piles
on the permanent bridge, free standing height, water level and soil conditions.
Refer to "Arrow Panel Bridging Series 300 Technical Handbook" for temporary bridge
dimensions and capacities.

These Standards are based on the DOT current inventory of temporary bridge elements
which are manufactured in accordance with Arrow Series 300 Double Wide design.

The Approach span and Ramp span are to be simple spans, each 5”-0” in length, to
eliminate Live Load uplift at backwall and grade beam support.
Do not place the temporary bridge on a vertical curve. A constant grade is acceptable.
Refer to "Arrow Panel Bridging Technical Handbook" for maximum grade and elevation
tolerance from constant grade (Bent to Bent and Cross-Stp for final cap elevations.

The temporary bridge is to have a zero cross-slips. Provide asphalt uplift transitions
to a zero cross slope outside the limits of the temporary bridge.
Design the foundations according to current AASHTO LRFD Bridge Design
Specifications.

For Substructure Design use the following:
Dead Load Factor = 1.25
Live Load Factor = 1.35

SERVICE LEVEL LOADS:

Calculate reactions using superstructure dead load unit weight = 1.25 kip/ft
Include a concentrated dead load = 250 lbs per truss plate at abutments. This
load accounts for 1 end post and 1 bearing per truss plate.

Calculate wind force on superstructure using basic wind force of 0.45 kip/ft
Calculate the above loading using wind pressures in Table 3.8.12.2-1 of AASHTO LRFD
Bridge Design Specifications.

Example

For wind slope of 30°
W: Lateral = 0.45 (0.065/0.75) = 0.39 kip/ft
W: Longitudinal = 0.45 (0.028/0.75) = 0.17 kip/ft

Plans for temporary bridge shall, as a minimum, cover the following:
1. General Notes Sheet
2. Simple span bearing details if noncontinuous spans are selected.
3. Grade changes at the extremities of the bridge.
4. Plan and elevation sheets with span lengths, abutments, alignment, grade and turning locations.
5. Foundation layout sheets including pile spacing & bent detailing.
6. File data sheets showing pile type, size, cut off elevations, capacity & estimated lengths.
TYPICAL PLAN VIEW OF DETOUR BRIDGE
(TIMBER PILE SHOWN, STEEL H PILES AND STEEL PIPE PILES SIMILAR)
ELEVATION VIEW

(TIMBER PILES SHOWN, STEEL H PILES AND STEEL PIPE PILES SIMILAR)
DETAILS FOR FOOT SUPPLIED FIXED BEARINGS

DETAILS FOR FOOT SUPPLIED EXPANSION BEARINGS
ELEVATION VIEW OF DISTRIBUTING BEAM
(FIXED BEARING SHOWN, EXPANSION BEARING SIMILAR)
(Timber Intermediate Bent shown, Steel H Pile and Steel Pipe Pile Intermediate Bents similar)

Note:
- Bearing may be shifted from Truss Pile as shown. Intermediate Bent may be shifted from Bearing an additional 3" to allow for pile placement tolerances.

Bent Cap & Bearing Plate shown dashed

Distributing Beam

Detour Bridge Superstructure (Truss and Transom members shown dotted)

Elevation View of Distributing Beam (Fixed Bearing Shown, Expansion Bearing Similar)
(Timber Intermediate Bent Shown, Steel H Pile and Steel Pipe Pile Intermediate Bents Similar)

End View A-A
Distributing Beam End Frame Detail

Bearing & Distributing Beam

Truss Retainer Plates

Lateral Alignment Dovetails (Typ.)

Bracing Bolts

AR22 Distributing Beam

AR22 Distributing Beam shown dashed

AR505C Distributing Beam End Frame

AR23 Distributing Beam

AR23 Distributing Beam End Frame

AR505C Distributing Beam End Frame

AR505C Distributing Beam (Typ.)

Truss Retainer Plates (Location, number and type vary)

Lateral Alignment Dovetails (Typ.)

Bracing Bolts

2'-0" 3'-2"

3'-0" 1'-0"

9" 9"

AR822 Distributing Beam

AR822 Cord Bolts

AR823 Distributing Beam End Frame (Typ. both ends)

AR822 Distributing Beam End Frame (Typ. both ends)

AR822 Distributing Beam (Typ. both ends)

2'-0" (C to C Trusses)
VIEW B-B
(SHOWING END OF CAP PLATES)

PLAN VIEW

ELEVATION VIEW

HOLD DOWN STRAP ASSEMBLY DETAIL

BACKWALL BENT DETAILS

SECTION A-A

STRAP PLATE DETAIL

CAP BUTT SPLICE PLATE DETAIL

2010 FDOT Design Standards
TEMPORARY DETOUR BRIDGE DETAILS
TIMBER PILE FOUNDATIONS

Sheet No. 21610
**FIXED BEARING DETAILS**

**PARTIAL PLAN VIEW**

- 1/4" x 1/2" Fixed Bearing Keeper Bar (Typ.)
- 3/8" Steel Pipe Pile Cap Plate
- 2-2" Ø x 1/2" x 5'-0" Steel Pipe Cap

**PARTIAL ELEVATION VIEW**

- 3/8" Steel Pipe Pile Cap Plate
- 1/2" Steel Pipe Pile

**END VIEW**

- 1/4" x 1/2" Fixed Bearing Keeper Bar (Typ.)
- 1/2" Steel Pipe Pile Cap Plate
- 2-2" Ø x 1/2" x 5'-0" Steel Pipe Cap
- 24" Ø Steel Pipe Pile

**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

PARTIAL PLAN VIEW

PARTIAL ELEVATION VIEW

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.
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 shall adopt these methods with the approval of the Engineer of Record provided the post-tensioning system is protected from contamination during all intermediate phases 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 in a vertical face or exiting from the bottom of the bottom soffit.

10. All grout inlets / outlets exiting on vertical surfaces shall be directed toward the inside face of exterior splices 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
- Optional Grout Outlet
- End Anchor with Grout Outlet
- Drain / Grout Inlet
- Grout Inlet
- Direction of Grout Flow
- Inspection Location
Post-Tensioning Vertical Profiles for Staged Grouting
(Simultaneous Low Point Grouting through a Manifold is not Permitted)

Profile 13

Profile 14

Profile 15

Profile 16

Profile 17

20-Lt. Spacing of
Intermediate Grout Inlets

NOTES: Grouting Procedures
1. Take into account longitudinal grade, if any, and establish direction of grouting.
2. Orient end anchors so that grout outlet is at the top.
3. Provide grout outlets at anchor.
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
- Optional Grout Outlet
- Drain / Optional Grout Inlet
- Direction of Grout Flow
- Grout Inlet
- Inspection Location

2010 FDOT Design Standards
Sheet No. 21801
2 of 2
TYPICAL ALTERNATE POUR-BACK TREATMENTS FOR ANCHOR PROTECTION ON EXPOSED SURFACES AND EXPANSION JOINTS

TYPE 1A

TYPE 1B

HIGH MOLECULAR WEIGHT METHACRYLATE

EXOXY GROUT POUR-BACK IN PIPE RECESSES

POST-TENSIONING GROUT POUR-BACK

EXOXY GROUT (OPTIONAL)

POST-TENSIONING ANCHOR PROTECTION

TYPE 2

TOP 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

TYPE 5

ANCHOR PROTECTION FOR PT BARS

TYPE 6

3 Bar or Equal

EPOXY GROUT POUR-BACK

PT BAR

EPOXY GROUT POUR-BACK

TYPE 7

ANCHOOR PROTECTION FOR PT BARS

STEEL CAP OR COVER

EPOXY GROUT POUR-BACK

TYPE 8

FLAT SLAB ANCHOR PROTECTION

TYPE 9

TRANSVERSE TENSION ANCHOR PROTECTION
GROUT OUTLET DETAIL AT HORIZONTAL SURFACES


2. Grout Outlet/Shutdown Valve
   - Place Anchor Grout Outlet/Inspection Port at Top of Anchor. Provide Threaded Plug in Anchor after Grouting.
   - Grout Outlet/Shutdown Valve

3. FILLING POCKET
   - Threaded Plug, Mortar or Epoxy Plugs not allowed.

4. INSTALLATION & SHIPPING
   - Remove and Clean as Per Grout Outlet/Inlet at Horizontal Surfaces.
   - Inspect Anchor for Void through Grout Inlet/Outlet at Horizontal Surfaces for Procedures.

5. INSPECTION
   - Install Permanent Threaded Plug after Inspection of Voids.
   - Grout Plug into Pipe Recesses.

6. PROTECTION
   - Round Pocket Formed for Gravity Feed Placement of Grout Acceptable
   - Modified Square Pocket Formed for Gravity Feed Placement of Grout Acceptable
   - Square Pocket Formed for Vacuum Grouting Required

NOTES:
1. Holes used for the Inspection and Grout Inlets/Outlets may be formed using Tapered Pipes or Mandrels.
1. **GROUT OUTLET CONNECTION TO TENDON**

   **PROCEDURE**
   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 (nonfascial) surfaces of I-Beams. For other Surfaces, Plug Recess with both Threaded Cap and Epoxy Grout.

2. **POCKET PREPARATION**

   **NOTE:**
   Stressing Anchorage or Nut to allow for flow of Grout into Cap.

3. **FILLING POCKET**

   **PROCEDURE**
   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 (nonfascial) surfaces of I-Beams. For other Surfaces, Plug Recess with both Threaded Cap and Epoxy Grout.

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**HIGH POINT INSPECTION**

**LOCATION AT GROUT OUTLET**

Details shown for I-Beams/Bulb-T's - Details for CIP. Boxes with Internal Tendons Similar.
**ELEVATION OF GROUT INLET**

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.

**SECTION**

**TEMPORARY ACCESS HOLES**

**Notes on 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" high and shall be limited to (1) per span.

2. Slab block-outs for temporary or permanent longitudinal post-tensioning tendons are not allowed. Temporary or permanent FT 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 webs is allowed for construction per span. Block-outs shall be a minimum of 22" from the nearest duct or anchor and shall be located as to prevent direct drip onto bottom slab anchors.

**Notes on Repair of Temporary Access Holes, Block-outs, and Lifting Holes**

1. Form all large blockouts with tapered sides.
2. Immediately before casting the concrete, mechanically clean 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 High Molecular Weight Methacrylate.
5. Alternatively, epoxy grout may be used to repair holes. High Molecular Weight Methacrylate is not required with epoxy grout.

**DETAIL OF GRIP, LEDGE AT ABUTMENTS AND EXPANSION JOINTS FOR SEGMENTAL AND CAST-IN-PLACE BOX CONSTRUCTION**

**Use Approved Duct Couplers with Post-Tensioned System**
Plastici Nucer, Works and Suctical Co-Mosite Lumbor Wale. Lable Sic.}

16” DIAMETER COMPOSITE PLASTIC PILES - INDEX No. 21900 AND 21920 ONLY: Provide 16” Diameter Composite Plastic Piles in accordance with Specification Section 973. Provide piles of sufficient length to achieve a minimum embedment of 24” into soil having a blow count greater than 6 (N > 6). 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 > 6). Pile splices and build-ups are not permitted. Use only 14” Square Prestressed Concrete Piles with 8” - 1” 8-strand Low Relaxation Strands fabricated in accordance with Index No. 20914.

Plasitic Lumber and Structural Composite Lumber Wale: Provide Plastic Lumber and Structural Composite Lumber Wale in accordance with Specification Section 975. Wale shall be continuous and spliced only at locations shown on the plans.

Plastic Lumber Decking for Catwalks: Provide Plastic Lumber decking for catwalks where called for in the plans in accordance with Specification Section 973.

Install Plastic Lumber Decking according to manufacturer’s recommendations using stainless steel 1/4” x 3” minimum deck screws.

Fiberglass Open Grating for Catwalks: Provide Fiberglass Open Grating for catwalks where 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 1/4”. Design live loads and deflections shall be 50 psi uniformly distributed load with a maximum deflection of 1/36” or U/200 at the center of a simple span or a concentrated load of 250 pounds with a maximum deflection of 1/36” at the center of a simple span. Color of fiberglass Open Grating shall be grey or black.

Install Fiberglass Open Grating according to manufacturer’s recommendations using stainless steel hardware, screws, bolts, nuts and washers. Attach Fiberglass Open Grating to Wale and Deck Supports at a 2” - 3” maximum spacing so as to resist pedestrian live loads and uplift forces from wind, buoyancy and wave action.

Clearance Gauge and Light: Clearance Gauge to be furnished by the Contractor and erected by the Contractor. Clearance Gauge width and height shall be determined by the United States Coast Guard District Commander. Provide and install Clearance Gauge Light in accordance with Specification Section 510 and Index No. 21920.

Navigation Lights: Provide and install Navigation Lights in accordance with Specification Section 510, Index No. 21920 and/or project specific details. Provide and maintain Temporary Navigation Lights during construction until permanent Navigation Lights are operational.

Bolts, Threaded Bars, Nuts, Screws and Washers: Furnish stainless steel bolts in accordance with ASTM F593 Type 316. Furnish stainless steel threaded bars in accordance with ASTM A493 Grade 88, 888. Furnish stainless steel nuts in accordance with ASTM F594 Type 326, Furnish stainless steel screws in accordance with ASTM F593 Type 305. Furnish stainless steel washers compatible with bolts, threaded rods and nuts under heads and nuts. Torque Nuts on 1” diameter bolts and threaded bars to 150 ft-lb. Keep threads on bolts, threaded bars and nuts free from dirt, coarse grime and sand to prevent galling and seizing during tightening.

Splice Plates: Furnish Splice Plates in accordance with ASTM A414 Type 316.

Wire Rope - INDEX No. 21930 ONLY: Furnish Wire Rope in accordance with Specification Section 938.
SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF SINGLE BRIDGE WITH NONSKEWED CHANNEL

SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF DUAL BRIDGES WITH NONSKEWED CHANNEL (PARALLEL DUAL BRIDGES SHOWN, NONPARALLEL DUAL BRIDGES SIMILAR)

SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF SINGLE BRIDGE WITH SKEWED CHANNEL

SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF DUAL BRIDGES WITH SKEWED CHANNEL (PARALLEL DUAL BRIDGES SHOWN, NONPARALLEL DUAL BRIDGES SIMILAR)

*CROSS REFERENCES:* See Structures Plans, Plan and Elevation and Foundation Layout Sheets for magnitude and orientation of Channel Skew Angle.
CROSS REFERENCES:
For Sections A-4 and B-8 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.
### 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>
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<td>A5</td>
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### PLASTIC LUMBER BILL OF MATERIALS

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<th>SIZE (NOMINAL)</th>
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** Note:**
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- **Provide Fiberglass Open Grabbing in lieu of 2" X 12" Plastic Lumber when called for in the Plans. Mounting hardware shall be Stainless Steel. Installer Manufacturer's recommendations. See Index No. 21900 and Structures Plans for Notes and Details.**
### Structural Composite Lumber Bill of Materials

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# Structural Composite Lumber and Plastic 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. Installer Manufacturer's recommendations. See Index No. 21900 and Structures Plans for Notes and Details.**
### Structural Composite Lumber Bill of Materials

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<thead>
<tr>
<th>MARK</th>
<th>SIZE (DIMENSION)</th>
<th>DIMENSIONS</th>
<th>BOARD FT PER EACH</th>
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### Plastic Lumber Bill of Materials

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<tr>
<td>F6</td>
<td>6&quot; X 10&quot; PLASTIC LUMBER</td>
<td>16'-0&quot; (STRAIGHT)</td>
<td>79.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>8&quot; X 10&quot; PLASTIC LUMBER</td>
<td>5'-8&quot; (STRAIGHT)</td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>6&quot; X 6&quot; PLASTIC LUMBER</td>
<td>4'-1&quot; (STRAIGHT)</td>
<td>12.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>4&quot; X 4&quot; PLASTIC LUMBER</td>
<td>4'-0&quot; (STRAIGHT)</td>
<td>1.5 PER LF EACH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>2&quot; X 6&quot; PLASTIC LUMBER</td>
<td>1'-0&quot; (STRAIGHT)</td>
<td>1.2</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, installer Manufacturer's recommendations. See Index No. 21950 and Structures Plans for Notes and Details.