ROADWAY AND TRAFFIC DESIGN STANDARDS

APPROVED BY

JANUARY 1986
This document was promulgated at an annual cost of $15.02 per copy to provide standards and criteria for the design, construction and maintenance of highway transportation facilities by governmental agencies, consultants, contractors and the citizens of the State of Florida.
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1986
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<td>Temporary and Permanent Construction Easements added. Board Foot Measure revised.</td>
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<td>'Symbols' headings changed to 'General Symbols'. Easement Line added.</td>
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<td>One-half of former Sheet 1 of 2 of Index 102.</td>
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<td>Pipe opening note deleted. (Transferred to Sheet 3 of 3) 'Eyebolt And Chain Requirements' for Index 218 added. Sump Bottom details added.</td>
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<td>Utility conflict manholes subtitles changed. Note 4 revised and notes 7 and 8 added under 'Optional Construction Joints' details. Pipe opening notes added to details for 'Minimum Dimensions for Box And Riser Segments'. General Note 4 revised.</td>
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<td>Minor drawing corrections for rebar location. Sod quantity rounded.</td>
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<td>Grate changed to reflect steel type of Inlet Type D. General Note No. 2 completely revised. Sod quantities rounded.</td>
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## REVISIONS
ROAD DESIGN STANDARDS
1986

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<td>250</td>
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<td>Dimension added to End View detail.</td>
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<td>Class I concrete quantity added for 54&quot; Single CM pipe.</td>
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<td>Quantity table expanded. Minor drawing changes.</td>
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<tr>
<td>261</td>
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<td>Complete revision. Expanded to include 3:1 slopes. Reinforcing steel modified. Structures regrouped.</td>
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<td>Formerly Sheet 2 of 2. Quantity table expanded to include 3:1 slopes. Grate angle material changed.</td>
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<td>Front slope and tie bar revised.</td>
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<td>272</td>
<td>1-4 of 5</td>
<td>Culvert pay limit redefined and sod quantities rounded.</td>
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<td>Culvert pay limit redefined and sod quantities rounded.</td>
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<td>Same as above, also, 8&quot;,10&quot; and 12&quot; pipe sizes added to table of 'Dimensions and Quantities.'</td>
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<td>'Permissible Pavement Modifications For Class I Turnouts' detail added.</td>
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<td>&quot;a&quot; and &quot;b&quot; labels corrected on Section EE. General Note No. 7 inserted.</td>
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<td>Bottom slab notation within structure redefined.</td>
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<td>286</td>
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<td>'External' added to filter fabric description in General Note No. 8. General Note No. 9 added. Underdrain Types Va and Vb added. Design Note No. 6 added and No. 7 revised and renumbered.</td>
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<td>FC-3 deleted from notation on 'Curb And Gutter Adjacent To Flexible Pavement' detail. 'Concrete Bumper Guard' added.</td>
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<td>Pavement and curb slopes corrected on 'Juncture Details'</td>
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<td>General Note No. 3 replaced.</td>
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<td>304</td>
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<td>Modified to conform with ATBCB 'Minimum Guidelines' and Requirements for Accessible Design.'</td>
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<tr>
<td>305</td>
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<td>Trade name changed from 'Hugensmith Materials, Inc.' to 'Iron Manufacturing Co., Inc.'</td>
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<td>400</td>
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<td>General Note No. 4 revised (8' to 6'). General Note No. 6 replaced. General Note No. 7 deleted. General Note No. 10 expanded. Remainder of notes renumbered. General Note No. 12 added.</td>
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<td>410</td>
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<td>General Note No. 1 added. Other notes renumbered.</td>
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<td>General Note No. 13 added.</td>
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<td>General Note No. 4-A (7), B(4), C(4) and D(2) revised. General Note No. 10 added and succeeding notes renumbered. Table for 'Type IV Vinyl Coated Fabric' added.</td>
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<td>General Note No. 2 revised. General Note No. 3 added.</td>
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<td>510</td>
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<td>Curves Replotted on 'Design Superelevation Rates' chart.</td>
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<td>513</td>
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<td>Complete Revision.</td>
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<td>514</td>
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<td>Options under 'Codes 980 and 981' added.</td>
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<td>515</td>
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<td>Completely revised to conform with manual entitled &quot;Policy And Guidelines For Vehicular Connections To Roads On The State Highway System.&quot;</td>
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<td>Same as above, also, detail for 'adverse superelevation' added.</td>
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<td>'Paving connections on existing facilities' information added.</td>
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<td>'Clear Recovery Area (CRA)' changed to 'Clear Zone (CZ)' Footnote added. DIVIDED OR UNDIVIDED - DESIGN SPEED OF 35-45 MPH:</td>
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<td>CLEAR ZONE: Criteria revised.</td>
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<td>LIGHT POLES: Criteria revised.</td>
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<td>ERRATA</td>
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<td>End Anchage Type II 'Note' expanded.</td>
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<td>End Anchage Type II 'Note' expanded</td>
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<td>Approach post spacing added to 'Installation-Case I And Case II' detail.</td>
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### Standard Symbols for Plan Sheets

#### General Symbols

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<td>LIMTED ACCESS LINE</td>
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<td>BOX CULVERT</td>
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<td>TRANVERSE CONTRACTION JOINT</td>
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<td>TRANVERSE CONTRACTION JOINT WITHOUT DOWELS</td>
<td>TRANSITION STATION</td>
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<td>BENCH MARK</td>
<td>POINT OF INTERSECTION</td>
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<td>EDGES OF EXISTING PAVEMENT AND SIDEWALK</td>
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<tr>
<td>CURB</td>
<td>CURB AND GUTTER</td>
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<td>WATER WELL, SPRING</td>
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<td>EDGE OF WOODED AREA</td>
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<td>SHRUBBERY</td>
<td>GROVE OR ORCHARD</td>
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<td>CONCRETE</td>
<td>WOOD</td>
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<td>Rate of SuperElevation</td>
<td>Definition of Skew for Cross Drains and Barrels of Concrete Box Culverts</td>
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#### Utility Adjustment Symbols

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<td>OVERHEAD TELEPHONE CABLE</td>
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<td>COMBINATION POLE</td>
<td>GUY WIRE AND ANCHOR PIN</td>
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<td>ELECTRIC DUCT</td>
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<td>WATER MAIN</td>
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<td>SANITARY SEWER</td>
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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**Right of Way Design**

**STANDARD SYMBOLS**

[Diagram of symbols and their descriptions]
### Standard Symbols for Plan Sheets

#### Traffic Signals Symbols

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<th>Proposed</th>
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<td>Traffic Signal Head (Pole Mounted)</td>
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<tr>
<td>Traffic Signal Head (Pedestal Mounted)</td>
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<tr>
<td>Traffic Signal Head (Mast Arm Mounted)</td>
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<td>Traffic Signal Pole (Concrete, Wood, Metal)</td>
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<td>Vehicle Detector (Loop)</td>
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<td>Signal Cable (On Messenger Wire)</td>
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<td>Conduit</td>
<td>![Image]</td>
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<td>Vehicle Detector (Others)</td>
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<td>Pedestrian Detector (Push Button)</td>
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<td>Pedestrian Signal Head (Pole or Pedestal Mounted)</td>
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<td>Controller Cabinet (Base Mounted)</td>
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<tr>
<td>Controller Cabinet (Pole Mounted)</td>
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<td>Walk - Don't Walk</td>
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<td>Flash</td>
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<td>Signal Face Number</td>
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<td>Programmed Signal Head</td>
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<td>Messenger Wire</td>
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<td>Pole Tabulation Cross Reference</td>
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<td>Pole Tabulation Cross Reference (Joint Use Pole)</td>
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#### Lighting Symbols

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<tr>
<td>Existing Pole &amp; Luminaire to be Removed</td>
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<tr>
<td>Final Position of Relocated or Adjusted Pole &amp; Luminaire</td>
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<tr>
<td>New High Mast Lighting Tower</td>
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<td>City or Utility Owned Luminaire &amp; Pole</td>
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<td>PVC (Polyvinyl Chloride) Lighting Conduit and Conductors</td>
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<td>Rigid Galvanized Lighting Conduit and Conductors</td>
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<td>Concrete Lighting Pull-Box</td>
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<td>Waterproof Lighting Pull-Box</td>
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#### Signing and Pavement Marking Symbols

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<th>Pavement Arrow</th>
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</thead>
<tbody>
<tr>
<td>Single Solid Line</td>
</tr>
<tr>
<td>Double Solid Line</td>
</tr>
<tr>
<td>Skip Line</td>
</tr>
<tr>
<td>Stop Bar</td>
</tr>
<tr>
<td>Traffic Sign (Post Mounted)</td>
</tr>
<tr>
<td>Traffic Sign (Overhead)</td>
</tr>
<tr>
<td>Sign Number</td>
</tr>
<tr>
<td>Sign Item Number</td>
</tr>
<tr>
<td>Traffic Flow Arrow</td>
</tr>
</tbody>
</table>

---

**Standard Symbols**

---
**GENERAL DESIGN NOTES**

1. Basins should be as deep as practical with a minimum depth of 2.0 feet.
2. In Type A, the top of the wall is below high water; no fence shall be required along the top of the wall.
3. In Type B, the wall shall be located as far from the wall as practical. On steep banks, two or more walls may be required. Intermediate walls shall be constructed without airtight seals.
4. In Type A, the 6" PVC pipe shall be constructed unless otherwise shown on the plans.

**GENERAL CONSTRUCTION NOTES**

1. Fence materials shall be aluminum or concrete only.
2. Aluminum posts shall be 3" diameter minimum. Aluminum nail braces shall be in accordance with Index 432. Concrete posts and nail braces shall be in accordance with 431. All posts shall be set in concrete.
3. Fabric shall be installed to inside of posts and nail braces, and tied to posts and bracing at 6" centers.
4. For additions or amendments, see Index Nos. 430 and 432.
5. All beam spans to be 1/3 unless otherwise shown on the plans.
6. Sediment basins to be constructed prior to commencement of work. Maintenance and cleaning shall be the responsibility of the Contractor until acceptance of project by the Engineer.
NOTE: Spacings shown in this chart are based on generalized conditions and should be adjusted based on actual site performance or hydraulic computations.

FLOW RATES (CFS)

- Very Light: < 5
- Light: 5 < 10
- Moderate: 10 < 15
- Heavy: 15 < 25
- Very Heavy: > 25

LEGEND
Flow
Soils

SOILS
Cohesive
- Firm Loam
- Clay Sands
- Clays
- Hardpans
Non-Cohesive
- Fine Sand
- Course Sand
- Gravels
- Sandy Loam
- Silt Loam

CHART I
RECOMMENDED SPACING FOR TYPE I AND TYPE II HAY BALE BARRIERS, TYPE III AND TYPE IV SILT FENCES AND PAVED DITCH HAY BALE BARRIERS
PROTECTION AROUND INLETS OR SIMILAR STRUCTURES

PRIORITY INLET

COMPLETED INLET

DITCH BOTTOM INLET

BALES BACKED BY FENCE

ANCHOR BALE WITH 2-2" x 2" x 4" STAKES PER BALE

Loose Soil Placed By Shovel And Lightly Compacted Along Upstream Edge Of Bales.

Type A or B Fence
Note: Bales to be staked at the direction of the Engineer.

BARREN FOR PAVED DITCH

When Filler Fabric Is Absent Of Distilled Sizes (Apes. 12" x 12")
Secure Edges By Extending And
Trimming Under Bards And Bales, Place
Shirt, Meet The Requirements Of Section 405 Of The Standard Specifications For Construction
To Be Included In The Contractor Unit Price For Grain Way Or Show, FL.

Loose Soil Placed By Shovel And Lightly Compacted Along The Upstream Edge Of Bales.

PLANT

Plan

PLAN

Anchor Bales With 2-2" x 2" x 4" Stakes Per Bale

90° On Centers (Typ.)

Limits Of Construction

Ditch Barrier

50° Min

50° Min

50° Min

Gated Ditch

Silt Barrier

Ditch Installation At Drainage Structures

To Be Used At Selected Sites Where The Natural Ground Slopes Toward The Toe Of The Slope

Barrels To Bales

Anchor Bales With 2-2" x 2" x 4" Stakes Per Bale

Loose Soil Placed By Shovel And Lightly Compacted Along The Upstream Edge Of Bales.

ELEVATION

ELEVATION

To Be Used At Selected Sites Where The Natural Ground Slopes Away From The Toe Of The Slope

Barrels For Fill Slopes

Barrel For Unpaved Ditches

Type I

Type II

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ROAD DESIGN

BALED HAY OR STRAW BARRIERS

AND SILT FENCES

DESIGNER

DATE

DRAWN

CHECKED

APPROVED

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2 OF 3
ELEVATION

TYPE III SILT FENCE

Note: Silt Fences to be paid for under the contract unit price for Staked Silt Fences (LF)

SECTION

Optional Post Positions

ELEVATION

TYPE IV SILT FENCE

SILT FENCE APPLICATIONS

Do not deploy in a manner that silt fences will act as a dam across permanent flowing
waterways. Silt fences are to be used at upland watersheds and turbidity barriers
used in permanent bodies of water.

Type III or Type II Silt Fences

Type III or Type IV Silt Fence Protection

Around Critical Highway Walls.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

BALED HAY OR STRAW BARRIERS
AND SILT FENCES

Sheet Date Checked Approved

1 1/18/00

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DRAFT PRINTED SHEET 3/3
FLOATING TURBIDITY BARRIERS

STAKED TURBIDITY BARRIER

TURBIDITY BARRIER APPLICATIONS

NOTES:
1. Turbidity barriers are to be used in all permanent bodies of water regardless of water depth.
2. Number and spacing of anchors depends on current velocities.
3. Deployment of barrier around pile locations may vary to accommodate construction operations.
4. A tugboat may require segmenting barrier during construction operations.
5. The above specifications include Type I Floating Turbidity Barrier since anchors are shown; however, if conditions warrant, Type II Floating Turbidity Barrier may be used. For additional information see Exhibit Specifications.

Note:
Turbidity barriers for flowing streams and tidal creeks may be either floating, or stacked types or any combinations of types that will suit the conditions and meet water quality requirements. The barrier depth will be of the Centrifuge type unless otherwise specified in the plans. However, permission will be under the pay than (1) established in the plans for floating Turbidity Barrier and/or Staked Turbidity Barrier. Placing it stacked Turbidity barriers to be restricted in vertical position unless otherwise directed by the Engineer.
ALT. A

FOR INLETS, MANHOLES AND JUNCTION BOXES

TYPE J

FOR INLETS, MANHOLES AND JUNCTION BOXES

1. WALLS OF CIRCULAR STRUCTURES (ALTERNATE A) MAY BE CONSTRUCTED OF CONCRETE OR BRICK, BUT RECTANGULAR STRUCTURES (ALTERNATE B) SHALL BE CONSTRUCTED OF CONCRETE ONLY. THE CONCRETE MAY BE CAST-IN-PLACE OR PRECAST.

2. WALL REINFORCEMENT AND THICKNESS ARE FOR EARTHER IN-LAY-CLASS OR PRECAST CONCRETE STRUCTURES. FOR CONCRETE STRUCTURES, REINFORCEMENT WITH I-PAN ELBSalles should be provided, in accordance with ASTM C 747. FOR PRECAST CONCRETE STRUCTURES, USE ASTM C 747 SPECIFICATION C-747, TABLE 11.3.1.5 WALL CONCRETE, TIP AND FLOOR SLAB ENHANCEMENTS AND REINFORCEMENT ARE FOR ALTERNATE B CONSTRUCTION.

3. ELONGATED STEEL, ALTHOUGH SPECIFICATION C-747, TABLE H: 8 WILL, IS MANDATED TO USE A CIRCULAR CAN OF STEEL, AREA EQUA TO THAT OF THE ELONGATED CAN AND PLACED IN THE CENTER OF THE CAN. THIS INSTALLATION IS FOR PRECAST CIRCULAR UNITS PRODUCED IN ACCORDANCE WITH ASTM C 747.


5. STRUCTURAL BOTTOMS (ALTERNATE A) MAY BE USED IN CONJUNCTION WITH EARTHLY INLAY TOPS. TYPES 1, 2, 3, 4, B, A, C, AND D CANARY ANY MANHOLE OR JUNCTION BOX UNLESS OTHERWISE SHOWN IN THE PLAN OR OTHER STANDARD DRAWING STRUCTURE BOTTOMS TYPE 2. ALTERNATE A UNITS CANARY INSTALLED FOR STRUCTURAL BOTTOMS TYPE 4.

6. REINFORCED STRUCTURAL BOTTOMS MAY BE SIZED AND LOCATED AS DIRECTED BY THE ENGINEER IN ORDER TO FACILITATE CONNECTIONS BETWEEN THE STRUCTURAL WALLS AND STRONG WALLS.

7. ENHANCEMENTS WERE IN THE TOP AND FLOOR CLASS AND ARE TO BE REPLACED WITH STRONGER EMBLEMS IN ACCORDANCE WITH THE REINFORCEMENT DETAIL SHOWN UNDER OMINAL CONSTRUCTION UNITS. UNLESS NOTE 5, DETAIL 3 OF 3.

GENERAL NOTES

ALL STEEL BARS SHALL HAVE 1/4 WITHIN 3/4 UNLESS OTHERWISE SHOWN. HORIZONTAL STEEL IN RECTANGULAR STRUCTURES SHALL BE LAMPED A MINIMUM OF 24 BAR DIAMETERS AT CORNERS.

THE CORNER FILLETS SHOWN ARE NECESSARY FOR RECTANGULAR STRUCTURES USED WITH CIRCULAR IDEAS, ANY INLET TANKS AND OR JUNCTION BOX WITH EARTHER INLAYS. ALL FILLETS WILL BE REQUIRED IN THE LOWER END OF THE ALL B VENTS WHEN USED WITH THE ALT. A BOX.

INLET THROATS, RISERS OR MANHOLE TOPS SHALL BE DECREES TO STRUCTURES AS SHOWN ON WIDE NO. 3.

STRUCTURAL BOTTOMS TYPE 2 ARE TO BE CHECKED FOR FLOATATION BY DESIGNEE OF PROJECT DRAWINGS.

LARGER THAN SPECIFIED STANDARD UNITS MAY BE SUBMITTED AT THE CONTRACTOR'S OPTION WHEN THESE UNITS ARE GOING TO INCREASE THE DEPTH OF UNITS AND ARE NOT WANTED TO BE REPLACED BY LARGER UNITS. ADDITIONAL COST TO THE DEPARTMENT. LARGER UNITS CANNOT REPLACE ALTERNATE A UNITS WITHOUT APPROVAL OF THE ENGINEER. THIS NOTE APPLIES TO STRUCTURAL BOTTOMS ONLY.

STRUCTURE BOTTOMS

TYPES J AND P

200
**EYE BOLT AND CHAIN REQUIREMENTS**

<table>
<thead>
<tr>
<th>Index Number</th>
<th>Inlet Type</th>
<th>Eye Bolt Length</th>
<th>Handling &amp; Remarks</th>
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</thead>
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<tr>
<td>217</td>
<td>MRS.1</td>
<td>4-7/8&quot; Side &amp; Spig.</td>
<td></td>
</tr>
<tr>
<td>218</td>
<td>MRS.2</td>
<td>4-7/8&quot; Side &amp; Spig.</td>
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</tr>
<tr>
<td>220</td>
<td>MRS.3</td>
<td>5&quot; Side &amp; Spig.</td>
<td></td>
</tr>
<tr>
<td>221</td>
<td>MRS.4</td>
<td>5-7/8&quot; Side &amp; Spig.</td>
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<td>222</td>
<td>MRS.5</td>
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<tr>
<td>223</td>
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<tr>
<td>225</td>
<td>MRS.8</td>
<td>8-1/2&quot; Side &amp; Spig.</td>
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<td>226</td>
<td>MRS.9</td>
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<tr>
<td>227</td>
<td>MRS.10</td>
<td>10&quot; Side &amp; Spig.</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL NOTE:**

- Mortar used to seal the pipe into the walls of precast units will be of such a mix that shrinkage will not cause leakage into or out of the units.

**BOTTOM CONSTRUCTION WHEN INLET SERVES AS MANHOLE**

- Channel to be formed with half-pipe and mortar or brick and mortar.

**CHANNELIZATION**

Channelization required of all drainage structures with two or more pipes.

- Smooth flow channels composed of concrete, or brick and mortar shall be constructed in the bottoms of all structures to a depth equal to half the diameter of the largest pipe.

**ALTERNATE LOCATION OF PIPE IN STRUCTURE WHEN PREFABRICATED FLOOR SLAB IS USED**

**LADDER BARS FOR STRUCTURES OVER 10' IN DEPTH**

**SUMP BOTTOM**
### Rigid Pavement

<table>
<thead>
<tr>
<th>PIPE TYPE/SIZE &amp; SHAPE</th>
<th>MINIMUM COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE</td>
<td></td>
</tr>
<tr>
<td>All Round B Elliptical</td>
<td>6&quot;</td>
</tr>
<tr>
<td>75/12&quot; Round B Arch Eq</td>
<td>9&quot;</td>
</tr>
<tr>
<td>75/12&quot; Or Larger Round</td>
<td>12&quot;</td>
</tr>
<tr>
<td>CORRUGATED STEEL</td>
<td></td>
</tr>
<tr>
<td>15&quot;-48&quot; Round</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>18&quot;</td>
</tr>
<tr>
<td>CORRUGATED ALUMINUM</td>
<td></td>
</tr>
<tr>
<td>15&quot;-48&quot; Round</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>18&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>24&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>30&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Polyethylene</td>
<td>18&quot;</td>
</tr>
<tr>
<td>15&quot;-24&quot; Round</td>
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<td>12&quot;</td>
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<tr>
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<td>18&quot;</td>
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### Flexible Pavement

<table>
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</tr>
<tr>
<td>All Round B Elliptical</td>
<td>6&quot;</td>
</tr>
<tr>
<td>75/12&quot; Round B Arch Eq</td>
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<tr>
<td>75/12&quot; Or Larger Round</td>
<td>12&quot;</td>
</tr>
<tr>
<td>Corrugated Steel</td>
<td></td>
</tr>
<tr>
<td>15&quot;-48&quot; Round</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>12&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>18&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>24&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>30&quot;</td>
</tr>
<tr>
<td>Corrugated Aluminum</td>
<td></td>
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<tr>
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<td>18&quot;</td>
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<tr>
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<td>24&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>30&quot;</td>
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### Unpaved W/O Select Bedding

<table>
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</thead>
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<td>All Round B Elliptical</td>
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</tr>
<tr>
<td>75/12&quot; Round B Arch Eq</td>
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<tr>
<td>75/12&quot; Or Larger Round</td>
<td>24&quot;</td>
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<tr>
<td>Corrugated Steel</td>
<td></td>
</tr>
<tr>
<td>15&quot;-48&quot; Round</td>
<td>18&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>24&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
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</table>

### Unpaved With Select Bedding (for 3"x1")

<table>
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<th>MINIMUM COVER</th>
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<td>75/12&quot; Round B Arch Eq</td>
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<td>75/12&quot; Or Larger Round</td>
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<tr>
<td>Corrugated Steel</td>
<td></td>
</tr>
<tr>
<td>15&quot;-48&quot; Round</td>
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<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>30&quot;</td>
</tr>
<tr>
<td>15&quot;-48&quot; Arch Equivalent</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

### 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's completed.
2. Less than the tabulated minimum cover may be used provided suitable method(s) are detailed in the plans. These features may include, but are not limited to extra strength pipe, select bedding, select backfill, and embankment.
3. Values shown are pressures for 3"x1" corrugations which must be specified to utilize the lesser cover.
4. Commercial and noncommercial refers to typical vehicular utilization of unpaved roads and drives where rutting and cover displacement may occur.

### Minimum Cover for Concrete, Steel, Aluminum and Polyethylene Pipe

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<tr>
<td>24&quot;</td>
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<td>30&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
</tr>
</tbody>
</table>

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**Note:** Extra base is required when cross slopes are located on sections subject to high-speed traffic (100 m/s or high volume traffic: 1800 ADT) and the cover is within the ranges specified in the table above. Extra base material to be routed for on or equivalent square yards less except when material is carried for on-lot or temporary base.

**EXTRA BASE FOR CROSS CURVETS UNDER FLEXIBLE PAVEMENTS**
### Round Pipe Dimensions

<table>
<thead>
<tr>
<th>Equiv Dia (in.)</th>
<th>Area (sq ft)</th>
<th>Wall Thickness (in.)</th>
<th>Classes</th>
<th>III, IV, V</th>
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<tr>
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<td>A, B</td>
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<tr>
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<td>2/4</td>
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<td>51/2</td>
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<td>61/2</td>
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### Round Pipe Installations

#### All Sizes

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<thead>
<tr>
<th>Design</th>
<th>Height Of Fill (ft)</th>
<th>Pipe Class</th>
<th>Bedding Class</th>
<th>Projection Condition</th>
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<tbody>
<tr>
<td>Standard</td>
<td>1-14</td>
<td>III</td>
<td>C</td>
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<tr>
<td>Modified Bedding</td>
<td>27-32</td>
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<td>B</td>
<td>Positive</td>
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<td>Modified Trench</td>
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<td></td>
<td>71-+</td>
<td>X</td>
<td>B</td>
<td>Imperfect</td>
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#### Elliptical Pipe Dimensions

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<thead>
<tr>
<th>Nominal Dimensions</th>
<th>Equiv Dia (in.)</th>
<th>Area (sq ft)</th>
<th>Wall Thickness (in.)</th>
<th>Classes</th>
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</thead>
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### Maximum Cover for Reinforced Concrete Pipe Round and Elliptical

**State of Florida Department of Transportation**

**Pipe Class**

- HE III: D-Load = 1350 lbs/ft² (0.1" Crack)
- D-Load = 2000 lbs/ft² (Ultimate)
- HE III: D-Load = 1350 lbs/ft² (0.1" Crack)
- D-Load = 2000 lbs/ft² (Ultimate)
- HE III: D-Load = 1350 lbs/ft² (0.1" Crack)
- D-Load = 2000 lbs/ft² (Ultimate)
- VE III: D-Load = 2000 lbs/ft² (0.1" Crack)
- D-Load = 3000 lbs/ft² (Ultimate)

**Cover Height**

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**Statewide:**

- Approved by: [Signature]
- Date: [Date]
### ROUND PIPE - 2 5/8 x 1 1/2 CORRUGATION

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### ROUND PIPE - 3 x 1 1/2 CORRUGATION

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### PIPE ARCH - 3 x 1 1/2 and 5 x 1 1/2 CORRUGATION

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* Recorrugated and not available. May be considered for cross drain and side drain applications only.
NA = Not Available
LA = Limited Availability
NS = Not Suitable (For Highway H-20 Loadings)

### MAXIMUM COVER FOR CORRUGATED STEEL PIPE ROUNP AND PIPE ARCH

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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**
**FLORIDA HIGHWAY DESIGN MANUAL**

**COVER HEIGHT**

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**F.S.A. Approval:** 03 3 of 4 205
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### PIPE ARCH - 2½" x 2½" CORRUGATION

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<th>Rise (in)</th>
<th>Equiv. Round Pipe (in)</th>
<th>Area (sq.ft.)</th>
<th>Minimum Sheet Thickness Required (in.)</th>
<th>Maximum Corner Pressure-Lbs/Sqft</th>
<th>Maximum Height Of Cover (ft.)</th>
<th>Min. Height Of Cover (ft.)</th>
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<tbody>
<tr>
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### PIPE ARCH - 3" x 1" CORRUGATION

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<thead>
<tr>
<th>Span (ln)</th>
<th>Rise (in)</th>
<th>Equiv. Round Pipe (in)</th>
<th>Area (sq.ft.)</th>
<th>Minimum Sheet Thickness Required (in.)</th>
<th>Maximum Corner Pressure-Lbs/Sqft</th>
<th>Maximum Height Of Cover (ft.)</th>
<th>Min. Height Of Cover (ft.)</th>
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<tbody>
<tr>
<td>36</td>
<td>7.1</td>
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<td>40</td>
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<td>42</td>
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<td>0.075(14)</td>
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<tr>
<td>48</td>
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<tr>
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<td>66</td>
<td>23.8</td>
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<td>108</td>
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<td>70.9</td>
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<td>114</td>
<td>70.9</td>
<td>120</td>
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<td>6000</td>
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</table>

**Notes:**
- **NA** - Not Available
- **LA** - Limited Availability
- **NS** - Not Suitable (For Highway H-20 Loadings)
- **SR** - Structural Review Required Which Shall Consider Temporary And Permanent Cover And Loadings (When FF > 0.0445 < 0.055) o
- **SR/NR** - Structural Review Required - Not Recommended Except For Deep Trench Installations (Deep ≥ Than 1.50 Above Top Of Pipe) (When FF ≤ 0.055)
- The structural review performed by the designer does not relieve the contractor from analyzing and taking any necessary precautions required to protect partially or completely constructed pipe from the equipment used during construction.

**CROUGATED ALUMINUM ALLOY ROUND PIPE AND PIPE ARCH**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**COVER HEIGHT**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Date</th>
<th>Approved By</th>
</tr>
</thead>
<tbody>
<tr>
<td>205</td>
<td>3/22</td>
<td>D. Smith</td>
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</table>

*The above information includes tables and diagrams related to the size and height of covers for different types of pipes, along with notes on structural considerations and review requirements.*
<table>
<thead>
<tr>
<th>INDEX NO.</th>
<th>INLET TYPE</th>
<th>TYPE CURB / GUTTER</th>
<th>GRADE CONSIDERATION</th>
<th>HYDRAULIC INTAKE (CFS)</th>
<th>BICYCLE SAFE / PEDESTRIAN SAFE</th>
<th>UTILITY LOCATION FROM CURB</th>
<th>MAXIMUM PIPE SIZE WITH STANDARD BOTTOMS</th>
<th>COMMENTS</th>
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</thead>
<tbody>
<tr>
<td>210</td>
<td>E &amp; F</td>
<td>Continuous</td>
<td>4.1</td>
<td>Yes / Limited</td>
<td>Inside</td>
<td>30°</td>
<td>30°</td>
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<tr>
<td>211</td>
<td>E &amp; F</td>
<td>Sag</td>
<td>9.0</td>
<td>Yes / Limited</td>
<td>Inside</td>
<td>30°</td>
<td>30°</td>
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<td>E &amp; F</td>
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<td>1.9</td>
<td>Yes / Limited</td>
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<td>30°</td>
<td>30°</td>
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<tr>
<td>213</td>
<td>E &amp; F</td>
<td>Sag</td>
<td>6.5</td>
<td>Yes / Limited</td>
<td>Inside</td>
<td>30°</td>
<td>30°</td>
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<td>214</td>
<td>E &amp; F</td>
<td>Continuous / Sag</td>
<td>3.1</td>
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<td>30°</td>
<td>30°</td>
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<tr>
<td>215</td>
<td>E &amp; F</td>
<td>Sag</td>
<td>7.5</td>
<td>Yes / Limited</td>
<td>Outside</td>
<td>30°</td>
<td>30°</td>
<td></td>
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<tr>
<td>216</td>
<td>E &amp; F</td>
<td>Continuous / Sag</td>
<td>4.4</td>
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<td>30°</td>
<td>30°</td>
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<td>217</td>
<td>E &amp; F</td>
<td>Sag</td>
<td>0.5</td>
<td>Yes / Yes</td>
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<td>30° Longitudinal Transverse</td>
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<tr>
<td>218</td>
<td>E &amp; F</td>
<td>Continuous / Sag</td>
<td>0.3</td>
<td>Yes / Yes</td>
<td>N.A</td>
<td>30° Transverse</td>
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<tr>
<td>219</td>
<td>E &amp; F</td>
<td>Sag</td>
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<td>220</td>
<td>E &amp; F</td>
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<td>4.0</td>
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<td>221</td>
<td>E &amp; F</td>
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<td>Yes / Yes</td>
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<td>E &amp; F</td>
<td>Continuous / Sag</td>
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<td>N.A</td>
<td>42° Longitudinal Transverse</td>
<td>30° Longitudinal Transverse</td>
<td></td>
</tr>
</tbody>
</table>

- **Hydraulic intake values** do not represent hydraulic capacity but are shown to compare inlets based on a 0.2% longitudinal slope, 0.2% cross slope, and a 90% efficiency factor. For other conditions the values shown should be adjusted for bypass flow or debris blockage. Sag inlet intake value is based on flooding the outside lane or shoulder, where spread rather than hydraulic intake may dictate inlet selection or spacing. Full design data and additional information is available in "A Study of Stormwater Inlet Capacities" by U.S.F.

- **Curb inlets and transitions** should be located outside pedestrian cross walk areas, preferably upgrade from these locations.

- **Double Throated inlets** are usually not warranted unless the minor flow is in excess of 50 feet per second or 0.5 cfs.

- **Median Barrier inlet types** 1, 2, 3, 4 & 5 can be made bicycle and pedestrian safe by specifying the restrictor grate.

- **Pipe sizes** are circular, Class III Wall, concrete pipe. Elliptical pipe and corrugated pipe are to be checked for fit in accordance with Index No. 70. Metal pipe sizes should be reviewed using 2 1/4 X 1 1/2 corrugation up to 30° and 3 X 1 1/1 corrugation for larger sizes.
GENERAL NOTES

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

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

3. All rebar reinforcing shall have 0.25” minimum cover unless otherwise shown. Inlet tops shall be either cast-in-place or precast concrete.

4. Precasting of this inlet top 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 D.O.T. Engineer of Record.

5. Concrete meeting the requirements of A.S.T.M. C 496 (4000 PSI) may be used in lieu of Class I concrete or pressed units manufactured in plants which are under the Standard Operating Procedures for the inspection of prestressed concrete products.

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

7. For inlet bottoms see index No. 200.

8. These inlet tops are designed for use with standard curb and gutter Type A and Type F. Louver circle, built to the pedestrian crosswalk where practical.

9. See index No. 204 for instrumental details.

10. All steel used for frame and cover shall meet the requirements of A.S.T.M. A 36.

11. Either cast iron covers or steel covers may be used. Steel covers shall be Class No. 30 castings in accordance with A.S.T.M. A 49.

12. When Alternate "C" Cover is specified in place of either the cast iron cover or galvanized steel frame or the galvanized steel frame and cover, covers shall be painted to match according to the painting detail shown on sheet 2 of 2, in lieu of field welding.

13. Tack weld cover to frame with backing bars or clips.

CURB INLET TOPS
TYPES 5 & 6

(See Sheet 2 of 2 For Steel Iron Cover and Frame)
CAST IRON COVER AND GALVANIZED STEEL FRAME

ALTERNATE G DETAIL

GALVANIZED STEEL COVER AND FRAME

CAST IRON COVER

FRAME

FOR CAST IRON COVER

HALF SECTION GD

FOR CAST IRON COVER

SECTION FF

FOR CAST IRON COVER

ANCHOR DETAIL

SECTION MM

SECTION NN

PLAN

PLAN

TOP VIEW

TOP VIEW
GENERAL NOTES

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

2. For grate details see index No. 220. The parallel bar grate shall be used unless the re雏cuting grate is called for in the plans. The re雏cuting grate shall be specified where bicycle traffic is anticipated.

3. For standard concrete barrier wall dimensions, and for dimensions of concrete barrier wall incorporating light standards within the wall, see index No. 401.

4. Reinforcing steel shall have 2" minimum cover.

5. All reinforcing steel #4 bars: longitudinal steel bars wound over full length of concrete barrier wall transition. Tie bars @ 12" on center. Reinforcing to be paid for under the contract unit price for concrete barrier wall.

6. For supplemental details see Index No. 201.

7. Inlets to be paid for under the contract unit price for Inlets (MBI Type 1, 2, 3, 4, or 5). Barrier wall to be paid for under the contract unit price for Concrete Barrier Wall, L.F.
## APPLICATION AND SELECTION GUIDE FOR DITCH BOTTOM AND MEDIAN INLETS

<table>
<thead>
<tr>
<th>INDEX NO.</th>
<th>TYPE</th>
<th>LOCATION</th>
<th>CAPACITY (CFS)</th>
<th>SAFETY</th>
<th>DEBRIS TOLENCENCE</th>
<th>PIPE SIZE LIMITATION</th>
<th>OTHER DESIGN CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>A</td>
<td>Limited Access Facilities</td>
<td>5  10  15</td>
<td>Traffic: Heavy Wheel Loads</td>
<td>Good</td>
<td>2'-0&quot;  18&quot;  3'-11&quot;  24&quot;  4'-8&quot;  30&quot;  4'-11&quot;  36&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td>231</td>
<td>B</td>
<td>Limited Access Facilities</td>
<td>16  20  25</td>
<td>Traffic: Heavy Wheel Loads</td>
<td>Excellent</td>
<td>3'-0&quot;  21&quot;  3'-10&quot;  27&quot;  4'-0&quot;  33&quot;  4'-7&quot;  39&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td>232</td>
<td>C</td>
<td>Outside CZ</td>
<td>6  10  15</td>
<td>Traffic: Infrequent</td>
<td>Poor</td>
<td>2'-0&quot;  18&quot;  3'-11&quot;  24&quot;  4'-8&quot;  30&quot;  4'-11&quot;  36&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Outside CZ</td>
<td>12  16  20</td>
<td>Traffic: Infrequent</td>
<td>Poor</td>
<td>3'-0&quot;  21&quot;  3'-10&quot;  27&quot;  4'-0&quot;  33&quot;  4'-7&quot;  39&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
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<tr>
<td></td>
<td>E</td>
<td>Outside CZ</td>
<td>13  17  22</td>
<td>Traffic: Infrequent</td>
<td>Poor</td>
<td>3'-0&quot;  21&quot;  3'-10&quot;  27&quot;  4'-0&quot;  33&quot;  4'-7&quot;  39&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>Outside CZ</td>
<td>19  23  28</td>
<td>Traffic: Infrequent</td>
<td>Poor</td>
<td>3'-0&quot;  21&quot;  3'-10&quot;  27&quot;  4'-0&quot;  33&quot;  4'-7&quot;  39&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td>233</td>
<td>F</td>
<td>Inside CZ</td>
<td>8  12  16</td>
<td>Traffic: Heavy Wheel Loads</td>
<td>Poor</td>
<td>2'-0&quot;  18&quot;  3'-11&quot;  24&quot;  4'-8&quot;  30&quot;  4'-11&quot;  36&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>Inside CZ</td>
<td>21  25  30</td>
<td>Traffic: Heavy Wheel Loads</td>
<td>Poor</td>
<td>4'-0&quot;  36&quot;  5'-0&quot;  42&quot;  6'-0&quot;  48&quot;  7'-0&quot;  54&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
<tr>
<td>234</td>
<td>J</td>
<td>Inside CZ</td>
<td>10  14  18</td>
<td>Traffic: Heavy Wheel Loads</td>
<td>Poor</td>
<td>2'-11&quot;  24&quot;  4'-0&quot;  36&quot;  5'-0&quot;  42&quot;  6'-0&quot;  48&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
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<tr>
<td>235</td>
<td>K</td>
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<td>3  7  11</td>
<td>Traffic: NA</td>
<td>Poor</td>
<td>3'-0&quot;  21&quot;  3'-10&quot;  27&quot;  4'-0&quot;  33&quot;  4'-7&quot;  39&quot;</td>
<td>Debris buildup may occur on Type B lining.</td>
</tr>
</tbody>
</table>

### GENERAL NOTES

1. All inlets must be selected to satisfy hydraulic suitability, with proper consideration given to safety and economics.
2. CZ denotes clear zone, formerly CRA denoting clear recovery area.
3. Alternate G grates should be specified when in salt water environment.
4. Inlets C, D and E capacity and debris tolerance may be increased by the addition of a slot. Slotted inlets located within roadway clear zones and in areas accessible to pedestrians shall have traversable slots. Traverse slots are not adaptable to inlet Type H.
5. Special ditch blocks require plan details.
6. Pipe size limitations are based on circular Class III, B wall, Concrete Pipe. Elipsoidal pipe and corrugated pipe are to be checked for fit in accordance with standard No. 201, metal pipe sizes shall be reviewed using 2") x 3") corrugation up through 30" and 3") x 4") corrugation for larger sizes.
7. The figures shown for capacity are approximate, and are intended as a guide to assist in describing relative performance:
   (a) Inlets with gages only are considered to be 50% blocked with 3" of ponding.
   (b) Standard 4") slots and traversable slots are calculated assuming a 25% blockage and 3") of ponding about the grate.
8. The capacity values assume inlet control. The designer must verify the outlet conditions and design assumptions before accepting the capacity values shown; outlet constraints are likely to control with minimum pipe size.
TRAVERSABLE SLOTS

SECTION AA

SECTION BB

SECTION CC

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>
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<tbody>
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<td>1.16</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>D</td>
<td>0.91</td>
<td>1.10</td>
<td>1.14</td>
<td>1.18</td>
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<tr>
<td>E</td>
<td>0.91</td>
<td>1.06</td>
<td>1.14</td>
<td>1.18</td>
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</table>
DITCH BLOCK FOR INLETS WITH OR WITHOUT SLOTS

SODDING AND PAVEMENT FOR INLETS WITHOUT SLOTS AND INLETS WITH NON-TRaversABLE SLOTS

Note: See General Notes Nos. 6 and 7.

NON-TRaversABLE SLOTS

PAVEMENT AND SODDING QUANTITIES FOR TRAVERSABLE SLOTS (EXISTING INLETS)

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<td>Single Star</td>
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<td>SY CY</td>
<td>SY CY</td>
<td>SY</td>
</tr>
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<td>D</td>
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<tr>
<td>E</td>
<td>5.88 0.99</td>
<td>7.37 1.24</td>
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</table>

Note: For plan view and additional details see Sheet 2 of 3.
For payment see General Note 6 and 7.

TRAVERSABLE SLOTS FOR EXISTING INLETS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
HIGHWAY DESIGN

DITCH BOTTOM INLETS TYPES C, D, E & H

UNIT: FT

Days: 7

Approved by: [Signature]

[Diagram of ditch bottom inlets with various dimensions and labels, including notes and measurements.]
<table>
<thead>
<tr>
<th>INDEX NO</th>
<th>TYPE</th>
<th>PIPE SIZE</th>
<th>CROSSRAIN</th>
<th>SIDERAIN</th>
<th>MEDIAN</th>
<th>APPLICABLE</th>
<th>HYDRAULIC PERFORMANCE</th>
<th>Kc</th>
<th>APPLICABLE</th>
<th>EROSION TOLERANT</th>
<th>PERMITTED LOCATION</th>
<th>TRAFFIC-SAFE GRATE AVAILABLE</th>
<th>ECONOMIC RATING</th>
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<tr>
<td>250</td>
<td>Straight Concrete</td>
<td>Single and Multiple 15&quot; Thru 54&quot;</td>
<td>Yes</td>
<td>No</td>
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<td>Yes</td>
<td>Excellent</td>
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<td>Good</td>
<td>Outside CZ</td>
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<td>258</td>
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<td>No</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Good</td>
<td>Outside CZ</td>
<td>No</td>
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<tr>
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<td>Inside CZ</td>
<td>Required</td>
<td>Good</td>
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<tr>
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<td>No</td>
<td>No</td>
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<td>N/A</td>
</tr>
<tr>
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<td>Yes</td>
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<td>Good</td>
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<td>Good</td>
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<tr>
<td>268</td>
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<td>Yes</td>
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<td>0.5</td>
<td>Yes</td>
<td>Very Good</td>
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<td>Good</td>
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<td>Single &amp; Multiple 15&quot; Thru 72&quot;</td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Fair</td>
<td>0.7</td>
<td>Yes</td>
<td>Good</td>
<td>Outside CZ</td>
<td>No</td>
<td>Very Good</td>
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<td>273</td>
<td>Side Drain Inlet End Section</td>
<td>Single &amp; Multiple 15&quot; Thru 60&quot;</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Fair</td>
<td>0.7</td>
<td>Yes</td>
<td>Good</td>
<td>Inside CZ</td>
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<tr>
<td>274</td>
<td>Side Drain Inlet End Section</td>
<td>Single 15&quot; Thru 24&quot;</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Fair</td>
<td>0.7</td>
<td>Yes</td>
<td>Good</td>
<td>Inside CZ</td>
<td>No</td>
<td>Good</td>
</tr>
</tbody>
</table>

1. All end treatments must be selected to satisfy hydraulic sustainability with proper consideration given to safety and economics.
2. CZ denotes clear zone, formerly CRA denoting clear recovery area.
3. Grates should not be placed on outlet ends unless positive debris protection is provided at inlet end.
4. Additional notes concerning application restrictions may be shown on individual indexes.
5. Economic ratings are based on statewide average costs.
6. End treatments with a Kc of 0.5 or greater should be used only in areas of low design velocities and negligible debris.
7. Pipe sizes are circular, Class III "B" Wall, concrete pipe. Elkhorn type and corrugated pipe are to be checked for fit in accordance with Index No. 300; metal pipe sizes should be reviewed using 15" 3° 45" corrugation up to 30" and 3°14" corrugation for larger sizes.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PIECE END TREATMENT SELECTION GUIDE

Date: 12/31/2020
Approved By: [Signature]

249
1. Endwall dimensions, locations and positions are for round and elliptical concrete pipe and for round and pipe-arch corrugated metal pipe. Round concrete pipe shown.
2. Front slope and ditch transitions shall be in accordance with Index No. 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 (roadway).
4. Concrete meeting the requirements of ASTM C-479 (4000 psi) may be used in lieu of Class II concrete in precast items manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
5. On outfall ditches with side slopes flatter than 1:1, provide 20' transitions from the endwall to the flatter side slopes, right of way permitting.
6. For sodding around endwalls see Index No. 281.
7. Payment for concrete quantities for endwalls skewed to the pipe shall be made on the following basis:
   Endwall Skew To Pipe Use Tabulated Value
   0° to 5° 0°
   6° to 15° 5°
   16° to 30° 15°
   31° or over 45°
8. Pipe length plan quantities shall be based on the pipe end locations shown in the standard location control end view, or, lengths based on special endwall locations called for in the plans.
9. Payment for pipe in pipe culverts shall be based on plan quantities, adjusted for endwall locations subsequently established by the Engineer.

**LEGEND**

- Ch Lage Chart
- T Center To Center Pipe Spacing
- X Centerline To Centerline Dimension At Face Of Headwall

**ENDWALL POSITIONS FOR SINGLE AND MULTIPLE PIPE AND SPACING FOR MULTIPLE PIPE**
GENERAL NOTES
2. Reinforcing Steel: Grade 40 or 60
3. Concrete: Class II
4. Chamber: All exposed edges and corners to be chamfered 45° unless otherwise shown
5. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Sodding SY
6. Endwall to be paid for under the contract unit price for Class II Concrete (Endwall) CY and Reinforcing Steel (Reedway) LB
Note: For concrete and corrugated metal pipes. Concrete pipe shown.

### TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>H</th>
<th>T</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>X</th>
<th>ONE PIPE CULVERTS</th>
<th>TWO PIPE CULVERTS</th>
<th>THREE PIPE CULVERTS</th>
<th>FOUR PIPE CULVERTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>CP</td>
<td>CMP</td>
<td>CP</td>
<td>CMP</td>
<td>CP</td>
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<tr>
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<td>2</td>
<td>0</td>
<td>6</td>
<td>0.75</td>
<td>6.1</td>
<td>1.2</td>
<td>1.9</td>
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<td>6</td>
<td>0.75</td>
<td>6.1</td>
<td>1.2</td>
<td>1.9</td>
<td>1.6</td>
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<tr>
<td>30&quot; 3/4 R</td>
<td>7.5</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0.75</td>
<td>6.1</td>
<td>1.2</td>
<td>1.9</td>
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<td>0</td>
<td>6</td>
<td>0.75</td>
<td>6.1</td>
<td>1.2</td>
<td>1.9</td>
<td>1.6</td>
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<td>6</td>
<td>0.75</td>
<td>6.1</td>
<td>1.2</td>
<td>1.9</td>
<td>1.6</td>
</tr>
</tbody>
</table>

The diagram shows sections Y-Y and Z-Z of the structure, indicating the dimensions and sections for materials like sand-cement endwalls. The table provides quantities for one endwall with specific sizes and configurations.
### Table of Dimensions and Quantities

<table>
<thead>
<tr>
<th>Slope</th>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>Cold Cross</th>
<th>Hot Sheet</th>
<th>No. of Grates Per Slab</th>
<th>Time</th>
<th>Solder (SD)</th>
<th>Slope Transition</th>
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<tr>
<td>4:1</td>
<td>4.57</td>
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<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General Notes
1. This endwall is to be used only in the outer recovery area for the drainage of meadows and other areas having low design velocities and negligible debris.
2. Reinforcing Shear: 0.3 bars per side #4. Spacings shown are center to center. Laps to be (2") minimum. Distance is 2") center to center.
3. Grates to be ASTM A 36 cold-rolled steel. Specific locations will be designated in plans. Joints are to be fabricated from ASTM A 36 cold-rolled steel.
4. Endwall to be paid for per piece. Payment shall include cost of concrete, reinforcing steel, grates, and accessories. Quantities shown are for estimating purposes only.
5. Soil slopes 5:1 both sides and above endwall. Soldering to be paid for under contract unit price for soldering.
6. Precipitation of this endwall will be permitted. Precipitation shall conform to the dimensions shown in accordance with approved shop drawings. Requests for shop drawings reviewed shall be directed to the O.T.E. Engineer of Drainage.
7. Concrete meeting the requirements of ASTM C 574 (4000 PSI) may be used in lieu of Class F. Class F concrete is priced with manufacturer or plants which are under the Standard Operating Procedures for the inspection of present drainage products.
**GENERAL NOTES**

1. Baffles to be constructed as shown when called for on plans.
2. When steel gratings are required, refer to Sheet 3 of 3 for details.
3. All reinforcing for 4 bars or 2 reinforcing bars placed.
4. All angles, channels, and bars to be of ASTM A-36 weathering steel except grates which are 1/8" thick and bar 43TM to 572 Grade 50 steel and furnished in accordance with Section 962.5 of the Standard Specifications and shall be designated in the plans as dimension "D." Channels section C-24 x 6 may be substituted for the C-40 x 4 channel.
5. Concrete meeting the requirements of ASTM C 496 (A526) can be used in lieu of Class I concrete in special cases with approval of the Engineer which are under the Standard Operating Procedures for the inspection of precast drainage products.
6. Section should be interconnected with tee, or elbow as specified and polished for proper fit and piping with schedule 40 pipe. Refer to section 9 for aquisition for precast products.
7. Baffles to be substituted for the 240 pipe and polished for proper fit and piping with schedule 40 pipe. Refer to section 9 for acquisition for precast products.

**DIMENSIONAL DETAILS**

**SIDE VIEW AND BACKWALL SECTION**

**REINFORCING DETAIL**

**ALL PIPE SIZES**

<table>
<thead>
<tr>
<th>Dimensions and Quantities for One U-Endwall</th>
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<tbody>
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<td>Pipe Size</td>
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<td>15&quot;</td>
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<td>24&quot;</td>
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<tr>
<td>30&quot;</td>
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**WITH BARRIERS**

**ENDWALLS FOR 2:1 SLOPES**

**WITHOUT BARRIERS**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**U-TYPE CONCRETE ENDOALS**

**BAFFLES AND GRATE OPTIONAL 15 TO 30' PIPE**

**SHEET 1 OF 5**

261
Steel Grating Use Criteria:
1. Steel grating shall be used in lieu of pipe grating where in the
   drainage area recover area and open or in the following conditions
   exist:
   a. Area where debris and/or grate is negligible.
   b. Area in which grate is by itself in enclosed channels that
      lends transport is not envisaged a major problem.
   c. Design is unusual, except on an exceptional daily
      (1.3 per year frequency) for example a discharge basin in
      lieu of pipe with normal low ground water tables.
2. Area where grating losses with efficient backwater would not
   occur, a street drainage enhancement, and/or through other
   means is necessary.
3. Steel grate is to be used only where called for in plans and
   only in minimum space requirements having either 3'-0" or 2'-0"
   clear or ...
ISOMETRIC

SECTION A A

SECTION B B

SECTION C C

SECTION D D

SECTION E E

DETAIL FOR SINGLE PIPE CULVERT

NOTE: For Multiple Pipe Culvert spacing between pipe centers + X

DIMENSIONS and QUANTITIES for METAL PIPE ARCH CULVERTS

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>For 2:1 Slopes</th>
<th>For 4:1 Slopes</th>
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<tr>
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</tr>
<tr>
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<td>24&quot;</td>
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DIMENSIONS and QUANTITIES for ROUND PIPE CULVERTS

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>For 2:1 Slopes</th>
<th>For 4:1 Slopes</th>
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<tr>
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<td>24&quot;</td>
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<td></td>
<td></td>
<td></td>
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</table>
### GENERAL NOTES

1. Flared end sections shall conform to the requirements of ASTM C-76, with the exception that dimensions and reinforcement shall be as prescribed in the table above. Compressive strength of concrete shall be 4000 psi. Shop drawings for flared end sections having dimensions other than those shown shall be submitted for approval to the Engineer of Drainage.

2. Connections between the flared end section and the pipe culvert may be any of the following types unless otherwise shown on the plans.
   a. Joints meeting the requirements of Section 941-1.5 of the Standard Specifications.
   b. Joints sealed with preformed plastic gaskets.
   c. Reinforced concrete jackets, as detailed on this drawing.

3. Toe walls shall be constructed as shown on the plans or at locations designated by the Engineer. The walls are to be cast in place with Class I Concrete and paid for under the contract unit price for Class I Concrete (Miscellaneous). Reinforcing steel to be included in cost of toe wall.

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

5. Flared End Section to be paid for per each. Sodding shall be in accordance with Index No. 260, and paid for under the contract unit price for Sodding B.Y.

### DESIGN NOTES

1. Flared end sections are intended for use outside the clear zone on median drain and cross drain installations, except that flared end sections for pipe sizes 12 and 15 are permitted within the clear zone. When the pipe intersection permits, these flared end sections may be located with the culvert opening as close as 8 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 all locations where high velocities and/or highly erodible soils may cause undermining. These locations are to be shown on the plans.

3. Toe walls shall be used wherever the anticipated velocity of discharge and soil type are such that erosive action would occur. Toe walls are not required where ditch pavement is provided, except when discharge would occur if the ditch pavement should fail.
<table>
<thead>
<tr>
<th>D</th>
<th>X</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>Single</th>
<th>Double</th>
<th>Triple</th>
<th>Quad</th>
<th>N</th>
<th>CONCRETE (CU YDS.)</th>
<th>SODDING (CU YDS.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1</td>
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<td>-2.7</td>
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<td>6.7</td>
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<td>10.1</td>
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<td>13.6</td>
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Dimensions permitted to allow use of 6' standard pipe lengths.

Concrete slab shall be designed to form bridge across corner of pipe. See section below.
Note: See Sheet 5 For Details And Notes.
GENERAL NOTES
1. Mitered end sections shall be paid for at mitered end section, each, based on each independent pipe end.
2. The cost of all pipe (s), fasteners, reinforcing, connectors, anchors, concrete, sections, jackets, and coupling bonds shall be included in the contract unit price for mitered end section, each. Soldering not included.
3. The reinforced concrete slab shall be constructed for all sizes of cross drain pipe and cost in place with Class I concrete.
4. Concrete pipe used in the assembly of mitered end sections shall be selected lengths to avoid excessive connections.
5. Corrugated metal pipe galvanizing that is damaged during bevelling and perforating for mitered and section shall be required.
6. That portion of corrugated metal pipe in direct contact with the concrete slab shall be bituminous coated prior to placing of the concrete.
7. 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 end sections may be used with any type of cross drain pipe except steel 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 and sections shall be constructed with line pipe or concrete pipe.
8. When the mitered end section pipe is dissimilar to the cross drain pipe, a concrete jacket shall be constructed in accordance with Standard Index 280.
9. When existing multiple cross drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered and sections will be constructed either separately as single pipe mitered end sections or collectively as multiple pipe sections and sections as directed by the Engineer; however, mitered end sections will be paid for each, based on each independent pipe end.
10. Mitered end sections 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 6' beyond the outside edge of the shoulder.
11. Slope and ditch transitions shall be used when the normal roadway slope must be flattened to place end section outside clear recovery area. See detail left.

CONCRETE PIPE CONNECTOR

All bars, bolts, nuts and washers are to be galvanized steel.
Bolt diameters shall be % for 15" to 36" pipe and % for 42" to 72" pipe.
Two connectors required per joint, located 60° right and left of bottom center of pipe.
Bolt holes in pipe shell are to be drilled.

ANCHOR DETAIL

Anchors required for CMP only.
Anchor, washer and nuts to be galvanized steel.
Bend anchors where required to center in concrete slab. Damaged surfaces to be repaired after bending. Anchors are 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.
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Note: See Sheet 5 for details and Sheet 6 for notes.

* Slope: To 6" Pipe For Pipe 18" And Smaller 2 1/2 For Pipe 24" And Larger

**These sizes are restricted to inlet and outlet treatment for water management systems or similar applications.**
SIDE DRAIN
MITERED END SECTION

SECTION

To Span Line For Pipe Arch 28" x 20" And Smaller
2:1 For Pipe Arch 35" x 24" And Larger

* Slope

Note: See Sheet 5 for details and Sheet 6 for notes.
1. Mitered end sections shall be paid for in the connection, 100% based on each independent pipe end.

2. The cost of all parallel grooves, fasteners, reinforcing, connectors, anchors, cement, sealants, jackets and coupling bands shall be included in the contract unit price for mitered end section, each. Saddling act included.

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

4. Round pipe size 30" or greater, pipe-arch size 30" x 24" or greater and elliptical pipe 19" x 30" or greater shall be grouted unless excepted in the plans. Smaller sizes of pipe shall be grouted only when called for in plans. The lower grout on trailing downstream ends on divided highways shall be omitted.

5. Grotes are to be fabricated from steel ASTM A 53, Grade B, pipe. The lower grate on all traffic approach ends shall be Schedule 80 and all remaining grates shall be Schedule 40. Grotes subject to salt-free and corrosive free environment may be fabricated from galvanized pipe, with base metal exposed during fabrication required as specified in Section 362; Standard Specifications; or, fabricated from black pipe and hot-dipped galvanized after fabrication in accordance with ASTM A 123. Grotes subject to saline water or highly corrosive environment shall be hot-dipped galvanized after fabrication in accordance with ASTM A 123.

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

7. Corrugated metal pipe galvanizing that is damaged during bungling and perforation for mitered end section shall be required.

8. That portion of corrugated metal pipe in direct contact with the concrete slab shall be blemishy coated prior to placing of the concrete.

9. 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, and corrugated aluminum mitered end sections may be used with any type of side drain pipe except steel pipe. When blemishy coated metal pipe is specified for side drain pipe, mitered end sections shall be constructed with like pipe or concrete pipe. When the mitered and section pipe is dissimilar to the side drain pipe, a concrete jacket shall be constructed in accordance with Index No. 2800.

10. Corrugated polyethylene pipe (CPE) for side-inlet application at 12" or 24" diameter shall utilize either corrugated metal or concrete mitered end sections. When used in conjunction with corrugated metal mitered and sections, connection shall be by either a formed metal band specifically designated to join CPE pipe and metal pipe or other coupling approved by the Engineer of Drainage. When used in conjunction with a concrete mitered and section, connection shall be by concrete jacket constructed in accordance with Index No. 2800.

11. When existing multiple side drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered and sections will 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 will be paid for each, based on each independent pipe end.

12. In addition to the requirements of Section 430-4, side-trap culverts shall comply with the bedding and backfill requirements shown on Index No. 2800.

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

14. The project engineer shall contact the District Drainage Engineer for possible alternate treatment prior to constructing side-train mitered end sections where a minimum spacing of 30' will not result between the toe points of the mitered and sections.

**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 4).

2. The design engineer shall determine highly corrosive locations and specify in the plans when the grates shall be hot-dipped galvanized after fabrication (General Note 5).

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

**PERMISSIBLE PAVEMENT MODIFICATION FOR CLASS I TURNOUTS**
### ESTIMATED QUANTITIES & DIMENSIONS

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<th>PIPE SIZE</th>
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<th>Conc Pipe</th>
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### GENERAL NOTE

1. Details for concrete and round corrugated metal pipe, concrete pipe shown.
2. Sod slopes 2' each side and top and ditch 4' beyond toe.
3. These mitered ends are intended for side drain installations by FDOT maintenance forces and for side drain installations constructed under FDOT Maintenance permit.
NOTE: Extra base is required when cross box culverts are located on facilities subject to high speed traffic (>45 mph) or high traffic volumes (NIDDO 2006 and the control is within the range noted in the column above). Extra base material to be paid for as equivalent square yard base, except when material is called for as cubic yard or tonnage base.

EXTRA BASE FOR CROSS BOX CULVERTS UNDER FLEXIBLE PAVEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

MISCELLANEOUS DRAINAGE DETAILS

CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS
**Schedule of Bell Reinforcement**

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**Detail of Bell & Spigot Concrete Pipe Joint Using Round Rubber Gasket**

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**Section CC**

- **Bridge Culvert Number Location**
  - For Bridge Number See Plans-Profile Sheets.

**Method for Setting Limits of Variable Front Slopes at Drainage Structures**

---

**Railroad Company**

- **Clearance Below Bottom of Rail Feet**
  - Class 13

**Miscellaneous Drainage Details**

- **State or Local Government Department of Transportation**
  - **Railway**
  - **Design load**
  - **Brick Culvert**

---

**Note:**

- Use larger value of either:
  1. $L = 10 \times H$ (No maximum)
  2. $L = (0 \times Ditch Offset)$ (Maximum $L = 100'$)
### SODDING QUANTITIES (S.Y.)

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</table>

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

EXCEPT INDEX 250

STRAIGHT ENDCAL L

INDEX 250

INDEX 266

INDEX 270

45° WINGS

WINDED ENDCAL L

INDEX 266

INDEX 270

FLARED ENDCAL L

INDEX 270

---

**DITCH PAVEMENT & SODDING**

[Diagram and data table related to ditch pavement and sodding]
SECTION A-A
Provide smooth Section
Match existing grade
Grade established in detail plans

SECTION B-B
(Cross Section at Any Point Designated in The Plans Or
As Adjusted By The Engineer During Construction)

Crest ditch to drain

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.Sold to be paid for under the contract unit price for Sodding, St.
2. Flumes to be located in low point of nose and at other points as designated in the plans. The locations may be adjusted by the Engineer during construction.

FLUME DETAIL
5'-6"-9'
5'-6"-3'
5" Wide Side unless other treatment called for in Plans
3'
DETAIL OF CONC. SPILLWAY AT END OF SHOULD GUTTER

(TO BE USED WHERE INLETS, PIPES & ENDWALLS ARE IMPractical)

1. Spillway to be paved for use should gutter.
2. If spillway extends into a drainage or median ditch, the gutter should be extended as necessary.
GENERAL NOTES
1. The type of pipe (metal or concrete) to be installed shall be as stipulated 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 the sides.
3. Alignment (pits are standard) (gaskets 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 Subsoil Drainage type meeting the requirements of Section 318. All filter fabrics shall be of minimum one inch of filter material.
6. The standard cross section shall be constructed unless other section(s) are 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 by sand, silt and foreign materials.
9. The 12" diameter weep hole shall be eliminated when the bottom of the inlet is below the normal water table, unless otherwise shown in the plans.
10. The cost for installation of pipe, filter fabric, and No. 4 coarse aggregate to be included in the contract unit price for French Drain, LF.

SLOTTED PIPE OPTIONS

OPTION A

OPTION B

CONSTRUCTION NOTES
1. Pipe invert should be at or above the water table in every possible case.
DESIGN NOTES

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

2. Type I underdrain is intended for minimum water removal conditions. Where adverse conditions may create chemical and/or physical conditions for the filter fabric may be necessary.

3. Type II underdrain is intended for moderate water removal conditions. Where adverse conditions may create chemical and/or physical conditions for the filter fabric may be necessary.

4. Type III underdrain is intended for maximum water removal conditions. The filter fabric selection is required to meet the course aggregate or fine aggregate grading as described in General Notes 2 and 3. Design note 5 applies for adverse conditions.

5. Type IV underdrain is intended for minimum water removal conditions and underdrain applications.

6. Type V underdrain is intended for use in special drainage basins and other locations which require a filter system. Type V underdrain should be used only when Type V underdrain is inappropriate.

7. The designer should evaluate whether a filter fabric envelope is required around underdrain Types I, II, III, and IV. When required, fabric must be specified in the plans. Fabric to be paid for separately.

GENERAL NOTES

1. The underdrain pipe shall be either 4" smooth or 5" corrugated tubing unless otherwise shown in the plans.

2. Fine aggregate shall be placed next to meeting the requirements of Section 902-4 of the Standard Specifications.

3. Corrugated pipe shall be gravel or stone meeting the requirements of Section 910 of the Standard Specifications. The gradient shall meet Section 901-7, Grade 1, 2, 3 or 4 retaining curves calculated in the plans.

4. Underdrain Type II, III, and IV shall be in accordance with Section 440 and underdrain Type IVI (Exposure) in accordance with Section 442.

5. Filter fabric meeting Section 905 shall be a substitute drainage type.

6. When corrugated polyethylene tubing with rates or 36000 performance is used in conjunction with fine aggregate, a filter fabric back impermeable.

7. For standard location details, see index 500. Special location criteria meeting detailed in the plans.

8. The contract unit price for Underdrain, LF, shall include the following components for each underdrain type as follows:
   Type I: Pipe, back, and aggregate.
   Type II: Pipe, aggregate, filter fabric envelope.
   Type III: Pipe, aggregate, and internal filter fabric envelope.
   Type IV: No filter fabric envelopes.

   Underdrain Type V is to be paid for under the contract unit price Corrugated Polyethylene Tubing, LF and shall include the cost for filter fabric back aggregate.

   External filter fabric envelopes, where specified for underdrain Types I, II, III and IV, shall be paid for separately under the contract unit price for Plastic Filter Fabric (5...7) BY.

9. All filter fabric costs shall be paid a minimum of $11.00.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PIPE DESIGN
UNDERDRAIN

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<th>Type</th>
<th>Notes</th>
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<tr>
<td>Vb</td>
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</table>
SAFETY MODIFICATION FOR INLETS IN BOX CULVERTS

ELEVATION

SECTION AA

PLAN

SECTION BB

3' Ditch Pavement

Top of Box

Slope varies not less than 8'"/6'

3' Ditch Pav*
GENERAL NOTES

1. For use criteria see "Steel Grating Use Criteria" Index No. 261.

2. Grates to be ASTM A588 weathering steel, except grates exposed to salt water shall be ASTM A572 Grade 50 steel and galvanized in accordance with Section 962-7 of the Standard Specifications, and shall be designated in the plans as Alternate B.

3. Channel section C 3 x 6.0 may be substituted for the C 3 x 5.4 channel.

4. All reinforcing No. 4 bars with 2" clearance except as noted. Spacings shown are center to center. Laps to be 12" minimum. Welded wire fabric (two cages max.) having an equivalent cross sectional area (0.20 sq. in.) may be substituted for bar reinforcement.

5. Drill (1) holes 8" deep with a rotary drill in existing endwall for dowel bars. Holes shall be thoroughly cleaned prior to placing dowel bars and epoxy.

6. Endwall to be paid for under the contract unit price for Class 1 Concrete (Endwall) CY and Reinforcing Steel (Roadway) L.B. Cost of dowel bars and epoxy mortar to be included in the contract unit price for reinforcing steel. Cost of grates to be paid for under the contract unit price for Endwall G.I.B., plan quantity. Cost of galvanized bolts and nuts to be included in the contract unit price for the grate.

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

DIMENSIONS AND QUANTITIES PER GRAZE

<table>
<thead>
<tr>
<th>Slope</th>
<th>Pipe Size</th>
<th>Class 1 Concrete (CY)</th>
<th>Reinforcing Steel (L.B.)</th>
<th>Sodding (SY)</th>
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<tbody>
<tr>
<td>6:1</td>
<td>1-3/4</td>
<td>3/16</td>
<td>3/16</td>
<td>3/16</td>
</tr>
<tr>
<td>4:1</td>
<td>1-3/4</td>
<td>3/16</td>
<td>3/16</td>
<td>3/16</td>
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DIMENSIONS AND QUANTITIES PER U-ENDWALL

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>G</th>
<th>M</th>
<th>D</th>
<th>R</th>
<th>P</th>
<th>Class 1 Concrete (CY)</th>
<th>Reinforcing Steel (L.B.)</th>
<th>Sodding (SY)</th>
</tr>
</thead>
</table>
TYPICAL RETURN PROFILES
INCLUDING DETAIL SHOWING LOCATION OF INLETS ON RETURN

NOTE:

1. On normal intersections, profiles need not be included on the plans of the above typicals; adequacy present in the shown configuration.

2. For minor intersections, where extreme grades are involved which do not seem necessary, it is often advisable to prevent the use of such grades. Such use shall be avoided where the grades do not correspond with the requirements as shown in the plans.

3. Prohibitive grades should be established not to exceed 2% or 1% outside the return when practical. Inlets should be located to guard against water passing through the return for the grades mentioned. Inlets shall be located at least 10 feet from the return, or as shown in the plans.

4. Inlets of 0.5% or greater should be protected on the return, unless as shown above.
GENERAL NOTES

1. Ramps locations are to be coordinated with and in conformance with crosswalk locations shown as on the plans.

2. If a curb ramp is located where pedestrians must walk across the ramp, then it shall have finished sides, the maximum slope of the flares shall be 1/2. See sheet 1 of 2.

3. Curb ramps with return cutouts may be used where pedestrians would not normally walk across the ramp.

4. Ramps shall have a surface material, texted to a depth not exceeding 1/8" by use of a tamp or roller, finished with an insulating surface of either 1-Mesh 0.250 wire cloth (4 x 4 mesh), conventional 1/2" or 924" expanded metal (standards) or 3/8" expanded metal grating.

5. Ramps to be constructed at all locations shown in the plans even when sidewalk is not constructed concurrently.

6. Ramps to be paid for as follows:

   Drop curb to be paid for under the contract unit price for Concrete Curb (Type A), LF or Concrete Curb and Gutter (Type A), LF.

   (On existing facilities removal of curb or curb and gutter to be included in the cost of curb or curb and gutter.)

   Ramp to be paid for under the contract unit price for Concrete Sidewalk (---), SY (On existing facilities removal of sidewalk to be included in the cost of concrete sidewalk.)

FOR TRANSVERSE PEDESTRIAN TRAFFIC SEE SHEET 1 OF 2

RAMP FOR LINEAR PEDESTRIAN TRAFFIC
**Joint Dimensions**

<table>
<thead>
<tr>
<th>Joint Width</th>
<th>Sealant Bead Thickness</th>
<th>Backer Rod Diameter</th>
<th>Minimum Joint Depth</th>
<th>Backer Rod Placement Depth</th>
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<tr>
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<tr>
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<tr>
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<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
<td>3/8</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
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<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
<td>&gt;1</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
</tr>
</tbody>
</table>

Note: Dimension w will be shown on the plans or specified by the Engineer based on field conditions. Dimension d will be constructed so that the shape factor e has a maximum value of 2.0 and a minimum value of 1.0.

For Rehabilitation Projects

**Tape Bond Breaker**

**Joint Dimensions**

**State of Florida, Department of Transportation**

**Concrete Pavement Joints**

Preformed Elastomeric Compression Seal

Backer Rod Bond Breaker
CONCRETE PAVEMENT JOINTS

FLORIDA STEEL CORPORATION

DOWEL ASSEMBLIES FOR EXPANSION AND CONTRACTION JOINTS
DETAIL SHOWING RIGID SHOULDER PAVEMENT

NOTE: Rigid shoulder pavement shall be concrete or concrete as called for in the plans.

DETAIL SHOWING SHEET METAL STRIP

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 back-up against the pavement edge.

The sheet metal strip shall be a minimum 16 gauge steel, 12" wide and shall be grooved in accordance with ASTM A-526, Class C, Grade C, Length 6".

GENERAL NOTES

1. Pay quantity of expansion joint to be calculated across pavement at right angles to the centerline of the roadway pavement. Shoulder pavement joints included.
2. For additional details see Index No. 302.
3. The E of roadway and the C of bridge do not necessarily accurately reflect the true location of the expansion joint. The E of the roadway pavement shall be determined.

CONCRETE PAVEMENT

COMPRESSION SEAL DETAIL

NOTE: All contacting surfaces between the compression seal and concrete shall be thoroughly coated with a lubricating adhesive.

SECTION THRU SEALS

Either of the three Seals shown may be used.
GENERAL NOTES

1. The illustrated applications for guardrail are standard requirements. Length of advancement shall be established by Figure 1 for all installations incorporating the Standard Flare Detail P. However, length of advancement shall not be less than 62.5 feet or other approach lengths shown by detail on this index.

2. One panel equals 12.5 feet. Post spacings shall be 6'-3" except that a reduced spacing of 3'-11½" shall be used for transitions to anchorages at rigid structures such as bridges (See Detail J).

3. At hazards where the face of guardrail is offset from the hazard less than the desirable 4 feet minimum, a 2 foot minimum offset may be used with reduced post spacing extending over the length of the hazard plus one panel of approach roll. For an offset less than 2 feet, a special detail should be submitted to the State Design Engineer, Roadways for approval.

4. In addition to use at conventional roadside hazards, guardrail will be required where fill slopes exceed 3:1, except that where fill heights are less than 6 feet guardrail may be omitted (regardless of fill slope) unless in the opinion of the Engineer its use is deemed necessary due to other roadside features.

5. Straight rail sections may be used for all radii of 125 feet or greater. For radii less than 125 feet the rail must be fabricated to fit.

6. Corrugated sheet steel beams, shoes, and sections and back-up plates shall conform to the current requirements of AASHO M800, Class 2 (80 gal.), Type 2 (least coating). Aluminum guardrail elements will not be permitted unless specifically called for in the plans.

7. Permissible post and offset block combinations are tabulated on sheet No. 13.

8. Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged galvanized guardrail will be metallized in accordance with Sections 562 and 971 of the Standard Specifications. No burning of holes will be permitted.

9. Guardrail reflectors shall be the same colors as the pavement striping edge lines.

10. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of sufficient guardrail length, offset or crashworthiness at terminals. On high speed facilities (90 mph or greater) crash cushions shall be constructed of Type II end anchorages located in the median within the clear zone.

11. Median guardrail for bridges located on divided roadways shall be constructed the same as outer roadway guardrail off the following conditions:
   (a) Medians of uniform width that are occupied by other transportation and joint use facilities.
   (b) Medians of uniform or variable widths with independent vertical alignments not suited to normal median guardrail installations.
   (c) Medians of bifurcated roadways.

12. Any guardrail with existing concrete posts that is being reset under a construction contract shall be reset using wood or steel posts.

---

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Over 6000 V.P.D.</th>
<th>2000-6000 V.P.D.</th>
<th>800-2000 V.P.D.</th>
<th>250-800 V.P.D.</th>
<th>Under 250 V.P.D.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>R (Runout Length) FT</td>
<td>R (Runout Length) FT</td>
<td>R (Runout Length) FT</td>
<td>R (Runout Length) FT</td>
<td>R (Runout Length) FT</td>
</tr>
<tr>
<td>60-70</td>
<td>480</td>
<td>440</td>
<td>400</td>
<td>360</td>
<td>330</td>
</tr>
<tr>
<td>50-55</td>
<td>400</td>
<td>360</td>
<td>330</td>
<td>300</td>
<td>270</td>
</tr>
<tr>
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<td>320</td>
<td>290</td>
<td>260</td>
<td>240</td>
<td>210</td>
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<tr>
<td>Less Than 40</td>
<td>240</td>
<td>220</td>
<td>200</td>
<td>180</td>
<td>160</td>
</tr>
</tbody>
</table>

Note: Guardrail length of need is length of advancement plus length of guardrail needed for hazard or hazardous area as shown on other details of this index.

\[ x + R \left( \frac{D - d}{D} \right) \]

Where:
- \( D \) = Distance in feet from near edge of the near approach travel 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 travel lane.
- \( d \) = Distance in feet from the near edge of the near approach travel lane to the face of guardrail at the No. 2 breakaway post. For left side hazards and clear zones on two-way undivided facilities \( d \) is measured from the inside edge of the near approach travel lane. See Standard Flare - Detail P for additional information.

LENGTH OF ADVANCEMENT

Figure 1
GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS

OPPOSING TRAFFIC - DETAIL D

GUARDRAIL APPLICATION FOR MEDIAN AND GORE HAZARDS

NOTE: See General Notes Nos. 1, 3, and 4. See Details K and L for guardrail offsets. For urban curb and gutter sections that require shielding from hazards see concrete barrier wall index No. 400.

ONE-WAY TRAFFIC - DETAIL G

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DEsign

GUARDRAIL
MEDIAN 30' OR LESS WITH 10' BRIDGE SHOULDERS

MEDIAN LENGTH

<table>
<thead>
<tr>
<th>Panels</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'</td>
<td>75'</td>
</tr>
<tr>
<td>10'</td>
<td>150'</td>
</tr>
</tbody>
</table>

10' Taper Rate

MEDIAN 30' OR LESS WITH 6' BRIDGE SHOULDERS

MEDIAN LENGTH

<table>
<thead>
<tr>
<th>Panels</th>
<th>Length</th>
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</thead>
<tbody>
<tr>
<td>5'</td>
<td>75'</td>
</tr>
<tr>
<td>10'</td>
<td>150'</td>
</tr>
</tbody>
</table>

10' Taper Rate

End Anchorages Type II

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
Highway Design

GUARDRAIL

DESIGN NO. 400
### LEGEND
1. Edge of roadway pavement.
2. Taper.
3. Taper return (radius $R_t$).
4. Standard flare to be installed except when existing guardrail or intersecting drive or side road aligns the project.
5. Posts for locating standard flare, approximate to PC or PT:
   - No. 2 post - Radii 25' or less.
   - No. 3 post - Radii 25' thru 50'.
   - No. 4 post - Radii 50' or greater.
7. Shoulder transition.
8. Type II end anchorage.
9. roadway shoulder for radial guardrail returns.
10. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius $R_g$).
11. Type II end anchorage (radial return only).
12. Guardrail installation limited to roadway right of way unless otherwise called for in the plans.

### RADIAL GUARDRAIL

#### Normal Turnouts

<table>
<thead>
<tr>
<th>$R_t$</th>
<th>$R_g$</th>
<th>$P_{L}$</th>
<th>$P_{R}$</th>
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<tbody>
<tr>
<td>15</td>
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<td>60'</td>
<td>90°</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
<td>60'</td>
<td>90°</td>
</tr>
<tr>
<td>25</td>
<td>40</td>
<td>60'</td>
<td>90°</td>
</tr>
</tbody>
</table>

Note: Only 25' and 40' radius panels are to be used for return guardrail on curved turnouts. The shoe return to the number of panels used and their arrangement to length panels will be as shown in the plans or as directed by the Engineer.

---

### GUARDRAIL

1. Edge of roadway pavement.
2. Pavement return (radius $R_p$).
3. Standard flare to be installed except when existing guardrail on intersecting drive or side road aligns the project.
4. Post for locating standard flare, approximate to PC or PT.
5. No. 3 post - Radii 25' or less.
6. No. 4 post - Radii greater than 25'.
7. Extended roadway shoulder for standard flare.
8. Type II end anchorage.
10. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius $R_g$).
11. Type II end anchorage (radial return only).
12. Guardrail installation limited to roadway right of way unless otherwise called for in the plans.
MISCELLANEOUS PAVEMENT FOR STANDARD SECTIONS

SECTION AA FOR 20' CLEAR ZONE

SECTION BB

SECTION CC

SHOULDER GUTTER

SHOULDER WITH OR WITHOUT 4' PAVEMENT

PAVED SHOULDERS

PAVED SHOULDERS

SHOULDER GUTTER

STANDARD GUARDRAIL LOCATION - DETAIL K
GUARDRAIL AND SHOULDER GUTTER TRANSITIONS AT BRIDGE APPROACHES - DETAIL J

GUARDRAIL ATTACHMENT AT HANDRAIL BARRIER - DETAIL N

GUARDRAIL ATTACHMENT AT END POST ON EXISTING BRIDGES

GUARDRAIL INSTALLATION - CASE I AND CASE II

TYPICAL GUARDRAIL INSTALLATION AT EXISTING BRIDGE ENDS
STEEL GUARDRAIL POST MOUNTING TO EXISTING APPROACH SLABS

STEEL POST FOR CONSTRUCTION OF GUARDRAIL WHERE CULVERT, PIER FOOTING OR OTHER STRUCTURE PRECLUDES NORMAL POST INSTALLATION

SPECIAL STEEL GUARDRAIL POSTS

6" C STEEL POST

W6 X 8.5 OR W6 X 9 STEEL POST

TIMBER POST

STANDARD TIMBER AND STEEL GUARDRAIL POST
SPECIAL POST LOCATIONS ON CURB INLETS

CURB INLET TYPE 1

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

CURB INLET TYPE 2

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

CURB INLET TYPE 3

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

CURB INLET TYPE 4

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

CURB INLET TYPE 5

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

CURB INLET TYPE 6

NUMBER OF SPECIAL POSTS
Min. 1
Max. 2
Cost Basis of Payment 1

LEGEND

- Expanded Location By Using Double Offset Blocks On Adjacent Standard Posts

3. Variations shown for the positions of special posts mounted on inlets are established from standard post spacing (48/77), clearance of special posts from roadway (4.2 mm) use of single and double offset blocks on standard posts adjacent to the inlet, optional trumpet mountings, and concrete anchor edge distance (77.2 for grouted and 133 for expansion anchor) (1). The number of posts and their locations may vary by reducing post spacing and adjusting the length of each post.

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

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

GUARDRAIL

ENCASED GUARDRAIL POST

TO BE USED PRINCIPALLY OVER SHALLOW UTILITIES

Notes:
1. The locations shown for special posts mounted on inlets are to be used as guidelines for placing the posts and for estimating the number of required posts.
2. Special posts and their encasements mounted on curb inlets shall be in accordance with standard steel guardrail posts Sheet 11 of 15, and paid for under the contract unit price for Special Guardrail Post, each.

3. Variations shown for the positions of special posts mounted on inlets are established from standard post spacing (48/77), clearance of special posts from roadway (4.2 mm), use of single and double offset blocks on standard posts adjacent to the inlet, optional trumpet mountings, and concrete anchor edge distance (77.2 for grouted and 133 for expansion anchor) (1). The number of posts and their locations may vary by reducing post spacing and adjusting the length of each post.

4. Encased guardrail posts shall conform to section for standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Post, each. Payment shall include cost of foam wrap and concrete encasement.
TRANSITIONS AT BRIDGES FOR BARRIER WALL ON RETAINING WALL

**REINFORCED CONCRETE BARRIER WALL (RETAINING)**

**RIGID BARRIER WALL**

**REINFORCED CONCRETE BARRIER WALL (SHOULDER)**

**NOTE:** All longitudinal reinforcement is No. 4 bars. Minimum segment length for this wall is 20 feet. Wall to be paid for under the contract unit price for Concrete Barrier Wall (Rigid) (Retaining), LF.

**BAR 4A**

**BAR 4B**

**BENDING DIAGRAM**

<table>
<thead>
<tr>
<th>WALL TYPE</th>
<th>CLASS B, CONCRETE CY Per Lin Ft</th>
<th>REINFORCING STEEL LBS Per Lin Ft</th>
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</thead>
<tbody>
<tr>
<td>Retaining</td>
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<td>20</td>
</tr>
<tr>
<td>Shoulder</td>
<td>0.32</td>
<td>21</td>
</tr>
</tbody>
</table>

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**ROAD DESIGN**

**CONCRETE BARRIER WALL**

**DESIGNER:**

**SHEET:**

**DRAWN:**

**CHECKED:**

**CHECKED BY:**

**APPROVED:**

**410**
TWO-WAY TRAFFIC (UNDIVIDED)

ONE-WAY TRAFFIC
FOR VALUES X₀ & X₂ SEE "LENGTH OF ADVANCEMENT" SHEET 8 OF 8

BRIDGE END HAZARD

NOTE:
For locations with utility strips see Sheet 4 of 8.
For transition, sidewalk and section details see Sheet 6 & 7 of 8.
For length of advancement for bridge end hazards and for other objects located more than 4' from face of curb that require shielding see Sheet 8 of 8.
See Sheet 4 of 8 for tubular lengths applicable to "Hazard 4' or Less From Face of Curb" and accompanying footnote.

HAZARD 4' OR LESS FROM FACE OF CURB

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

CONCRETE BARRIER WALL

CONTRACTOR

Dr. Paul

410
PLAN
WITH UTILITY STRIP
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)

PLAN
WITHOUT UTILITY STRIP

PLAN
WITH UTILITY STRIP
ONE-WAY TRAFFIC (TRAILING END)

TRANSITION SEGMENTS FOR 'CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)
SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)

NOTE:

- Transition Segments Shall Be Doweled Into The End Of The Barrier Wall In The Following Manner:
  - Four 1/2" diameter holes 6" deep on 6" centers shall be drilled in the end of the barrier and No. 6 bars 15" long set in epoxy mortar. The ends of the dowels extending into the transition segment shall be wrapped with one layer of 10 lb. asphalt felt with the ends crimped.
- When Construction Joints Are Utilized For Transition Segment Construction The Stee Shall Be Doweled To The Footing In The Following Manner:
  - Five No. 4 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.
OPTION 1 ANNOTATIONS

1. Carefully, Tongue D'6" (152), Groove D'6" (152).

2. Barrier unit without anchorage, with tie heights of not less than 5" nor more than 10" and with or without bolted trusses, produced prior to August 1, 1987, shall be considered acceptable to the Commissioner of August 1, 1987 may be used under the following conditions:

(a) Ground Mount Units shall be fastened to the wall with 1/2" diameter anchor bolt, minimum yield strength of 4200 psi, and may be either threaded insert, welded or epoxy grouted sleeve type with 3/8" minimum embedment.

(b) Bridge Mount Units shall be fastened to the wall with 3/8" diameter anchor bolt, minimum yield strength of 4200 psi, and may be either threaded insert, welded or epoxy grouted sleeve type with 3/8" minimum embedment.

(c) Tongue and groove units of both types shall be fastened to the wall with 1/2" diameter anchor bolt, minimum yield strength of 4200 psi, and may be either threaded insert, welded or epoxy grouted sleeve type with 3/8" minimum embedment.

OPTIONAL END TREATMENTS FOR WALL UNITS

WALL TIE AND ANCHORAGE REQUIREMENTS

<table>
<thead>
<tr>
<th>END TREATMENT</th>
<th>OPTION 1</th>
<th>OPTION 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROOVE END</td>
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<td>YES</td>
</tr>
<tr>
<td>TONGUE END</td>
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<td>YES</td>
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WALL TIE AND ANCHORAGE REQUIREMENTS

<table>
<thead>
<tr>
<th>END OPTION</th>
<th>GROUND MOUNT</th>
<th>BRIDGE MOUNT</th>
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<tr>
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<tr>
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</tr>
<tr>
<td>3</td>
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<td>YES</td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Note: When the plans call for wall units furnished by the Contractor, ground and bridge mounts will be required. The Contractor shall furnish the necessary tie and anchor assemblies.
GENERAL NOTES
1. Gate components shall meet the material requirement specified in Index No. 452.
2. Steel gate frame shall be fabricated prior to galvanizing, except that tress rods and tress rod plates may be fabricated following frame galvanizing provided surfaces damaged during welding are galvanized in accordance with Section 24 of AASHTO M38.
3. All fabric shall be knuckled top & bottom selvages.
4. Cost of all gate components shall be included in the contract unit price for Sliding Fence Gate (Cantilever), Each.
5. The Contractor may substitute any equivalent cantilever slide gate approved by the Engineer.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PEN DESIGN
CANTILEVER SLIDE GATE
TYPE B FENCE

DETAIL A

DETAIL B
FOUR LANE ROADWAY

TWO LANE ROADWAY

SYMBOL | SOIL | CLASSIFICATION (AASHTO M-145)
-------|------|----------------------------------
S      | Select | A-1, A-3, A-2-4
H      | High Plastic | A-2-5, A-2-7, A-5 or A-7 (All with LL > 50)
M      | Muck | A-8

Symbols listed left to right in order of preference.

** | Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and therefore should be used in the embankment above water level existing at time of construction.

When otherwise shown on plans this dimension may be reduced to 24".
2-LANE OR 4-LANE PAVEMENT, NO MEDIAN

4-LANE PAVEMENT WITH MEDIAN

SHOULDER CONSTRUCTION WITH SUPERELEVATION

SUPERELEVATION RATES

DESIGN SPEEDS, MPH

SLOPE RATIOS FOR SUPERELEVATION TRANSITIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

SLOPE IN Lieu of 0.6 FT/FT, ABOVE.
SUPER ELEVATION TRANSITION $L_2$ (VARIES 100' MIN)

FULL SUPER ELEVATION
OUTER ROADWAY

SUPER ELEVATION TRANSITION $L_4$ (VARIES 100' MIN)
FULL SUPER ELEVATION
INNER ROADWAY

STRAIGHT LINE TRANSITION OUTSIDE EDGE OF PAVEMENT

CROWN POINT
BOTH ROADWAYS

OUTSIDE RHT. EDGE - BOTH ROADWAYS

$L_1 = S(D_1 + D_6)$
$L_2 = S(D_2 - D_3)$
$L_3 = S(D_3 - D_4)$
$L_4 = L_2 + L_3$

S = SLOPE RATIO

SECTION A-A
NORMAL CROWNED SECTION

SECTION B-B
SUPER ELEVATION SECTION LT & RT.

SECTION C-C
SUPER ELEVATION SECTION LT.
PLANE INCLINED SECTION RT.

SECTION D-D
PLANE INCLINED SECTION LT.
SUPER ELEVATION TRANSITION RT.

SECTION E-E
SUPER ELEVATION TRANSITION LT.
FULL SUPER ELEVATION RT.

SECTION F-F
FULL SUPER ELEVATION LT & RT.

B-LANE PAVEMENT WITH ONE LANE SLOPED TO MEDIAN
GENERAL NOTES FOR SUPERELEVATION

1. Maximum rate of super-elevation in municipal construction shall be 0.05 ft/ft.

2. Super-elevation shall be obtained by positioning the plane successively about the break points of the section, and in the absence of a break point, the plane shall be positioned in such a manner as to result in the maximum rate of super-elevation permitted by the chart. The rotation 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.

3. When positive super-elevation is required, the slope of the gutter in the inside lane shall be the construction of the slope of 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. Minimum gutter grades within the limits of the super-elevation transition shall be 0.02.

6. The variable super-elevation transition length shall be a minimum value of 50 ft for design speeds under 40 mph and 75 ft for design speeds of 40 mph and above.

7. Municipal sections having lane arrangements different from those shown but composed of a series of planes, shall be super-elevated in a similar manner.

8. For curves in rural areas, see Index No. 510.
### LAYER THICKNESS FOR ASPHALTIC CONCRETE STRUCTURAL COURSES

<table>
<thead>
<tr>
<th>COURSE THICKNESS (inches)</th>
<th>S-1/S-2 Top Layer</th>
<th>S-2/S-3 Top Layer</th>
<th>Type S-1</th>
<th>Type S-2</th>
<th>Type S-3</th>
<th>Type III</th>
<th>SAHM</th>
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**GENERAL NOTES**

1. If combinations other than those shown in the table are used, the thickness must be consistent with the following thickness ranges and the details must be given on the Typical Section Sheet:

   **Type Mix** | **Min.** | **Max.**
   ----------- | -------- | --------
   S-I        | 1 1/2"   | 2"       
   S-II       | 1 1/2"   | 2"       
   S-III      | 1"       | 1 1/2"   

2. When quantities are bid as tonnage items, equivalent tonnage layer thickness will be constructed (i.e., 1000 - one square yard inch).

3. When construction includes paving of adjacent 1'-1/2" shoulders, the layer thickness(s) for the shoulder shall be the same as the upper roadway pavement layer(s) in order to facilitate paving. This may limit combinations available. (See Note 1.)
# Optional Base Groups and Structural Numbers

<table>
<thead>
<tr>
<th>Base Group and Structural Range</th>
<th>ABC-2, ABC-3, ABC-5 (Base)</th>
<th>ABC-2, ABC-3, ABC-5 (Soil)</th>
<th>ABC-2, ABC-3, ABC-5 (Soil)</th>
<th>ABC-2, ABC-3, ABC-5 ( Soil)</th>
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*Not Recommended For Design*

**Year 18 Kip Loads > 1,000,000**

**Base Type**

- Soil Structural Number (per site)

**Option Code**

- Base Thickness
- Base Structural Number

**Legend**

- 6
- 1129 - 141

**State of Florida Department of Transportation**

**300 Series option codes indicate base options which have been revised**

---

**FOR N-A Approval:** 10/78

---

**CE 210-2 (07-21)**

**Channel No.: 4001 10/78**

---

**514**
### Quantities for One Turnout (Sq. Yd.)

<table>
<thead>
<tr>
<th>Drive Width (Ft.)</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
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### Turnout Pavement Structure Minimum Requirements

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<th>COURSE</th>
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<th>MINIMUM THICKNESS</th>
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<tr>
<td>Structural</td>
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<td></td>
<td>Gravel</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

### General Notes

1. Turnouts are to be constructed or resurfaced at locations as directed by the Engineer.
2. Turnout construction not required with paved shoulders.
3. Connections outside the 5' limit are to be constructed as directed by the Engineer.
4. Contract unit price, Turnout Construction, to include excavation and base.
5. Payment for structural course to be included in roadway resurfacing pay item.
6. Payment for feathering friction course to be included in the unit price for Asphaltic Concrete Friction Course placed on the roadway. Feathered areas will not be included in measured quantities. Feathering not required for FC-2 friction course.
7. For low volume two-lane facilities without a friction course the structural course is replaced by a surface course.

### Section AA

- **Turnout Construction**
  - Friction Course
  - Structural Course
  - Leveling Course
  - Existing Base & Surface

- **Turnout Construction**
  - Friction Course
  - Structural Course
  - Leveling Course
  - Existing Base & Surface

### Section A-A

- **Resurfacing Existing Turnout**
  - Friction Course
  - Structural Course
  - Leveling Course
  - Existing Base & Surface

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN**

**TURNS OUT RESURFACING PROJECTS**
DETAIL A
EXIT TERMINAL
TWO THRU LANES

DETAIL B
EXIT TERMINAL
TWO THRU LANES
THREE APPROACH LANES

NOTES:
1. FOR GENERAL NOTES SEE SHEET NO. 2
SHOULDER TREATMENT
AT SPEED CHANGE LANES WITH SHOULDER GUTTER

SHOULDER TREATMENT
AT SPEED CHANGE LANES WITHOUT SHOULDER GUTTER
NOTE
CLASS I CONCRETE IS TO BE USED UNLESS OTHERWISE NOTED IN PLANS OR SPECIAL PROVISIONS

PLAN

No. 4 Bars @ 6" Ctrs. Top and Bottom
withcrire - See Section Below

SECTION A-A

TYPE A
REINFORCED CONCRETE

NOTE
TRACTOR CROSSING TO BE CONSTRUCTED TO MATCH PAVEMENT CROSS EMBANKMENT.

TRADE JOURNEYS

The number of mats required will vary with the pavement width. A sufficient number of mats will be used so that the overall width of the tractor crossing will be a minimum of one foot greater than the pavement width. The tractor crossing will be centered on the pavement centerline.

PLAN

Corners exposed to traffic to be channelized 1/2"

SECTION X-X

TYPE B
TREATED TIMBER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DONA MOVES

TRACTOR CROSSINGS

DESIGN NO.        DP-1000

Apporved By

DRAWN BY

ARCHITECT

REV.

DRAFTS

SUMMARY

Sheet No.        1

Scale: 1/8"

Drawn by:        1/8/87

Date: 1/8/87

535
INSTALLATION

NOTES
1. Elevation of the top of each length of main pipe shall be determined on site as it is installed and shall be recorded before the next length of main pipe is added.
2. Settlement plate preventors shall be flagged and protected from construction vehicles and equipment. If settlement plates are damaged, they shall be replaced in said.
3. Decking used to construct seat should not have a mesh covering (plastic or other synthetic material).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

SETTLEMENT PLATE

STEM AND PLATE OPTIONS
GENERAL NOTES

1. The purpose of shrubs in areas back of guardrail is to withstand low maintenance in these areas.
2. Shrubs are to be platted approximately 5' back from guardrail property and hazards. Narrow plant areas are to have at least one row of shrubs, as directed by the Engineer.
3. Shrubs are to be spaced approximately 3' on center in rows with 3' spacings.
4. Shrubs are to be spaced in adjacent rows to create a zig-zag pattern between the guardrail.
5. Shrubs shall be specified in the plans by Landscape Materials Master Pam List numbers.
6. Only one variety of shrub shall be planted within any given contiguous area and no shrub variety is to be repeated within a distance of one mile.
7. Where guardrail planting is incorporated in conjunction with shrub planting, soil sterilization shall be in accordance with Section 329 of the Standard Specifications.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

SHRUBBERY

BACK OF GUARDRAIL APPLICATION

[Formal engineering drawing details]

D/o:

State: Florida

Date: [Insert Date]

Approved:

[Signature]

545
FRAME DETAILS

GENERAL NOTES

1. This drawing is based on using 50" rail on a tangent section and Decking fabricated in sections to fit the corresponding sections of the supporting frame. The depth of the 2 bars and channels may be varied to fit other rail sections.

2. The framework units are attached to ties by 7/8" x 6-1/2" lag screws, and to Headwall by 5/8" anchor bolts. Double-tail spring washers are used with legs to compensate for vertical motion.

3. The decking is attached to the framework with 5/8" bolts. The head of the bolt is to be spot welded to the underside of the channel flange.

4. Flanges and outside filler timbers to be repositioned to ensure close fit prior to treatment.

5. Ties to be bowed and spaced 18° C to C.

6. Crossings of any angle can be equipped with units of either 45°, 67.5° or 90°.

7. Decking may be as shown or equal (Submit shop drawings for approval by the Engineer).
GENERAL NOTES
1. The crossings shown on this sheet are NOT to be used for multiple track crossings within zones for on existing or scheduled future vehicular stop. Zone lengths are charted above.
2. Crossings on this sheet may be used for single track crossings within the zones in the chart unless engineering or safety considerations dictate otherwise.
3. Details shown are for straight track installations. Materials are also available for curved track installations.
4. For additional details, materials required and installation procedures refer to the manufacturers specifications.

1) Experimental - Requires Prior Approval

SECTION

CROSSING TYPE "P" (POLYETHYLENE)

PARTIAL SECTION PARALLEL TO RAIL

CROSSING TYPE "R" (RUBBER)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY AGENCIES
R[AILROAD CROSSINGS
TYPE P & R

DESIGN NO. 100

SHEET 1

Scale: 1/8" = 1'-0"

3 of 9

560
GENERAL NOTES

1. The reinforced concrete slabs are manufactured in 8'-0" sections, 5" in depth to fit all rail sections 5 1/4" in height or heavier. Slabs are interchangeable and relocatable.

2. Center slabs are one piece construction allowing for 2 1/2" flange opening. 80 lb. rail is used to encase, armor and reinforce slabs and is held in gage with 3 tie rods per slab.

3. Slabs are installed by a "flotation" process, supported on non-shrinkable, non-metallic grout positioned on the ties. Slabs can be placed on wood ties, concrete ties, steel ties, bridge decks or any other type of track support. No re-spacing of ties is necessary.

4. Slabs are secured to "running rails" with specially designed hardware. Insulation is to be provided for crossings in signal territory.

5. Curved slabs are fabricated to fit curved track to 22 degrees (262.04' radius). Special slabs are available for Diamond Crossings, Turnouts, Multiple Tracks, Bridge Decks and Rapid Transit Systems.

6. For additional details, materials required and installation procedures refer to the manufacturer's specifications.

STATE P.O. FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RAILROAD CROSSINGS

TYPE T
STANDARD SLABS (PRECAST CONCRETE)

TOP VIEWS - CENTER SLAB AND OUTSIDE SLAB

SECTION AA

TOP VIEWS - CENTER SLAB AND OUTSIDE SLAB

SECTION BB

RAMP SLABS (PRECAST CONCRETE)

SECTION CC  SECTION DD

STANDARD AND RAMP SLAB SECTIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RAILROAD CROSSING
TYPE T MODIFIED
TYPICAL 44' CROSSING

PLAN VIEW

TOP VIEW
TIE PAD

SIDE VIEW
PRECAST CONCRETE TIE (CROSSING TIE)

TRANSVERSE SECTION

ELEVATION
TIE SPACING

GENERAL NOTES
1. Slab frames are welded 50 lb rails.
2. Slab reinforcement on No. 8 bars.
PHASE I

1. Maintain two-way two-lane traffic over existing facility.
2. Construct temporary structure, approaches, guardrail and attenuators.
3. The signing shown in the Phase I diagram is required whenever equipment, man or their activities are within 15 feet of the existing pavement edge.

PHASE II

1. Re-sign and mark as shown in Phase II plan.
2. Recruit traffic to detour and maintain two-way traffic on detour. Traffic control shall be in accordance with the MTCSP. Install class H barricades.
3. Construct proposed structure and reconstruct or resurface existing approaches.

PHASE III

1. Route traffic to existing alignment and maintain two-way traffic.
2. Remove all temporary construction items.

**GENERAL MAINTENANCE OF TRAFFIC NOTES**

- All signing, pavement markings, barricades and warning lights necessary for maintenance of traffic shall conform to the MTCSP.
- The detour pavement should be constructed of width equal to the existing pavement, but lanes shall be not less than 10 feet in width. When one-way two-lane operations are necessary, a minimum width of 10 feet shall be maintained and traffic controlled in accordance with the MTCSP. Minimum width for the detour shoulders is 6 feet.
- Railed pavement markers shall be placed along the center of the detour pavement at 20-foot centers in the transition area where alignment shift is 10 feet or greater.
- Existing signs and pavement markings that conflict with construction signs and markings shall be obliterated or removed.
- Painted speed on the existing facility shall be decreased at the rate of 10 mph per 500 feet (minimum distance) until detour design speed is reached.
- Method of attaching temporary guardrail to the structure to be approved by the Engineer.
- Precautions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
- Temporary attenuators shall be the inertial type indicated in Figure 7.3 of the MTCSP.

**TABLE FOR MINIMUM RADIUS FOR NORMAL CROSS SLOPES**

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**LEGEND**

- Phase I
- MTCSP
- Manual On Traffic Control
- And Safe Practices
- Denotes Direction Of Traffic And Does Not Reflect Pavement Markings

**STRUCTURE REPLACEMENT STANDARD TRAFFIC CONTROL PLAN**

**RURAL FACILITY**

[Diagram and text not fully legible due to image quality]
PHASE I

1. Maintain two-lane twoway traffic over existing pavement. Construct new roadway within the proposed 4-Lane limits, excluding the friction course. Signage shown if roadway construction area falls within 15 feet of existing pavement edge. When the construction area falls more than 15 feet from the existing pavement edge, traffic shall be controlled in accordance with Cases I, II, or III of the MTCS.

2. Construct shoulder pavement to provide two-lane two-way traffic over shoulder and existing pavement during Phase II roadway construction. Lanes to be not less than 10 feet in width. Signage as shown to be in place prior to shoulder pavement construction.

PHASE II

1. Remove existing pavement marking, in areas of detour and re-mark as shown, install warning devices and re-sign as shown. Traffic to be controlled in accordance with Case II of the MTCS. Lanes to be not less than 10 feet in width.

2. Route through traffic to temporary and existing pavement

3. Construct transitions, excluding friction course

LEGEND

- Phase I
- Phase II
- MTCS-P Manual On Traffic Control And Safe Practices
- Detects Directional On Traffic And Does Not Reflect Pavement Marking
PHASE III

1. Remove temporary marking from the existing pavement and temporary shoulder pavement. Mark pavement, install warning devices and re-sign as shown. Traffic to be controlled in accordance with Case 21 of the MTSCP. Lanes to be not less than 10 feet in width.
2. Route traffic to newly constructed roadway.
3. Resurface or reconstruct existing pavement including required shoulder pavement and friction course.

PHASE IV

1. Relocate traffic as shown in Phase III. Signing to be as shown in Phase III.
2. Construct friction course over pavement constructed in Phase I and II.

GENERAL MAINTENANCE OF TRAFFIC NOTES

1. All signing, pavement marking, barcodes and warning lights necessary for maintenance of traffic shall conform to the MTSCP.
2. Lane widths for Maintenance of two-way traffic should be equal to lane widths of the existing facility, but lanes shall not be less than 10 feet in width. When one-way plan is necessary, a minimum width of 12 feet shall be maintained and traffic controlled in accordance with the MTSCP. Minimum width for the temporary shoulders is 6 feet.
3. Barcode markers shall be placed along the center of the pavement under traffic at 40 foot intervals in the transition area where alignment shift is 10 feet or greater.
4. Existing signs and pavement markings that conflict with construction signing and marking shall be obliterated or removed.
5. Picked speed on the existing facility shall be decreased by the rate of 10 mph per 500 feet (minimum 5 mph) until detour speed is reached.
6. Additional barcodes, signs, lighting or other traffic controls as required by the MTSCP shall be provided as conditions warrant in each phase.
7. Information advisory speed signs shall be erected when the length of construction exceeds one mile, as directed by the Engineer.
8. Provisions approved by the Engineer shall be made for the removal of salt water from the roadway during construction.
9. Barcoding shall meet the requirements of Chart 2 of the MTSCP.
1. Maintain two-lane two-way traffic along existing facility, maintain construction signage.
2. Remark existing pavement to facilitate temporary pavement construction. Lanes shall be not less than 10 feet in width.
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 cannot be maintained during temporary pavement construction (such as minimum traveled lane is dropped), one-lane two-way operations shall be maintained in accordance with Case XXII of the MTCS. Barricading shall meet the requirements of Chart II of the MTCS.
4. Mark the pavement in accordance with the Phase I diagram. Route through traffic to the temporary pavement and a portion of the existing pavement. Lanes shall be not less than 10 feet in width.
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 Cases XXI and XXII of the MTCS. Barricading shall meet the requirements of Chart II of the MTCS. When work extends through an intersection, temporarily reroute the cross traffic to the 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.
PHASE III

1. Sign and mark Phase II pavement in accordance with the Phase III diagram.
2. Recruit through traffic to Phase II pavement.
3. Construct friction course over Phase I pavement. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with Cases III and V of the MTCS. 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) in each direction for four-lane two-way cross streets.

GENERAL MAINTENANCE OF TRAFFIC NOTES

1. All signing, pavement marking, barriers and warning lights necessary for maintenance of traffic shall conform to the MTCS.
2. Raised pavement markers shall be placed along the center of pavement open to traffic at 200' centers in the transition area where alignment shift is 10 feet or greater.
3. For divided facility, barriers along traffic signs as shown above shall be placed on the outside and median of both roadways for each phase.
4. Existing signs and pavement markings that conflict with construction signing and markings shall be modified or removed.
5. All signalized intersections, signals shall be directed or relocated as required to the center of relocated lanes.
6. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
7. Additional barriers, signing, signing or other traffic controls as required by the MTCS shall be provided as conditions warrant in each phase.

LEGEND

- Phase I
- Phase II
- Phase III
- MTCS
- MUTCD
- Manual On Traffic Control And Safe Practices
- Denotes Direction Of Traffic And Does Not Reflect Pavement Markings
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1) **GROUND RODS SHALL HAVE A RESISTANCE TO GROUND NOT TO EXCEED 25 OHMS, WHERE THE RESISTANCE IS NOT AS LOW AS 25 OMS, TWO OR MORE GROUND RODS CONNECTED IN PARALLEL GROUND ROOD CONNECTED.**

2) **THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES PRIOR TO ANY UNDERGROUND WORK. THE Utilities Company WILL LOCATE AND DEEPEST THEIR FACILITIES.**

3) **CONTRACTOR SHALL DETERMINE THE SERVICE REQUIRED FOR THE POWER COMPANY TRANSFORMER INSTALLATION AT THE PRE-CONSTRUCTION CONFERENCE.**

4) **THE POWER COMPANY RESERVES THE RIGHT TO INSTALL THE POLES, POLES ARE TO BE REPLACED BASED ON POWER COMPANY POLE AT THE EXPENSE OF THE CONTRACTOR, CONTACT THE POWER COMPANY FOR COSTS 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 525 OF THE STANDARD SPECIFICATIONS.**

6) **POLES, BRACKET ARMS AND FRANGIBLE DEVICES SHALL BE DESIGNED IN ACCORDANCE WITH THE DESIGN CRITERIA AS INDICATED IN THE PLANS AND THE APPLICABLE EQUATIONS FOUND IN THE STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SAFETY AND TRAFFIC SIGNALS.**

7) **THE LUMINARIE MANUFACTURER SHALL PLACE A PERMANENT TAG ON THE LUMINARIE HOUSING ON WHICH IS IMPRINTED THE FOLLOWING INFORMATION: MODEL, BALAST TYPE, LAMP SPECIFICATION, PLAN, LAMP SITING (POSITION IN LUMINARIE), LENS LIGHT DISTRIBUTION WITH THIS LAMP IN THE POSITION SPECIFIED, INPUT VOLTAGE AND POWER FACTOR.**

8) **BEFORE FINAL ACCEPTANCE, CONTRACTOR SHALL PROVIDE 2 SETS OF FULL SIZE AS BUILT PLANS TO THE MAINTENANCE AGENCY.**

9) **CONDUIT ROUTING SHALL BE POLE TO POLE, MAINTAINING POLE SETBACK DISTANCE FROM EDGE OF PAVEMENT. ANY CABLE ROUTING IN LOCATIONS WHERE THE GUARDIAN IS PROPOSED SHALL BE 2' IN FRONT OF THE STANDARD GUARDIAN POSITION.**

10) **POLE POSITIONS AND CONDUIT ROUTING MAY BE ADJUSTED, AS APPROVED BY THE ENGINEER TO PREVENT CONFLICTS WITH UTILITY AND LUMINARIE, STRUCTURE NOT INDICATED, AND PREVENT GUARDIAN POST CONFLICT WITH UNDERGROUND LIGHTING CIRCUITS.**

11) **WHERE GUARDIAN IS CONSTRUCTED, THE POLES SHALL BE PLACED A MINIMUM OF 4' BEHIND THE FACE OF GUARDIAN.**

12) **POLE FOUNDATION INSTALLATIONS SHALL BE BACKFILLED TO THE TOP OF THE FOUNDATION COMPACTED TO A FINISH, STABLE CONDITION APPROXIMATELY EQUAL TO THAT OF THE ADJACENT SOIL, THE FILL SHALL CONFORM TO EXISTING GRADE AND BE FULLY RIEDED.**

13) **THE WIRES AT THE POLE HANDHEL AND FULL BOXES SHALL BE LOADED IN THE POLE AND FULL BOXES WITH SUFFICIENT LENGTH TO COMPLETELY REMOVE CONNECTIONS TO THE OUTSIDE OF HANDHELD AND FULL BOXES TO MAKE CONNECTIONS ACCESSIBLE FOR OPRATION PURPOSES AND TO PROVIDE ACCESS TO THE SYSTEM.**

14) **NEUTRAL WIRES TO HAVE WHITE INSULATION. DO NOT USE WHITE OR GREEN INSULATED WIRES FOR UNDERGROUND CONDUCTORS.**

15) **UNLESS OTHERWISE SPECIFIED, ALL CABLE SHALL BE SINGLE CONDUCTOR, 50 PERCENT CONDUCTIVITY STRANDED COPPER, WITH THERMAL INSULATION.**

16) **ALL SPLICES SHALL BE MADE IN FULL BOXES ON THE POLE BASE. NO SPLICES SHALL BE MADE INSIDE THE CONDUIT.**

17) **ALL EXPOSED OR SURFACED MOUNTED CONDUIT SHALL BE RIGID OR INTERMEDIATE MOUNTED IN REINFORCED CONCRETE BUNKS OF CONDUIT SHALL BE PROVIDED WITH EITHER EXPANSION JOINTS OR FLEXIBLE METAL CONDUIT SECTIONS TO ACCOMMODATE TAKING CARE OF VIBRATIONS AND THERMAL EXPANSIONS. ALL METAL CONDUIT SHALL BE GROUNDED. STEEL CONDUIT SHALL BE HOOKED INSIDE THE CONDUIT.**

18) **ALL CONDUIT THAT WILL REMAIN EMPTY AS SPARED SHALL BE HANDLED TESTED, CLEANED INSIDE, AND EACH END AGAIN LEFT THE CORRESPONDING B/ULT B/L/D WIRE AND PLACE OUT THE FULL BOXES TO MARK THE LOCATION OF THE ENDS OF THE CONDUIT.**

19) **FULL BOXES SHALL BE LOCATED AT ENDS OF CONDUIT CROSSED ROADS AND AS NECESSARY FOR THE COMPLETION OF THE PROJECT.**

20) **THESE PLANS REPRESENT MINIMUM ACCEPTABLE CRITERIA. THE INSPECTION PER THESE DRAWINGS REPRESENT THE MINIMUM BASE OF ACCEPTANCE.**

21) **ALL MATERIAL UNLESS OTHERWISE SPECIFIED, SHALL BE UNDER WRITERS LABORATORY APPOINTED.**

22) **PRIOR TO ANY EQUIPMENT ORDERS, THE CONTRACTOR SHALL SUBMIT FOR APPROVAL EQUIPMENT SPECIFICATIONS OR DESIGN DATA FOR ALL MATERIAL, PROPOSED FOR THE PROJECT AND MUST INCLUDE SPECIFICALLY: LUMINARIE PRODUCTS.**

23) **ETHER APPLICATION OF DRAWINGS AND DESIGN DATA FOR HIGHWAY LIGHTING EQUIPMENT SHALL BE SUBMITTED TO THE STATE TRAFFIC PLAN ENGINEER AT THE FOLLOWING ADDRESS WITH A COPY OF THE SUBMITTAL LETTER SENT TO THE DEPARTMENT OF CONSTRUCTION ENGINEER IN CHARGE OF THE PROJECT. ALLOW A 30 DAY TURN AROUND FOR SHOP DRAWINGS.**

---

**BREAKAWAY FEATURE**


THE DESIGN OF THE BREAKAWAY FEATURE SHALL BE IN ACCORDANCE WITH THE BREAKAWAY PERFORMANCE REQUIREMENTS OF SECTION 7, STANDARD SPECIFICATIONS. STRUCTURAL SUPPORTS FOR HIGHWAY SAFETY LUMINARIES AND TRAFFIC SIGNALS. A S 5, C. 1975. THE CONTRACTOR SUPPLIERS SHALL SUBMIT WITH THIS SUBMISSION CHARTS OF DRAWINGS AND SPECIFICATIONS AS EVIDENCE THAT THE BREAKAWAY FEATURE HAS UNDERGONE FULL SCALE TESTING. FOR EACH BREAKAWAY FEATURE, THE CONSTRUCTION CONTRACTOR WILL PROVIDE AN INTEGRAL PART OF EACH BREAKAWAY FEATURE. ALL CONNEXIONS SPECIFIED IN THE CONTRACT PLANS. ALL POLES ARE TO BE INSTALLED PRIOR TO BE IN CHARGE APPROVAL OF THE SUBMITTAL DATA. POLES MOUNTED ON BARRIER WALL OR REMOVED LIE RAIL ARE EXEMPTED FROM THE ABOVE FRINGIBLE REQUIREMENTS.
LUMINARE SPECIFICATIONS

THE REFLECTOR WITH ITS ALUMINUM COVER SHALL BE FIRMLY ATTACHED TO A STAINLESS STEEL ADAPTOR NUT. THE ADAPTOR NUT SHALL BE LOCATED IN THE HEAD FRAME AS SHOWN IN THE DRAWING. EACH REFLECTOR-REFRACTOR ASSEMBLY MAY BE REMOVED BY PULLING UP OR DOWN FROM THE LUMINARE BRACKET ENTRY AND LAMP SUPPORT ASSEMBLY WITHOUT COMPLETELY REMOVING THE SUPPORT BOLTS.

EACH LUMINARE SHALL CONTAIN AN INTERNAL AUTO-REGULATOR TYPE RATED FOR 440 VOLS. INPUT 10% AND A POWER FACTOR OF MORE THAN 90%. THE LUMINARE BALLAST SHALL BE ELABORATED WITH AN ALUMINUM HOUSING WHICH INTERMITTENTLY ATTACHES TO THE LUMINARE BRACKET ENTRY AND LAMP SUPPORT ASSEMBLY. IT SHALL BE READILY REMOVABLE WITHOUT REMOVING THE LUMINARE FROM THE BRACKET ARM.

THE LUMINARE SHALL BE ATTACHED TO THE BRACKET ARM BY MEANS OF A BRACKET ENTRY AND LAMP SUPPORT ASSEMBLY. THE ASSEMBLY SHALL INCLUDE A SIDE ENTRY ELIPSE DESIGNED FOR TWO (2) INCH FIT FOR PREVENTION OF WATER INTRUSION. THE EXTERIOR OF THE BLOCK SHALL BE INCLUDED SUCH THAT ALL ELECTRICAL CONNECTIONS SHALL BE PROTECTED FROM EXPOSURE TO WEATHER.

ALL ELECTRICAL CONNECTIONS SHALL BE WATERPROOF AND INTERMITTENTLY CHANGED TO BE ANSI/UL 514. THE LUMINARE BALLAST SHALL BE MARKED WITH THE NAME, SERIAL NUMBER, AND MANUFACTURER. THE BALLAST LABEL SHALL BE IN THE FORM OF A PERMANENT LABEL, WHICH STATES THE TYPE OF LAMP, VOLTAGE RATING, POWER FACTOR, BALLAST TYPE, SOCKET POSITION, AMPLITUDE, LIGHT DISTRIBUTION, AND SUCH OTHER CATALOG INFORMATION AS A COMPLETE REPLACEMENT CAN BE EASILY ORDERED.

THE CONTRACTORS ATTENTION IS DIRECTED TO THOSE PLANS SHEETS DETAILING THE MOUNTING OF LUMINARES AT THE POLE TOP. PARTICULAR ATTENTION IS DIRECTED TO ALIGNMENT OF LUMINARE, LIGHT DISTRIBUTION. SPECIAL ATTENTION MUST BE DEVISED IN THE PHYSICAL ALIGNMENT OF THESE LUMINARES TO ENSURE THAT THE APPLIED PHOTOGRAPHIC LAYOUT IS PROPERLY REPRODUCED AT EACH LOCATION. THE LUMINARE SHALL BE ATTACHED TO THE BRACKET ARM AND THE MOUNTING BRACKETS SHALL BE USED. THE MOUNTING BRACKETS SHALL BE ATTACHED TO THE MOUNTING MECHANISM WHICH MOUNTS UPON THE FABRICATION OF THE MOUNTING MECHANISM. THE MOUNTING MECHANISMS SHALL BE DESIGNED TO PROVIDE SEALING MEANS UPON THE MOUNTING MECHANISM. THE MOUNTING MECHANISMS SHALL BE DESIGNED TO PROVIDE SEALING MEANS UPON THE MOUNTING MECHANISM. THE MOUNTING MECHANISMS SHALL BE DESIGNED TO PROVIDE SEALING MEANS UPON THE MOUNTING MECHANISM. THE MOUNTING MECHANISMS SHALL BE DESIGNED TO PROVIDE SEALING MEANS UPON THE MOUNTING MECHANISM.
METAL POLE CONCRETE FOUNDATION DETAIL

- BOLT CIRCLE
- BOLT PROJECTION, DIAMETER, AND BOLT LENGTH PER MANUFACTURER'S SPEC (SUBMIT DATA REQUIRED)
- SOIL MOUNTING HEIGHT BOLT CIRCLE
  - SD SOIL 30° 6' 0" 1' 10"
  - MEDIUM CLAY 30° 6' 0" 1' 10"
  - DENSE CLAY 30° 6' 0" 1' 10"
- OR CONDUIT LENGTH ANCHOR BOLTS TO BE GALVANIZED PER SECTION 460-50 OF FLA DOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (DATED 1992)
- PRECAST OR POURRED IN PLACE

2500 PSI MIN
CLASS 1 CONCRETE

#4 BARS @ 12" ON CENTER WITH TOP 8" BOTTOM @ 8" ON CENTER
- 8-17 REINFORCING CASE
- NO WELDING PERMITTED ON REINFORCING CASE
- REINFORCING STEEL TO BE GRADE 40 OR 80
- 5" CLEAR

SCREW TYPE FOUNDATION SPECIFICATIONS

1. THE FOUNDATION SHAFT AND BASE PLATE SHALL BE ASTM A-36 STRUCTURAL STEEL, OR BETTER.
2. THE ANCHOR BOLTS SHALL BE ASTM A-325, OR BETTER.
3. ALL WELDS SHALL BE SUFFICIENT TO WITHSTAND 10,000 FT.-LBS. OF TORSION, APPLIED ABOUT THE AXIS OF THE FOUNDATION SHAFT.
4. THE FOUNDATION SHALL HAVE A HANDHELD IN THE BASE PLATE AT LEAST 6" IN DIAMETER.
5. THE BASE PLATE SHALL BE NOTCHED TO INDICATE THE ORIENTATION OF THE SHAFT CABLES.
6. DRAINAGE SHALL BE PROVIDED IN THE BOTTOM OF THE FOUNDATION BY MEANS OF AN OPENING OF AT LEAST 3 SQUARE INCHES.
7. THE FOUNDATION SHALL BE DESIGNED FOR INSTALLATION USING A RIGHT HAND TURNING MOVEMENT WITH A SLIGHT DOWN PRESSURE. THE MAXIMUM INSTALLATION TORQUE SHALL NOT EXCEED 10,000 FT.-LBS. OR BE LESS THAN 3,500 FT.-LBS.
8. THE WHOLE FOUNDATION SHALL BE HOT DIP GALVANIZED AFTER FABRICATION TO ASTM A-123.

SCREW TYPE FOUNDATION DETAIL

CAST IRON TRAFFIC COVER OR APPROVED EQUAL TO FIT BOX

CONCRETE FULL BOX DETAIL

1. FULL BOX SHALL BE CONCRETE WITH CAST IRON COVER OR APPROVED EQUAL.
2. FULL BOX SHALL BE DESIGNED AND TESTED TO MEET AASHTO H-10 LOADING H-10
   LOADING H-10 * SINGLE AXLE LOAD OVER ANY 10' X 10' AREA COVER TO BE MARKED STREET LIGHTING*
3. BOXES MAY BE NESTED FOR DEEP CONDUIT AND FOR MORE WORKING ROOM.

FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN
ROADWAY LIGHTING DETAILS

DATE REVISIONS
0-24
4-78

DETAILS

- M. D. D. 2/83
- G. K. 4-78

- CHECKED
- DRAWN
- CHECKED
- SUPERVISED

- A. kHz
- L. Jones
- L. Jones
- L. Jones

DRAWN NO. INDEX NO.
1 17503
**DETAIL "A" AERIAL FEED**

1. **SERVICE SPECIFICATIONS**
   1. The enclosure shall be NEMA 3R, pole mounted, rain-tight, rated 480 VAC.
   2. The enclosure door shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a continuous hinge and draw down latches.
   3. 480V bolt-in type breakers shall be used. All components to be interchangeable with major manufacturers.
   4. All bus to be copper-225 A rated. Enclosed copper ground bus included.
   5. Locate control, transformer, and HOA switch inside enclosure.
   6. 600V lightning protector shall be wired inside the enclosure.
   7. Enclosure to be used to accommodate as many breakers as called for by other service equipment.
   8. Enclosure to be rigidly attached to the pole face.
   9. All service equipment shall be U-L approved.
   10. Main breaker required wall service panels with 2 or more feeder breakers.

**DETAIL "B" UNDERGROUND FEED**

1. **SERVICE SPECIFICATIONS**
   1. The enclosure shall be NEMA 3R, pole mounted, rain-tight, rated 480 VAC.
   2. The enclosure door shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a continuous hinge and draw down latches.
   3. 480V bolt-in type breakers shall be used. All components to be interchangeable with major manufacturers.
   4. All bus to be copper-225 A rated. Enclosed copper ground bus included.
   5. Locate control, transformer, and HOA switch inside enclosure.
   6. 600V lightning protector shall be wired inside the enclosure.
   7. Enclosure to be used to accommodate as many breakers as called for by other service equipment.
   8. Enclosure to be rigidly attached to the pole face.
   9. All service equipment shall be U-L approved.
   10. Main breaker required wall service panels with 2 or more feeder breakers.
### Table: Dimensions of Bars

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<thead>
<tr>
<th>Bars</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Size</th>
<th>Length</th>
<th>O.D. Min</th>
<th>Size</th>
<th>Length</th>
<th>O.D. Max</th>
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<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>5 / 6</td>
<td>6</td>
<td>6 / 7</td>
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<td>6 / 7</td>
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<tr>
<td>1-4</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>5 / 6</td>
<td>6</td>
<td>6 / 7</td>
<td>6</td>
<td>6</td>
<td>6 / 7</td>
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<tr>
<td>1-5</td>
<td>1</td>
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<td>6</td>
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<td>6 / 7</td>
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<td>1-6</td>
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<td>1</td>
<td>10</td>
<td>6 / 7</td>
<td>6</td>
<td>6 / 7</td>
<td>6</td>
<td>6</td>
<td>6 / 7</td>
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<td>6 / 7</td>
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<td>1-9</td>
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<td>1</td>
<td>10</td>
<td>6 / 7</td>
<td>6</td>
<td>6 / 7</td>
<td>6</td>
<td>6</td>
<td>6 / 7</td>
</tr>
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<td>6 / 7</td>
<td>6</td>
<td>6 / 7</td>
<td>6</td>
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<td>6 / 7</td>
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</tbody>
</table>

### Diagram: Towing Signal Trusses

**Section A-A**

**Section B-B**

**Notes:**
1. All reinforcing steel shall have a 2 hr. Fireproof of Concrete, unless otherwise specified.
2. All reinforcing steel shall be properly protected from weather.
3. See Concrete signal pole, Reeve Metal, 38 ft. long, available from S & C Co.
4. See Contractor's estimate for materials and labor cost, standard bars, etc., refer to Contractor's estimate for materials and labor cost.

---

**Bill of Materials:**

<table>
<thead>
<tr>
<th>Material</th>
<th>Size</th>
<th>Length</th>
<th>O.D. Min</th>
<th>O.D. Max</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>6</td>
<td>6</td>
<td>6 / 7</td>
<td>6 / 7</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
<td>6</td>
<td>6</td>
<td>6 / 7</td>
<td>6 / 7</td>
</tr>
</tbody>
</table>
### GENERAL NOTES

1. For sign identification numbers (see Sheet 3). Use the same identification number and the required distance from the center of the support column. The distance from the center of the support column to the edge of the sign support is not the same for all support columns. The sign will then be supported on columns of different heights.

2. All columns in the table are aluminum columns, given as outside diameters in millimeters and wall thicknesses in millimeters. The table includes data for 2, 4, and 6. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces.

3. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces. The column sizes in the table are given as outside diameters in millimeters and wall thicknesses in millimeters. The table includes data for 2, 4, and 6. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces.

### SLIP BASE DETAILS

**SLIP BASE NOTES**

1. Inlet diameter: 1/2" (12.7 mm) for concrete to be inserted into the base. The inlet diameter of the concrete is not specified in the table.

2. Bolt size: 1/2" (12.7 mm) for concrete to be inserted into the base. The bolt size of the concrete is not specified in the table.

3. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces. The column sizes in the table are given as outside diameters in millimeters and wall thicknesses in millimeters. The table includes data for 2, 4, and 6. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces.

### SLIDE BOARD DETAIL

**SLIDE BOARD NOTES**

1. Inlet diameter: 1/2" (12.7 mm) for concrete to be inserted into the base. The inlet diameter of the concrete is not specified in the table.

2. Bolt size: 1/2" (12.7 mm) for concrete to be inserted into the base. The bolt size of the concrete is not specified in the table.

3. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces. The column sizes in the table are given as outside diameters in millimeters and wall thicknesses in millimeters. The table includes data for 2, 4, and 6. The minimum column size for the support columns will be determined by the code requirements. The support columns must be designed to withstand the required forces.
**SPECIFICATIONS**

**STRUCTURAL STEEL**: The material used shall meet the requirements of the American Society of Civil Engineers (ASCE) and the American Institute of Steel Construction (AISC) specifications.

**WELDING**: All welds shall be done in accordance with the American Welding Society (AWS) codes.

**ANCHOR BOLTS**: All anchor bolts shall be Grade 50 steels and shall meet the requirements of the American Institute of Steel Construction (AISC) specifications.

**ANCHOR BOLT DETAIL**: The anchor bolts shall be Grade 50 steels and shall meet the requirements of the American Institute of Steel Construction (AISC) specifications.

**NOTES**:
- For column support, tabulated use requires a larger diameter and wall thickness.
- All dimensions are in inches.

---

**ALUMINUM BASES FOR COLUMN SUPPORTS**

**NOTES**:
- For column support, tabulated use requires a larger diameter and wall thickness.
- All dimensions are in inches.

---

**ELEVATION**

**SECTION A-A**

**NOTE**
- The thickness of the sleeve shall match the thickness of the column. Inside diameter of the sleeve shall be used for a stop inside the column.

---

**WELDING ROSES**

**MATERIALS**: All materials shall be in accordance with the American Society of Civil Engineers (ASCE) and the American Institute of Steel Construction (AISC) specifications.

**WELDING**: All welds shall be done in accordance with the American Welding Society (AWS) codes.

---

**ANCHOR BOLTS**: All anchor bolts shall be Grade 50 steels and shall meet the requirements of the American Institute of Steel Construction (AISC) specifications.

---

**ANCHOR BOLT DETAIL**: The anchor bolts shall be Grade 50 steels and shall meet the requirements of the American Institute of Steel Construction (AISC) specifications.

---

**NOTES**:
- For column support, tabulated use requires a larger diameter and wall thickness.
FOR FREEWAY USE

1. **WEIGH STATION**
   - SIGN NO FTO-4A
   - 8.0" x 6.5"
   - 2" BORDER - 6" RAD.

2. **ALL TRUCKS ENTER WEIGH STATION**
   - SIGN NO FTO-4B
   - 8.0" x 5.0"
   - 2" BORDER - 6" RAD.

3. **WEIGH STATION NEXT RIGHT**
   - SIGN NO FTO-4C
   - 8.0" x 6.0"
   - 2" BORDER - 6" RAD.

4. **WEIGH STATION NEXT LEFT**
   - SIGN NO FTO-4D
   - 8.0" x 6.0"
   - 2" BORDER - 6" RAD.

NOTE: FTO-6A — RIGHT ARROW
FTO-6B — LEFT ARROW

FOR OTHER THAN FREeways USE

- **WEIGH STATION**
  - SIGN NO FTO-7
  - 8.0" x 4.0"
  - 2" BORDER - 6" RAD.

- **ALL TRUCKS ENTER WEIGH STATION**
  - SIGN NO FTO-8
  - 5.0" x 3.5"
  - 2" BORDER - 6" RAD.

- **WEIGH STATION 1000 FT**
  - SIGN NO FTO-9
  - 6.0" x 4.0"
  - 2" BORDER - 6" RAD.

- **WEIGH STATION**
  - SIGN NO FTO-10
  - 6.0" x 4.0"
  - 2" BORDER - 6" RAD.

NOTE: FTO-10A — RIGHT ARROW
FTO-10B — LEFT ARROW

NOTE
ALL SIGNS TO HAVE GREEN REFLECTORIZED BACKGROUND
WITH WHITE LEGEND AND BORDER
EXCEPT SIGNS NO. FTO-4 & FTO-8
WHICH SHALL HAVE WHITE BACKGROUND
WITH BLACK LEGEND AND BORDER
ALL DIMENSIONS SHOWN ARE IN INCHES AND EIGHTHS

---

**FLORIDA DEPARTMENT OF TRANSPORTATION**

**TRAFFIC DESIGN**

**TYPICAL SIGNING FOR TRUCK WEIGH AND INSPECTION STATIONS**

**DATE** | **INITIALS** | **DESCRIPTION**
--- | --- | ---
 | | |

**REVISIONS**

- SIGN NO. FTO-11 TO BE USED WITH SIGNS NO. FTO-5A & B
- SIGN NO. FTO-12 TO BE USED WITH SIGN NO. FTO-3.
WEIGH STATION AGRICULTURAL INSPECTION 1 MILE

ALL TRUCKS-TRAILERS PICKUPS-VANS NEXT RIGHT

WEIGH STATION AGRICULTURAL INSPECTION NEXT RIGHT

TRUCKS-TRAILERS PICKUPS-VANS

NOTE

ALL SIGNS SHALL HAVE GREEN REFLECTORIZED BACKGROUND WITH WHITE LEGEND AND BORDER, EXCEPT SIGNS FTO-M88 WHICH SHALL HAVE A WHITE BACKGROUND WITH BLACK LEGEND AND BORDER.

ALL DIMENSIONS SHOWN ARE IN INCHES AND EIGHTHS.

ALL GUIDE SIGN CORNER RADIUS SHALL HAVE THE OUTSIDE CORNERS OF SIGN FACE CUT CONCENTRIC WITH BORDER. BORDER TO BE MOUNTED TANGENT TO AND WITH EDGE OF SIGN.
1. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A SIGNALIZED INTERSECTION

2. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A STOP CONTROLLED INTERSECTION

**NOTE:**
SCHOOL SIGNS ERECTED AT THE SIDE OF THE ROAD IN RURAL DISTRICTS SHALL BE MOUNTED AT A HEIGHT OF AT LEAST 6 FEET, MEASURED FROM THE BOTTOM OF THE SIGN TO THE LEVEL OF THE ROADWAY EDGES. SIGNS IN BUSINESS, COMMERCIAL, AND RESIDENTIAL DISTRICTS WHERE PEDESTRIAN MOVEMENT IS LIKELY TO OCCUR OR WHERE THERE ARE OTHER OBSTRUCTIONS TO VIEW, THE CLEARANCE TO THE BOTTOM OF THE SIGN SHALL BE AT LEAST 7 FEET.

**NOTE:**
ALL SCHOOL SIGNS SHALL BE REFLECTORIZED.
7. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS (4 Lanes Divided - 2 Way Traffic)

<table>
<thead>
<tr>
<th>APPROACH SPEED MPH</th>
<th>A</th>
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<tr>
<td>25 TO 35</td>
<td>275</td>
<td>50</td>
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<td>36 TO 45</td>
<td>350</td>
<td>65</td>
</tr>
<tr>
<td>46 TO 55</td>
<td>500</td>
<td>80</td>
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</table>

A & B distances shall be increased by adding the intersecting street width (curb return included) to dimensions given in table.

8. TRAFFIC CONTROL DEVICES FOR SIGNALIZED MIDBLOCK SCHOOL CROSSWALK
9. Traffic Control Devices at School Entrances Where There Are Little or No Walking Students

These signs are intended for use only at those few locations where the school entrance is not evident to the motorist, and must be approved in advance by the responsible traffic engineering authority.

10. Traffic Control Devices for a Typical School Zone Fronting the School Property

Florida Department of Transportation
Traffic Design

| SCHOOL SIGNS & MARKINGS
<table>
<thead>
<tr>
<th>REVISIONS</th>
<th>INITIALS</th>
<th>DATES</th>
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</thead>
<tbody>
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</tbody>
</table>

DRAFT D-16, LEE COUNTY ENGINEER
STANDARDS NUMBER: 4
APPENRACE NO: 4 OF 41: 17348
MARKINGS FOR LEFT OFF-RAMP

The left edge line (yellow) will be continuous from the main line down the ramp to crossroad. The main line left edge line (yellow) will start again at the physical gore which is the end of 6" line used in gore delineation.

DETAIL A
COLORLESS-RED REFLECTIVE PAVEMENT MARKERS TO BE PLACED ON EVERY STRIPE BEGINNING AT NOSE

NOTE:
REFLECTIVE PAVEMENT MARKERS ARE INSTALLED ON THE THERMOPLASTIC EDGELINE.

NORMAL TAPERED EXIT
(TWO THRU LANES)

DETAIL C
COLORLESS-RED REFLECTIVE PAVEMENT MARKERS TO BE PLACED ON EACH STRIPE BEGINNING AT MYS

NOTE:
In advance of lane drops at off 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 inch wide by 3 foot long white stripes separated by 1/2 foot gaps. In urban areas, this special marking should begin 1/2 mile in advance of the theoretical gore point. Where last minute lane changes may cause conflicts, an 8 inch wide solid white channelizing line extends 300 feet upstream from the theoretical gore point (MUTCD, Section 38-1-1).

DETAIL B
COLORLESS-RED REFLECTIVE PAVEMENT MARKERS TO BE PLACED OUTSIDE OF THE STRIPE IF PRINT IS USED.
NORMAL TAPERED ENTRANCE

4" WHITE LINE ALONG RIGHT EDGE OF TRAVELWAY
4" YELLOW LINE ALONG LEFT EDGE OF TRAVELWAY
4" WHITE & YELLOW EDGE LINES TERMINATE AT POINT OF SHOULDER PAVEMENT

NORMAL TAPERED ENTRANCE WITH ADDED LANE

4" WHITE & YELLOW EDGE LINES TERMINATE AT POINT OF SHOULDER PAVEMENT
4" YELLOW LINE ALONG LEFT EDGE OF TRAVELWAY

DETAIL D

4" WHITE STRIPING
4" WHITE EDGE LINE
COLORLESS-RED REFLECTIVE MARKERS (EVERY 40 FT.) SHALL END AT THE TERMINATION OF THE YELLOW EDGE LINE

NOTE: WHEN THERMOPLASTIC EDGELINES ARE USED PLACE REFLECTIVE PAVEMENT MARKERS ON THERMOPLASTIC EDGELINES.

COLORLESS-RED REFLECTIVE PAVEMENT MARKERS TO BE PLACED ON EVERY STRIPE BEGINNING AT NOSE.
REFLECTIVE PAVEMENT MARKERS SHALL BE PLACED OUTSIDE OF THE STRIPE IF PAVEMENT IS USED.
**PLACEMENT OF EDGELINES**

- Edge line striping typical for right or left edge.
- Colorless-red reflective pavement markers to be placed on every stripe beginning at nose.

**DETAIL E**

- Reflective pavement markers shall be placed outside of the stripe if paint is used.

**PARALLEL ACCELERATION AND DECELERATION LANE**

- Colorless-red reflective markers (every 10 ft) shall begin at the beginning of the deceleration lane.
- Colorless-red reflective markers (every 40 ft) shall begin at the termination of the yellow edge line.

**WROUGHT WAY ARROWS**

- White thermoplastic arrow with colorless-red reflective markers.
- White paint arrow with colorless-red reflective markers to be used only in areas with low traffic volumes.

**FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN**

**INTERCHANGE MARKINGS**

**REVISIONS**

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<th>DATE</th>
<th>INITIALS</th>
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<td>ZLD</td>
<td>REVISED DIMENSIONS</td>
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<td>H-H</td>
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<tr>
<td>3-15</td>
<td>R-L</td>
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**INITIALS/DATE**

- INITIALS: PB, ZLD, H-H, R-L
- DATE: 8-11-78, 9-7-78, 3-10, 3-15

**SUPERVISED BY**

- STATE DESIGN ENGINEER - HIGHWAY 17

**DRAWING NO.**

- NO. 4

**INDEX NO.**

- 1786
Types of Permanent Longitudinal Lines

Left

Right

Bus Stop

Only Lane

Turn

Merge

Note: When arrow and pavement message are used together, the arrow shall be located down stream of the pavement message and shall be separated from the pavement message by a line of equal distance to the base of the message.

Pavement Markings and Delineators for Median Cross-Over

Pavement Markings for Intersections with Major and Minor Roads

Florida Department of Transportation

Special Marking Areas
PAINTED LEFT TURN STORAGE LANE(S) DETAILS
FOR STOP CONTROLLED OR SIGNALIZED INTERSECTIONS

NOTE:
1. YELLOW LEFT TURN LINES MARKING MAY BE USED ALONGSIDE OR ON LANE EDGE, PROVIDING IT IS NOT REQUIRED ACCESS TO DRIVES APPROACHING A LEFT TURN STORAGE LANE.
2. WITH EACH ADDITIONAL SIDE OF TURN LANE BILD ONE ARROW.

ARROWS SHOULD BE EVENLY SPACED BETWEEN FIRST AND LAST ARROW

NOTE:
CRITERIA FOR PAINTED MARKINGS ONLY, NOT WHEELCHAIR RAMP LOCATIONS FOR RAMP.
CRITERIA SEE ROADWAY DESIGN INDEX NO. 504.

PAVEMENT MARKING FOR WHEELCHAIR RAMPS IN PARKING ZONES

ON STREET PARKING
NOTE:
1. ALL PARKING AND REFUGE LANE MARKINGS SHALL BE 4" WHITE
2. PARKING LANE LINES SHALL BE BROKEN AT DRIVEWAYS

TWO WAY LEFT TURN LANE
(WITH SINGLE LANE LEFT TURN CHANNELIZATION)

SCHEME ONE
(USE IN CONNECTED URBAN AREAS WHERE AVAILABLE STORAGE LENGTH BETWEEN INTERSECTIONS IS LIMITING A PERMANENT POINT OR TRANSITION FROM THE TWO-WAY TURNING LANE TO THE EXCLUSIVE TURNING LANE CAN NOT BE DETERMINED)

SCHEME TWO
(USE IN RURAL & SUBURBAN AREAS WHERE AN ABBREVIATED STORAGE LANE LENGTH CAN BE SPECIFICALLY DETERMINED)

# FOR ENTRANCES TO A ONE-WAY STREET THE DISTANCE FROM THE DOWNSTREAM DETAIL MAY BE REDUCED TO 20 FEET.

ON STREET PARKING
NOTE:
1. ALL PARKING AND REFUGE LANE MARKINGS SHALL BE 4" WHITE
2. PARKING LANE LINES SHALL BE BROKEN AT DRIVEWAYS

TWO WAY LEFT TURN LANE
(WITH SINGLE LANE LEFT TURN CHANNELIZATION)
TYPICAL INTERSECTION 2 THRU LANES PLUS LEFT TURN LANE, WITH CROSSWALK

RIGHT TURN LANE DROP AND ISLAND DETAILS

APPLIES TO ONEWAY LEFT TURN LANE DROPS ALSO

RIGHT TURN LANE AND ISLAND DETAILS

DETAIL "A"

STOP BARS, CROSSWALKS AND DOUBLE CENTER LINES DETAILS

APPLIES TO ONEWAY LEFT TURN LANE ALSO

FULL LANE WIDTH

FLORIDA DEPARTMENT OF TRANSPORTATION

TRAFFIC DESIGN

SPECIAL MARKING AREAS

REVISED

INITIALS

DATE

DESCRIPTION

DETAILED BY

CHECKED BY

REVIEWED BY

APPROVED

STATE DESIGN ENGINEER - FOOT

DRAWING NO.

INDEX NO.

17346
BEGINNING OF A DIVIDED HIGHWAY

NOTE
RAISED PAVEMENT MARKERS SHALL BE SET IN THERMOPLASTIC AS SHOWN BELOW, OR SET TWO (2) INCHES INSIDE PAINTED LINE AS SHOWN IN DETAIL A.

PAVEMENT MARKINGS FOR TRAFFIC CHANNELIZATION AT GORE
(TRAFFIC FLOWS IN SAME DIRECTION)

4-LANE-2-LANE TRANSITION-NO MEDIAN

PAVEMENT MARKING FOR TRAFFIC SEPARATION
(TRAFFIC FLOWS IN OPPOSITE DIRECTION)
RAILROAD CROSSING AT 2-LANE ROADWAY

Placing of Edgelines

FOR NON INTERSTATE

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 CROSSBAR SHALL BE LOCATED AT THE SITE LOCATION OF THE RR CATE OR SIGNAL, AND DETERMINE WITH INDEX 17882.
3. PLACEMENT OF THE WW-1 SIGN SHALL BE NORMALLY BE PLACED 75 FEET OR 1000 FEET IN ADVANCE OF THE CROSSING IN URBAN AREAS AND 250 FEET IN ADVANCE OF THE CROSSING IN URBAN AREA EXCEPT THAT IN A RESIDENTIAL OR BUSINESS DISTRICT, WHERE LOW SPEEDS ARE PREVALENT, THE SIGN MAY BE PLACED A MINIMUM DISTANCE OF 100 FEET FROM THE CROSSING. WHERE STREET INTERSECTIONS OCCUR BETWEEN THE RR MOVEMENT MESSAGE AND THE TRACKS AN ADDITIONAL WW-1 SIGN BE ADDED. WW-1 SIGN NEUTRAL, PAVEMENT MESSAGE SHOULD BE USED.
4. RECOMMENDED LOCATION FOR FTO-3B SIGN. 100% URBAN A 100% RURAL IN ADVANCE OF THE CROSSING.
- GENERAL NOTES -
1. FOR TRAFFIC AND PEDESTRIAN SIGNAL INSTALLATION, SEE STANDARD INDEXES (772) THROUGH (785)

2. FOR HANDICAP CURB CUT, SEE ROADWAY DESIGN STANDARD INDEXES 304 SHEETS 1 OF 2 AND 2 OF 2.

3. FOR PAVEMENT MARKING AND SIGN INSTALLATION, SEE TRAFFIC DESIGN STANDARD INDEXES 9639 THROUGH (7326)

---

**Special Emphasis Cross Walk**

Mid-Block - Signalized

**Approach Speed MPH** | **Suggested Distance in Feet**
--- | ---
25 TO 30 | 2.75
36 TO 45 | 350
46 TO 55 | 500

---

Special Emphasis Cross Walk

Signalized or Stop Sign Controlled Intersection
**NOTE:** When used on a bicycle lane (opposite side of vehicle only) markings shall be placed adjacent to markings for vehicles. A "NO" sign shall be sized and placed for vehicles.

**PAVEMENT MESSAGE DETAILS**

- "ONLY LANE BIKE"

**DIMENSIONS:**

- **Width:** 3.0"
- **Height:** 5.0"
- **Depth:** 4.0"
- **Diameter:** 10.0"
- **Angle:** 45°

**Colors:**

- **White**
- **Black**

---

**BICYCLE SPECIAL MARKING AREAS & DETAILS**

---

**Table:**

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<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
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<td>Value</td>
<td>Value</td>
<td>Value</td>
<td>Value</td>
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</tr>
</tbody>
</table>
CASE I. REFLECTOR SHALL HAVE A YELLOW REFLECTIVE BACKGROUND AND YELLOW REFLECTIVE BUTTONS.

SIGN SHOP *M2-170

CASE II. REFLECTOR SHALL HAVE A RED REFLECTIVE BACKGROUND AND RED REFLECTIVE BUTTONS.

SIGN SHOP *M2-171

No concrete footing is required for reflector supports. Supports shall be driven 3' into the ground.

Yellow Reflector Case II

Red Reflector Case II

Dead end sign shall be posted a sufficient advance distance to permit the vehicle operator to avoid the dead end by turning right at an appropriate point.

Note: For Roadway Warning, see Exhibit #17346. No crosshairs are required unless special field conditions require its use.

Supplemental Sign, with distance panel, to be used as needed.
NOTE
DISTANCE MESSAGE OF 1/2 MILE MAY BE USED TO KEEP THIS SIGN WITHIN THE STATE LINE.

NOTES:
1. SIGNS AND SIGN STRUCTURES SHALL BE ERECTED IN ACCORDANCE WITH THE DETAILS SHOWN ON INDEX 9553.
2. SIGN FTO-19 SHALL BE LOCATED ON THE WELCOME CENTER GROUND IN PROXIMITY TO THE BUILDING AND AS FAR FROM THE MAIN LINE ROADWAYS AS POSSIBLE (2 SIGNS BACK TO BACK). 
3. SIGN/TOUCHER SHALL BE LOCATED ON LIMITED ACCESS HIGHWAYS ONLY.
4. DETAIL OF FLORIDA SYMBOL IS AVAILABLE ON REQUEST FROM TRAFFIC OPERATIONS OFFICE OF D.O.T.

Florida Department of Transportation
Trafif Signs
WELCOME CENTER SIGNING
FOR LIMITED ACCESS HIGHWAYS

<table>
<thead>
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Tourist Information Center
NEXT RIGHT
NOTE: On two-way traffic markers may be installed either on the leading edge or trailing edge of the stripe.

FR: Note
Reflective Pavement Markers shall be placed 40 degrees on all projects, however on sharp curves less than 40 degrees may be used, if specified by the plans. For Pavement Arrow Requirements see Index 17346.

INSTALL MARKERS AT 15 INCH CENTER TO CENTER

COUNTY ROUTE MARKER DETAIL
(3 & 4 DIGIT MARKER)

 Color: Yellow reflective legend on blue reflective background.

NOTE:
1. Space and indent for the county name shall have the county name. The numerical size may have to be adjusted.
2. When used on a pole sign, should be overlaid on a 30" x 30" white reflective background.

COUNTY ROUTE MARKER DETAIL
(1 & 2 DIGIT MARKER)

 Color: Yellow reflective legend on blue reflective background.

NOTE:
1. Signs for 1-4 digits are to be used on signs.
2. When used on a pole sign should be overlaid on a 30" x 30" white reflective background.

PEDESTRIANS
BICYCLES
MOTOR VEHICLES
LESS THAN 5 BHP
PROHIBITED
FLORIDA STATUTES

FTO-30

Notes: The color of the sign shall be silver-white reflective background with black opaque border and legend.

EXIT PANEL
(GORE INSTALLATION)

Color: Reflective green background with reflective white legend and border.

Reduce size of numbers when 3 or more digits are used. Example 1000.

SPECIAL SIGN DETAILS

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<th>REVISIONS</th>
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FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC SERVICES

SUPERINTEGRAL
Page 1 of 4
17355
GENERAL NOTE

1. SIGNS FTO-25 AND FTO-26 MAY BE FABRICATED ON ONE PANEL OR TWO.

2. SIGN FTO-25 IS FOR USE IN AREAS WHERE THERE IS LIMITED SPACE.

3. USE OF SIGNS PER FLORIDA STATUTES FTO-25 and FTO-26, FS 316.1956 & 316.1956
   FTO-39A and FTO-38B, FS 351.03
   FTO-39, FS 316.212

EDUCATIONAL PLACARD FOR SIGN FTO-39B

EDUCATIONAL PLACARD FOR SIGN FTO-39A

Notes:
1. All letters are 1.5" Series "C".
2. Top sign shall have a reflectorized blue background with white reflectorized legend & border.
3. Bottom sign shall have a reflectorized white background with black opaque legend & border.

EDUCATIONAL PLACARD FOR SIGN FTO-39A

Notes:
1. Both signs shall have a reflectorized yellow background with black opaque legend & border.

GOLF CART XING

REFLECTORIZED YELLOW SIGN WITH BLACK OPAQUE LEGEND & BORDER, 5" SERIES C LETTERS

REFLECTORIZED YELLOW SIGN WITH BLACK OPAQUE LEGEND & BORDER, 4" SERIES C LETTERS

Note:
1. For golf cart warning remove the two 1/2" cross walk stripes.
NUMERAL SIZE
1 or 2 Digits 12" Series G - 24" x 24"
3 Digits 8" Series G - 24" x 24"
4 Digits 6" Series G - 24" x 30"
More Than 4 Digits 6" Series G - 24" x 30"

Notes:
1. All state route markers and auxiliaries shall have black opaque legend and border with white reflective background.
2. Type 'G' arrow to be positioned as indicated on Signing Plans.
3. Green reflectorized background with white reflectorized legend and border.

FLORIDA ROUTE MARKER FOR INDEPENDENT USE
FTO-28

FLORIDA SHIELD FOR GUIDE SIGN USE

Notes:
1. Florida shield shall have black opaque legend with white reflective background.

ARROW VERTICAL
ARROW LEFT
ARROW 45° LEFT
ARROW 45° RIGHT
ARROW NO ARROW

DETAIL LAYOUT OF
FLORIDA TURNPIKE TRAILBLAZER
FTO-27

SPECIAL SIGN DETAILS

REVISIONS

STATE ENGINEER

DATE

DESIGNER

DATE

DRAWN BY

CHECKED BY

SPECIFIED BY

FLORIDA DEPARTMENT OF TRANSPORTATION

TRAFFIC DESIGN

SPECIAL SIGN DETAILS

DETAILS DATE

ENGINEER

DATE

DRAWN BY

CHECKED BY

SPECIFIED BY

FLORIDA DEPARTMENT OF TRANSPORTATION

TRAFFIC DESIGN

SPECIAL SIGN DETAILS

DETAILS DATE

ENGINEER

DATE

DRAWN BY

CHECKED BY

SPECIFIED BY
FIGURE A
For use in areas not exposed to vehicular traffic and under driveways

MAY BE ADJUSTED IN FIELD DUE TO FIELD CONDITIONS UPON APPROVAL OF PROJECT ENGINEER.

FIGURE B
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 25 feet at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asbestos to be sawcut and removed to leave neat lines on both sides of the is pavement cut.
3. See note 3 figure C.

FIGURE C
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 3 ft minimum depth.
2. Asbestos to be sawcut at the edges of the trench.
3. The removal and replacement of the additional pavement width (6") will not be required when the trench is constructed without disturbing the asphalt surface on either side.

FIGURE D
For use in installing conduit under a new roadway prior to installation of curbs, base and pavement.

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 Class I concrete.

FIGURE E
For use in installing conduit under sidewalk.
FIGURE A
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT FIGURE

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 lower ground wire of the pole or to the external wire extending down the pole.

2. When utilizing the external ground wire to the pole, a piece of 0.7/34-in. conduct shall extend up the pole externally to a point 8" (20 cm) above finish grade.

3. Locking cable ties or lashing wire when used shall be placed no further than one (1) foot apart except at the point of cable drop or termination where one (1) tie is required, one (1) inch (2.5 cm) from the connector wire and another placed five (5) inches (12.7 cm) from that tie. When using Figure A, 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 feet or greater.
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 IN FORMING THE COMPLETE LOOP.
2. LOOP TYPES OR DETAILS NOT DRAWN TO SCALE.
3. LOOP TYPES ARE CENTERED IN A SINGLE LANE EXCEPT TYPE G WHICH IS CENTERED IN TWO LANES.
4. THE NUMBER OF INDIVIDUAL LOOPS IN THE TYPE G LOOP MAY VARY UP TO A MAXIMUM OF FOUR (4)

VERTICAL SECTION

FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN

VEHICLE LOOP INSTALLATION DETAILS

INITIALS

DATE

APPROVED

REVIEWED

STATE DESIGN ENGINEER, HSMW

DRAWN

INDEX TO

DRAWING NO.

2 OF 2

17781
**FIGURE A**
POLE MOUNTED DETECTOR STATION

**FIGURE B**
PEDESTAL STATION DETECTOR STATION

**FIGURE C**
WOOD POLE MOUNTED DETECTOR STATION

**NOTES**
1. SIGNS RD-36 A RD-462 SHALL BE MOUNTED ABOVE DETECTORS, EXPLAINING THEIR PURPOSE AND USE.
2. THE POSITIONING OF PEDESTRIAN PUSH BUTTONS SHOULD CLEARLY INDICATE WHICH CROSSWALK SIGNAL IS ACTIVATED BY EACH PUSH BUTTON.
3. PUSH BUTTONS AND SIGNS ARE TO BE MOUNTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
4. GROUND TO BE IN ACCORDANCE WITH SECTION 5220 OF STANDARD SPECIFICATIONS.
POLE MOUNTED CABINET

INTERCONNECT JUNCTION BOX

NOTES:

1. NUMBER, SIZE AND ORIENTATION OF CONDUIT SWEEPER WILL VARY ACCORDING TO SITE CONDITION OR LOCATIONS. ONE SCAFFOLDING CONDUIT SHALL BE PROVIDED IN ALL CASES. THE SCAFFOLDING CONDUIT WILL BE PLACED IN THE DIRECTION OF THE SERVICE LANE. BEHIND THE CABINET AND ALWAYS IN THE DIRECTION OF THE STREET. THE CONDUIT SCAFFOLDING FROM STREET TO THE CABINET OR THE REAR OF THE CABINET IS LOCATED ON THE SERVICE LANE. ALL SCAFFOLDINGS OF CONDUIT SHALL BE APPROVED BY THE PROJECT ENGINEER. ALL SCAFFOLDINGS OF CONDUIT SHALL BE CAPED WITH A WEATHER PROOF FITTING.

2. GROUNDING TO BE IN ACCORDANCE WITH SECTION 620 OF THE STANDARD SPECIFICATIONS.

BASE MOUNTED CABINET

FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN
CABINET INSTALLATION DETAIL

INITIALS/DATE:
Redrawn by: Mark 03/30/82
Revised by: Mark 02/24/84

STATE DESIGN ENGINEER, ABBY

Supervised by:
DRAWING NO: INDEX NO
1 of 1 (1784)
SIGNAL PLACEMENT AT RAILROAD CROSSING
(2-LANE DESIGN)

TRACK CLEARANCE FOR ACUTE OR RIGHT ANGLE CROSSINGS

TYPICAL LOCATION PLAN FOR GATE ON PLAIN SIGNAL WITH GATE WHERE TRACKS ARE AT OR Diagonal

NOTE: IT IS INTENDED THAT THE FULL SHOULDER WIDTH OF THE EXISTING RAILROAD BE USED. WHERE AN EXISTING SHOULD BE SUBSTANTIALLY SUBSTANTIAL FOR THE FACILITY INVOLVED, THE SHOULDER WIDTH SHOULD BE UPDATED TO MEET CURRENT STANDARDS.

SIGNAL PLACEMENT AT RAILROAD CROSSING
(4-LANE DESIGN)

NOTE: TWO SEPARATE FOUNDATIONS MAY BE REQUIRED FOR SIGNALS, ONE FOR EACH TYPE OF EQUIPMENT USED.

FLORIDA DEPARTMENT OF TRANSPORTATION
RAILROAD CROSSING TRAFFIC CONTROL DEVICES

REVISIONS

DATE
INITIALS
DESCRIPTION

12-11-94
0-J
ADDED SHEET NO. 10

12-19-94
0-J
ADDED SHEET NO. 11

12-21-94
0-J
ADDED SHEET NO. 12

FLORIDA DEPARTMENT OF TRANSPORTATION
RAILROAD CROSSING TRAFFIC CONTROL DEVICES

DRAWING NO. INDEX NO.
1 of 4 17882
MEDIAN SIGNAL GATES FOR
MULTI LANE UNDIVIDED URBAN SECTIONS
(FOUR OR MORE DRIVING LANES IN ONE DIRECTION, 45 MPH OR LESS)

FOR ADDITIONAL INFORMATION SEE THE "MANUAL ON
UNIFORM TRAFFIC CONTROL DEVICES", PART VIII, THE
"TRAFFIC CONTROL DEVICES HANDBOOK", PART V, AND
"ASHTO: A POLICY ON GEOMETRIC DESIGN OF STREETS
AND HIGHWAYS", 1964.
Typical Bridge Mounts

**TYPE I**

To be used where bridge operators are full time or on a daily basis.

**SEQUENCE CHART**

**GATES**

1. **Traffic Signals**
   - Main Traffic Sign
   - Drawbridge Sign (Movable Bridge Sign)
   - Stop Here on Red Sign
   - Entrance Gate
   - Exit Gate
2. **Exit Sign**
3. **Entrance Sign**

**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 to red, or beginning of flashing red, should not be less than the travel time of a passenger car, from the sign location to the stop line, traveling at the 85 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. On each approach (Type I), all four red signals shall be on the same two circuit flasher, with the two top signals on one circuit, and the two bottom signals on the other circuit.
9. A drawbridge Ahead sign is required for both types of signal operation. However, a flashing beacon shall be added to the sign when physical conditions prevent a driver from traveling at the 85% speed approach from having a continuous view of at least one signal indication for approximately 10 sec.