METRIC

ROADWAY AND TRAFFIC DESIGN STANDARDS

FOR DESIGN, CONSTRUCTION, MAINTENANCE AND UTILITY OPERATIONS ON THE STATE HIGHWAY SYSTEM

JANUARY 1995

TOPIC NO. 625-010-003-d
INTRODUCTION

METRIC ROADWAY AND TRAFFIC DESIGN STANDARDS, JANUARY 1995


The Department has adopted a standard practice for use of the m and mm designations and the use of the decimal that applies to the standards of this booklet, metric contract plans and other metric documents. That practice along with applied symbology is as follows:

a. Meter shall be indicated in decimal form without the m designation unless needed for clarity; for example: 30.0, 0.1 and 4.53.

b. Millimeter shall be a whole number without the mm designation unless the designation is needed for clarity. Anytime a fractional millimeter is required, the decimal form shall be labeled with mm; for example: 0.0400 mm. Whenever the whole number may be misinterpreted for the number of items required, then the mm designation is to be added; for example: 10 mm joints or 150 mm spaces.

c. Designations m or mm are not applied to dimensional information on dimension lines with line terminators unless needed for clarity. Designations m or mm are applied to dimensional information when tagged directly to a drawing feature by a leader line.

d. Designations m or mm are not applied to radii unless needed for clarity; for example: 15.0 R (without the m) and 0.5 R (without the mm).

e. In notation the m and mm designation are not to be used when the terms depth, thick, length, width, slopes, cites, height, slot, corrugation, timber and similar terms follow the number unless needed for clarity.

f. All general and design notes and other notation should show the m and mm after any numbers for clarification.

g. For round holes, diameter may be specified in one of the following forms:

   Examples: 15 mm Ø Hole (Preferable) 15 Ø Hole or 15 Ø Dia. Hole (Acceptable)
   15 mm Ø Hole (2 Req'd.) (Preferable) 2-15 mm Ø Holes (Acceptable)
   (5.3 mm Ø Hole (mm required with fractional mm)

h. Designations m or mm are not applied to established trade sizes or identifiers unless indicated by the trade or where needed for clarity; for example: L20 x 89 x 7.9 for a steel shape, 15M for steel reinforcing bar, not No. 15 (No. 15M acceptable but not a general practice); and, pipe size 750, since the diameter is understood by the industry to be in millimeters.  

i. All tables should be labeled in mm and m in the headings of columns including tabulations for those items where the industry has specified a single designation.

j. Pay items units are labeled with upper case letters as shown in the 1994 Metric Basis Of Estimates Handbook, and duplicated on an index No. 001.

k. For drawings and description information use the small superscript; for example: m² not m².

l. All items shall be described with their specific designations except as outlined above. SI units and symbols (ASTM's E 620 and E 380) must be adhered to for example kPa not KPa.

The 1994 Appropriations Act was signed into law on October 27, 1993. This act forbids the expenditure of Federal Funds for highway signs displaying speed limits, distance or other measurements using the metric system. Therefore, all speeds and all distances will be displayed in English units.

The equations for determining taper lengths, flare lengths and lane transition lengths "L", for example L = W/2/L and L = W/S/500 are for metric values. Design speed will be substituted for "S" in the equations unless otherwise assumed values are to be applied. On those standard indexes where the assumed value is the posted speed (English), conversion tables for English to metric speeds have been included on the indexes.

This booklet is the initial publication of metric roadway and traffic design standards by the Department. Users of these standards are encouraged to suggest improvements to the standards. Suggestions should be submitted only after thorough study has been made and supporting background data can be furnished with the suggestion. Suggestions should be submitted to the State Roadway Design Engineer, Florida Department of Transportation, 605 Sowannee St, MS 32, Tallahassee, F.L. 32394-0450. The Department will make changes to the standards by special provisions, or where necessary by interim standards, until the next regular publication of metric standards is implemented.
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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN**

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### UTILITY ADJUSTMENT SYMBOLS

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<td>Sanitary Sewer</td>
</tr>
<tr>
<td>P</td>
<td>Manhole</td>
</tr>
<tr>
<td>P</td>
<td>Water Meter</td>
</tr>
<tr>
<td>P</td>
<td>Valve</td>
</tr>
<tr>
<td>P</td>
<td>Fire Hydrant</td>
</tr>
</tbody>
</table>

See General Note Sheet 10 of 3.
STANDARD SYMBOLS FOR PLAN SHEETS

TRAFFIC SIGNALS SYMBOLS

EXISTING

PROPOSED

Traffic Signal Head (Span Wire Mounted)

Traffic Signal Head (Pedestal Mounted)

Traffic Signal Head (Mast Arm Mounted)

Traffic Signal Pole (Concrete, Wood, Metal)

Vehicle Detector (Loop)

Signal Cable (On Messenger Wire)

Conduit

Vehicle Detector (Points)

Pedestrian Detector

Pedestrian Signal Head (Pole Or Pedestal Mounted)

Controller Cabinet (Base Mounted)

Controller Cabinet (Base Mounted)

Walk - Don't Walk

Flashing Don't Walk

Signal Face Number

Signal Lens

Programmed Signal Head

Messenger Wire

Pole Tabulation Cross Reference

Pole Tabulation Cross Reference (Joint Use Pole)

Signal Phase

LIGHTING SYMBOLS

EXISTING

PROPOSED

Pole & Luminaire

Existing Pole & Luminaire To Be Removed

Final Position Of Relocated Or Adjusted Pole & Luminaire

High Mast Lighting Tower

City Or Utility Owned Luminaire & Pole

PVC (Polyvinyl Chloride) Lighting Conduit And Conductors

Rigid Galvanized Lighting Conduit And Conductors

Lighting Pull-Box

Light Distribution Point

Joint Use Pole

Pier Cap Underdeck Luminaire

Pendant Hung Underdeck Luminaire

SIGNING AND PAVEMENT MARKING SYMBOLS

Pavement Arrow

Single Solid Line

Double Solid Line

Skip Line

Stop Bar

Traffic Sign (Post Mounted)

Traffic Sign (Overhead)

Sign Number

Sign Item Number

Traffic Flow Arrow

See General Notes, Sheet 1 of 3
SOD FLUME (SODDING OVERLAPPED)

PLAN

SECTION AA

SECTION BB

TEMPORARY SLOPE DRAIN

ELEVATION

SLOPE DRAIN APPLICATION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

TEMPORARY SLOPE DRAIN AND SOD FLUME
**GENERAL CONSTRUCTION NOTES**

1. Fence materials shall be continuous or concrete only.
2. Aluminum posts shall be 75 mm diameter minimum. Aluminum rail spacing shall be in accordance with Index 450. Concrete posts and rail spacing shall be in accordance with Index 450. All posts shall be set in concrete.
3. Fabric shall be designed to resist posts and rail brackets, and tied to posts and braced at 100 mm centers.
4. For additional details on fencing, see Index 450 and 450.
5. All drainage pipes shall be 1/2" unless otherwise noted in the plans.
6. Sediment basins to be constructed prior to commencement of embankment construction. Maintenance and cleanup to be by the Contractor until acceptance of project by the Engineer.

**GENERAL NOTES**

1. The cost for Type A and Type B trash retainer and sediment basins shall include the cost for piping, fencing, baffles, piping and for bays and work placed over and above ditch excavation specified for in the plans. Payment for both Type A and Type B shall be under the contract unit price for Sediment Basin, Each. Specifications as called for in the plans shall be paid for under the contract unit price for Sediment Basin, Each.
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 (m³/min.)
- Very Light: < 0.1
- Light: 0.1 < 0.6
- Moderate: 0.6 < 2.4
- Heavy: 2.4 < 4.0
- Very Heavy: > 4.0

LEGEND
SOILS
- Cohesive:
  - Firm Loam
  - Clay Sands
  - Clays
  - Hardpan
- Non-Cohesive:
  - Fine Sand
  - Course Sand
  - Gravels
  - Sandy Loam
  - Silt Loam

CHART I
RECOMMENDED SPACING FOR TYPE I AND TYPE II HAY BALE BARRIERS, AND TYPE III SILT FENCES
Note: Silt Fence to be paid for under the contract unit price for Staked Silt Fence (WSL).

TYPE III SILT FENCE

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

SILT FENCE APPLICATIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

BALED HAY OR STRAW BARRIERS AND SILT FENCES
8 mm Vinyl Sheathed E.W. Sheath Cable
1,440 lbs Breaking Strength With
Galvanized Connectors (Field-Free Unconnect)

Closed Cell Solid Plastic Foam
Foundation (150 psi, Blue, #1248R w/Brand)

6 mm Perforated Pipe
(375 lbs Breaking Strength)

6 mm Galvanized Chain

8 mm Galvanized Chain

D.5 kg Nylon Reinforced
PVC Fabric (3000 N/m Test)

D.5 kg Nylon Reinforced
PVC Fabric (3000 N/m Test) With Locator Grommets

0.5 Max.

POST OPTIONS
50 x 100 OR
65 x 100 OR
85 x 200 OR
105 x 400 OR
7 kg/m, 120 mm, Stainless, Steel
TYPICAL

0.5 kg Nylon Reinforced
PVC Fabric (3000 N/m Test)

STAKED TURBIDITY BARRIER

NOTES:
1. Turbidity barriers are to be used in all permanent bodies of water regardless of water depth.
2. Number and spacing of anchors depend on current velocities.
3. Placement of barrier around pile locations may vary to accommodate construction operations.
4. Navigation may require segmenting barrier during construction operations.
5. For additional information see Section 9.4 of the Standard Specifications.

LEGEND
• Pile Locations
• Dredge Or Pile Area
• Wearing Body Wrencher
• Anchor
• Barrier Movement Due To Current Action

TURBIDITY BARRIER APPLICATIONS

GENERAL NOTES
1. Floating turbidity barriers are to be paid for under the contract unit price for Turbidity Barrier Floating, WH.
2. Staked turbidity barriers are to be paid for under the contract unit price for Turbidity Barrier Staked, WH.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TURBIDITY BARIERS

DESIGNER

PROJECT: [Project Name]

DATE: [Date]

STATE: FLORIDA

STATE WIDE: [State Wide]

TURBIDITY BARRIERS

NOTE: Turbidity barriers for flowing streams and tidal areas may be either floating or staked type or any combination of types that will suit site conditions and meet erosion control and water quality requirements. The barrier type(s) will be shown on Drawings as shown or otherwise specified in the plans, however payment will be under the pay item specified in the plans for Floating Turbidity Barrier and/or Staked Turbidity Barrier. Piles in staked turbidity barriers to be installed in vertical position unless otherwise directed by the Engineer.
SHOULDER AND SLOPE TREATMENT FOR SUPERELEVATED ROADWAYS

SEEDING RATES (kg/ha) FOR NEW SHOULDERS AND SLOPES*

<table>
<thead>
<tr>
<th>TYPE OF SEED</th>
<th>COASTAL INLAND</th>
<th>COASTAL INLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone I</td>
<td>Zone II</td>
</tr>
<tr>
<td>PERMANENT GRASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unfortified Bermuda</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Bahia Argentina or Paradesi</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Quick Growing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown Top Wheat</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Annual Ryegrass</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>TOTAL SEEDING rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PER SQR METER</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

*See index No. 65 for zone boundaries and seeding rates for shoulder reworking.

SHOULDER AND SLOPE TREATMENT IN SAG VERTICAL CURVES
## STANDARD CRITERIA

### CLASS

<table>
<thead>
<tr>
<th>CLASS</th>
<th>APPLICATION DESCRIPTION</th>
<th>STANDARD INDEX NO.</th>
<th>PERMEABILITY on/sec</th>
<th>A.O.S. Range Dia. in.</th>
<th>GRAB TENSILE STRENGTH lbf/in²</th>
<th>PUNCTURE</th>
<th>TRAPEZOIDAL TEAR</th>
<th>WELLEN BURST</th>
<th>ELONGATION X</th>
<th>SEAM STRENGTH X</th>
<th>U.V. RESISTANCE (W/sq. ft.)</th>
<th>FILTRATION EFFICIENCY</th>
<th>FLOW RATE l/sec</th>
<th>COMMENTS</th>
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<tbody>
<tr>
<td>D-1</td>
<td>Revetment (Special)</td>
<td>1:10 x 8</td>
<td>0.425 - 0.500</td>
<td>0.07</td>
<td>220</td>
<td>3.44</td>
<td>15 - 50</td>
<td>1000</td>
<td>80</td>
<td>500</td>
<td></td>
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<td></td>
<td>Woven Wood/Concrete only</td>
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<tr>
<td>D-2</td>
<td>Revetment (Standard)</td>
<td>1:10 x 8</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
<td>2.106</td>
<td>15 - 50</td>
<td>800</td>
<td>80</td>
<td>500</td>
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<td>Woven Wood/Concrete only</td>
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<tr>
<td>D-3</td>
<td>Underdrain Trench Wrap</td>
<td>200</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
<td>0.95</td>
<td>1000</td>
<td>360</td>
<td>80</td>
<td>500</td>
<td></td>
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<td></td>
<td>When placed adjacent to temporary sheeting which will be removed, the filter fabric must meet the requirements of 2-2 fabric.</td>
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<tr>
<td>D-4</td>
<td>Silt Fence</td>
<td>200</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
<td>1.24</td>
<td>1000</td>
<td>720</td>
<td>80</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td>Non-Woven only, Min. Thickness 90 MILs</td>
</tr>
<tr>
<td>D-5</td>
<td>Chechen Filter Silt</td>
<td>200</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
<td>0.95</td>
<td>1000</td>
<td>360</td>
<td>80</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td>Non-Woven only, Min. Thickness 20 MILs</td>
</tr>
<tr>
<td>D-6</td>
<td>Silt Fence</td>
<td>200</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
<td>1.24</td>
<td>1000</td>
<td>720</td>
<td>80</td>
<td>500</td>
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<td></td>
<td></td>
<td>Non-Woven only, Min. Thickness 20 MILs</td>
</tr>
<tr>
<td>D-7</td>
<td>Underdrain Filter Silt</td>
<td>200</td>
<td>0.202 - 0.250</td>
<td>0.07</td>
<td>220</td>
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<td>1000</td>
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<tr>
<td>E-1</td>
<td>Reinforcement</td>
<td>0.600</td>
<td>880</td>
<td>400</td>
<td>400</td>
<td>0.465</td>
<td>10</td>
<td>800</td>
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<td>See Standard Specification 948</td>
</tr>
<tr>
<td>E-2</td>
<td>Reinforcement</td>
<td>0.600</td>
<td>880</td>
<td>400</td>
<td>400</td>
<td>0.465</td>
<td>10</td>
<td>800</td>
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<td></td>
<td></td>
<td>See Standard Specification 948</td>
</tr>
<tr>
<td>R-1</td>
<td>Reinforcement</td>
<td>0.600</td>
<td>880</td>
<td>400</td>
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<td>800</td>
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<tr>
<td>R-2</td>
<td>Reinforcement</td>
<td>0.600</td>
<td>880</td>
<td>400</td>
<td>400</td>
<td>0.465</td>
<td>10</td>
<td>800</td>
<td>80</td>
<td>500</td>
<td></td>
<td></td>
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<td>See Standard Specification 948</td>
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### TABLE 1

<table>
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<tr>
<th>Test</th>
<th>Unit</th>
<th>Test Method</th>
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<tr>
<td>Permeability</td>
<td>on/sec</td>
<td>ASTM D-4596</td>
</tr>
<tr>
<td>A.O.S.</td>
<td>U.S. Spec No.</td>
<td>ASTM D-4792</td>
</tr>
<tr>
<td>Grab Tensile Strength</td>
<td>lbf/in²</td>
<td>ASTM D-4333</td>
</tr>
<tr>
<td>1st Burst Tear</td>
<td>lbf/in²</td>
<td>ASTM D-4333</td>
</tr>
<tr>
<td>Puncture</td>
<td>lbf/in²</td>
<td>ASTM D-4333</td>
</tr>
<tr>
<td>Trapezoidal Tear</td>
<td>lbf/in²</td>
<td>ASTM D-4333</td>
</tr>
<tr>
<td>Mainline Burst</td>
<td>lbf/in²</td>
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</tr>
<tr>
<td>Elongation</td>
<td>%</td>
<td>ASTM D-4333</td>
</tr>
<tr>
<td>Ultra Violet Resistance</td>
<td>%</td>
<td>ASTM D-4555</td>
</tr>
<tr>
<td>Filtration Efficiency</td>
<td>%</td>
<td>ASTM D-5946</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>l/min.</td>
<td>ASTM D-5946</td>
</tr>
</tbody>
</table>

### GENERAL NOTES

1. Specifications for geotextiles are Section 985 or the Section identified by the specific application. Physical criteria for each application is provided by this standard, in conjunction with these sections.

2. All values are MINIMUM AVERAGE ROLL values in the weakest principal direction unless otherwise stated.

3. Range of values do not preclude the responsibility to design the fabric to the locally materials and conditions.

4. Unless specifically restricted in COMMENTS column, any type of material may be used.

### DESIGN NOTES

1. The Designer must review this criteria and adjust the values as necessary to satisfy project requirements. These adjustments shall be noted in the plans or contained in the project special provisions.
   - See design note 3.1
2. U.V. Resistance: The value represents the percent of initial tensile strength retained (ASTM D-4532) after weathering per ASTM D-4333 for the test period (1 hour).
   - Soil with > 30% passing 0.075 mm sieve, A.O.S. Range is 0.15 to 0.30.
   - Soil with > 50% passing 0.075 mm sieve, A.O.S. Range is 0.12-0.25.
   - Soil with > 65% passing 0.075 mm sieve, A.O.S. Range is 0.10-0.15.
### SLAB DESIGNS - SQUARE AND RECTANGULAR STRUCTURES

**SHORT-WAY**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>0.067 x UNLTD</th>
<th>0.067 x UNLTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>8.8</td>
<td>0.00</td>
<td>0.00</td>
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</table>

**LONG-WAY**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>0.067 x UNLTD</th>
<th>0.067 x UNLTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>8.8</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

---

### SLAB DESIGNS - ROUND STRUCTURES

**SHORT-WAY**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>0.067</th>
<th>0.067</th>
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</thead>
<tbody>
<tr>
<td>203.0</td>
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<td>0.00</td>
</tr>
<tr>
<td>8.8</td>
<td>0.00</td>
<td>0.00</td>
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</table>

**LONG-WAY**

<table>
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<th>SIZE</th>
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<th>0.067</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.0</td>
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<td>0.00</td>
</tr>
<tr>
<td>8.8</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

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### WALL DESIGNS - RECTANGULAR STRUCTURES

**VERTICAL REINFORCING**

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<thead>
<tr>
<th>WALL</th>
<th>0.067</th>
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</thead>
<tbody>
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<td>203.0</td>
<td>0.00</td>
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</tbody>
</table>

**HORIZONTAL REINFORCING**

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<thead>
<tr>
<th>WALL</th>
<th>0.067</th>
</tr>
</thead>
<tbody>
<tr>
<td>203.0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

---

### GENERAL NOTES

1. Slab reinforcement is appropriate for top, intermediate, and bottom slabs.
2. Slab depth is measured from finished grade to top of slab.
3. Wall design depth is measured to the top of the bottom slab for boxes and to the bottom of the intermediate slab for risers.
4. Wall height is the distance between top of lower slab to bottom of upper slab.
5. Size shown in parentheses ( ) is the nominal size as shown on the plans.

---

### REINFORCING SCHEDULE

<table>
<thead>
<tr>
<th>SIZE</th>
<th>400 WPS STEEL</th>
<th>400 WPS WIRE FABRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>470</td>
<td>370</td>
</tr>
<tr>
<td>B</td>
<td>600</td>
<td>470</td>
</tr>
<tr>
<td>C</td>
<td>780</td>
<td>600</td>
</tr>
<tr>
<td>D</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>

---

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

**STRUCTURE BOTTOMS TYPE J AND P**

**DESIGNER:**

**CHECKED BY:**

**APPROVED BY:**
NOTES FOR THIN-WALL PRECAST OPTIONS

1. The details on Sheets 4, 5 & 6 are optional for precast thin-walled construction up to depths of 4.5m. These limits can be used with All "B" Details, Index 200. Care in placing construction wall adheres to the details contained on the referenced indexes.

2. Only the dimensions and reinforcement changes or other modifications are indicated. For all other dimensions and details, the referenced index drawings apply. These precedents units are used in conjunction with All "B" Structures Banners, Index 200, the interior dimensions of an All "B" Banner can be adjusted to reflect these thin wall interior dimensions.

3. Concrete which meets the requirements of ASTM C 496 shall be used for structures constructed to these details.

4. Reinforcement may be either deformed bar reinforcement or welded wire fabric. Bar reinforcement other than 300 MPA may be used, however only two grades are recognized; 300 MPA and 400 MPA. Welded wire fabric, including deformed welded wire fabric, will be recognized as having a design strength of 492 MPA. The area of reinforcement required may be reduced in accordance with the Equivalent Steel Area Table provided. For bars and spacers not given, the steel area required can be determined by the following equations:

For Depths 4.0 To 4.5, the Two Lower Bars in Long Walls Spaced @ 250 Cms.

\[ \text{Steel Area} = \frac{A_b}{f_y} \times 1000 \times 0.9 \times \frac{A_b}{A_{eq}} \]

\[ A_{eq} = A_b \times \frac{f_y}{f_{yd}} \]

For Depths 4.6 To 4.9, the Two Lower Bars in Long Walls Spaced @ 1000 Cms.

\[ \text{Steel Area} = \frac{A_b}{f_y} \times 1000 \times 0.9 \times \frac{A_b}{A_{eq}} \]

\[ A_{eq} = A_b \times \frac{f_y}{f_{yd}} \]

**EQUIVALENT STEEL AREA TABLE**

<table>
<thead>
<tr>
<th>300 MPA REINFORCING BAR</th>
<th>EQUIVALENT 400 MPA REINFORCING BAR</th>
<th>EQUIVALENT 450 MPA WELDED WIRE FABRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Size &amp; Spacing</td>
<td>Shear Area</td>
<td>Mils Steel Area</td>
</tr>
<tr>
<td>5W @ 100 CEMS</td>
<td>350</td>
<td>5W @ 345 CEMS</td>
</tr>
<tr>
<td>5W @ 200 CEMS</td>
<td>300</td>
<td>5W @ 300 CEMS</td>
</tr>
<tr>
<td>5W @ 300 CEMS</td>
<td>250</td>
<td>5W @ 250 CEMS</td>
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<tr>
<td>5W @ 250 CEMS</td>
<td>200</td>
<td>5W @ 200 CEMS</td>
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<td>5W @ 350 CEMS</td>
<td>150</td>
<td>5W @ 150 CEMS</td>
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<tr>
<td>5W @ 400 CEMS</td>
<td>100</td>
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</tr>
<tr>
<td>5W @ 450 CEMS</td>
<td>50</td>
<td>5W @ 50 CEMS</td>
</tr>
</tbody>
</table>

**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

The details on Sheets 4, 5 & 6 are optional for precast thin-walled construction up to depths of 4.5m. These limits can be used with All "B" Details, Index 200. Care in placing construction wall adheres to the details contained on the referenced indexes. Only the dimensions and reinforcement changes or other modifications are indicated. For all other dimensions and details, the referenced index drawings apply. These precedents units are used in conjunction with All "B" Structures Banners, Index 200, the interior dimensions of an All "B" Banner can be adjusted to reflect these thin wall interior dimensions. Concrete which meets the requirements of ASTM C 496 shall be used for structures constructed to these details. Reinforcement may be either deformed bar reinforcement or welded wire fabric. Bar reinforcement other than 300 MPA may be used, however only two grades are recognized; 300 MPA and 400 MPA. Welded wire fabric, including deformed welded wire fabric, will be recognized as having a design strength of 492 MPA. The area of reinforcement required may be reduced in accordance with the Equivalent Steel Area Table provided. For bars and spacers not given, the steel area required can be determined by the following equations:

For Depths 4.0 To 4.5, the Two Lower Bars in Long Walls Spaced @ 250 Cms.

\[ \text{Steel Area} = \frac{A_b}{f_y} \times 1000 \times 0.9 \times \frac{A_b}{A_{eq}} \]

\[ A_{eq} = A_b \times \frac{f_y}{f_{yd}} \]

For Depths 4.6 To 4.9, the Two Lower Bars in Long Walls Spaced @ 1000 Cms.

\[ \text{Steel Area} = \frac{A_b}{f_y} \times 1000 \times 0.9 \times \frac{A_b}{A_{eq}} \]

\[ A_{eq} = A_b \times \frac{f_y}{f_{yd}} \]
PARTIAL SECTION AA
PARTIAL SECTION BB

MEDIAN BARRIER INLET TYPES 1 & 2

INDEX 217

PARTIAL SECTION AA
PARTIAL SECTION BB

MEDIAN BARRIER INLET TYPES 3, 4, & 5

INDEX 217

PARTIAL SECTION AA
PARTIAL SECTION BB

BARRIER WALL (RIGID) (C & G)

INDEX 219

PARTIAL SECTION AA
PARTIAL SECTION BB

STRUCTURE BOTTOM TYPE P

INDEX 200

SIZE CUBED x 1007
**Rigid Pavement**

**Flexible Pavement**

**Unpaved W/O Select Bedding**

**Unpaved With Select Bedding**

---

### Minimum Cover

**Concrete**

- Air Round & Elliptical: 225

**Corrugated Steel**

- 375-500 Round & Arch Eq: 225

**Corrugated Aluminnum**

- 375-500 Round & Arch Eq: 225

**Polyvinyl Chloride**

- 375-500 Round: 225

---

### Pipe Type/Size & Shape

**Concrete**

- Air Round & Elliptical

**Corrugated Steel**

- 300-750 Round

**Corrugated Aluminnum**

- 375-500 Round & Arch Eq

**Polyvinyl Chloride**

- 375-900 Round

---

### Minimum Cover (mm)

**Concrete**

- Air Round & Elliptical: 225

**Corrugated Steel**

- 300-750 Round: 525

**Corrugated Aluminnum**

- 375-500 Round & Arch Eq: 450

**Polyvinyl Chloride**

- 375-900 Round: 450

---

### Minimum Cover

**Concrete**

- Air Round & Elliptical: 300

**Corrugated Steel**

- 300-750 Round: 600

**Corrugated Aluminum**

- 375-900 Round & Arch Eq: 675

**Polyvinyl Chloride**

- 375-900 Round: 675

---

### General Notes

1. The tabulated values are recommended minimum dimensions to withstand hydrostatic highway traffic loads. Additional cover may be required in support construction equipment loads or highway traffic loads before pavement is completed. Some site conditions may require an additional cover greater than those listed above. See Sheets 3, 4, 5, 6, and 7 for details to the plan. These features may include but are not limited to extra strength plates, stress relieving, bent steel, and the like.

2. Less than the tabulated minimum cover may be used provided suitable method 1.5 is selected and the design is acceptable.

3. Values shown in parentheses () are for 75 mm x 25 mm corrugations which must be specified to utilize the lesser cover.

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

5. Commercial and noncommercial refers to typical vehicular utilization of unpaved roads and driveways where rutting and other deck displacement may occur.

---

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

<table>
<thead>
<tr>
<th>Equiv. Dia.</th>
<th>Area (ft²)</th>
<th>Wall Thickness (mm) *</th>
<th>Classes II, III, IV, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>0.07</td>
<td>48</td>
<td>50</td>
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<tr>
<td>375</td>
<td>0.11</td>
<td>47</td>
<td>57</td>
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<tr>
<td>450</td>
<td>0.17</td>
<td>50</td>
<td>63</td>
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<tr>
<td>600</td>
<td>0.25</td>
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<td>750</td>
<td>0.45</td>
<td>69</td>
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<td>900</td>
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<td>150</td>
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<td>1800</td>
<td>2.21</td>
<td>158</td>
<td>183</td>
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<td>2000</td>
<td>2.65</td>
<td>150</td>
<td>175</td>
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<tr>
<td>2400</td>
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<td>190</td>
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<td>2750</td>
<td>3.58</td>
<td>175</td>
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<td>3250</td>
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<tr>
<td>4000</td>
<td>4.67</td>
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<td>6000</td>
<td>5.90</td>
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<tr>
<td>7000</td>
<td>6.74</td>
<td>264</td>
<td>——</td>
</tr>
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</table>

*For informational purposes only - Do not specify wall thickness. Option B wall is industry standard.

### Round Pipe Installations

#### Height of Fill (m) & Projection Condition

<table>
<thead>
<tr>
<th>Design</th>
<th>Height of Fill (m)</th>
<th>Pipe Class</th>
<th>Bedding Class</th>
<th>Projection Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>0.3-2.5</td>
<td>C</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.6-4.3</td>
<td>C</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.4-6.7</td>
<td>C</td>
<td>Positive</td>
<td></td>
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<tr>
<td></td>
<td>6.8-9.0</td>
<td>C</td>
<td>Positive</td>
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<tr>
<td>Modified Bead</td>
<td>8.1-9.8</td>
<td>B</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Modified Trench</td>
<td>9.9-13.1</td>
<td>B</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.2-21.4</td>
<td>B</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

### Elliptical Pipe Dimensions

#### Nominal Dimensions

| RISE (ft) | SPAN (ft) | Rise (m) | Span (m) | Equiv. Dia. (in) | Area (ft²) | Wall Thickness (mm) *
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
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<td>300</td>
<td>50</td>
<td>NA</td>
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<td>750</td>
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<td>900</td>
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<td>900</td>
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<td>125</td>
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<td>337</td>
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<td>337</td>
</tr>
</tbody>
</table>

*For informational purposes only

### Elliptical Pipe Installations

#### Height of Fill (m) & Projection Condition

| Installation | Rise (ft) | Span (ft) | Rise (m) | Span (m) | Equiv. Dia. (in) | Area (ft²) | Wall Thickness (mm) *
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Horiz.</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
</tr>
<tr>
<td>Vert.</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
<td>2.0-3.1</td>
<td>0.3-1.9</td>
</tr>
</tbody>
</table>

*Note: HE III and VE III pipe required for depths of cover less than 0.6 for 375, 450 and 600 equivalent.

### Maximum Cover for Reinforced Concrete Pipe Round and Elliptical

<table>
<thead>
<tr>
<th>Cover Height</th>
<th>Nominal Rise (ft)</th>
<th>Nominal Span (ft)</th>
<th>Nominal Rise (m)</th>
<th>Nominal Span (m)</th>
<th>Nominal Cover (ft)</th>
<th>Nominal Cover (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round</td>
<td>300</td>
<td>50</td>
<td>300</td>
<td>50</td>
<td>300</td>
<td>50</td>
</tr>
<tr>
<td>Elliptical</td>
<td>300</td>
<td>50</td>
<td>300</td>
<td>50</td>
<td>300</td>
<td>50</td>
</tr>
</tbody>
</table>

* Note: Height of fill maximum cover is measured from top of finished grade to outside top of pipe.
### Round Pipe - 67 x 13 Corrugation

<table>
<thead>
<tr>
<th>D (in)</th>
<th>Area (ft²)</th>
<th>Max. Height of Fill (in)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>1.63</td>
<td>2.06</td>
<td>NA</td>
</tr>
<tr>
<td>1/2</td>
<td>2.54</td>
<td>2.77</td>
<td>4.27</td>
</tr>
<tr>
<td>3/4</td>
<td>3.50</td>
<td>3.50</td>
<td>4.27</td>
</tr>
</tbody>
</table>

### Round Pipe - 75 x 25 Corrugation

<table>
<thead>
<tr>
<th>D (in)</th>
<th>Area (ft²)</th>
<th>Max. Height of Fill (in)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>2.54</td>
<td>2.77</td>
<td>4.27</td>
</tr>
<tr>
<td>3/4</td>
<td>3.50</td>
<td>3.50</td>
<td>4.27</td>
</tr>
</tbody>
</table>

### Round Pipe - 125 x 25 Corrugation

<table>
<thead>
<tr>
<th>D (in)</th>
<th>Area (ft²)</th>
<th>Max. Height of Fill (in)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>2.54</td>
<td>2.77</td>
<td>4.27</td>
</tr>
<tr>
<td>3/4</td>
<td>3.50</td>
<td>3.50</td>
<td>4.27</td>
</tr>
</tbody>
</table>

Notes:
- Increase the minimum cover value shown on Sheet 4 by 1/16 for gages and size combinations below the heavy lines.
- Height of fill maximum cover is measured from top of finished grade to outside top of pipe.
- Repurposed end not available. May be considered for cross drain and side drain applications only.
- NS - Not Suitable (For Highway H-30 Loadings)

### Pipe Arch - Spiral Rib (19 x 19 x 90) and 292 Rib Spacing Pipe Arch - 67 x 13 Corrugation

<table>
<thead>
<tr>
<th>Spans (ft)</th>
<th>Rise (ft)</th>
<th>Equivalent Pipe (in)</th>
<th>Area (ft²)</th>
<th>Minimum Vertical Required (in)</th>
<th>Maximum Height of Fill (in)</th>
<th>Maximum Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>4.27</td>
</tr>
</tbody>
</table>

### Pipe Arch - 75 x 25 (1, 2, 3) and 125 x 25 (2, 3) Corrugation

<table>
<thead>
<tr>
<th>Spans (ft)</th>
<th>Rise (ft)</th>
<th>Equivalent Pipe (in)</th>
<th>Area (ft²)</th>
<th>Minimum Vertical Required (in)</th>
<th>Maximum Height of Fill (in)</th>
<th>Maximum Cover (ft)</th>
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<tbody>
<tr>
<td>600</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>4.27</td>
</tr>
</tbody>
</table>

Notes:
- Limited availability of this product. Check availability before specifying (generally limited to 75 mm x 25 mm corrugation pipe arch fabricated from 6300 and smaller diameter round pipe in 12 ga. and thicker material).

### Round Pipe - Spiral Rib Spacing (19 x 19 x 90) or (19 x 25 x 292)

<table>
<thead>
<tr>
<th>D (in)</th>
<th>Area (ft²)</th>
<th>Max. Height of Fill (in)</th>
<th>Min. Cover (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>2.54</td>
<td>2.77</td>
<td>4.27</td>
</tr>
<tr>
<td>3/4</td>
<td>3.50</td>
<td>3.50</td>
<td>4.27</td>
</tr>
</tbody>
</table>

Notes:
- Increase the minimum cover value shown on Sheet 4 by 1/16 for gages and size combinations below the heavy lines.
- Height of fill maximum cover is measured from top of finished grade to outside top of pipe.
- Repurposed end not available. May be considered for cross drain and side drain applications only.
- NS - Not Suitable (For Highway H-30 Loadings)

### Maximum Cover for Corrugated Steel Pipe Round and Pipe Arch

### Cover Height

[Table with dimensions for various pipe arch and round pipe configurations]
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</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>375</td>
<td>375</td>
<td>0.40</td>
<td>1.504 (6.0)</td>
<td>3.66</td>
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</tr>
<tr>
<td>560</td>
<td>490</td>
<td>490</td>
<td>0.45</td>
<td>1.504 (6.0)</td>
<td>3.66</td>
<td>6.57</td>
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</tr>
<tr>
<td>680</td>
<td>600</td>
<td>600</td>
<td>0.50</td>
<td>1.504 (6.0)</td>
<td>3.66</td>
<td>6.57</td>
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<tr>
<td>100</td>
<td>750</td>
<td>750</td>
<td>0.53</td>
<td>1.905 (7.6)</td>
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</tr>
<tr>
<td>120</td>
<td>900</td>
<td>900</td>
<td>0.57</td>
<td>2.667 (10.6)</td>
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<td>12.22</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>1050</td>
<td>1050</td>
<td>0.63</td>
<td>2.667 (10.6)</td>
<td>5.25</td>
<td>12.22</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>1200</td>
<td>1200</td>
<td>0.68</td>
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<td>12.22</td>
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<tr>
<td>160</td>
<td>1350</td>
<td>1350</td>
<td>0.73</td>
<td>3.429 (13.5)</td>
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<td>14.03</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>1600</td>
<td>1600</td>
<td>0.83</td>
<td>2.667 (10.6)</td>
<td>5.25</td>
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<tr>
<td>200</td>
<td>2000</td>
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<td>1.00</td>
<td>3.429 (13.5)</td>
<td>6.83</td>
<td>14.03</td>
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</tr>
</tbody>
</table>

Notes:
- Increase the minimum cover values shown on Sheet 1 of 4 by 50 mm for gaps and size combinations below the heavy lines.
- Height of fill maximum is measured from top of finished grade to outside top of pipe.
- NA = Not Available
- KS = Not Suitable For Highway Bridges or ASTM B388 and manufacturer's recommendations.

Surface...
- Design Review is recommended for each specific application. The review should address any special conditions, backfill procedures, and construction and restrictions which may be required. See FDOT Drainage Manual, Chapter 9, Section 9.1.5, Vol. II, 1988. The specification of the minimum sheet thickness for this review is a minimum for the purposes of ensuring a minimum corner pressure difference. 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.

1. Limited availability of this product. Check availability before specifying.
2. 360° perforated pipe (French drain pipe) is not recommended in the pipe arch design. Do not specify without checking both for suitability and workability.
3. This size and gap combination must be strung during installation per manufacturer's recommendations. Extra care will be required during handling and installation.
4. Use of this size and gap combination must be approved by the State Drainage Engineer.

MAXIMUM COVER FOR CORRUGATED ALUMINUM ALLOY ROUGH ROUND PIPE AND PIPE ARCH

COVER REQUIREMENTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

DESIGNER: K.K. 
DATE: 05/04/94

ENGINEER: M.G. 
APPROVED: 06/15/94

SHEET NO. 4 OF 4

D. 75 x 25 CORRUGATION

D. 25 x 25 CORRUGATION

D. 75 x 25 SPIRAL RIB

D. 25 x 25 SPIRAL RIB

See Sheet 1 of 4
## APPLICATION GUIDELINES TO CURB INLETS AND GUTTER INLETS

<table>
<thead>
<tr>
<th>INDEX NO.</th>
<th>INLET TYPE</th>
<th>TYPE CURB/GUTTER</th>
<th>GRADE CONSIDERATION</th>
<th>HYDRAULIC INTAKE (m³/s)</th>
<th>BICYCLE SAFETY PEDESTRIAN SAFE</th>
<th>UTILITY LOCATION FROM CURB</th>
<th>MAXIMUM PIPE SIZE WITH STANDARD BOTTOMS</th>
<th>COMMENTS</th>
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<tr>
<td>20</td>
<td>E &amp; F</td>
<td>Continuous</td>
<td>0.015</td>
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<td>Inside</td>
<td>750 mm</td>
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<td>21</td>
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<td>Sag</td>
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<td></td>
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<tr>
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<tr>
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<td>E &amp; F</td>
<td>Continuous</td>
<td>0.088</td>
<td>Yes / Limited</td>
<td>Outside</td>
<td>750 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>E &amp; F</td>
<td>Sag</td>
<td>0.025</td>
<td>Yes / Limited</td>
<td>Outside</td>
<td>750 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Separator I &amp; II</td>
<td>Continuous or Sag</td>
<td>0.025</td>
<td>Yes / Limited</td>
<td>Inside</td>
<td>600 mm longitudinal / 750 mm Transverse</td>
<td>To be used only where flows are light to moderate and R/W does not permit the use of throatless curb inlets. Values to be adjusted for major flow direction.</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Separator III &amp; IV</td>
<td>Continuous or Sag</td>
<td>0.025</td>
<td>Yes / Limited</td>
<td>Inside</td>
<td>600 mm longitudinal / 750 mm Transverse</td>
<td>To be used only where flows are light and R/W does not permit the use of throatless curb inlets.</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>D &amp; F</td>
<td>Continuous or Sag</td>
<td>0.04</td>
<td>Yes / Yes</td>
<td>Outside</td>
<td>750 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>D &amp; F</td>
<td>Continuous or Sag</td>
<td>0.008</td>
<td>Yes / Yes</td>
<td>Outside</td>
<td>750 mm</td>
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<td></td>
</tr>
<tr>
<td>30</td>
<td>Median Barrier Wall</td>
<td>Continuous</td>
<td>0.013</td>
<td>No / Yes</td>
<td>NA</td>
<td>375 mm longitudinal / 750 mm Transverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Median Barrier Wall</td>
<td>Continuous</td>
<td>0.012</td>
<td>No / No</td>
<td>NA</td>
<td>375 mm longitudinal / 750 mm Transverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Median Barrier Wall</td>
<td>Continuous</td>
<td>0.013</td>
<td>No / Yes</td>
<td>NA</td>
<td>1500 mm longitudinal / 750 mm Transverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Median Barrier Wall</td>
<td>Continuous</td>
<td>0.013</td>
<td>No / Yes</td>
<td>NA</td>
<td>1500 mm longitudinal / 750 mm Transverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Median Barrier Wall</td>
<td>Continuous</td>
<td>0.013</td>
<td>No / Yes</td>
<td>NA</td>
<td>1500 mm longitudinal / 750 mm Transverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Barrier Wall</td>
<td>Continuous or Sag</td>
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<td>NA</td>
<td>750 mm</td>
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<td>Shoulder</td>
<td>Continuous</td>
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<td>NA</td>
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<td></td>
<td></td>
</tr>
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<td>37</td>
<td>Valley</td>
<td>Continuous or Sag</td>
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<td>Yes / Yes</td>
<td>NA</td>
<td>750 mm</td>
<td></td>
<td></td>
</tr>
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</table>

### Notes:
1. Hydraulic intake values do not represent hydraulic capacity but are shown to compare inlets based on a 0.25 longitudinal slope, 0.05 cross slope and a 0.06 effluent factor. For other conditions, the intake values may be adjusted for slopes flow or effective backwater. Sag inlets are based on flooding the outfall lane or shoulder, while spread rather than hydraulic throat inlets may divert clear flow or spillage. Full design data and additional information is available in "A Study of Stormwater Inlet Capabilities" by University of South Florida, and the Department's 1987 Drainage Manual, Vol. 1, Chapter 13 and Vol. 2, Chapter 8.
2. Curb inlets and structures should be located outside pedestrian cross walk areas, preferably upgrade from these locations.
3. Double throatless inlets are usually not warranted unless the action flow is in excess of 15 meters per second or 0.05 cubic meters per second.
4. Median Barrier Inlets Types 1, 2, 3, 4, 5 & Shoulder Inlet Type 5 can be made bicycle safe by specifying the restrictive grate.
5. Pipe sizes are circular, Class III, 50,000 pipe, 60,000 pipe, 40,000 pipe and 60,000 pipe are to be sized for flow in accordance with the Florida Design Manual, 2007. Metal pipe sizes should be reviewed using 68 mm x 63 mm corrugation up to 750 mm and 76 mm x 25 mm corrugation for larger sizes.
PLAN (INLET TYPE 2 SYMMETRICAL ABOUT E)

SECTION BB (INLET TYPE 2 SYMMETRICAL ABOUT E)

SECTION BB (INLET TYPE 4 SYMMETRICAL ABOUT E)

DIMENSIONAL SECTION CURB TYPE F SHOWN

INLETS TYPES 1 AND 2

INLETS TYPES 3 AND 4

REINFORCING SECTION
1050 DIA. STRUCTURE BOTTOM (SECTION AA)

REINFORCING SECTION
1200 DIA. STRUCTURE BOTTOM (SECTION AA)

DIMENSION & REINFORCING HALF SECTION TYPES A & E CURB (HALF SECTION AA) (TYPE E GUTTER SHOWN)

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

SLAB REINFORCING

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

2. Hewn joints are to be constructed in a horizontal plane, relative to internal construction. Hewn joints shall be either either a 1 in 1500 slope.

3. All sidewalks shall be constructed in accordance with the approved plans and specifications.

4. All sidewalks shall be constructed in accordance with the approved plans and specifications.

5. For structural details see Index No. 350.

6. Reference to materials see Index No. 350.

7. Reinforcement may be used with curb and gutter Type E and Road Curb Type 1. Locate outside of pedestrian crosswalk where practical.

8. For structural details see Index No. 350.

9. Reinforcement may be used with curb and gutter Type E and Road Curb Type 1. Locate outside of pedestrian crosswalk where practical.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN

CURB INLET TOPS TYPES 1, 2, 3, & 4

SHEET NO. 20  REV.

DRAWN BY

CHECKED BY

APPROVED BY

1/12/06

10/1/06

1/12/06
GENERAL NOTES

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

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 reinforcing steel shall have 30 mm minimum cover unless otherwise shown. Inlet tops shall
   be either cast-in-place or precast concrete.

4. Preparing 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 State Drainage Engineer.

5. Concrete meeting the requirements of A.S.T.M. C 418 (2057 kPa) may be used in lieu
   of Class 2 concrete for precast units, manufactured in plants which are under the Standard
   Operating Procedures for the inspection of precast-concrete products.

6. The center (filter) shown for rectangular throats are necessary only when throats are to be
   used in conjunction with circular inlet bottoms or when used on an skew 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 E and F. Locate
   outside of pedestrian crosswalk where practical.

9. See Index 250 for supplemental details.

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

11. Either cast iron covers or steel covers may be used. Iron covers shall be Class No. 30

12. When Alternate "A" Cover is specified in plans the cast iron cover and galvanized steel frame
    or the galvanized steel cover and frame must be used. Covers are to be grooved in accordance
    with the grooving detail shown on sheet 2 of 2, in lieu of Nad welding.

13. Inlet to be paid for under the contract unit price for inlets (Curb & Gutter).

CURB INLET TOPS

TYPES 5 & 6

SKETCHS SHOWING FRAME SEAT AND THROAT RECESS
**GENERAL NOTES**

1. This inlet is primarily intended for applications with light flows where right of way does not permit the use of standard curb inlets.

2. This inlet is too be located in vertical faced curbs such as curb and gutter Type E. Grooves shall be oriented with vanes directed toward precipitation flow, inlet to be located surface addition or overall of roadway where practical.

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

4. All steel in slab tops shall have 30 mm min. cover unless otherwise shown. Taps shall be either cast-in-place or precast concrete.

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

6. When used on a structure with dimensions larger than those listed above and risers not applied, the top slab shall be constructed using Index No. 200 with the slab opening adjusted to 600 mm x 900 mm. The "Special Top Slab" on Index 200 is not permitted.

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

8. Inlet and grate detail shown is Nominal P-3005 L. Grated grooves with approximately equal openings will be permitted that satisfy AASHTO H-20 loading. Grate and grate shall be Class 30 castings in accordance with ASTM A 48. Grotes shall be reversible, left or right.

---

**CURB INLET TOP TYPE 10**

- **PLAN**
  - Section A
  - Detail A
  - Detail B

- **LONGITUDINAL SECTION**

- **TOP VIEW**
  - ISM Bars
  - ISM Bars, With Hooks, 150 mm x 150 mm, Bottom
  - ISM Bars, Top & Bottom

- **TRANVERSE SECTION**
  - ISM Bars, With Hooks, 150 mm x 150 mm, Bottom

- **SECTION**

- **SECTION BB**
  - See Note 6 Below

- **SECTION AA**
  - See Note 6 Below
Optional Steel Grates

Plan

Section LL

Inset B

Section EE

Inset C

State of Florida Department of Transportation
Road Design

Barrier Wall Inlet
Concrete Barrier Wall (Rigid) (C & G)
GENERAL NOTES

1. This inlet is designed for areas within the vicinity, driveways, or areas subject to heavy vehicular, pedestrian, and bicycle traffic.

2. When alternate "D" grate is specified in plans, the grate is to be not clipped, gapped, or perforated after fabrication.

3. Reinforcing: RS bars or 1/4-in. dia., both ways. Cut or bend bars out of way of pipe to clear pipe 40.

4. All exposed edges and corners shall be rounded to 6 mm radius.

5. Recommended maximum pipe sizes shown are for concrete pipe.

6. For supplementary details see Index No. 260.

INLET WITH STRUCTURE BOTTOM

NOTES: All B Structure Bottom Only. See Index No. 200

1. For Pipes 700 dia. And Larger

SECTION BB

Recommended Maximum Pipe Sizes:

8"x10" Well - 800 Size

200 Dia. - 900 Size

SECTION AA

OPTIONAL BAR SPACING

STEEL GRATE

Two Required Per Inlet

25 mm Steel Grate

Washing Bars 25 mm x 6 mm

Intermediate Bars 40 mm x 6 mm

Interfacial Bars 30 mm x 5 mm

Steel Grate: Manufactured by Bender, Florida Steel, U.S.A. Fastening: Riveting, Perforation, Grease (1/10 Equal).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

PHYSICIAN DESIGN

DESIGN BY: J. J. McCusker

GUTTER INLET

TYPE V
# APPLICATION GUIDELINES FOR DITCH BOTTOM AND MEDIAN INLETS

## INDEX NO. TYPE LOCATION **CAPACITY (m³/m)***

<table>
<thead>
<tr>
<th>INDEX NO.</th>
<th>TYPE</th>
<th>LOCATION</th>
<th>GRADE ONLY</th>
<th>GRADE WITH SINGLE STD. SLOT</th>
<th>GRADE WITH SINGLE TRAV. SLOT</th>
<th>GRADE WITH DOUBLE TRAV. SLOT</th>
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<tr>
<td>230</td>
<td>A</td>
<td>Limited Access Facilities</td>
<td>12</td>
<td>7</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>231</td>
<td>B</td>
<td>Limited Access Facilities</td>
<td>27</td>
<td>10</td>
<td>NA</td>
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<tr>
<td>232</td>
<td>C</td>
<td>*Outside C2</td>
<td>9</td>
<td>7</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>233</td>
<td>D</td>
<td>*Outside C2</td>
<td>24</td>
<td>10</td>
<td>46</td>
<td>9</td>
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<tr>
<td>234</td>
<td>E</td>
<td>*Outside C2</td>
<td>17</td>
<td>10</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>235</td>
<td>F</td>
<td>Inside C2</td>
<td>15</td>
<td>9</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>236</td>
<td>G</td>
<td>Inside C2</td>
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<td>12</td>
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## SAFETY

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<tr>
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<th>PEDESTRIAN</th>
<th>BICYCLE</th>
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<tr>
<td>No</td>
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<td>Good</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Excellent</td>
</tr>
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<td>Yes</td>
<td>Yes</td>
<td>Poor</td>
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<td>Yes</td>
<td>Yes</td>
<td>Poor</td>
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<td>Yes</td>
<td>Poor</td>
</tr>
<tr>
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<td>Yes</td>
<td>Poor</td>
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</table>

## PIPE SIZE LIMITATION

<table>
<thead>
<tr>
<th>INLET INSIDE WIDTH / MAXIMUM PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 / 450</td>
</tr>
<tr>
<td>120 / 500</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
<tr>
<td>600 / 600</td>
</tr>
</tbody>
</table>

## OTHER DESIGN CONSIDERATIONS

- Debris buildup may occur on Type B fencing.

### GENERAL NOTES

1. All inlets must be selected to satisfy hydraulic suitability, with proper consideration given to safety and economics.
2. C2 denotes clear zone, formerly CDA denoting clear recovery area.
3. Alternate G grades should be specified when salt water environment.
4. Inlets within clear zone or adjacent to clear zone may be located within the clear zone, Inlets C, D and
5. E capacity and debris tolerance may be increased by the addition of a slot. Staggered slotted inlets located within roadway clear zones
6. and is accessible to pedestrians shall have traversable slots. Traversable slots are not adaptable to inlet Type H.
7. Special ditch blocks require plan details.
8. Pipe size limitations are based on circular Class III, B Well, Concrete Pipe. Elliptical pipe and corrugated pipe are to be checked for fit in accordance with
9. Index No. 100, metal pipe sizes should be reviewed using 67 mm x 13 mm corrugation up through 750 mm and 75 mm x 25 mm corrugation for larger sizes.
10. The capacity values shown are approximate and are intended as a guide to assist in describing relative performance. Inlets are assumed to be in a sag condition
11. (No Bypass Flow). The effects of vortex flow have not been considered. Inlet control is assumed. 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 sizes.

### Flow Condition A: Orifice Flow Conditions

1. Slotted Grates are 50% blocked with 75 mm of water depth above the grate.
2. Orifice Equation: Q = 0.67 A √(1.2H)

### Flow Condition B: Weir Flow Conditions

1. A 75 mm head above the top of the inlet is assumed.
2. Effective weir length is assumed to equal to the inlet perimeter with no deduction for the grate or debris.
3. For inlets with slots, the effective head for the side of the inlet with the slot is 375 mm for standard 300 mm slots and 250 mm for traversable slots. The slot is assumed to be 25% blocked. In some instances the flow will be in orifice conditions into the slot.
4. Weir Equation: Q = 3.0 L/H^2

### Diagram

- Flow Condition A (General Diagram)
- Flow Condition B (Orifice Diagram)
- Approach Depth (NPS)

### Notes

- NA = Not Applicable

---

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**DITCH BOTTOM AND MEDIAN INLET APPLICATION GUIDE**

**Signatures:**
- SRT: 06/25/19
- B.E.: 06/25/19

**Prepared by:**
- A.O. Laine

**Approved by:**
- A.O. Laine

**Identifier:**
- 229

---

**Index No:**
- 1 of 1

---

See Note 7
SODDING, PAVEMENT AND DITCH BLOCK

SECTION AA

SECTION BB

SECTION CC

SECTION EE

SECTION FF

SECTION DD

RECOMMENDED MAXIMUM PIPE SIZES

INLET INSIDE WIDTH  PIPE SIZE

W5  750
W10  900

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

GENERAL NOTES

1. Notice: Inlet intended for use only on that portion of project area subject to pedestrian and / or bicycle traffic.

2. Inlet designed for streets, medians or other areas subject to heavy wheel loads, where yields may be a problem and inlet loads are 0.2 kN/linear meter or more.

3. Reinforcing steel 1/2" bars at 450 mm centers both ways with 50 mm clearance to inside of walls and bottom, bars to be cut or bent for 40 mm minimum clearance around pipe.

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

5. Ditch paving to be included in cost of Inlet. Sodding to be paid for under the contract unit price for Sodding, W5.

6. For supplementary details see Index No. 200.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION PLOT DESIGN

DITCH BOTTOM INLET TYPE B

Designed By: M.D. Lighthall
Approved By: D.J. Hunt

Sheet No.: 231  10F 1
DESIGN NOTES FOR TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS

1. The general purpose of these conversions is to remove the hazard of the pre-existing inlet top, while not creating a hazard by exposing the top to drain.

2. The corrective procedure depends on the approach ditch grade and hydraulic requirements of the site. The selection of the appropriate case depends on the relationship between inlet top and ditch elevation, and, on the vertical clearance between the top of the uppermost pipe(s) and the grade. The purpose for Case I is to add the traversable slot to an exiting inlet where top removal, change in grade elevation and ditch transitions are not required. Case II will normally be applicable to ditches with firmer grades adjusting the inlet. Case III will normally be applicable to ditches with steeper grades adjusting the inlet where raising of the existing ditch is acceptable.

3. The designer shall specify the width of each individual inlet location.

4. When the existing inlet top is above the existing ditch (Case I) but adjacent material is required to adjust the ditch (Case III) or vertical clearance or other conditions do not permit removal of the inlet top, the designer shall specify Case II. The designer shall determine if ditch reconstruction is required where more than 0.75 meters of elevation is beyond the traversable slot side and steel includes separate welds in the plans to cover the cost for that portion of required ditch reconstruction exceeding the 0.75 meter limit. The designer shall determine whether ditch pavement is required for ditch reconstruction within the 0.75 meter limit and include that pavement under a separate contract from the Inlet Details.

5. When the detention ditch is to be used with Case III, the designer shall specify "Case I (Detention)" in the plans.

6. The designer shall determine whether right-of-way or other conditions at each individual inlet location are subject to conversion and steel cost for Underdrain, Type II in the plans.

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

1. Existing Inlets converted to traversable slot inlets shall be paid for as Inlets partial, EA. Case shall be included in the pay item description.

2. All ditch reconstruction work within 0.75 meters of each traversable slot conversion, whether required by design details or as a direct result of the conversion, shall be included as a part of the partial cost. Reconstruction work shall include excavation and removal of surplus material or double material in place, grading, compacting, shaping and paving of ditch. Steel, ditch pavement and underdrain are not included as part of the Inlet partial and are to be paid for separately.

3. Inlet pavement and sodding shall be in accordance with the sections on this detail and with the plans on Sheet 2 of 4 and Sections 2A, 2B and 2C of Case I and relevant sections on Sheet 3 of 4.

4. Unit price and payment shall constitute full compensation for Inlet conversions, replacement grade(s), ditch reconstruction, and underdrain with no additional or extra pay being required for the contract unit price for "Ditch Bottom Inlets" (Partial), EA.

5. Sodding shall be paid for under the contract unit price for sodding, Md. Ditch pavement shall be paid for separate from the Inlet by pavement type(s) 1 and 2(s) as called for in the plans.

6. Underdrain called for in the plans for Case 3 conversions shall be paid for at Underdrain Type II, Md.
<table>
<thead>
<tr>
<th>INDEX NO.</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>INLET END</th>
<th>OUTLET END</th>
<th>SAFETY</th>
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<td>Limited</td>
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<tr>
<td></td>
<td></td>
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<td>Outside C2</td>
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<tr>
<td>251</td>
<td>Straight Concrete</td>
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<td>Limited</td>
<td>Limited</td>
<td>Good</td>
</tr>
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<td></td>
<td></td>
<td>Double</td>
<td></td>
<td>Outside C2</td>
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<td>252</td>
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<td>Very Good</td>
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<tr>
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<tr>
<td>268</td>
<td>U Type Sand Cement</td>
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<td>Limited</td>
<td>Limited</td>
<td>Good</td>
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<td></td>
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<td></td>
<td>Outside C2</td>
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<td>Topped End Section</td>
<td>Single</td>
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</tr>
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<td>Cross Drain Niltered</td>
<td>Single &amp;</td>
<td>No</td>
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<td>Section</td>
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<td>375 Thru 1000</td>
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<td>273</td>
<td>Side Drain Niltered</td>
<td>Single &amp;</td>
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<td></td>
<td></td>
<td>375 Thru 1000</td>
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</tr>
</tbody>
</table>

1. All end treatments must be selected to satisfy hydraulic conditions with proper consideration given to safety and economics.
2. C2 denotes clear zone, formerly EPA-ice maintaining clear recovery area.
3. Gates 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 average average costs.
6. End treatments with a Kp of 0.5 or greater should be used only in areas of low design velocities and negligible debris.
7. Pipe sizes are limited. Class IV K = 90, concrete pipe. Elliptical pipe and corrugated pipe are to be checked for F11 in accordance with index No. 254. Metal pipe sizes should be reviewed using 57 mm x 13 mm corrugation up to 150 mm and 75 mm x 25 mm corrugation for larger sizes.
ENDWALL DIMENSIONS (EXCLUSIVE OF MULTIPLE PIPE SPACING)

NORMAL PIPE

SKewed PIPE

LEGEND

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

1. Endwall, joint permitted See End View (Enlarged).

2. Foundation and ditch transitions shall be made in accordance with Index No. 286.

3. Endwalls are to be cast in place or placed concrete. Reinforcing steel shall be 40 W30 or 60 W60. Additional reinforcing 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 (Endwall).

4. All exposed corners and edges of concrete are to be chamfered 20 mm.

6. Concrete meeting the requirements of ASTM C-494 C 150 MPa may be used in Class I, Class II, Class III, and Class IV products manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

7. On flow lines with pipe slopes greater than 1:15, provide 60 mm transitions from the endwall to the smaller side slopes, right of any partitioning.

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

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

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

11. Endwalls to be paid for under the contract unit price for Concrete Class I (Endwalls), M3.
## ROUND CONCRETE AND CORRUGATED METAL PIPE

### Class I Concrete (m³)

#### Number and Type Of Pipe and Skew Angle Of Pipe

<table>
<thead>
<tr>
<th>Opening Area (in²)</th>
<th>Diameters</th>
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<th>Quadruple</th>
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#### Dimensions

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<th>E</th>
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<th>G</th>
<th>S</th>
<th>O</th>
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<th>X 2</th>
<th>Y 1</th>
<th>Y 2</th>
<th>Z 1</th>
<th>Z 2</th>
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#### Number Of Pipe And Skew Angle Of Pipe

<table>
<thead>
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<th>Span (ft)</th>
<th>Rise (ft)</th>
<th>Number Of Pipe</th>
<th>Skew Angle (°)</th>
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### CORRUGATED METAL PIPE ARCH

#### Class I Concrete (m³)

#### Dimensions

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<th>G</th>
<th>S</th>
<th>O</th>
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<th>X 2</th>
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#### Number Of Pipe And Skew Angle Of Pipe

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### CONCRETE ELLIPTICAL PIPE

#### Class I Concrete (m³)

#### Dimensions

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<th>S</th>
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<th>Y 1</th>
<th>Y 2</th>
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#### Number Of Pipe And Skew Angle Of Pipe

<table>
<thead>
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<th>Span (ft)</th>
<th>Rise (ft)</th>
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<th>Skew Angle (°)</th>
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</thead>
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### CONCRETE STRAIGHT CONEWALLS

#### Single And Multiple Pipe

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<th>Reinforced X</th>
<th>Reinforced Z</th>
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<th>Double</th>
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<th>Quadruple</th>
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<td></td>
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#### Approx. Equv. Round Pipe

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</thead>
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Note: See the guidelines of Concrete Pipe No. 1 for selecting proper quantities.
GENERAL NOTES

1. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index, design specifications, AASHTO 600. Precast endwalls which adhere to this index, including all additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approval. Deviations from this index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 210 for opening and grading details.

2. Reinforcing steel shall be either 400 MPa or 450 MPa.

3. Concrete shall be Class II excess concrete meeting the requirements of ASTM C 492 (27.2 MPa) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the Inspection of precast drainage products.

4. Chamfers: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.

5. Metal pipe shall be bimetallic coated on all surfaces in contact with concrete and 300 mm beyond the boundary of the wall. Any suitable bimetallic material may be field applied.

6. Sealing shall be in accordance with index No. 210.2 and paid for under the contract unit price for Sanding, MA.

7. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Conc. Class II, Endwall L45, and Rein. Steel (Roadway L45, KG).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

STRAIGHT CONCRETE ENDCOULS
SINGLE AND DOUBLE 150 PIPE

BENDING DIAGRAM

NOTES: All bar dimensions are cut to cut

ESTIMATED QUANTITIES

<table>
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<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>RPM</th>
<th>MSW</th>
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<tbody>
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<td>D2</td>
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SECTION AA

HALF ELEVATION
(Showing Bars at Back Face Of Wall)

SECTION BB

HALF ELEVATION
(Showing Bars at Front Face Of Wall)

TYPICAL SECTION THRU ENDWALL

OPTIONAL ENTRANCE FOR CONCRETE PIPE
**SECTION BB**

**PLAN**
(Showing Bars in Footing)

**SECTION AA**

**HALF ELEVATION**
(Showing Bars in Back Face of Wall)

**GENERAL NOTES**
1. Joistwalls may be cast-in-place or prestressed. Cast-in-place endwall steel conform to the details on this index. Design specifications AASHTO 1999. Prestressed construction which adheres to this index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approval. Deviations from this index, for prestressed units, shall require the approval of the State Drainage Engineer prior to construction. For prestressed construction, see Index No. 250 for opening and grouting details.

2. Reinforcing steel shall be either 450 WPS or 450 WPS.

3. Concrete shall be Class D except concrete meeting the requirements of ASTM C 471 (275 ksi) may be used in lieu of Class D concrete in prestressed units manufactured in plants which are under the Standard Operating Procedures for the Inspection of Prestressed Products.

4. Chamfer: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.

5. Prestressed concrete shall be silicofluoride coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable silicofluoride material may be field applied.

6. Saturation steel be in accordance with Index No. 289 and paid for under the contact unit price for Saturating, MD.

7. Basis of payment for either cast-in-place or prestressed construction shall be the estimated quantities tabulated on the index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Duct, Class II (Endwall), MS and Reinforcement Steel (Precoated), KG.

**BENDING DIAGRAM**

**ESTIMATED QUANTITIES**

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**BILL OF REINFORCING STEEL**

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<td>E</td>
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<td>YD</td>
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<td>YD</td>
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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**ROAD DESIGN**

**STRAIGHT CONCRETE ENDWALLS**

**SINGLE AND DOUBLE 1800 PIPE**

**Approved By:**
[Signature]

**Date:**
[Date]

**Prepared by:**
[Signature]

**Drawn:**
[Signature]

**Drawn:**
[Signature]

**Scale:**
1:20

**In:**
[Inch/Unit]

**Approved:**
[Signature]

**Date:**
[Date]

**F.A.R.A. Approvals:**
[Signature]

**Approved by:**
[Signature]

**State:**
Florida

**Page:**
1 of 9

253
SECTION BB

PLAN
(Showing Bars in Front of Wall)

HALF ELEVATION
(Showing Bars in Back Face of Wall)

TYPICAL SECTION THRU ENDWALL

BILLS OF REINFORCING STEEL

<table>
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<tr>
<th>MARK</th>
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BENDING DIAGRAM

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ESTIMATED QUANTITIES

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<tbody>
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NOTE: All bar directions are cut to cut

NOTE: See Sheet 1 of 2 for General Notes.

OPTIONAL ENTRANCE
FOR CONCRETE PIPE

SINGLE AND DOUBLE 1800 PIPE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

DESIGNER: [Signature]

REVIEWED:
APPROVED:

Date: 2/2/99

Sheet: 2 of 2

253
1. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this Index, design specifications 831105 1658. Preceded construction which adheres to this Index, including any additional reinforcement required for handling whilst shall be determined by the Contractor or supplier, does not require additional approval. Deviation from this Index, for precast units, shall require the approval of the State Engineer and/or to construction. For general construction, see Index No. 502 for opening and grading details.

2. Reinforcing steel shall be either 430 Mpa or 450 Mpa.

3. Concrete shall be Class B except concrete meeting the requirements of ASTM C 476 (577 to 628 psi) may be used in lieu of Class B concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

4. Chapers: All exposed edges and corners to be sheathed 20 mm unless otherwise shown.

5. Metal pipe shall be smooth or coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable luminescent materials may be field applied.

6. Section shall be in accordance with Index No. 280 and paid for under the contract unit price for Section 80.

7. Bunds of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Cast.

Class B Endwalls I, M2 and Reinforce, Street I, Roadway I, KC.

GENERAL NOTES

HALF ELEVATION

(Shewing Ends in Back Face of Wall)

HALF ELEVATION

(Shewing Ends in Front Face of Wall)

NOTE: Cut and field bend bars as shown

TYPICAL SECTION

THRU ENDWALL

OPTIONAL-ENTRANCE

FOR CONCRETE PIPE
**SECTION YY**

**TABLE OF DIMENSIONS AND QUANTITIES FOR ONE ENDWALL**

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<th>T</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>F</th>
<th>X</th>
<th>ONE PIPE CULVERTS</th>
<th>TWO PIPE CULVERTS</th>
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<td>L RIPRAP m³</td>
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**Note:** (1) For concrete and corrugated metal pipes, Concrete pipe shown.  
(2) The top row of riprap bags shall be secured by pinning using ISM reinforcing bars 455 mm in length, as follows:  
(a) The end bags shall be secured using two bars per bag, one vertical and one diagonal as shown.  
(b) The next to last bag on each end shall be secured with two bars vertically.  
(c) Bags located over the pipe shall be secured by a bar which is driven diagonally except that for concrete pipe two bars shall be used for single bags above the pipe.  
(d) Intermediate bags shall be secured with a single bar.  
Bols shall be driven to one inch below the surface of the bag.  
The cost of furnishing and installing the bars shall be included in the cost of the riprap.  

**FRONT ELEVATION**

**STRAIGHT SAND-CEMENT ENDWALLS**
MOUNTING FOR STEEL GRATE

STEEL GRATING USE CRITERIA

1. Grates to be used on pipe culvert endwalls located within the designated clear zone. Positive drainage control shall be provided at all appurtenant openings. Grates shall not be used unless one or more of the following conditions exist:
   A. Drainage area to culvert consists of meadow or infilled areas or areas where debris and/or debris is negligible.
   B. Adjacent to culvert is by sheet flow, or to such in defined channels that debris transport is not considered a major problem.
   C. Adjacent to culvert is either except on an infrequent basis 1/10 to 1/5 year frequency for example a drainage basin in flat spars forest with properly low ground water table.
   D. Areas where culvert backflow with resultant backwater would not seriously affect roadway embankment, traffic operation or upland property.

2. Steel grating to be used only where coated for in place.

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<th>L</th>
<th>W</th>
<th>F</th>
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CHANNEL TO ANGLE WELD

BAR TO CHANNEL WELD

SECTION BB

PLAN

BAR TO BAR WELD

SECTION AA

ELEVATION

ANCHOR BOLT DETAIL

END VIEW

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
HIGHWAY ENGINEER

U-TYPE CONCRETE ENDWALLS
BAFFLES AND GRATE OPTIONAL
375 TO 750 PIPE

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
### TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES

**PIPE COLLAR ENDWALLS WITH U-TYPE WINGS**

<table>
<thead>
<tr>
<th>Opening Width (mm)</th>
<th>Steel Tie Bar Length (mm)</th>
<th>Concrete, Class I Concrete, Class II</th>
<th>Total m³</th>
<th>Reinforced Concrete, Class I Concrete, Class II</th>
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<td>280</td>
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**GENERAL NOTES**

1. Check all exposed edges 20 mm.

2. Concrete meeting the requirements of ASTM C-492 (127°F 40°F) may be used in lieu of Class I concrete in prescast units manufactured in plants which are under the Standard Operating Procedures for the Inspection of prescast tilt-up products.

3. Endwall to be paid for under the contract unit price for Cones, Class I Endwall (W), Cost of steel tie bars to be included in the contract unit price for Class I Concrete.

4. Sealing to be in accordance with Index No. 280, and paid for under the contract unit price for Sealing, 280.

### TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES

**PIPE COLLAR ENDWALLS WITH 45° WINGS**

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<th>Total m³</th>
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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

WINGED CONCRETE ENDWALLS

SINGLE ROUND PIPE

Designed by: [Signature]

Approved by: [Signature]

Progress No.: [Number]

Engineering No.: [Number]

P.A.A. Approved: 03/05/10

Scale: 1/2" = 1'-0"
### Dimensions and Quantities

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### CROSS DRAIN MITERED END SECTION

- **Concrete Slab:** 75 mm or 155 mm thick, reinforced with WVP 130 x 150 Welded Wire Mesh

### Top View - Single Pipe

- **Concrete Slab:** 75 mm or 155 mm thick, reinforced with WVP 130 x 150 Welded Wire Mesh

### Top View - Multiple Pipe

- **Concrete Slab:** 75 mm or 155 mm thick, reinforced with WVP 130 x 150 Welded Wire Mesh

### Notes:
- See Sheet 6 for Details and Notes.
DIMENSIONS & QUANTITIES

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<th>C</th>
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<th>F</th>
<th>G</th>
<th>S</th>
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See General Note No. 3.
See Sheet 5 Of 6 For 75 mm Sub Quantities

TOP VIEW - SINGLE PIPE

TOP VIEW - MULTIPLE PIPE

Concrete Slab, 75 mm Or 138 mm Thick, Reinforced With WRF 150 x 150 x 15.4 x 14.4

NOTE: See Sheet 6 For Details And Notes.

CROSS DRAIN MITERED END SECTION
SINGLE AND MULTIPLE ELLIPTICAL CONCRETE PIPE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROJECT DESIGN

DESIGNED BY: DRAUGHTING BY: PROOFREAD BY: APPROVED BY:

© 2023 FLORIDA DEPARTMENT OF TRANSPORTATION

### Quantities for 75 mm Thick Concrete Slabs (m³)

#### Round-Concrete

<table>
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<tr>
<th>D</th>
<th>Single Pipe</th>
<th>Double Pipe</th>
<th>Triple Pipe</th>
<th>Quad Pipe</th>
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#### CMP-Arch

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GENERAL NOTES

1. Mitered end sections for pipe sizes 375 mm, 450 mm and 600 mm round or equivalent pipe or elliptical pipe are permitted within the steel zone.
   When the slope intersection permits, the mitered end section may be located with the culvert opening as close as 2.5 m beyond the outside edge of the shoulder.

2. Slope and ditch transitions shall be used when the normal roadway grade must be flattened to place end section surtax over river zone.
   See detail C3.

3. The reinforced concrete slab shall be constructed for all sizes of cross drain pipe and cast in place with Class 1 concrete.
   Slabs shall be 135 mm thick unless 75 mm thickness certified for in pipes.

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

5. Corrugated metal pipe gaskets used in mitered end shall be damaged during bevelling and profiling for mitered end section shall be required.

6. That portion of corrugated metal pipe in direct contact with the concrete slab shall be实施细则 coated prior to placing the concrete.

7. Unless otherwise designated in the plans, the pipe mitered end sections may be used with any type of cross drain pipe.
   Corrugated steel pipe mitered end sections may be used with an any type of cross drain pipe except steel pipe.
   When miscellaneous jacket pipe is specified for cross drain pipe, mitered end sections shall be constructed with pipe or concrete pipe.

8. When the mitered end section pipe is dissimilar to the cross drain pipe, a concrete jacket shall be cast in accordance with Standard 180.

9. When existing multiple cross drain pipes are paralleled or have non-uniform sections, the mitered end sections will be constructed either separately or attached as multiple pipe end sections as directed by the Engineer. However, mitered end sections will be paid for each based on the independent pipe end.

10. The cost of all pipes, fittings, reinforcing, concrete, anchors, washers, and nuts shall be included in the cost for the mitered end section. Sawing shall be paid for separately under the contract unit price for Sawing, 0.

11. Mitered end sections shall be paid for under the contract unit price for Mitered End Section (C01), EA, based on each independent pipe end. Mitered end sections used for detention retention basin outlets are to be paid for under the contract unit price for Mitered End Section (C01), EA.

CONCRETE PIPE CONNECTOR

ANCHOR DETAIL

All bars, bolts, nuts and washers are to be galvanized steel.

Bolt diameters shall be 10 mm for 375 mm to 750 mm pipe and 15 mm for 950 mm to 1100 mm pipe.

Two connectors required per joint, located 60° right and left of bottom center of pipe.

Bolt holes in pipe shall be to be drilled.

Anchors required for CEM only.

Anchor, washer and nuts to be galvanized steel.

Send anchor where required to center in concrete slab. Damaged surfaces to be repaired before welding. Anchors are to be spaced a distance equal to four (4) corrugations. Place the anchors in the outside crest of corrugations.

Flat washers to be placed on inside wall of pipe.

Holes in the mitered end pipe are to be drilled or punched, turning not permitted.
These sizes are reserved for lateral and outlet treatment for water management systems or similar applications.
### Dimensions & Quantities

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**Construction Joint Permitted**

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

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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**ROAD DESIGN**

**SIDE DRAIN**

**MITERED END SECTION**

SINGLE AND MULTIPLE CORRUGATED METAL PIPE-ARCH

---

**SECTION**

*Special*:
- To Open Line For Pipe Arch 660 x 900 and Smaller
- F For Pipe Arch 900 x 660 and Larger

---

**E. M. Lambert**

3 of 6
### Dimensions & Quantities

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**Top View - Single Pipe**

**Top View - Multiple Pipe**

**Notes:**
- See Sheets 5 and 6 for details and general notes.
- To Major Axis For Pipes 600 x 060 And Smaller.
- H2 For Pipes 130 x 050 And Larger.
**GENERAL NOTES**

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

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

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

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

5. Corrugated polyethylene pipe (CPE) for side drain application of 375 mm, 450 mm or 600 mm diameter shall utilize either corrugated metal or concrete mitered end sections. When used in conjunction with corrugated metal mitered end sections, connection shall be by either a formed metal bender specifically designated to join CPE pipe and metal pipe or other coupler approved by the State Drainage Engineer. When used in conjunction with a concrete mitered end section, connection shall be by concrete jacket constructed in accordance with Index No. 280.

6. When existing multiple side drain pipes are spaced other than the dimensions shown in this drawing, or have non-paralleled axes or are in non-uniform sections, the mitered end 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.

7. In addition to the requirements of Section 450-4, side drain culverts shall comply with the cover requirements shown on Index No. 205.

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

9. Round pipe size 750 mm or greater, pipe wall size 900 mm or 600 mm or greater and elliptical pipe 490 mm x 770 mm or greater shall be grouted unless excluded in the plans. Smaller sizes of pipe shall be grouted only when called for in plans. The lower grate on flowing downstream ends on divided highways shall be omitted.

10. Grades are to be fabricated from steel ASTM A 53, Grade B, pipe. The lower grate in all traffic approach end shall be Schedule 80 and all remaining grades shall be Schedule 40. Grades subject to soil and corrosive free environment may be fabricated from galvanized pipe, with base metal exposed during fabrication required as specified in Section 560, Standard Specifications, or, fabricated from black pipe and galvanized after fabrication. In accordance with ASTM A 123, Grades subject to soil water or highly corrosive environment shall be hot dipped galvanized after fabrication in accordance with ASTM A 123.

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

12. The project engineer shall contact the District Drainage Engineer for possible alternate treatment prior to constructing side drain mitered end sections where a minimum spacing of 3.0 m will not result between the tee points of the mitered end sections.

13. The cost of all pipe (s), grates, fasteners, reinforcing, connectors, anchors, concrete, sealants, jackets and coupling bands shall be included in the cost for the mitered and section. Sealing shall be paid for separately under the contract unit price for Sealing, MD.

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

**DESIGN NOTES**

1. In critical hydraulic locations, grates shall not be used unless potential drain transport has been evaluated by the drainage engineer and appropriate adjustments made. Ditch grades in excess of 3% or pipe with less than 450 mm of cover and grades in excess of 1% will require such an evaluation (General Note 9).

2. The design engineer shall determine highly corrosive locations and specify in the plans when the grates shall be hot rolled galvanized after fabrication (General Note 11).

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.

**SIDE DRAIN MITERED END SECTION**

- **NOTES & INFORMATION**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

- **Sizing Information**

**ENGINEER'S INFORMATION**

- **Specified No.**

**INERTS, PUMPS & PAVING**

- **Drawn by:**

**APPROVED:**

- **Date:**

**REVISED:**

- **Date:**
CONCRETE GUTTER AND DRAINS AT RETAINING WALLS

SECTION CC
Notes: Either cast iron pipe or PVC pipe, Schedule 40, may be used. Pipe to be placed for under the gutter until price for either cast iron pipe for roof drains (100 mm. W. or Pop. Vicar) or Schedule 40 pipe (100 mm. W.) will remain competitive.

PLAN OF TOP
INLETS, MANHOLES OR JUNCTION BOXES
ON INTEGRAL PRECAST CONCRETE RISER FOR CONCRETE PIPE

SECTION AA

PLAN - STEEL PLATE

SECTION BB

PLAN VIEW

METHOD FOR DETERMINING THE LENGTH OF SPECIAL PIPE REQUIRED UNDER RAILROADS

MISCELLANEOUS DRAINAGE DETAILS
NOTE: The computerized printout for reinforcing steel does not include the additional lengths needed for extension and overlap or connections to the horizontal reinforcement in the interior walls of double, triple and quadruple existing concrete box culverts. The cost for additional reinforcement and the thickened concrete wall in the transition area shall be included in the costs for constructing the tie-in.

Cost for removal and disposal of materials from existing headwall, wingwalls and the top slab, and cost of cleaning, straightening and aligning longitudinal reinforcing steel shall be included in the costs for concrete and steel of the culvert extension.

For concrete box culvert details, see Index No. 290.
BRIDGE CULVERT NUMBER LOCATION

PLAN
INLET TYPE A GRATE

NOTE: 1. Cast of Steel Grating to be included in cost of Box Culvert.
2. All steel to be 30 mm. thick.

INLET IN TOP OF BOX CULVERT

EXTRA BASE FOR CROSS BOX CULVERTS UNDER FLEXIBLE PAVEMENT

ASPHALTIC CONCRETE BASE

NOTE: Extra base is required when cross box culverts are located on facilities subject to high-speed traffic (>40 km/h) or high-traffic volumes (>1,000 AADT) and the cover is within the range specified in the notation above.
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**NOTES:**
- **INDEX 250:**
  - **PIPE SIZE:**
  - **INDEX 256:**
  - **INDEX 266:**
  - **INDEX 270:**

### GEOTEXTILE PLACEMENT AT CONCRETE STRUCTURE

**DITCH PAVEMENT & SODDING**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**DESIGN:**

**DRAWN BY:**

**APPROVED BY:**

**DATE:**

**STANDARD:**

**SODDING BOTTLES:**

**1 1/2 Endwall With Bottles**
Provide Approximately A Minimum Of 0.20% Grade On Curves, Slightly Warming the Surface Of The Median Placement if Necessary. Within Limits Of The Median Curb or Curb and gutter, Construct A Drainsage Flume Or Flumes At The Points or Points of Low Grade. See Details.

SECTION AA

Prop. Plan.  
Grades Established In Detail Plans

Prop. Plan.  
Grades Established In Detail Plans

SECTION BB

Flume Detail

GENERAL NOTES

1. These details are to apply to projects which provide for the conversion of 2-lane sections to 4-lane divided highway sections and for super-elevated sections of new 4-lane divided highways. Layout data is (illustration only). Cost of Flumes to be included in the contract price for Curb on Curb and gutter. Said to be paid for under the contract unit price for Screwing, NE.

2. Flumes to be located in the line of cuts and of other points as designated in the plans. The locations may be adjusted by the engineer during construction.
SECTION AA

SECTION BB

SECTION CC

PLAN

GENERAL NOTES

1. This detail not recommended for grades greater than 0.5% or discharges exceeding 0.85 cfs.

ESTIMATED QUANTITIES

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*Quantity shown above includes pavement for 3.0 m "Length of Slope".
For each additional meter of slope length add 0.06 m².
1. Spillway to be built for a shoulder gutter.

2. If spillway empties into a shallow or weak ditch, the detail should be modified as necessary.

DETAIL OF CONC. SPILLWAY AT END OF SHOULDER GUTTER

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

1. Pipe shall be any of the optional types permitted in Section 433 of the Specifications unless otherwise restricted in the plans. Distinctive types of pipe will not be permitted in a continuous run of pipe.

2. Concrete pipe shall be placed with the stars positioned on sites.

3. Alignment joints are standard (gaskets not required).

4. Reinstatement of water pipe ends not required.

5. The contractor may supply other methods of providing stars having equal or greater area of opening, for approval by the Engineer.

6. Filter fabric shall be Subsurface Draining type satisfying the requirements of Section 985. All filter fabric joints shall lap a minimum of 300 millimeters.

7. The standard cross section shall be constructed unless other section is specified in the plans.

8. For supplemental details see Index No. 260.

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

10. Where the 300 mm diameter sewer pipe shall be eliminated, when the bottom of the sheet is below the named water level, unless otherwise shown in the plans.

DESIGN NOTES

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

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

French drains with significantly different cross section shall be detailed in the plans.
SLOTTED PIPE OPTIONS

OPTION A - ROUND PIPE

OPTION B - ROUND OR ELLIPTICAL PIPE

ELLIPtical pipe

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A curved cut is acceptable provided the control dimension is maintained (Typical For Elliptical & Round Pipe)
DESIGN NOTES FOR UNDERDRAIN

1. The type of underdrain should be selected to meet design water removal rate and soil conditions. Coulson’s formula (in the use of these typical sections) is intended to provide guidance, and any specific project conditions may require a different design.

2. Type I underground is intended for maximum water removal conditions. The filter fabric envelope is required between the coarse aggregate or fine aggregate including those described in general notes 2 and 3. Design note 2 applies to reactive conditions.

3. Type II underground is intended for moderate water removal conditions. The filter fabric envelope is required between the coarse aggregate or fine aggregate including those described in general notes 2 and 3. Design note 3 applies to reactive conditions.

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

5. Type II underground is intended for use in detention basins and other locations that have a filtration system. Type II underground is to be used only when Type II underground is required. The standard filter aggregate specified for Type II underground conforms to filtration requirements of Chapter 21-25.025 F.A.C.

6. The designer should evaluate whether a filter fabric envelope is required around the underdrain types II, III, and IV. When required, fabrication shall be specified in the plans. Piping shall be identified as required for separability.

GENERAL NOTES FOR UNDERDRAIN

1. The underdrain pipe shall be 100 mm smooth or 25 mm corrugated pipe unless otherwise shown in the plans. The size of the pipe shall be based on the nominal diameter of the pipe with a smooth interior. Except when specified, the 100 mm smooth or 25 mm corrugated pipe with a corrugated interior wall may be provided based on the following size equivalent:

   - 100 mm smooth equivalent to 125 mm corrugated interior (25 mm smooth equivalent to 50 mm corrugated interior)
   - 200 mm smooth equivalent to 250 mm corrugated interior
   - 300 mm smooth equivalent to 350 mm corrugated interior

2. Filter fabric shall be made and meet the requirements of Section 902-4 of the Standard Specifications. The filter fabric shall be approved by the State of Florida. The filter fabric shall be tested in accordance with Section 405.6.13. The filter fabric shall be suitable for the intended use.

3. The filter fabric shall be installed in accordance with the filter fabric manufacturer’s specifications and the filter fabric shall be tested in accordance with Section 405.6.13. The filter fabric shall be suitable for the intended use.

4. Underdrain Types I, II, III, and IV shall be in accordance with Section 405.6.13. The filter fabric shall be suitable for the intended use.

5. Filter fabric shall be Type D-3.1. (See Index No. 201.)

6. When corrugated or grooved pipe is used, the corrugated or grooved pipe shall be in accordance with the filter fabric manufacturer’s specifications and the filter fabric shall be suitable for the intended use.

7. Filter fabric shall be suitable for the intended use.

8. Underdrain pipe or soil shall be suitable for the intended use.

9. Underdrain outlet pipes shall be in accordance with the outlet pipe details and general notes for Expansion, Index No. 205. Outlet pipes shall not be 100 mm diameter unless larger pipe sizes are specified in the plans.

10. Piping shall be provided on the size of the smooth interior pipe. The contract unit price for underdrain, when specified, shall include the following components for each underdrain type as follows:

    - Type I, aggregate and filter fabric envelope
    - Type II, aggregate and filter fabric envelope
    - Type III, aggregate and filter fabric envelope
    - Type IV, aggregate and filter fabric envelope
    - Type V, aggregate and filter fabric envelope

External filter fabric envelopes, when specified for underdrain Types I, II, and III, shall be paid for separately under the contract unit price for Plastic Filter Fabric Envelope.

The contract unit price for Underdrain Pipe 100 mm Wt. shall be fully compensational for removal of existing soil, pavement, trench excavation, pipe and fittings, hardware costs, and cutting and threading of pipe and installation of expansion joints. Concrete aprons shall be provided for under the contract unit price for Concrete Class II/Dimensional, No. 300. Slabbing shall be provided for under the contract unit price for Slabbing, No. 300. Shoulder pavement shall be provided for under the contract unit price for Alkaline Concrete Type S, Wt. Tack coat shall be provided for under the contract unit price for Bituminous Waterproofing, Tack Coat, No. 1.
NOTES FOR DRAINCRETE PAVEMENT SUBDRAINAGE

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

METHOD OF PAYMENT

NEW CONSTRUCTION:

1. Payment shall be full compensation for trench excavation, disposal of excess materials, filter fabric, pipe and fittings, and backgages necessary for concrete pavement subdrainage construction. Payment shall be included in the cost for Base Asphalt Treated Permeable, W3, Concrete Treated Permeable Base, W3.

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

FOR REHABILITATION:

1. The contract unit price for EdgeDrain (Draincrete) / 100 ft. shall be full compensation for removal of existing shoulder pavement, trench excavation, disposal of excess materials, filter fabric, draincrete, and pipes and fittings, and backgages necessary for edgeDrain construction.

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

Concrete apron shall be paid for the contract unit price for Class I Concrete, W100, W3.

Sealing shall be paid for under the contract unit price for Sealing, W2.

Shoulder pavement shall be paid for under the contract unit price for Asphalt Con.

Type 1, W5.

Tack coat shall be paid for under the contract unit price for Bit Melt / Tack Coat, W1.1.

Shoulder joint seal shall be paid for under the contract unit price for Portland Joint Seal, W1.
GENERAL NOTES FOR MONOLITHIC EDGEDRAIN
(NEW CONSTRUCTION)

1. The contractor shall ensure the construction of monolithic edgedrain in an open trench, in which the entire operation can be carried out in 11 or 15 work days, unless another construction period is called for in the plans, with sufficient time allowed for the permeable base to set.

METHOD OF PAYMENT

NEW CONSTRUCTION

1. Payment shall be full compensation for trench excavation, disposal of excess materials, filter, fabric, pipe and fittings, and fittings, and terraces necessary for concrete pavement shoulders construction. Payment shall be included in the cost for Base Asphalt Treated Permeable, 3A or Concrete Treated Permeable Base #3.

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

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT

MONOLITHIC SUBDRAINAGE

CONCRETE SHOULDERS

100 mm ATPB or CITPB

Stabilization

Filter Fabric

100 Dia. Special Perforated Pipe
(Noncorroded Or Smooth Line)
(Drilled Or Split Only)
(Steel Grade Only)
See Sheet 1 of 3

ASPHALT SHOULDERS

100 mm ATPB or CITPB

Stabilization

Filter Fabric

100 Dia. Special Perforated Pipe
(Noncorroded Or Smooth Line)
(Drilled Or Split Only)
(Steel Grade Only)
See Sheet 1 of 3

MONOLITHIC SUBDRAINAGE
SAFETY MODIFICATION FOR INLETS IN BOX CULVERTS
**GENERAL NOTES**

1. For use criteria see "Steel-Galvanizing Use Criteria" Index No. 26L.
2. Grates shall be ASTM A 242, A 441, A 572 or A 583,425 type steel, and galvanized in accordance with Section 962-7 of the Standard Specifications.
3. Channel section C 75 x 8.9 may be substituted for the C 100 x 8 channel.
4. All reinforcing CM bars with 50 mm clearance except as noted. Spacings shown are center to center. Lips to be 400 mm minimum. Welded wire fabric (two Rogersefined) having an equivalent cross section area (130 mm²) may be substituted for bar reinforcement.
5. Drill 45 mm holes 200 mm deep with a rotary drill in existing endwall for dowel bars. Nuts shall be thermally cleaned prior to placing dowel bars and spacers.
6. Endwall to be paid for under the contract unit price for Conc. Class I (Endwall) L.3 and Reinforcing Steel (Tie Bar) L.6. Cost of dowel bars and spacers to be included in the contract unit price for reinforcing steels. Cost of grates to be paid for under the contract unit price for Endwall Grates, kg, plan quantity. Cost of galvanized bars and nuts to be included in the contract unit price for the grate.
7. Sub slopes 1.5 mm each side and above endwall. Spacing to be paid for under the contract unit price for Slabbing, M3.

**DIMENSIONS AND QUANTITIES PER GRADE**

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**DIMENSIONS AND QUANTITIES PER U-ENDWALL**

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Showing location of inlets on return

Typical return profiles

Note:
Profile grades should be established that will allow inlets to be located outside the return whenever practical. Inlets should be located to avoid conflict with pedestrian movement. Special care must be exercised to prevent conflict with public sidewalk curbed ramps for the disabled. For information on public sidewalk curbed ramps refer to Index No. 304.
**TYPICAL PLACEMENT OF PUBLIC SIDEWALK Curb RAMPS AT CURBED RETURNS**

1. Public sidewalk curb ramps shall be constructed in the curb right-of-way at locations that will provide continuous, uninterrupted pedestrian circulation paths to pedestrian areas, elements and facilities in the public right-of-way and to accessible pedestrian routes on adjacent sites. Curbed facilities with sidewalks and those without sidewalks are to have curb ramps constructed at all street intersections and at turnouts that have curbed returns. Partial curb returns shall extend to the full prescribed by Item No. 50 to accommodate curb ramps. Ramps constructed at locations without sidewalks shall not be landing constructed at the top of each ramp, see Sheet 3 or 3.

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

3. Curb ramp running slope shall be placed opposite to the curbed side. When existing ADA/curb ramp facilities are present in the curb right-of-way, the height of the sidewalk shall be permitted to increase on sloping sections of 1 in 12 and 1 in 8 is permitted for a rise of 75 mm minimum. Where compliance with the requirements for cross slope cannot be fully met, the minimum feasible cross slope shall be provided.

4. If a curb ramp is located where sidewalks must walk across the ramp, then the ramp shall have transition slopes to the ramp. The maximum slope of the transition shall be 1 in 12. Curb ramps with transition slopes may be used where transitions would not normally walk across the ramp, see Sheet 2 of 3.

5. When curb ramp running slope is placed opposite to the curbed side, the transition surface shall be placed opposite to the curbed side. When landing is the curb of the inclination the transition surface shall be constructed by exercising d to a depth not exceeding 3 mm by use of a ramp or similar material. In exercising the surface of either 2% or 6 mm wide, 10 mm wide or with. (Principal (196) expanded metal (standard) or 1.4 kg expanded metal (standard) is permitted for a rise of 75 mm minimum. When compliance with the requirements for cross slope cannot be fully met, the minimum feasible cross slope shall be provided.

6. Where a curb ramp is constructed within existing curb, curb and gutter and/or sidewalk, the existing curb or curb and gutter shall be removed to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb or curb and gutter is less than 100 mm. The existing sidewalk shall be removed to the nearest joint beyond the transition slope or walk area or to the extent that no remaining section of sidewalk is less than 150 mm long.

7. Alpha numeric identification number is not reference (prospect, permits, etc.).

8. Public sidewalk curb ramps shall be placed as follows:

   - Ramps, reconstructed sidewalks, curb connections and sidewalk boards are to be placed for under the contract unit price of Sidewalk Concrete. (Type 1). Curbs transitions and reconstructed curbs are to be placed for under the contract unit price for the general curbs. i.e., (Curb Concrete. (Type 1). Mir Curb and Gutte Concrete. (Type 1) . . . .)

When a separate application for the removal and disposal of existing curbs, curb and gutter, and/or sidewalk is not provided in the plans, the cost of removal and disposal shall be added to the contract unit price for new curbs, curb and gutter and/or sidewalk, respectively.
RAMP AND SIDEWALK CURB OPTIONS

PLAN VIEW

PICTORIAL VIEW

PICTORIAL VIEW

PICTORIAL VIEW

Ramps for Linear Pedestrian Traffic

Integral Cast Curb

Separately Cast Curb

Diagonal Ramps for Condition of Infeasibility

State of Florida Department of Transportation

Public Sidewalk Curb Ramps

Approved by:

Public Works Director

Plan No.

Sheet No.

F.A.A. Approved: 06/06/94

2 of 3
MEDIAN CROSSWALKS

LANDINGS FOR RAMPS WITHIN PUBLIC RIGHT OF WAY CONSTRUCTED AT LOCATIONS WHERE FUTURE SIDEWALKS ARE PROPOSED, WHERE STABLE SURFACES OTHER THAN SIDEWALKS ARE PART OF A CONTINUOUS PASSAGE OR WHERE A CURB FALLS ALONG THE CIRCULATION PATH TO PEDESTRIAN ROUTES ON ADJACENT SITES.
Metal or plastic caps for dowel bars

Butt construction joint to be used at discontinuities of work

Transverse expansion joint

Transverse contraction joint, Vibro Cast method

Transverse contraction joint, Sawed method

Dowel bar layout

Transverse joints are to be spaced at a maximum of 6.3 m. Dowels are required at all transverse joints unless otherwise noted in plans.

CONCRETE PAVEMENT JOINTS

State of Florida Department of Transportation Road Design

Note: Dowel bars are deformed 8MM or reinforcement steel bars meeting the requirements of Section 93 of the Standard Specifications.
BACKER ROD BOND BREAKER

(CONCRETE-CONCRETE JOINTS)

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Unless otherwise indicated on the plans, the joint width for new construction will be 6 in. for construction joints, 10 in. for all other joints. For rehabilitation projects, the joint width will be shown on the plans or established by the Engineer based on field conditions.

FOR REHABILITATION OF EXISTING JOINTS
TAPE BOND BREAKER

FOR NEW JOINTS
PREFORMED ELASTOMERIC COMPRESSION SEAL

FOR NEW JOINTS AND REHABILITATION OF EXISTING JOINTS
BACKER ROD BOND BREAKER

CONCRETE-CONCRETE JOINTS

CONCRETE-PAVEMENT JOINTS

JOIN SEAL DIMENSIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN

CONCRETE PAVEMENT JOINTS

 obras de transporte y comunicación local

obra de transporte y comunicación local

obra de transporte y comunicación local
CONTRACTION ASSEMBLY

EXPANSION ASSEMBLY

Notes:
Proprietary contraction and expansion assemblies
may be used. Shop drawings must be submitted to
the Office Of Construction, Projects Evaluation
Section for approval.
NOTE: After the concrete has set to the extent that the keyway will retain its shape, the hex bolt and plastic insert shall be removed. The remaining portion of the hook bolt assembly shall be installed immediately prior to placing of concrete in the adjacent lane.

ALTERNATE KEYWAY AND HOOK BOLT

Anchor bolts shall be Grade C in accordance with ASTM A 307. threaded sleeves shall develop the full strength of the bolt and meet the material and thread requirements of ASTM A 363.

STEEL HOOK BOLT ASSEMBLY

J O I N T  L A Y O U T  A T  T H R U  I N T E R S E C T I O N

1. Longitudinal joints will not be required for single lane pavement 8.2 m or less in width. For entrance and exit ramp joint details, see Sheet 5 or 6.

2. When pavement width necessitates five or more longitudinal joints which would normally be tied, provide one or more unfilled key joints. No joint shall be tied that is more than 1.2 m from a free edge or free joint including flanged road shoulders.

3. Arrangement of longitudinal joints are to be as directed by the engineer.

4. All joints, center lines and other projections into the pavement shall be boxed in with 13 mm preformed expansion joint material.

DETAIL OF JOINT ARRANGEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN

CONCRETE PAVEMENT JOINTS

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DESIGNED BY: ____________________________
CHECKED BY: ____________________________
PRINTED BY: ____________________________
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN

305 4 of 5
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

CONCRETE PAVEMENT JOINTS

JOINT LAYOUT AT ENTRANCE AND EXIT RAMP TERMINALS

2-LANE LINES WITH SINGLE LANE ENTRANCE RAMP

2-LANE LINES WITH SINGLE LANE EXIT RAMP

ENTRANCE TAPER WITH AUXILIARY LANE

EXIT TAPER WITH AUXILIARY LANE

ENTRANCE RAMP WITH ADDED LANE

Note: On single lane ramps, longitudinal joint to be constructed along centerline of ramp.

3-LANE LINES WITH AUXILIARY LANE AND 2-LANE EXIT RAMP
**Expansion Joint** Shall be Constructed Parallel To The Existing Transverse Pavement Joints On Rehabilitation Projects, and Perpendicular To The Standard Transverse Pavement Joints Shown In The Plans For New Construction.

**PLAN**

For Joint Placement See General Note No. 3.

**REINFORCING STEEL**

- Concrete Pavement
- Stainless Steel Strip
- Concrete Pavement

**OPTIONAL SEALS**

- Crim surface smooth, Cure with heavy coating of wax base white pigmented curing compound.
- Apply sealant spallation immediately prior to placing pavement.

**SECTION AA**

**EXPANSION JOINT**

- Compression Seal
- Concrete Pavement
- Stainless Steel Strip
- Concrete Pavement

**DETAILED SHOWING SHEET METAL STRIP**

**GENERAL NOTES**

1. The centerline of roadway and the centerline of bridge do not necessarily coincide. Prior to the placement of the expansion joint, the centerline of the roadway pavement shall be determined.

2. For information on other types of concrete pavement joints see Index No. 207.

3. Pay quantity for expansion joint is the length of joint to be constructed across the roadway and shoulder pavements, measured at right angles to the centerline of the roadway.

**DESIGN NOTES**

1. For rehabilitation projects, the designer must indicate in the plans the number of stops to be removed, the number of sub bases to be constructed/installs/constructed, and the location of expansion joints.

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

**JOINT DIMENSIONS**

**COMPRESSION SEAL DETAIL**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**BRIDGE APPROACH EXPANSION JOINT - CONCRETE PAVEMENT**

**BRIDGE APPROACH EXPANSION JOINT - CONCRETE PAVEMENT**

**Distributor**

**Owner**

**Engineer**

**Prepared By**

**Checked By**

**Approved By**

**Compiler**

**Scale**

**Prepared**

**FSA-8 Approved**

306 1 of 1
JOUNT LEGEND
A - 33 mm Expansion Joints (Preformed Joint Filler)
B - 3 mm Dumpy Joints, Tauled
C - 3 mm Formed Open Joints
D - 5 mm Saw Cut Joints, 100 mm Deep (10th Hour) Max 3.5 m Centers
E - 5 mm Saw Cut Joints, 40 mm Deep (10th Hour) Max 5.0 m Centers
F - 10 mm Expansion Joint when Run Of Sidewalk Extends 36.0 m
G - Cold Joint with Bond Breaker, Tauled

GENERAL NOTES
1. Sidewalks shall be constructed in accordance with FDOT Standard Specification, No. 522, except for public sidewalk curb ramp runs which shall be finished in accordance with Index No. 304.
2. Bond breaker materials can be any impermeable coated or sheet membrane or preformed material having a thickness of not less than 0.8 mils nor more than 1.3 mils.
3. For public sidewalk curb ramps see Index No. 304.
4. For turnouts see Index No. 55.
5. Sidewalks shall be poured for each contract unit price for Sidewalk Concrete (100 mm Thick), 24.

CONCRETE SIDEWALK FOR CURBED ROADWAYS
GENERAL NOTES

1. The illustrated applications for guardrail are standard requirements. The beginning of guardrail need be at the greatest of the upsurge distances from the feature, as determined from Figure 1, or other application details of this index and the lengths described below for bridges.

Bridges generally have classified several hazards, whereas the length of advancement is established by the intersection of the hazard boundary and the Clear Zone (as shown in Figure 1). For bridges that extend in the absence of the detailed guide, a distance sufficient to shield the hazard, and the ends of their traffic rails or barriers are the only hazards that require spanning, then the length of guardrail will be either 0.05 m or 8.00 m in accordance with Section H.5 & H.7 of this index; however, when Chevrons H.3, H.13 & H.14 of Index No. 400, these lengths must be decreased to achieve the reverse bridge connections in these schemes.

2. One Panel equals 3.80 m. Guardrail shall be constructed with roll elements 3.80 m in length except where 7.625 m moments are allowed for by this and other standards / indexes in a specifically defined in the plans.

Fiberglass panels should be 1.00 m in length that reduce break points for use in transitions to approaches of rigid structures such as bridges (See Section H.11.1(b) the conditions in Area No. 8 below). 1.00 m standard special applications, i.e., specific panels spanning in index No. 400, and 1.00 m specifications listed for in the plans.

3. All posts ground rigid panels where the face of guardrail is offset from the hazard less than the desirable 0.2 m, 0.9 m minimum offset may be used with posts spanning of 0.9 m extending over the length of the hazard plus one panel of approach rails. For an offset less than 0.9 m, the concrete safety shape shall be used unless otherwise specified by the Engineer of record. See Index No. 400, details "Standard Rigid Barrier as Rigid Above Ground levels for typical safety shape and the plans for specific shapes and applications.

4. In addition to use of conventional roadable hazards, guardrail will be required where fill slopes within the clear zones exceed 3:1, except that where fill heights are less than 1.8 m, guardrail may be omitted regardless of fill slope unless in the opinion of the Engineer its use is deemed necessary due to other roadable features.

5. Slope of road sections may be used for all rail at 18.0 m or greater. For rail less than 18.0 m in the rail must be fabricated to fit.

6. Corrugated sheet steel beams, ends, and sections and back up plates shall conform to the current requirements of ASRA/2400, Class A R-3 galv. 1/2 Inch Corrugated. Aluminum guardrail elements will not be permitted unless explicitly allowed for in the plans. Certain applications and accessories shall be in conformance with the appropriate current ASRA/2400 requirements.

Refurbished beams: Class A guardrail beams that have been refurbished to condition new (AASTHO M690) may be used for both maintenance and construction of new guardrail panels. Refurbished steel includes shimming of the existing galvanizing, restoration of the base metal in sections and strength/gap free of rust and deformation, and, regalvanizing to AASHTO Type 2 Specifications. Refurbished beams that retain notched edges, gussets or teeth will not be accepted.

7. Permissible post and offset back connections are as shown in sheet No. 15.

8. Where necessary to ensure or add to the normal guardrail, the work will be done by driving or ramming. Drainage guardrail will be maintained in accordance with Sections 562 and 591 of the Standard Specifications. No burning of rails will be permitted.

9. Guardrail witness color light or white steel conform to the color of the near lane edge (See Section H.11.1).

10. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where speed does not permit development of sufficient guardrail length, or crash cushions be constructed of guardrail Type II and crash barriers be installed in the median within the clear zone.

11. Median guardrail for bridges located on divided roadways shall be constructed the same as outer roadways guardrail under the following conditions:

(a) Widths of uniform widths that are accepted by other transportation and joint-use facilities.

(b) Widths of small or wide surfaces with independent vertical alignments not installed to normal median guardrail installations.

(c) Widths all divided roadways.

12. Any guardrail with existing concrete posts that is being reset under a construction contract shall be re-ballasted with 10.16 cm of fill, and shall be affixed to all posts.

13. All guardrail panels, ends, and sections and special-end sheets shall be lapped in the direction of adjacent traffic.

14. Guardrail requiring height of 0.55 m to center of W beam and 0.45 m to lower post top in the R beam is allowed and shall be affixed to all posts.

15. Guardrail connections to existing bridges shall be in accordance with this index and index No. 400. Connections to concrete barrier walls shall be in accordance with this index and index No. 400.
GUARDRAIL APPLICATIONS FOR MEDIANS 9.0 m OR LESS WITH 3.0 m BRIDGE SHOULDERS

GUARDRAIL LENGTHS

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GUARDRAIL APPLICATIONS FOR MEDIANS 9.0 m OR LESS WITH 1.8 m BRIDGE SHOULDERS

GUARDRAIL LENGTHS

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NOTE: The guardrail configurations shown apply only to parallel or near parallel bridges with median widths 9.0 m or less. When medians 9.0 m or less in width are crossed by continuous decking between the bridge piers, traffic separation shall be achieved by appropriate treatments such as, but not limited to, raised separators, curbs, guardrail, concrete barrier walls and special barriers.
GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES

**LEGEND**

1. Edge of roadway pavement.
2. Taper
3. Pavement return (Radius R1). 
4. Standard flare to be installed except when existing guardrail or intersecting drive or side road defines the project.
5. Post for installing standard flare, proximate to PC or PT:
   - No. 2 post-Radial: 8.0 m or less,
   - No. 3 post-Radial: 8.0 m to 16.5 m
   - No. 4 post-Radial: >16.5 m
6. Post for installing standard flare, proximate to PC or PT:
   - No. 3 post-Radial: 8.0 m or less,
   - No. 4 post-Radial: >16.5 m
7. Expanded shoulder for standard flare.
8. Shoulder transition.
9. Type II end anchorage (standard flare only).
10. Shoulder for radial-guardrail returns.
11. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (Radius R1).
12. Type II end anchorage (radial return only).
13. Guardrail installation limited to roadway right of way unless otherwise carried out in the plans.

**Notes:**

- Only 7.6 m and 16.0 m radius project to be used for return guardrail on normal turnouts. Other stesso turnouts the number of panels used and their arrangement with straight panels will be as shown in the plans or as directed by the Engineer.

**TAPER TURNOUTS**

**SIMPLE CURVE TURNOUTS**

**GUARDRAIL**

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

**GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES**
NOTES: (SPECIAL STEEL POST)

1. Either anchor bolts, concrete wedge anchors or approved concrete adhesive (chemically cured) anchors may be used.

Anchor bolts, wedge anchors and adhesive anchors shall have a minimum tensile strength of 400 MPa and be installed in accordance with ASTM A353. Anchorage steel components shall be substituted for bar components listed in accordance with ASTM A370, except as noted. Adhesive anchors bolts shall be equal in diameter to the bolt size for anchor bolts. Wedge anchors shall be installed in accordance with the manufacturer's instructions, assuming 20% compressive strength for concrete. Anchor bolts shall be used for the following requirements: for non-tolerant load each anchor/hole approach must be 600 kN or other structures 74.7 kN.

2. Posts are to be plumbed by adjusting nuts or mortar seating. Posts installed using anchor bolts and adhesive anchors are to be set with adjusting nuts or anchored, unless the Engineer approves the use of mortar seating in lieu of adjusting nuts. Posts installed using wedge anchors are to be set with mortar seating. Base plates must be anchored with neat finish.

3. Anchor bolts shall be set in accordance with the manufacturer's recommendations. Adhesive anchors shall be set in accordance with the manufacturer's recommendations as approved by the Engineer.

4. Anchor nuts and rebar shall be installed with wedge anchor nuts to be drilled in accordance with the manufacturer's specifications. Enlarged reinforcing steel shall be drilled through. Holes shall be thoroughly cleaned when setting bolts and anchors and dry when setting wedge anchors.

5. Steel post and base units shall be galvanized in accordance with ASTM A523. Any damaged galvanized areas are to be re-galvanized in accordance with Section 560 of the Standard Specifications.

SPECIAL STEEL GUARDRAIL POSTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

GUARDRAIL DESIGN

52-C STEEL POST

W50 X 3.5 STEEL POST

STANDARD TIMBER AND STEEL GUARDRAIL POST
Notes:
1. The locations shown for special posts mounted on inlets are to be used as guidelines for positioning the posts and for estimating the number of required posts.
2. Special posts and their hardware mounted on inlets shall be in accordance with special post guards as specified in Exhibit 2 of the Specification and paid for under the contract unit price for Special Guardrail Post, each.

3. Variations shown for the locations of special posts mounted on inlets are established from standard post spacing 1.905 m (6 ft). Allowance for standard posts from inlet 1.80 m (6 ft) to 2.40 m (8 ft) are made with the lowest optimal zone layout, concrete barrier edge distances 1.50 m for grouted and 0.50 m for expansion anchors. The number of posts and their locations may vary by reducing post spacing and adjusting the length of rail panel(s).4. Encased guardrail posts shall conform in section to standard steel 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.

SPECIAL POST LOCATIONS ON CURB INLETS

ENCASED GUARDRAIL POST
GENERAL NOTES

1. Whether an existing bridge needs to be replaced or repaired, it is a determination that must be made independent of any information contained on this index.

2. The schemes on this index are not to be used for new bridge construction, bridge widening, bridge barrier wall or handrail replacement, etc., for existing bridges that have wing walls for guardrail connection that conform with configurations shown in current Roadway Standards and Bridge Design Standards.

3. The schemes on this index are divided into two general categories, representing curved and uncurved roadway approaches. A scheme selection guide is provided under "Designer Notes" for curved and uncurved roadway approaches. Approach styles with torus or wing walls with radial safety units will be treated as uncurved roadway approaches.

4. Existing bridge features shown in these schemes are exempt from configuration changes. The principal key to scheme selection is bridge curb or sidewalk width. Location criteria is keyed to bridge face of curb, except for certain railing configurations.

5. Details that are repetitive on the schemes and features that are detailed on Index No. 400 have been purposely designed to produce clarity and simplification in the schemes, and to emphasize proper location and positioning of the anchorage and connecting guardrail.

6. All schemes are right side or left side details for traffic flow right to left. Left side applications are opposite notes.

7. For undivided two-way bridges (trafficking end), as detailed in this index, is in relation to the direction of travel of near side traffic, but it is always considered as an approach for opposing lane traffic.

8. All combinations of general purpose and special use to concrete anchorage posts, general and special use torus and wing walls shall have a 3,000 x 3,000 normal steel built-up plate for long life. New life of key is 22 mm diameter galvanized anchor bolts. Special end torus anchor bolts must have a moment arm equal to the thickness of the concrete anchorage plus 40 mm. When torus units are used in existing bridge cases, 22 mm diameter plate clamps and end torus anchor bolts meeting the manufacturers recommendations may be substituted as approved by the Engineer.

9. Unless otherwise specified for the pipe exposed concrete surfaces shall have a Class 3 surface finish and Class 5 Applied Finish Coating in accordance with Section 502 and 503 respectively of the Standard Specifications.

10. The guardrail and anchorage schemes on this index do not include cost for guardrail, see index 400 Series for level of guardrail measurement.

   Each independent anchorage described in these schemes shall be priced for as a bridge and anchoring assembly under the contract unit price for Bridge Anchorage Assembly, each. The unit price shall be fully compensation for the following:

   (a) Each concrete anchor post, plate, or foundation wall including reinforcing steel, existing rail or rail and post removal, rail fitting, lane breaker, post bedding, driving, grouting, expansion, benefit special end and access item.

   (b) Each guardrail steel return post, including Flared and extension, anchorage and accessory items (when use not installed).

   (c) Each special and shop fabricated direct to an existing bridge end post or wing wall, including deck-up plate and accessory items.

   Continuous concrete safety barrier (Schemes 6 & 9) shall be priced for as a roadway item under the contract unit price for Concrete Highway Guardrail Barrier (Randall-Fietz I Panel) with 10' H, each.

   Continuous guardrail across bridges shall be priced for as a roadway item under the contract unit price for Highway Guardrail Bridge and Special Guardrail Post, each. The unit price for guardrail shall include the cost for all anchorage, accessories specified under index No. 400 and the unit price for special posts shall include the cost for all accessories and anchorage provisions in Index 400 and in Scheme 6 of this index.

DESIGN NOTES

1. The details in this index are intended to be used for existing bridges that have end and approach bridge configurations constructed under former Department standards, etc., and are not intended as previously specified design details. These details are shown as a guide for designers to accommodate special requirements for the presence or absence of guardrail approaches on each independent corner of the bridge.

2. The schemes provide the designer with a convenient method of providing standardization information on the plans. In the selection and placement of schemes the designer must determine existing structure conditions, sidewalk and approach conditions, particularly the location of obstructions, and in general, special attention should be directed to the presence or absence of guardrail approaches on each independent corner of the bridge.

3. From corner of the bridge that require a guardrail connection should be labeled independently by scheme number, etc., where continuous barrier is required across a bridge the scheme number should be labeled independently for each corner of the bridge. When both corner guardrails are carried for, bridge and anchor plate assemblies will be omitted, but when continuous concrete safety barrier is carried for, one or more bridge and anchorage assemblies will be labeled on the plans.

4. The scheme selection guide below is to be used as a guide reference for determining anchorages and guardrail assemblies that are applicable to specific conditions for existing bridges. When appropriate, special details are to be used in lieu of schemes or supplemental to complement the scheme details, in selecting schemes the width of curb, safety rail and boundary is the distance from face of curb to the nearest face of post, rail or pan.
CAST IN PLACE TRANSITION WALL

BRIDGE WITH APPROACHING ROADWAY CURB

APPLICATIONS
- SAFETY CURB 60 mm WIDE OR LESS
- CONCRETE PARAPET WITH METAL PIPE RAILING
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE WAY BRIDGES
- APPROACH SLAB FOUNDATION

SCHEME 9

Reinforcing Steel Same As SCHEME 2

Reinforcing Steel Same As SCHEME 7 (Vertical Bars Lengthened)

See SCHEME 2 For Typical Information

See SCHEME 9 For Details

Pictorial View

APPLICATIONS
- SAFETY CURB 60 mm WIDE OR LESS
- CONCRETE PARAPET WITH METAL PIPE RAILING
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE WAY BRIDGES
- APPROACH SLAB FOUNDATION

SCHEME 10

Pictorial View
GUARDRAIL STEEL TERMINAL POST

TRAILING END / SAFETY CURB 600 mm OR LESS IN WIDTH

APPLICATIONS
SAFETY CURB 600 mm OR LESS IN WIDTH
APPROACH END OF ONE-WAY BRIDGES
TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 15
STEEL ANCHOR POST AT RADIAL WING WALL

ALIGNMENT CONTROL
Face Of Rail Flush With Face Of Curb

BASE PLATE
25 mm Base Plate
30 mm @ Hole (Typ.)

GUARDRAIL CONTINUOUS ACROSS BRIDGE

APPLICATIONS
SAFETY CURB 600 mm OR LESS IN WIDTH
APPROACH END OF ONE-WAY BRIDGES
TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 16
GUARDRAIL CONTINUOUS AND
CONTINUOUS BARIER FOR EXISTING BRIDGES

END POST WITH SPECIAL END SHOE RECESS

APPLICATIONS
SAFETY CURB 460 mm TO 600 mm WIDE
APPROACH END OF ONE-WAY BRIDGES ONLY

SCHEME 17
CONCRETE ANCHOR POST

BRIDGES WITH APPROACHING ROADWAY CURB
BRIDGES WITHOUT APPROACHING ROADWAY CURB

CAST IN PLACE PANELS

APPLICATIONS
SAFETY CURVES 230 mm TO 405 mm WIDE CONCRETE CONTINUOUS BEAM RAILING APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES

CURB WIDTHS VARY TRAILING END WHEN OTHER HAZARDS PRESENT
Notes: For Trailing End Curb Less Than 250 mm Wide See SCHEME 27.

SCHEME 27

CAST IN PLACE PANELS

APPLICATIONS
SAFETY CURVES 230 mm TO 405 mm WIDE CONCRETE CONTINUOUS BEAM RAILING APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

CURB WIDTHS VARY TRAILING END WHEN OTHER HAZARDS PRESENT
Notes: For Trailing End Curb Less Than 250 mm Wide See SCHEME 27.

SCHEME 27

CAST IN PLACE PANELS

APPLICATIONS
SAFETY CURVES 230 mm TO 405 mm WIDE CONCRETE CONTINUOUS BEAM RAILING APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

CURB WIDTHS VARY TRAILING END WHEN OTHER HAZARDS PRESENT
Notes: For Trailing End Curb Less Than 250 mm Wide See SCHEME 27.

SCHEME 27
APPLICATIONS

SAFETY CURB WIDER THAN 400 mm AND UP TO 600 mm
APPROACH END OF ONE-WAY BRIDGES ONLY

SCHEME 28

CONCRETE ANCHOR POST

APPLICATIONS

SAFETY CURB WIDER THAN 230 mm AND UP TO 600 mm
APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
APPROACH END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 29

BRIDGES WITHOUT APPROACHING ROADWAY CURB

APPLICATIONS

HANDRAIL CURB
SPECIAL END SHOE RECESS (EXISTING)
APPROACH AND TRAILING END OF TWO-WAY BRIDGES
APPROACH END OF ONE-WAY BRIDGES (NOTE: SPECIAL END SHOE TO REMAIN IN THE RECESS ON TRAILING END)

SCHEME 30

END POST WITH SPECIAL END SHOE RECESS
**CONCRETE BARRIER WALL TERMINAL**

**DETAIL II**

**DESIGN SPEED 80 mph or LESS**

**CONCRETE BARRIER WALL TERMINAL FOR NARROW MEDIAN**

**DETAIL III**

**WALL FACE SAFETY SHAPES**

**GENERAL NOTES**

1. Class 2 and 3 barriers are to be used for all reinforced and prestressed concrete barrier walls except where standard barrier walls are used.
2. Where standard barrier walls are used in the approach to existing structures, the approach to the standard barrier walls shall be in accordance with the Standard Specifications for Highway Bridges and Roads.
3. Standard barrier walls are to be used for under the contract unit price for Barrier Wall Concrete.

**STANDARD BARRIER WALL SECTIONS**

**GENERAL NOTES (Cont.)**

7. Concrete barrier walls that are continuous over roadways and bridges shall be constructed or prestressed. These concrete barrier walls shall be connected to the approach sides or ends of the standard barrier walls at the same time that the approach sides are constructed. See Figures 2, 3, 4, and 5.
8. Prestressed concrete barrier walls are to be included in the approach unit price for concrete barrier walls. See individual details for pay item information.
9. For barrier wall details see Index Nos. 227, 228, and 229.

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**CONCRETE BARRIER WALL**

**DESIGN**

- **Width:** 12 ft
- **Height:** 10 ft
- **Weight:** 1000 kips

**MEDIAN BARRIER WALL FOR SUPERELEVATED SECTIONS OR FOR VARIABLE ROADWAY PROFILE GRADES**

**SYMMETRICAL ABOUT X & Y (See Standard Wall Detail)**

**SYMMETRICAL ABOUT X**

**END ELEVATION**

1. Reflectors shall conform to Section 935.5
    of the Standard Specifications.
2. Reflectors shall be installed at the ends of the barrier.

**SYMMETRICAL ABOUT Y**

**END ELEVATION**

1. Reflectors shall be installed at the ends of the barrier.
2. Reflectors shall be installed at the ends of the barrier.

**REFLECTIVE BARRIER MARKER SPACING ON WALL**

**FULL WALL**

For concrete median barrier wall details at plaques, highway lighting and guardrail connections, see Figures 2, 3, 4, and 5.

**STANDARD BARRIER WALL SECTIONS**

**GENERAL NOTES**

1. Class 2 and 3 barriers are to be used for all reinforced and prestressed concrete barrier walls except where standard barrier walls are used.
2. Where standard barrier walls are used in the approach to existing structures, the approach to the standard barrier walls shall be in accordance with the Standard Specifications for Highway Bridges and Roads.
3. Standard barrier walls are to be used for under the contract unit price for Barrier Wall Concrete.

**CONCRETE BARRIER WALL**

**DESIGN**

- **Width:** 12 ft
- **Height:** 10 ft
- **Weight:** 1000 kips
JUNCTION BOX - ELECTRICAL

1. Junction boxes are to be fabricated from steel conforming to ASTM A36 and be hot-dipped galvanized after fabrication. All seams shall be continuously welded and ground smooth. A removable gasket shall be attached to the box to provide a water-tight cover. The cover screws shall be fully galvanized.

2. Remove excess concrete while green and hard form chippers.

3. Junction box complete and conduit risers are included in the construction contract and cost of the barrier wall. There is to be no separate compensation for the box, risers or installation unless specifically noted in the plans.

JUNCTION BOX NOTES

LIGHT POLE MOUNTING IN MEDIAN BARRIER WALL

Notes:
- For foundation design and details see Index No. 1863.
- Refer to Highway Lighting Plans for size of conduit.
- Payment for the 760 mm concrete shaft including reinforcing steel, anchor bolts and accessories shall be included in the contract unit price for Light Pole Complete-Each.

Pictorial

TRANVERSE SECTION

LONGITUDINAL SECTION

INSTALLATION

SECTION AA

SECTION BB

JUNCTION BOX

CONCRETE BARRIER WALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CONTRACT NO. 924-12-0460

CONTRACT NO. 924-12-0460

3 of 15

30M
Tie Bar 7/8 inch Bar OA Modified
in Reinforced Concrete Barrier Wall Retaining

BENDING DIAGRAMS

NOTE:
- All reinforcement CM bars.
- Minimum segment length for this wall is 6 ft.
- Wall to be priced as per the contract unit price
  for Barrier Wall Concrete Right Retaining.

QUANTITIES (For Estimating Purposes Only):
- Class 2 Concrete: 0.33 cu yd
- Reinforcing Steel: 24 lb

REINFORCED CONCRETE BARRIER WALL (RETAINING)
TWO-WAY TRAFFIC (UNDIVIDED)

BEGIN BARRIER WALL
(Rigid) (Curb & Gutter)

SIDEWALK (1.5 STC.)

UTILITY STRIP (VARIES)

Type F Curb & Gutter (600)

X (Length Of Advancement, m)

3.0 Transition

Bridge

X (Length Of Advancement, m)

3.0 Transition

END BARRIER WALL
(Curb & Gutter)

NOTE:
X = Length of advancement in meters for rear and opposing approach lanes. See Sheet K.
For questions without utility strips see Sheet K.
For transition, sidewalk and section details see Sheets S & I.
The 750 mm offset to toe of barrier wall cannot be reduced to accommodate hazards. However, hazards located in the area of the wall can be accommodated by the detail on Sheet K.

ONE-WAY TRAFFIC

BRIDGE END HAZARD

END BARRIER WALL
(Rigid) (Curb & Gutter)

SIDEWALK (1.5 STC.)

UTILITY STRIP (VARIES)

Type F Curb & Gutter (600)

X (Length Of Advancement, m)

3.0 Transition

Sidewalk Alignment Varies To Suit Conditions Around Hazard

X (Length Of Advancement, m)

3.0 Transition

BEGIN BARRIER WALL
(Rigid) (Curb & Gutter)

SIDEWALK (1.5 STC.)

UTILITY STRIP (VARIES)

Type F Curb & Gutter (600)

ONE-WAY TRAFFIC

TWO-WAY TRAFFIC (UNDIVIDED)

BEGIN BARRIER WALL
(Rigid) (Curb & Gutter)

SIDEWALK (1.5 STC.)

UTILITY STRIP (VARIES)

Type F Curb & Gutter (600)

X (Length Of Advancement, m)

3.0 Transition

Sidewalk Alignment Varies To Suit Conditions Around Hazard

X (Length Of Advancement, m)

3.0 Transition

BEGIN BARRIER WALL
(Rigid) (Curb & Gutter)

SIDEWALK (1.5 STC.)

UTILITY STRIP (VARIES)

Type F Curb & Gutter (600)

ONE-WAY TRAFFIC

HAZARD 1.2 m OR LESS FROM FACE OF CURB

CONCRETE BARRIER WALL (RIGID) (Curb & Gutter) • CURB AND GUTTER WITH UTILITY STRIP

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

CONCRETE BARRIER WALL

Date: 01/01/2023

Reviewed By: [Signature]

Approved By: [Signature]

410
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)

ONE-WAY TRAFFIC (TRAILING END)

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENTS
WITH OR WITHOUT UTILITY STRIP
NEAT LINE PICTORIAL VIEW

SECTION AA
Const. Joint Permitted

SECTION BB
Const. Joint Permitted

PICTORIAL VIEW

SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)

NEAT LINE PICTORIAL VIEW
SECTION CC

NOTE:
- Transition Segments Shall Be Coverd With The End Of The Barrier Wall in the Following Manner:
  Four 32 mm diameter holes 50 mm deep on 305 mm centers shall be drilled in the end of the barrier and
  20M bars 38 mm long set in epoxy mortar. The ends of the dowels extending into the transition segment
  shall be wrapped with one layer of Type I asphalt-saturated
  roasting felt (150 g/m²) (commonly named No. 9) with
  the ends enclosed.

- When Construction Joints Are Utilized For Transition Segment Construction The Steel Shall Be Disposed To
  The Forcing To The Following Manner:
  Five 38 mm bars 380 mm long shall be embedded into the forcing. The dowels shall be spaced 380 mm on
  centers with the first dowel located 300 mm from the barrier wall. Dowels may be placed within or adjacent to
  the roadway.

PLAN WITH UTILITY STRIP

13 mm Expansion Joint
Sidewalk (1.5 Std.)
Utility Strip (Varies)
Type 2, Curb & Gutter (600)
Barrier Wall

PLAN WITHOUT UTILITY STRIP

13 mm Expansion Joint
Sidewalk (1.8 Std.)
Textile Surface
Type 2, Curb & Gutter (600)
Barrier Wall

RIGHT SIDE SHOWN, LEFT SIDE OPPOSITE HAND
ONE-WAY AND TWO-WAY TRAFFIC (NEAR LANE APPROACH)
CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

CONCRETE BARRIER WALL

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENT
BARRIER WALL AT SQUARE OR RECTANGULAR SHAPED HAZARD

PARTIAL PLAN

When back Of Wall Loosened In Front Of Hazard Face The Forces Are To Be Adjusted To Maintain Flat Bearing Surface Against Hazard.

12 in Expansion

Material

Downward Joint

BARRIER WALL AT ROUND PIER

PARTIAL PLAN

Plan For Design Speed ≤ 80 km/h

PLAN FOR DESIGN SPEED ≥ 90 km/h

SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS

WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 0.90 METERS

STANDARD TIMBER OFFSET BLOCK (FIELD TRIMMED)

NOTE:
1. This wall is intended for use where at least one end of each wall is not leaning against the hazard. If such leaning does not occur, then the distance from the hazard is the distance for "Transitional Concrete Barrier Wall Block" (P. 16) in the notes.
2. This wall is intended for use where at least one end of each wall is not leaning against the hazard. If such leaning does not occur, then the distance from the hazard is the distance for "Transitional Concrete Barrier Wall Block" (P. 16) in the notes.
3. All sections are shown with 305 mm centers. Additional information is available.

CONCRETE BARRIER WALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

Road Design

CONCRETE BARRIER WALL

SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS

WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 0.90 METERS

FOR USE WITH EITHER 180° OR 1,15° GUARDRAIL TRANSITIONS

PLAN FOR DESIGN SPEED ≤ 80 km/h

PLAN FOR DESIGN SPEED ≥ 90 km/h

SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS

WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 0.90 METERS

STANDARD TIMBER OFFSET BLOCK (FIELD TRIMMED)
INSET

Note: Deflector required on left side for sidefracture facilities unless extension or transition panel called for.

REINFORCEMENT

SIDE VIEW

SECTION AA

WALL DETAILS

NOTES
1. For the number of bays required see Table, Sheet 1.
2. See Transition Assembly Features for guardrail connections.
3. For design information see the General Notes.

CONCRETE BACKUP WALL ASSEMBLY
TENSION STRUT BACKUP ASSEMBLY

NOTES
1. For the number of bays required see table, Sheet 1.
2. See Transition Assembly Features for guardrail connections.
3. For design information see the General Notes.
WIDE FLANGE BACKUP ASSEMBLY

NOTES
1. For the number of bays required see table, Sheet 1.
2. See Transition Assembly Features for gusset connections.
3. For design information see the General Notes.
**22.00 Wns, Unidirectional and Bidirectional**

**54.00 Wns, G-R-E-A-T**

**80.00 Wns, G-R-E-A-T**

Notes: See Index 415 for freestyle reinforcement and for additional wall information (Sheet 2).

**60.00 Wns, G-R-E-A-T**

**50.00 Wns, G-R-E-A-T**

Notes: See Index 415 for freestyle reinforcement and for additional wall information (Sheet 2).

**ASSEMBLY LENGTHS**

<table>
<thead>
<tr>
<th>No. of Bays</th>
<th>L (m)</th>
<th>Lx (m)</th>
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<tr>
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<td>1.98</td>
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<tr>
<td>5</td>
<td>8.65</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Note: Bolt longitudinal spacing to be in accordance with the manufacturer's recommendation drawings and specifications.

**UNIT PLAN**

- **PLAN FOUNDATION**
  - **PLAN**
    - **SECTION AA**
    - **SECTION BB**
- **UNIT ELEVATION**
- **SIDE VIEW**
- **FRONT VIEW**
- **UNIT ELEVATION**

**NOTES**

1. This assembly applies to single and double face F-Shape and single face New Jersey (NJ) Shape concrete barrier walls (double face F-Shape detailed). Adaptable to single face F-Shape walls by bracket adjustment. See Index No. 415 for barrier wall information.

2. Concrete barrier wall free and reinforcement required with G-R-E-A-T system connection. See Index No. 415.

3. For the number of bolts required see table, Sheet 1.

4. For design information see the General Notes.

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**G-R-E-A-T SYSTEM**

**FIELD BENDING OF WALL REINFORCEMENT**

**CONCRETE BARRIER WALL BACKUP ASSEMBLY**
**GENERAL NOTES**

4. The energy absorbing system represented on this data sheet is a proprietary design by Energy Absorption Systems, Inc., and marketed under the trade name Brakemaster. Any infringement on the rights of the designer shall be the sole responsibility of the user.

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

3. This standard drawing is sufficient for plan details for the Brakemaster system installed in connection with standard single- and double-faced 5 ft. beam guardrail systems, and prescribes the requirement for stop growing substituted unless the owner otherwise consents as such substitution.

4. The Brakemaster system shall be assembled and installed in accordance with the manufacturer's detailed drawings, specifications, and procedures for such substitution.

5. The Brakemaster system shall be constructed only on tangents 1/32 or flatter.

6. The Brakemaster system shall not be installed closer than 3.3 meters to any traffic lane.

7. The "roll" end section represented on this drawing applies to connections with single- and double-faced guardrails. Where the Brakemaster system is installed in conjunction with safety shaped or vertical faced barrier walls or other right-of-way structures, a special transition guardrail section between the Brakemaster and wall or structure shall be as detailed on Index No. 400 or as approved by shop drawings.

8. Vehicular components shall meet the generalizing requirements for guardrail, Index No. 400.

9. The Brakemaster system will be paid for under the contract unit price for Impact Attenuator Vehicular (Brakemaster) 1, Each.

**DESIGN NOTES AND GUIDELINES**

1. The Brakemaster system is designed to protect automobile and/or motorcycle from side impacts at speeds up to 60 mph and including 50 mph. The Brakemaster unit has a storable design for speeds of 40 mph or less, and any adjustment to its design will not be permitted except as authorized by the manufacturer.

2. The Brakemaster system is specifically designed to withstand impact at the design speed and to absorb the kinetic energy of the vehicle. The Brakemaster system is not intended for use in areas where there is a history of high frequency vehicle departures from the roadway or the potential exists for such departures. The Brakemaster system is not a replaceable system and therefore requires complete replacement after being subjected to an end-on or a side vehicular impact. Reinforced side rail elements of the Brakemaster will be reinforced and are to be replaced immediately. Replacement elements are not to be reinforced for reuse. When replacing an impacted Brakemaster system, the cable/roadway assembly is not to be reused. After vehicle impact on the Brakemaster system the cable/roadway assembly can be returned to the manufacturer for credit toward replacement of the cable.

3. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the Brakemaster, and until such alternatives are available, the Brakemaster need not be bid against other proprietary items.
BIDIRECTIONAL SYSTEM

NOTE: NOTICE THE BOLT ARRANGEMENT FOR STRAP AND PANEL CONNECTIONS.

RIGHT SIDE ELEVATION

NOTE: NOTICE THE BOLT ARRANGEMENT FOR STRAP AND PANEL CONNECTIONS.

LEFT SIDE ELEVATION

50 mm Wire Asphait, In Absence Of Other Paved Surface
ISOMETRIC VIEW

ANCHOR ASSEMBLY, EMBEDDED BRS

Notes: This assembly is driven into 203 mm Ø 1.52 mm deep pilot hole by drive cap furnished.

ANCHOR ASSEMBLY, DPA BRS

DIAPHRAGM, BRS

BRAKE/CABLE REPLACEMENT

Cable Replacement Required When Cable Sleeve Exposed. See "Design Notes and Guidelines." Note No. 3. For Additional Information.
GENERAL NOTES
1. The energy absorbing system represented on this standard drawing is a proprietary design by Energy Absorption Systems, Inc. and marked under the trade name Hex-Foam™ Sandwich System. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department of Transportation solely for use by the Department and its employees. This standard drawing provides the general graphics and information necessary to fabricate identical components of the Hex-Foam Sandwich System and their incorporation into a complete system.
3. This standard drawing is furnished for placement details for the Hex-Foam Sandwich System installed as a free standing system or installed in connection with concrete barrier walls and other finished barrier systems, and prescribes the requirement for stop drawing geometry unless the plans otherwise call for such stop details. For unusual situations such as stop details exceeding 20' (6.096 m), expansion joints, drainage, and structural details, or extra wide barriers, Energy Absorption Systems, Inc. provides a free design service to ensure proper use of the system.
4. The Hex-Foam Sandwich System shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures, and specifications.
5. The standard Hex-Foam Sandwich System is available in 5 standard widths protecting lanes up to 25.5' (7.82 m). Each of these widths can be matched to any of the four basic assemblies shown in this sheet. The four basic assemblies are to be utilized as follows:
   - 1-4 separated systems:
     - (1) Concrete backup assemblies,
     - (2) Diagonal braced backup assemblies,
     - (3) Wide Flange backup assemblies,
     - (4) Inclined systems.
   - 1-8 separated systems:
     - (1) Concrete backup assemblies,
     - (2) Diagonal braced backup assemblies,
     - (3) Wide Flange backup assemblies,
     - (4) Inclined systems.
6. Only the Hex-Foam assemblies shall be used in all lanes and the nose section.
7. Concrete foundations and backup blocks shall be constructed with 28 Wksi concrete, compressive strength concrete.
8. The Hex-Foam Sandwich System can be constructed on cross slopes up to 20% without compromising performance.
9. All metallic components shall meet the general requirements for guardrail, Index No. 400.
10. Fittings, hardware, and accessories not labeled or described in these details are those furnished by the manufacturer/subcontractor and are to be installed in accordance with the manufacturer's instructions and drawings and specifications.
11. The Hex-Foam Sandwich System will be paid for under the contract unit price for impact attenuation Vehicle Hex-Foam, GA.

DESIGN NOTES AND GUIDELINES
1. The Hex-Foam Sandwich System is designed to sustain automobile and truck loads and to resist automobile and truck loads from side hits.
2. The standard width Hex-Foam Sandwich System is designed to shield fixed hazards up to 25.5' (7.82 m) or to the ends of other fixed barrier systems. The number of bays to be used in a specific unit will be determined by the design speed of the roadway or the presence of fixed obstacles on the roadway or the potential risks for such departures. The Hex-Foam Sandwich System is particularly suited to shield hazards within the pavement and to the ends of other fixed barrier systems. It is particularly suited to conditions where the hazard is close to the traffic lane. For unusual situations see General Note No. 5.
3. The Hex-Foam Sandwich System is a retroactive system that is particularly suited to stabilizing wide (a 9.2 m) hazards subject to high speed traffic, high volume traffic, or where traffic with a history of frequent vehicle departures from the roadway or the potential exists for such departures. The Hex-Foam Sandwich System is particularly suited to stabilizing hazards within the pavement and to the ends of other fixed barrier systems. It is particularly suited to conditions where the hazard is close to the traffic lane. For unusual situations see General Note No. 5.
CONCRETE BACKUP ASSEMBLY

BACKUP ASSEMBLY - UNIDIRECTIONAL

BACKUP ASSEMBLY - BI DIRECTIONAL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PRELIMINARY DESIGN

HEX-FOAM
SANDWICH FOAM SYSTEM

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HORIZONTAL BRACED BACKUP ASSEMBLY

TYPICAL HORIZONTAL BRACE ASSEMBLIES

Note: Horizontal braces are custom assembly items. Actual designs vary depending on the concrete backup structure.

Concrete Structure Heights (E):

Coiled Concrete Structure (See Sheet 6 of 6):
- Narrow Units: 100 in., 110 in., 120 in.
- Wide Units: 150 in., 160 in., 170 in.

CORNERS MOUNT

Notes: See Sheet 6 of 6 for minimum concrete structure reinforcement.
WIDE FLANGE BACKUP ASSEMBLY

PLAN - UNIDIRECTIONAL UNIT (6 BAY UNIT SHOWN)

PLAN - BIDIRECTIONAL UNIT (5 BAY UNIT SHOWN)

* 2 WF posts are required on narrow and median width systems.
* 3 WF posts are required on wide systems (>2200 mm).

SUPPLEMENTAL DIMENSIONS

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
Highway Design

HEX-FOAM SANDWICH SYSTEM
RIGID FOUNDATION NOTES

1. The reinforced portland cement concrete (RPCC) foundation is designed to take the G-R-E-A-T™ system load. The slab foundation shall be constructed with 28 MPa minimum compressive strength concrete. The slab shall be at least 12 in thick with the surface intended for approaching vehicles. The surrounding surface shall be paved as shown in this sheet on the Unit Plan for the Tension Strap Back-up Assembly. The G-R-E-A-T™ shall be anchored exclusively with the 460 mm MP-3 anchor system supplied with the G-R-E-A-T™ unit, unless another anchor is supplied or approved by the G-R-E-A-T™ manufacturer.

2. The reinforced portland cement concrete (RPCC) foundation shall be Class I concrete, having slump deviations equal to or greater than those for the RPCC foundation. The RPCC foundation installation standards are as follows: (a) Placed in place as an assembled slab, having a thickness of not less than 150 mm, classified as Class 1, 28 MPa minimum compressive strength concrete, as approved by the Engineer. (b) Project constructed roadway RPCC pavement to the existing surfacing.

   The utilization option shall be as approved by the Engineer on a site specific basis. The top of the RPCC foundation shall be flush with the surrounding pavement for approaching vehicles. In the absence of surrounding pavement the surrounding surface shall be paved as shown in this sheet on the Unit Plan for the Tension Strap Back-up Assembly. The G-R-E-A-T™ installed on RPCC pavement shall be anchored exclusively with the MP-3 anchor system supplied with the G-R-E-A-T™ unit, unless another anchor is supplied or approved by the G-R-E-A-T™ manufacturer.

3. For additional information see the General Notes.
NOTE: L.A. R/W along the crossroad will extend a minimum 100.0 ft beyond the end of the acceleration or deceleration taper, with the taper end remote from the project establishing the end for both sides of the roadway. In the absence of a taper, the radius point of the ramp return will be used with the above criteria.

For interchange quadrants having to ramp the L.A. R/W will extend along the crossroad to a odd extension the radius point of the ramp return will be used with the above criteria.

FENCING TERMINALS AT RURAL INTERCHANGES

APPLIES TO BRIDGE OVER CROSSTRADE AND CROSSROAD OVER FREEWAY (BRIDGE OVER CROSSTRADE SHOWN)

FENCING TERMINALS AT URBAN INTERCHANGES

Note A - The indicated distance shall be sufficient to provide satisfactory sight distance for the traffic from the ramp.

Note B - The indicated distance shall be identical to the above noted dimension, if practical.

FENCING TERMINALS AT RETAINING WALLS
GENERAL NOTES

1. Unless a specific material is called for in the plans, the Contractor may elect to use either a single type of material or a combination of different types of materials. Certain combinations of materials are restricted as follows: Only one type or optional material will be permitted between corner and/or post assemblies. Each type or post assembly shall be identified by either the line post or optional material. All line posts shall be the same optional material whether any of set assembly and/or post assemblies.

2. Concrete bases shall be Class I as specified in Section 5.4 of the Standard Specifications except that the requirements contained in 5.4.b.), 5.4.d), and 5.4.f) shall not apply. Literature for Class I concrete may be obtained by volume and/or by weight.

3. Line posts are to be set in concrete as detailed above or by the following methods:
   a. In accordance with specifications and details as specifically described in the contract details and specifications.
   b. In accordance with ASTM F675 Subsection 4.4 through 4.7 and 4.9 and 4.10 as approved by the Engineer.
   c. In tills that are firm, well-drained and suitable for full-scale embankment, any of the optional materials may be driven in. Driven posts shall be inserted at a minimum depth of 9.0 ft. For fences up to 10.0 ft. in height, posts with a minimum diameter of 2.5 in. shall be inserted at a minimum depth of 8.0 ft. Posts shall be permitted to prevent collapse of the grout, channeling, and soil erosion or consolidation of the ground and/or additional support as required by the Engineer.
   d. Posts required on concrete structures or solid wall shall be mounted in accordance with the details described in Section 5.4.5.1. Fences mounted on concrete structures or solid wall shall be set by base plate or by embedment. Any additional support required in accordance with ASTM F675 Subsection 4.10.

4. End, corner, and post assemblies shall be set in concrete as detailed above or as required by the Engineer as determined by the Engineer on the plan sheet where the radius is less than 500 ft.

5. Pull posts shall be used at breaks in vertical grades at 15° or more, at an intersection of 100° or greater, except that this maximum may be increased by the Engineer on the Engineer’s request.

6. Corner posts are to be installed at all vertical breaks in the fence at 15° or more and as required at vertical breaks over 15° as determined by the Engineer.

7. When fences have a radius of 100 ft or less, intermediate top and bottom rails shall be specified as required by the Engineer.

8. Unless specified otherwise, all metal rails will be 2.5 in. diameter and the configuration described above shall be used at the points as specified. The fence shall be designed and constructed as specified, and the Contractor shall be responsible for the design and construction of the fence.
OPTIONAL "C" LINE POST FOR TYPE B FENCE

NOTES
Attachments to be used only when called for in the plans.
Attachments to extend in direction of restraint, unless otherwise called for in plans, direction of restraint will be as follows:
(a.) Outward on limited access right of way line.
(b.) Outward on controlled access right of way line.
(c.) Outward from utilities and hazardous facilities located within
highway right of way.
(d.) Outward from lateral ditch, curvits, retention basins,
ditches, ditches and similar support facilities.
(e.) Outward on pedestrian ways.
The cap-aim shall be designed to provide a drive fit over the top of posts and to exclude moisture in areas with lidar sections.
Attachments to be paid for under the contract unit price for Fencing.
Type B (With Bar Wire Attachment).

BARB WIRE ATTACHMENT

BASE PLATE AND ANCHOR NOTES:
1. Base plate identification for line, null, and end corner posts and shall be considered as integral part of the respective posts for basis of payment.
2. Post to be plumbed by great ship under base plate.
3. Anchors (Galvanized Steel):
   - 300 mm Cast in place, 625 mm Embedment, 200 mm Adhesive Anchors, 50 mm Wide Embedment.
   - Adhesive anchors shall be headed anchor bolts set in drilled holes with heavy hexagonal shank Type I (Class 29) in accordance with the manufacturers specifications. Drilled holes shall be 2 mm larger in diameter than the anchor bolt.
   - Expansion bolts not permitted.

OPTIONAL H-BEAM LINE
POST FOR TYPE B FENCE

FENCE MOUNTING ON CONCRETE ENDWALL AND RETAINING WALLS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

FENCE TYPE B
GENERAL NOTES

1. The Contractor may substitute any equivalent cantilever slide gate approved by the Engineer.

2. Steel gate frame shall be fabricated prior to galvanizing, except that truss rods and truss rod plates may be fabricated following frame galvanizing provided surfaces damaged during welding are galvanized in accordance with Section 24 of AASHTO M36.

3. All fabric shall be knurled top & bottom serrations.

4. Cost of all gate components shall be included in the contract unit price for Siding Fence Gate (Cantilever), each.
GENERAL NOTES

1. The opaque visual barrier is intended to function as a visual screen, and is not intended to restrict vehicle speed nor to restrain, contain or redirect vehicles or cargo. The barrier is designed to withstand direct wind loadings and strikes by light debris, and is designed to yield to exceptional strikes by vehicles or cargo, and to contain ruptured segments of the screen when yielding to such strikes.

2. When the opaque visual barrier is constructed on an existing barrier wall, dowels shall be 500 mm in length, embedded 350 mm into the barrier wall and set with an approved chemical grout. Embedment holes shall be 650 mm long, drilled to a depth 600 mm below the top of the wall, unless greater depth is required to accept manufactured grout capsules.

3. For both double and single faced concrete walls the opaque visual barrier is to be located in the center of the top of the wall.

4. In lieu of the reinforcement shown the Contractor may substitute equivalent wire fabric equal to or better than that shown, when approved by the Engineer. Details shall be submitted with requests for substitution.

5. The Contractor may construct continuous prestressed concrete panels in lieu of the cast-in-place opaque screen when approved by the Engineer. Panel design and method for anchorage to the barrier wall shall be shown. By drawings when requesting the Engineer's approval.

6. The Contractor may construct the opaque screen non-conventionally with the barrier wall. However, the screen design shall not be modified so as to cause the wall to be dynamically active. All screens shall be designed and fabricated in accordance with Section 1500.3 of the Standard Specifications.

7. Paymen for opaque visual barrier shall be full compensation for concrete, reinforcement, dowels, casting, placement, curing, grooving, finishing and work involved herein, and shall be paid for under item 1.02.7.0.0 of the price for Opaque Visual Barrier (Concrete) 1.680 mm Height A.W.
WITH OVERBURDEN - HALF SECTION

IN RURAL CONSTRUCTION

WITH OVERBURDEN - HALF SECTION

IN URBAN CONSTRUCTION

REMOVAL OF ORGANIC MATERIAL

GENERAL NOTES

1. All details shown on this sheet refer to removal of organic and plastic materials, as defined under soil classifications for Plastic (P) and high Plastic (H) on Index No. 505.

2. Utilization of stabilized materials shall be in accordance with Index No. 505.

3. Where organic or plastic material is used, backfill shall be made of suitable material in accordance with Index No. 505, unless otherwise shown on the plans.

4. The term "Organic Material" used in this index refers to removal of plastic pipe, as defined under soil classifications for Plastic (P) and high Plastic (H) on Index No. 505.

5. The term "Organic Material" as used on this index is defined as any soil which has an organic content greater than 5% (35.3% by volume), or as individual organic content tests required service area over 75.1% percent. Organic material shall be removed as shown on this index and the plans unless directed otherwise by the District Geotechnical Engineer.

6. The primary depth of side slippage shall be 1.0 in below the shoulder point, except in special cases.

7. In municipal areas, where underdrain is to be constructed beneath the proposed pavement, the grade of the underdrain filter material shall not extend above the bottom of the stabilized section of the subgrade. Drainage of the filter material shall conform to FDOT specifications. Minimum grade on underdrain pipe shall be 0.2%.

8. See Index No. 506 for miscellaneous earthwork details.

DESIGN NOTES

1. At locations where organic material or other soft soil deposits persist to such depth that removal is impractical, the construction of a geosynthetic foundation over these soils should be considered. The Engineer of Record should request guidance from the District Geotechnical Engineer and solicit geosynthetic foundation designs from geosynthetic manufacturers when pursuing geosynthetic alternatives.

2. The designer shall take into consideration the expected failure at the service areas and where failure is anticipated, the necessary to accommodate anticipated widening.
HALF SECTION

NOTES: Refer to roadway cross sections to determine whether minimum or preferable removal is used.

*Where frequency of median breaks indicates that it is impractical to leave plastic material in the median, the designer may elect to indicate total removal of this material.

If during construction it becomes apparent, due to normal required construction procedures, that it is impractical to leave the plastic material in the median, total removal of this material shall be approved by the Engineer.

REMOVAL OF PLASTIC MATERIAL AND LOCATION OF UNDERRAIN IN URBAN CONSTRUCTION

REMOVAL OF PLASTIC MATERIAL ON INTERSTATE FACILITIES, FREEWAYS, DIVIDED ARTERIALS AND MAJOR COLLECTORS HAVING DEPRESSED MEDIANs

REMOVAL OF PLASTIC MATERIAL ON DIVIDED FREEWAYS, ARTERIALS AND MAJOR COLLECTORS HAVING FLUSH MEDIANs, AND, ON UNDIVIDED ARTERIALS AND MAJOR COLLECTORS

TYPICAL CUT SECTION

TYPICAL CUT SECTION ON TANGENT

TYPICAL CUT SECTION ON SUPERELEVATION

MISCELLANEOUS DETAILS

Removal of Plastic Material to this Line

Note: When this detail is applied to other connectors and local facilities, the underdrain may be reduced to 400 mm.

REMOVAL OF ORGANIC AND PLASTIC MATERIAL

Note: For GENERAL NOTES see Sheet 1.
GENERAL NOTES

1. Roadway dimensions are representative. Subgrade dimensions and control lines are standard. The details shown on this note do not supersede the details shown in the plans or on any Index Nos. 500 or 600.

2. Plastic (P) soils may be placed above the existing water level of the time of construction to within 1.2 m of the proposed base, if it should be placed uniformly in the lower portion of the embankment for some distance along the project rather than full depth for short distances.

3. High Plastic (H) soils excavated within the project limits may be used in embankment construction as indicated on this Index. High Plastic soils are not to be used for embankment construction when obtained from outside the project limits.

4. Select (S) soils having an average organic content of more than two and one-half (2.5) percent, or having an individual test value which exceeds four (4) percent, shall not be used in the subgrade portion of the roadway.

SELECT (S), Plastic (P), or High Plastic (H) soils having an average organic content of more than five (5) percent, or an organic content individual test value which exceeds seven (7) percent, shall not be used in the portion of embankment inside the control line, unless written justification is provided by the District Geotechnical Engineer; these soils may be used for embankment construction outside the control line, unless restrained by the plans or otherwise specified in the plans, provided they can be compacted sufficiently to support a desirable surface for operational vehicles as approved by the Engineer.

Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum or strata of a particular material. Tests shall be performed in accordance with F.W. R-1327 on the portion of a sample passing the 4.75 mm sieve.

5. Highly organic soils, composted primarily of partially decayed organic matter, often dark brown or black in color with an odor of decay, and sometimes fibrous, shall be designated as muck. Further, any stratum of strata of soil which contains pockets of highly organic muck may be designated as muck.

Highly organic soils shall not be used within the subgrade or embankment portion of the roadway, with the exception of muck used as a supplement to construct top soils as described in Section 621 of the FDOT Standard Specifications.

DESIGN NOTES

1. The designer shall take into consideration the existing condition of roadways widening in the vicinity, and where widening is anticipated, specify to the plans the utilization of Select (S), Plastic (P) and/or High Plastic (H) soils classified as organic materials, in the embankment outside the control line.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
HIGHWAY DESIGN

EMBANKMENT UTILIZATION

FLEXIBLE PAVEMENT
NOTES
1. All material in the shaded area is excess base to be removed.
2. The cost for removal of excess base material shall be included in the contract unit price for base.
3. Payment for base shall be calculated using normal width.

REMOVAL OF EXCESS BASE MATERIAL

NOTES
1. When the median has curb or curb and gutter, stabilize 0.1 m back of curb.
2. When the median has shoulder with no curb or curb and gutter, stabilize to normal shoulder width.
3. See the details above for stabilizing requirements at crossroads.
4. Stabilize entire area under all paved traffic islands.
5. Stabilize full width under all traffic separators.
6. Select material as defined in Index No. 506. For minor collectors and local facilities the depth of select material thickness may be reduced from 0.6 m to 0.45 m.

MEDIAN STABILIZING DETAILS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN
MISCELLANEOUS
EARTHWORK DETAILS
SUPERELEVATION RATES (e) FOR RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS

\[ e_{\text{max}} = 0.10 \]

SUPERELEVATION FOR RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS

**Charted Values**

**Tabulated Values**

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

**SUPERELEVATION**

RURAL HIGHWAYS, URBAN FREEWAYS
AND HIGH SPEED URBAN HIGHWAYS

Superintendent

Architect:

F.S.A. Approved 1/25/2023

Page 1 of 3
SLOPE RATIOS FOR SUPERELEVATION TRANSITIONS

DESIGN SPEEDS, km/h

SECTION

70 ≤ V < 90
90 ≤ V < 100
V ≥ 100

ADJUSTED SLOPE RATIO

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z

D</ref>

SUPERELEVATION TRANSITIONS

- SHOULDER ON HIGH SIDE: A shoulder slope of 0.06 downward from the edge of pavement will be maintained until a 0.06 break in slope of the pavement edge is reached due to superelevation of the pavement. As the superelevation increases, the 0.06 break in slope will be eliminated and the shoulder flattened until the shoulder is level. A slope of 0.05 downward from the edge of pavement may further increase in the superelevation. Any further increase in superelevation will cause a break in the middle half of the shoulder toward the pavement and the outer half outward, both at 0.06. These slopes will be held with further increase in pavement superelevation until the maximum break of 0.05 of the pavement edge is again reached. This maximum break will then be reduced and shoulder slopes restrained with additional superelevation.

- SHOULDER ON LOW SIDE: Maintain 0.06 slope across inside shoulder until pavement cross slope reaches 0.06. For pavement cross slopes greater than 0.06, shoulder to have same slope as pavement.

NOTE: These details apply to both paved and gravel shoulders. For median shoulders use 0.05 in lieu of 0.06.

GENERAL NOTES

1. For Super elevation Urban Highways and High Speed Urban Streets, see index No. 54.

SUPERELEVATION SECTIONS AND PROFILES FOR RURAL HIGHWAYS, URBAN FREeways AND HIGH SPEED URBAN HIGHWAYS
SUPERELEVATION TRANSITION (L, Varies 30.0 Mph)

SECTION A-A
NORMAL CROWNED SECTION

SECTION B-B
SUPERELEVATION SECTION LT. & RT.

SECTION C-C
SUPERELEVATION SECTION LT. PLANE INCLINED SECTION RT.

SECTION D-D
PLANE INCLINED SECTION LT. SUPERELEVATION TRANSITION RT.

SECTION E-E
SUPERELEVATION TRANSITION LT. FULL SUPERELEVATION RT.

SECTION F-F
FULL SUPERELEVATION LT. & RT.

B-LANE PAVEMENT WITH ONE LANE SLOPED TO MEDIAN
### SUPERELEVATION RATES (e) FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

**e<sub>max</sub> = 0.05**

#### TABULATED VALUES

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<th>Design Speed (km/h)</th>
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</table>

#### CHARTED VALUES

- **a:** When the speed curves and the radius of curve lines intersect above this line, the pavement is to be super-elevated at linear rate to the rate indicated at the radius of curve lines intersecting points.
- **b:** When the speed curves and the radius of curve lines intersect below this line, the pavement is to be super-elevated at the rate of 0.02/Radius or linear rate to the rate indicated at the radius of curve lines intersecting points.
- **c:** When the speed curves and the radius of curve lines intersect below this line, the pavement is to have normal crown (typically 0.02/Radius or 0.03 downward slopes).  

**GENERAL NOTES**

1. When the speed curves and the radius of curve lines intersect above this line, the pavement is to be super-elevated at a rate indicated at the radius of curve lines intersecting points.
2. When the speed curves and the radius of curve lines intersect below this line, the pavement is to be super-elevated at a rate of 0.02/Radius or linear rate to the rate indicated at the radius of curve lines intersecting points.
3. When the pavement is to have normal crown, the pavement shall be super-elevated at the rate indicated at the radius of curve lines intersecting points.
4. In construction, the curves for super-elevations shall be placed at equal vertical profile elevations within the limits of the super-elevation transition.
5. The table shall be provided with minimum values of 0.02/Radius or linear rate to the rate indicated at the radius of curve lines intersecting points.
6. Roadway markers having lane markings different from those shown, but composed of a series of lines, shall be super-elevated in a similar manner.
7. For super-elevation of speed urban streets, see the FDOT Manual of Uniform Minimum Standards For Design, Construction And Maintenance For Streets And Highways. For super-elevation of curves on rural highways, urban freeways and high-speed urban highways, see FDOT No. 5/10.
Parabolic Section

State of Florida Department of Transportation
Road Design

Super-elevation Transition Sections for Urban Highways and High Speed Urban Streets

Información sobre la superficie y la velocidad en las carreteras urbanas.

Superelevation Transition Sections for Urban Highways and High Speed Urban Streets
Two lanes each direction

Note: The sections and profiles shown are examples of superelevation transitions. Similar schemes should be used for roadways having other sections.

Example Superelevation Sections and Profiles for Urban Highways and High Speed Urban Streets

State of Florida Department of Transportation
Highway Design

Superelevation
Urban Highways and Streets

<table>
<thead>
<tr>
<th>Slope Ratio</th>
<th>50 km/h</th>
<th>60 km/h</th>
<th>70-80 km/h</th>
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<tbody>
<tr>
<td>D</td>
<td>1:100</td>
<td>1:125</td>
<td>1:150</td>
</tr>
</tbody>
</table>

D: 1:25 may be used for up to 80 km/h under mentioned conditions.
**Layer Thickness for Asphaltic Concrete Structural Courses**

(Layers Are Listed in Sequence of Construction)

<table>
<thead>
<tr>
<th>COURSE THICKNESS (mm)</th>
<th>All Type S-I With Type S-I Top Layer</th>
<th>All Type S-II With Type S-II Top Layer</th>
<th>All Type S-I</th>
<th>All Type S-II</th>
<th>Type S-I at Layer With Type S-I Interlayer and Top Layer</th>
<th>Type S-II at Layer With Type S-II Interlayer and Type S-II At The Layer</th>
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<tbody>
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</tbody>
</table>

* Denotes multiple combinations available. Combination selected must be consistent with the General Notes shown below and the total number of layers shown by *'s used. The coarser graded mix shall be used in the lower layers to improve the pavement's resistance to rutting.

**General Notes**

1. For combinations not shown in the table, the thickness must be consistent with the following thickness ranges:

<table>
<thead>
<tr>
<th>Type Mix</th>
<th>Minimum</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>S-I</td>
<td>30 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>S-II</td>
<td>50 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td>S-III</td>
<td>80 mm</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

Multiple layers shall be used when possible. Layer combinations shall be as approved by the Engineer.

2. In addition to the minimum and maximum thickness requirements, the following restrictions are placed on the respective materials when used as a structural course:

- S-I: May not be used in the 1st layer of courses over 30 mm thick.
- S-II: May not be used in the final layer structural layer only.
- S-III: Limited to the final layer structural layer only.

Above restrictions do not apply to overlaid and leveling.

3. When quantities are bid as a single item, equivalent concrete layer thickness will be constructed per h groin 22 kg/m³(22 kg/m³ for each 10 mm thickness).

4. The designer shall consider stage construction for course thickness greater than 10 mm.

5. When construction includes the paving of adjacent shoulders (≤ 1.5 m wide), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass. See design notes.

6. A minimum of 40 mm to 50 mm initial lift is required over an asphalt rubber interlayer (ARW).

**Design Notes**

It is desirable that the top layer of the roadway overlying and the shoulder structure course be constructed in one pass. The following applies when a 1.5 m or less shoulder meeting the minimum standards is to be constructed in conjunction with an overlay of the roadway:

1. If alternate friction courses are not to be shown on the typical section, use the following:

<table>
<thead>
<tr>
<th>Shoulder Type</th>
<th>Type S</th>
<th>Type 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
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<td>40</td>
</tr>
<tr>
<td>50</td>
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<td>50</td>
</tr>
<tr>
<td>60 and up</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>w/ FC-2</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

   *(The increased thickness is required to ensure a 30 mm thickness of Type S on the shoulder under the open graded friction course and to meet the requirements of the RIN-WIN criteria of this note.)*

2. If alternate friction courses are to be shown on the typical section, use one of the following combinations:

<table>
<thead>
<tr>
<th>Roadway Course</th>
<th>Shoulder Type</th>
<th>Type S</th>
<th>Type 5</th>
</tr>
</thead>
<tbody>
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<td>60</td>
</tr>
<tr>
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</tr>
<tr>
<td>w/ FC-3</td>
<td>20</td>
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<td>20</td>
</tr>
<tr>
<td>60 and up</td>
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<td>20</td>
</tr>
<tr>
<td>w/ FC-3</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

3. Layer Thickness for FC-2 is 15 mm. Layer Thickness for FC-3 is 25 mm.
GENERAL NOTES

1. On new construction and complete reconstruction projects where an entire new base is to be built, the design engineer may specify just the Base Group and any of the unrestricted General Use Optional Bases shown in that Base Group may be used. Note, however, that some thick granular bases are limited to widening which prevents their general use.

2. On any type of widening project, the base options to be used must be specified by the designer and shown in the plans.

3. Where base options are specified in the plans, only those options may be bid and used.

4. The designer may require the use of a single base option, for instance ABC-3 in a high water condition. This will still be bid as Optional Base.

5. The contractor will indicate the basis for his bid by designating the three digit option code on the bid blank.

---

### GENERAL USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS

**Legend**

- For granular base, the construction of both the subbase and ABC-3 will be paid for under the contract unit price for Granular Base. Granular bases include Lime Road, Cemented Coupling, Shell Rock, Bank Run Shell and Graded Aggregate Base or LRB 800. The base thickness shown to ABC-3. All subbase thicknesses are 100 mm. The base structural number shown is for the composite base.
- To be used for widening only, one meter or less.
- Base Group I Based on minimum practical thicknesses.
- Restricted to non-interstate shoulder base construction.

---

<table>
<thead>
<tr>
<th>Base Group &amp; Structural Range</th>
<th>Base Type</th>
<th>Unit Structural Number (per mm of thickness)</th>
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<td>LRB 800</td>
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<tr>
<td>Cemented Coupling LRB 800</td>
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<tr>
<td>Shell Rock</td>
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<tr>
<td>Bank Run Shell</td>
<td></td>
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</tr>
<tr>
<td>Graded Aggregate Base</td>
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</tbody>
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---

**OPTIONAL BASE GROUP AND STRUCTURAL NUMBERS**

**State of Florida**

**Department of Transportation**

**Mail OX-44**

**Mail OX-44**

**Mail OX-44**

**Mail OX-44**
# Optional Base Groups and Structural Numbers

## Limit Use

### Base Group

<table>
<thead>
<tr>
<th>Base Group</th>
<th>2005-2015</th>
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<td>C</td>
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<tr>
<td>D</td>
<td>2005-2015</td>
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<tr>
<td>E</td>
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### Structural Number

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### Optional Group Number

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<td>50</td>
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</table>

### Optional Group with Structural Number

<table>
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<th>Optional Group with Structural Number</th>
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<tbody>
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<td>50-100</td>
<td>2005-2015</td>
</tr>
</tbody>
</table>

---

**Legend:**

- Base Type with Structural Number (per min of inches)
- Base Group
- Structural Range
- Optional Group Code
- Optional Group with Structural Number

---

**Notes:**

- These data were developed by the Division of Materials Engineering and shown in the plots.
- The optional base materials may be used on CPT7 projects when approved by the Division of Materials Engineering.
- All data are based on minimum standards measures.

---

**Base Group and Structural Numbers:**

- Base Group: 100, 150, 200
- Structural Number: 100, 150, 200
- Optional Group Number: 10, 50
- Optional Group with Structural Number: 10-100, 50-100

---

**Sandstone LBR 70**

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**Shell LBR 70**

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**Shell Stabilized LBR 70**

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**Sand-Clay LBR 75**

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<th>Sand-Clay LBR 75</th>
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<tbody>
<tr>
<td>2005-2015</td>
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</tbody>
</table>

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**ABC II (Whole, Marshall)**

- Stability: 2300 N
- 2005-2015

**ABC I (Whole, Marshall)**

- Stability: 3400 N
- 2005-2015

**SMA (Whole, Marshall)**

- Stability: 500 N
- 2005-2015

---

**Soil Cement (2.0 MPa)**

- Plant Mixed
- 2005-2015

**Soil Cement (3.5 MPa)**

- Plant Mixed
- 2005-2015

**Soil Cement (2.0 MPa)**

- Road Mixed
- 2005-2015
MODIFICATIONS OF 'ADVERSE' AND 'MARGINAL' APPLICATIONS

ADVERSE* AND MARGINAL* SECTIONS MODIFIED TO ACHIEVE GENERAL* APPLICATION

ADVERSE* SECTIONS MODIFIED TO ACHIEVE MARGINAL* APPLICATION

*See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS' On Sheet 2.
A Maximum Width Attainable up To 95 with A Finding of Infeasibility.

SIDEWALK ADJACENT TO CURB
SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE
SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

MODIFICATIONS TO ADVERSE AND MARGINAL SECTIONS
### Areas for One 1.5 m Deep Turnout (m²)

<table>
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<tr>
<th>Drive Width (m)</th>
<th>Type I</th>
<th>Type II</th>
<th>Type I Skewed</th>
<th>Type II Skewed</th>
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<td>18.8</td>
<td>44</td>
<td>63</td>
<td>52</td>
<td>74</td>
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</tbody>
</table>

### Pavement Structure for 1.5 m Deep Turnouts

<table>
<thead>
<tr>
<th>Course</th>
<th>Material</th>
<th>Minimum Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>Asphaltic Concrete</td>
<td>33</td>
</tr>
<tr>
<td>Base</td>
<td>Optional Base Group I</td>
<td>Index No. 504</td>
</tr>
</tbody>
</table>

**Notes:**
1. Turnout structural course to be the same material as roadway. Sealing as structure course. Structural course not required if turnout base course on its thickness increased to match edge of roadway pavement.
2. Any Department-approved pavement structure equivalence may be used at the discretion of the Engineer.
3. Additional structural strength may be required if heavy truck loads are anticipated.

### General Notes
1. Turnouts are to be constructed or resurfaced for low volume single-family, townhouse, etc., residential connections as directed by the Engineer.
2. Turnout construction not required for low volume residential connections where roadway shoulders are paved.
3. Connections outside the 1.5 m limit are to be constructed as directed by the Engineer.
4. The contract unit price for Turnout Construction includes the cost for excavation and base.
5. Payment for structural course to be included in roadway resurfacing bid items.
6. Payment for resurfacing friction course to be included in the unit price for asphaltic concrete friction course placed on the roadway. Accelerated distress will not be included in measured quantities. Pavement not required for FC-2 friction course.
7. For low volume two-lane facilities without a friction course the structural course will be the finish layer.
GENERAL NOTES

1. When a crossover is no longer needed, all temporary construction shall be immediately removed and the area restored to its original condition.

2. Crossovers to be constructed where sight distance is adequate in both directions as directed by the Engineer.

3. Cost of all construction, maintenance, removal and restoration work related to temporary crossovers shall be included in the contract unit price for maintenance of traffic.
STRUCTURES WITH LESS THAN FULL WIDTH SHOULDERS

GENERAL NOTES FOR RAISED RUMBLE STRIPS

1. Raised rumble strips shall be constructed on all paved shoulders approaching structures with less than full roadway width, including paved shoulders.

2. Raised rumble strips at intersections shall be constructed only when specified in the plans.

3. Raised rumble strips are to be constructed in accordance with Section 546 of the Specifications.

4. When any portion of a curve falls within the 60 ft of rumble strips shown in these details, additional rumble strip sets equal to 60 ft. in length shall be constructed throughout the remainder of the approaching curve.

5. Raised rumble strips shall be placed at the center of the lane on the left side of the traffic stream.

6. The rumble strip shall be fully extended across the width of the lane and 60 ft. in length.

INTERSECTIONS

RAISED RUMBLE STRIPS
LIMITED ACCESS FACILITIES
SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT

GENERAL NOTES FOR
SHOULDER GROUND-IN RUMBLE STRIPS

1. Ground-in rumble strips shall be constructed on freeway and other limited access
   facilities only, and only when called for in the plans.
2. The 40 cm spacing is the standard array. The continuous array shall be constructed in
   advance of bridge ends for a distance of 300 m or back to the gore necessary and
   for effective interchange areas and constructed at other specific locations as
   called for in the plans.
3. Ground-in rumble strips are to be constructed in accordance with Section 546 of
   the Specifications.
4. When friction course extends more than 0.3 m beyond the edge of the outer
   travel lane, the extended friction course shall be blasted off back to the 0.3 m line, prior
   to rumble strip grinding.
5. Both arrays shall be paid for under the contract unit price for Rumble Strip (Ground
   In, .40). Such price and payment shall be full compensation for all work and materials
   required.

DESIGN NOTE

1. The rumble strips described on this sheet are intended for use on flexible pavement
   facilities. When constructing ground-in rumble strips on existing rigid (concrete)
   facilities, no rumble strips shall be located closer than 200 mm from any pavement
   joint. When specifying ground-in rumble strips on existing rigid shoulders their
   location and array shall be detailed in the plans.
2. Other methods and types of applications shall not be used unless approved in writing
   by the State roadway Design Engineer. Approval will be considered only with
   sufficient documentation Justification for variance from this standard.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RUMBLE STRIPS

SHOULDER GROUND-IN RUMBLE STRIPS

LOCATION ALONG SHOULDER (FLEXIBLE PAVEMENT)
SECTION

ESTIMATED QUANTITIES FOR WALL

<table>
<thead>
<tr>
<th>HEIGHT LINE (EXPOSED FACES)</th>
<th>CONCRETE (cu. ft)</th>
<th>STEEL (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0.084</td>
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<tr>
<td>6</td>
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<td>1</td>
</tr>
<tr>
<td>0.5</td>
<td>1.035</td>
<td>1</td>
</tr>
</tbody>
</table>

GRAVITY WALL NOTES

1. Gravity wall is constructed as extensions of reinforced concrete retaining walls, except walls of proprietary designs shall have the same face texture and finish as the reinforced concrete retaining wall.

2. Cost of reinforcing steel, face texture, finish and joint seal to be included in the contract unit price for Class I Concrete Retaining Walls.

GRAVITY WALL
DETIAL C
TWO THRU LANES

FLEXIBLE PAVEMENT THICKNESS TRANSITION

INSET

GENERAL NOTES
1. Exit and entrance terminals as detailed shall not be used on ramps for which a speed of 80 mph or greater cannot be maintained. For such ramps, proper acceleration and deceleration zones shall be used in place of terminals with lengths set according to AASHO.

2. (a) PCC Pavement Projects:
   Where shoulder pavement adjacent to shoulder gutter is less than 1.0 ft wide, it shall be separated from the adjacent roadway pavement beginning with the transverse joint nearest the point of 1.0 ft in width.

(b) Flexible Pavement Projects:
   Where shoulder pavement used in conjunction with shoulder gutter is less than 1.0 ft in uniform width, it shall be identical to the adjacent roadway pavement.

3. For concrete pavement joint details and layouts of entrance and exit ramp terminals see Index No. 525.

4. For shoulder gutter applications refer to the FOOT Drainage Manual.

DETAIL D
WITH ADDED LANE

ENTRANCE TERMINALS
SINGLE-LANE RAMPS
ACCELERATION LANE WITH SHOULDER GUTTER

DECELERATION LANE WITH SHOULDER GUTTER

ACCELERATION LANE WITHOUT SHOULDER GUTTER

DECELERATION LANE WITHOUT SHOULDER GUTTER

SHOULDER TREATMENT AT SPEED CHANGE LANES AT EXPRESSWAY RAMP TERMINALS

EXPRESSWAY RAMP TERMINALS
LEFT SIDE WIDENING

CENTERED WIDENING

RIGHT SIDE WIDENING

FLARED & PAINTED LEFT TURNS FOR 2-LANE 2-WAY ROADWAYS
4-LANE DIVIDED TO 4-LANE UNDIVIDED

L₁ = 85 ≥ 70 km/h
L₂ = 85 ≥ 60 km/h

4-LANE DIVIDED TO 2-LANE UNDIVIDED

L₁ = 2.35 ≥ 70 km/h
L₂ = 3 ≥ 60 km/h

4-LANE UNDIVIDED TO 2-LANE UNDIVIDED

LANE DIVERGENCE AND CONVERGENCE FOR CENTERED ROADWAYS

S - Design speed (km/h)
CONNECTING FLARE WITH PAVED SHOULDERS TO EXISTING ROADWAY WITHOUT PAVED SHOULDERS

CONNECTING SIMILAR WIDTH PAVEMENTS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING SYMETRICAL FLARE WITHOUT PAVED SHOULDERS

CONNECTING DIFFERENT WIDTH PAVEMENTS

FLARED - PAVED SHOULDERS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING ASYMETRICAL FLARE WITHOUT PAVED SHOULDERS

PAVED SHOULDER TREATMENT AT TRANSITIONS AND CONNECTIONS
NOTES FOR SHEETS 5 THRU 8

1. The transition geometry shown on sheets 5 thru 8 are applicable to tangent alignments and median widths shown. The geometries of these schemes are associated with the standard subsectional spacing for sideroads, but in any case will require modification to accommodate sideroad location, multilane and/or divided sideroads, oblique sideroads, crossroad widths, storage and speed change lane requirements, and other related features. The match lines are cut lines where the transitions may be moved back on approach roadways and cut on departing roadways to accommodate intermediate access connections, storage lanes and other related features.

2. Approaches lane departures (Δ-*Δ*) are suitable for design speeds up to 80 km/h. Interior curves (R = 145.0) are suitable for normal crown for design speeds up to 80 km/h. Wearing curves (R = 350.0) will require super-elevation.

LEFT ROADWAY CENTERED ON APPROACH ROADWAY
TWO LANE TO FOUR LANE TRANSITION
LEFT ROADWAY CENTERED ON THRU ROADWAY
FOUR LANE TO TWO LANE TRANSITION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROADWAY TRANSITIONS

* This value can be increased in order to note this transition geometry bear f100 1000 friendly features, see note for sheet 5.
RIGHT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION
NOTES

FLOOR
- 150 mm thick Concrete Slab w/WR TE 6 x 6 & LA 4 x 6 LA
- 450 mm x 450 mm Drop Paneling of Slab
- Perimeter & Interior Pools
- Harden & Finish Slab Surface

STRUCTURE
- Posts 200 mm x 200 mm PT
- Beams 600 mm x 150 mm PT
- Framing: 100 mm x 100 mm PT As Described.
- Misc Members: 50 mm x 50 mm As Described.

ROOF
- 75 mm x 150 Wood Decking
- Type II A Modified Saturated Organic Felt
- 1270 g/m² (110# Li-Fi)
- Commonly Called SBS, 501
- Standing Seam Metal Roof 24 GA Steel
- Dr. Vam Alum., 3-Wveyor 500 Finish
- Trim: Decking And Roofing Trim
- Milltongue 242 mill Finish

BUILDING CODE

PICNIC PAVILIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

REST AREA EQUIPMENT
**KEYNOTES**

03300-A Class II Concrete Slab
03300-B 100 mm x 100 mm x 4 ft / 4.5 ft x 4 ft A 12 x 12 x 4
03300-C 6 in. Wood Barrier
03300-D 600 mm x 600 mm Drop Footing
03300-E 450 mm x 450 mm Drop Footing
03300-F 150 mm Win Comp Sand Fill

05500-A 10 mm Galv. Steel Plate
05500-B 14 mm Galv. Steel Plate
05500-C Post Base
05500-D 16 mm Ø Bolt, Washer & Nut (Typ)
05500-E 16 mm Ø Eyebolt, Washer & Nut For Cross Brace Bars
05500-F 14 mm Ø Steel Rod w/Turnbuckle

06300-A 75 mm x 50 mm T&G Wood Decking
06300-B 100 mm x 50 mm PT Wood Frame
06300-C 200 mm x 200 mm PT Wood Post
06300-D 50 mm x 50 mm PT Wood Fascia
06300-E 25 mm x 250 mm PT Wood Fascia

07401-A Standing Seam Metal Roof
07401-B Type II Asphalt-Saturated Organic Felt

PICNIC PAVILIONS
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DESIGN

REST AREA EQUIPMENT

[Diagram of a picnic pavilion with various sections and details labeled.]
SPECIFICATIONS

Concrete:
- Footing: ASTM A656/656M, Grade 400.
- Reinforcing Bars: ASTM A615/A615M, Grade 60.
- Vapor Barrier: Black S-W Polyethylene.

Steel:
- Galvanized Steel Pipe: ASTM A450/A450M with 220g coating.
- Galvanized Fasteners: High-Strength Bolts and Nuts, ASTM A325/A325M with zinc coating, ASTM A381.
- Galvanized Shapes after Fabrication, Wire Field Repairing to Galvanizing with high zinc dust content paint, complying with SSPC-Paint-20.

Wood:
- Comply with American Institute for Timber Construction (ATC) 10, “Standard for Heavy Timber Construction.”
- For Solid Wood Decking, comply with ATC 20, Standard for Tongue and Groove Heavy Timber Standards.
- Species: Douglas Fir, Iron Fir, or Southern Pine, at fabricator’s option.
- Preservative Treatment: Pressure Treated, members with waterborne solution for above ground use, complying with APA CC.
- Wood Decking: Pre-Drill Decking at 150 mm centers for Internal Spacing To Adjacent Units.

Picnic Tables:
- Picnic Tables and Benches Shall Be 1.8 m x 1.8 m with heavy Galvanized Pipe Frames and Recycled Plastic Wood Seats and Table Tops. All Tables Shall Be Of Riser Tread Design, Suitable For Exterior Locations and Shall Be Accessible According To The Requirements Of The Americans With Disabilities Act (ADA) Accessibility Guidelines For Tables And Benches Shall Be Selected From DOT’s Qualified Products Lists.

Picnic Pavilions:
- State of Florida Department of Transportation Benches Design

Rest Area Equipment:
GENERAL NOTES

1. The location and construction of mailboxes shall conform to the rules and regulations of the United States Postal Service as modified by this design standard.

2. Mailboxes will not be permitted on Interstate highways, freeways, or other highways where prohibited by law or regulation.

3. If the contractor shall give the Postmaster of the delivery route the written notice of project construction 7 days prior to the beginning of work, with Saturdays, Sundays, and holidays excluded. The contractor shall furnish and install one mailbox in accordance with this design standard at each mail patron delivery location and maintain the box throughout the contract period. The contractor shall apply box numbers to each patron box in accordance with identification specifications of the Domestics Mail Manual of the U.S. Postal Service where local street names and house numbers are authorized by the Postmaster as a postal address. The contractor shall inform the house number on the back of the box if it is located on a different street from the patron's residence, the contractor shall inform the street name and house number on the box.

4. The contractor shall coordinate the removal of the patrons' existing mailboxes. Immediately after installing the new mailboxes, the contractor must notify each "Mail Delivery Patron" by certified mail that removal of the existing mailboxes must be accomplished in 2 days after receipt of notice. Patrons shall have the option of removing their existing mailboxes or leaving the mailboxes in place for removal by the contractor. The contractor shall be included in the contract unit price for Mailbox, Each. The contractor shall dispose of mailboxes and supplies in areas provided for by him.

5. Mailboxes shall be located on the right-hand side of the roadway near the direction of the delivery route, except on one-way roads and streets where they may be placed on the left-hand side.

6. Mailboxes on rural highways shall be set with the roadside face of the box an offset from the edge of the traveled way a minimum distance of the greater of the following:
   (a) Shoulder width plus 200 to 300 mm.
   (b) 1.5 m for ADT 10,000 or less.
   2.5 m for ADT 10,000 to 20,000.
   3.0 m for ADT 20,000 to 50,000.
   3.5 m for ADT 50,000 and over.
   1.8 m for low speed (under 60 mph).
   0.8 m for low speed (under 40 mph).

7. When a mailbox is installed within the limits of guardrail, it should be placed behind the guardrail whenever practical.

8. Mailboxes on curved highways, roads and streets shall be set with the back of the box at 150 and 300 mm back of the face of curbs. If the sidewalk abuts the curb or if an unusual condition exists which makes it difficult or impractical to install or serve boxes of the curb, the contractor with concurrence of the local public authority may be permitted to install all mailboxes at the back edge of the sidewalk, where they can be served by the carrier from the sidewalk.

9. Wood and steel support posts for both single and double mailboxes shall be embedded no more than 600 mm into the ground. Concrete block, brick, stone or other rigid foundation structure or encasement, either above or below the shoulder grade, will not be permitted for mailboxes on rural highways. On urban roads and streets where the support post supports are set within rigid pavement back of curb, the support support shall be isolated from the pavement by a minimum of 25 mm of expansion material.

10. Support posts shall not be fitted nor installed with surface mount base plates.

11. At driveway entrances mailboxes shall be placed on the far side of the driveway in the direction of the delivery route.

12. At intersecting roads mailboxes shall be located 30.0 m or more from the centerline of the intersecting road on the far side in the direction of the delivery route, with the distance increased to 60.0 m when the route volume exceeds 400 vehicles per day.

13. Wood support posts shall be in conformance with the material and dimensional requirements of Section 105C and the treatment requirements of Section 155 of the Standard Specifications.

Steel support posts shall have an external finish equal to or better than two coats of weather-resistant, oil-based or baked, paint or enamel. Surfaces shall be cleaned of all loose scale prior to finishing. The Postal Service prefers that posts be painted white, but other colors may be used when approved by the Engineer. When galvanized posts are used painting is not required.

Mounting brackets, plates, platforms, shelves and accessory hardware surface finishes are to be suited to support post finish.

14. Mailboxes shall be paid for under the contract unit price for Mailboxes, Each. Payment shall be full compensation for boxes, posts and accessory items essential for installation in accordance with this standard, erection, adjustments to suit construction needs, and, for identification letters and numbers.

Payment shall be limited to one mailbox per patron address. Payment shall be made to the contractor for removal and disposal of existing mailboxes.

The above compensation shall include any work and cost incurred by the contractor for removal and disposal of existing mailboxes.

There shall be no payment participation for NOCBUS furnishing, assembly, installation, resetting or relocation.
STEEL FLANGED CHANNEL SUPPORT POSTS

FLANGED CHANNEL

Dimensions:
- Platform: 8 mm x 40 mm
- Adapter Plate: 8 mm x 56 mm
- Bracket: 8 mm x 18 mm

Materials:
- 4 mm Ø x 18 mm Slotted Rd. Hd. Bolt
- 2 Washers, Lockwasher, Nut
- (Per Box, 20 Total)

Notes:
- See General Notes for Finish Requirements

ELEVATION

POST SPACING

SINGLE OR COMBINED WOOD/FLANGED CHANNEL
ON PIPE POST TYPES SHOWN ON THIS SHEET

STEEL ADAPTER PLATE

END VIEW

STEEL BRACKET

END VIEW

STEEL SPACER

END VIEW
GENERAL NOTES

1. The purpose of shrubs in areas lack of guardrail is to eliminate road maintenance in those areas.
2. Shrubs are to be planted approximately 1.5 m back from guardrail posts and hazards. Narrow plant areas are to have at least one row of shrubs, as directed by the Engineer.
3. Shrubs are to be planted approximately 1.5 m on centers in rows with 1.5 m spacings.
4. Shrubs are to be offset in successive rows to create a zig-zag pattern between any two rows.
5. Shrubs plan be specified in the plans to Landscape Material Master Pay Item 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 1.6 km.
7. When guardrail posts are constructed in conjunction with shrub planting, soil sterilization should be in accordance with Section 319 of the Standard Specifications.
8. For line of cross sight lines see Index No. 545.

LANDSCAPING
BACK OF GUARDRAIL APPLICATION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

LANDSCAPING
BACK OF GUARDRAIL APPLICATION
GENERAL NOTES
1. Signposts apply to both rural and urban intersections under stop sign control and flashes beacon control. For full signal controlled intersections see Design Note No. 3, below.
2. Sight distance (d) applies to normal and skewed intersections (intersection angles between 60° and 90°), and where horizontal and/or vertical curves are present. Sight distance (d) is measured along the major roadway from the center of the intersecting roadway. Distances d1 and d2 are measured from the centerline of the intersecting roadway to a point on the edge of the outer traffic lane on the major roadway. Distance d1 is measured from the centerline of the intersecting roadway to a point on the median clear zone limit for the far side roadway of the major roadway.
3. The limits of clear sight define a corridor through which a clear sight window must be preserved. See Window DETAIL, Sheet 2 of 2.
4. Clear sight must be provided between vehicles at intersection stop locations, and vehicles on the major roadway within 10° of.
5. Short observations are made in both directions along the line of sight, the reference datum between roadways is 100 mm above respective pavements.
6. The corridor defined by the limits of clear sight is a restricted planting area. Drivers of vehicles on the intersecting roadway and vehicles on the major roadway must be able to see each other clearly through the limits of clear sight.
7. Plants with heavy pruning or permanent green, leaf or woody habit or other Department approved flush surfaces, tree size and spacing shall conform to the following table:

<table>
<thead>
<tr>
<th>Description</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>7.0</td>
<td>10.0</td>
<td>15.0</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Sizes and spacings are based on the following conditions:
1. A straight approach, with no median, as described in No. 2, above.
2. For the maximum allowable at distance of 100 ft, a view of the entering vehicle at 100 ft for clearance, shrouded by a vertical blind 1.8 meters wide (max. shadow). For any other conditions the tree sizes, spacings and operations shall be calculated in the plans see Design Note No. 4.
3. Depression wells with guardrail attachment.
4. In the Engineered judgment landscaping interfaces with the line of sight corridor prescribed by these standards, the Engineer may recommend, relocate or eliminate plantings.
5. Plants shall never obscure signs or signals.

DESIGN NOTES
1. The information shown on this index is intended for the purpose of clear sight development and maintenance at intersecting highways, roads and streets, and is not intended to be used to establish geometric design, speed control, signing, median, right-of-way or other design features except as related to clear sight corridors. An analysis of clear sight distance shall be performed and documented for all intersections.
2. Details are based on the AASHTO A Policy On Geometric Design Of Highways and Streets Chap. 11, Class III and IV and Department practices for engineered median openings on left turns from major roadways.
3. Far SIGNALIZED INTERSECTIONS. Due to a variety of standard operational characteristics associated with signal controlled intersections, the sight distances based on Class II procedures should be evaluated to the driver, on-site vehicle conflicts or signalized intersections, such as violation of the right-of-way, turn on red, malfunction of the signal, or use of the flashing red-yellow lights further substantiate the need for incorporation of Class III sight distances, if the proper sight distances cannot be satisfied, other design features such as "no right turn on red" may be necessary. These decisions shall be included in the analysis. The planting restrictions under General Notes above shall also apply to signalized intersections.
4. Where curvature, superelevation, adverse grade profiles or other conditions preclude the use of standard tree sizes and spacing of view and shadowing restrictions must be documented and the size and location of trees in locations detailed in the plans.

SIGHT DISTANCE AT INTERSECTIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
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</thead>
<tbody>
<tr>
<td>Plants</td>
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<td>10.0</td>
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2. For the maximum allowable at distance of 100 ft, a view of the entering vehicle at 100 ft for clearance, shrouded by a vertical blind 1.8 meters wide (max. shadow). For any other conditions the tree sizes, spacings and operations shall be calculated in the plans see Design Note No. 4.
3. Depression wells with guardrail attachment.
4. In the Engineered judgment landscaping interfaces with the line of sight corridor prescribed by these standards, the Engineer may recommend, relocate or eliminate plantings.
5. Plants shall never obscure signs or signals.
TYPICAL FLEXIBLE PAVEMENT REPLACEMENT AT RR CROSSINGS

TYPE D, E, G, G-MOD., H, L & S
Concrete Paving Between Multiple Crossings

NOTE:
1. The furnishing and installing of concrete paving, together with any necessary releveling, grade adjustment and track alignment shall be done by the Railroad Company without cost to the Contractor or to the Highway Agency.

2. All concrete, steel, rubber pads for tops of ties and wood filler blocks shall be furnished and installed by the Railroad Company.

3. Concrete crossings shall be spaced on 13 mm centers.

4. Rubber pads shall be installed on concrete ties in Fioro using contact cement.

5. Filler blocks shall be pressure-pressed into place over hard wood and shall be capped prior to treatment.

6. Cost of concrete and reinforcing steel necessary for approach slabs and paving between multiple crossings shall be paid for by the Highway Agency under the contract for the Concrete Pavement Reinforcement. (160 mm x 840 mm.)

RAILROAD CROSSINGS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION RAIL DIVISION

DESIGN

Contract No. 94-00

BY

560 FOR "A", "B", "FV" FOR "A", "A", "K"

B

PLAN

SECTION AA

ELEVATION

CONCRETE PAVING BETWEEN MULTIPLE CROSSINGS

(Cost of Pavement To be included in Cost of Concrete, See Note No. 6.)

NOTE:
1. The furnishing and installing of concrete paving, together with any necessary releveling, grade adjustment and track alignment shall be done by the Railroad Company without cost to the Contractor or to the Highway Agency.

2. All concrete, steel, rubber pads for tops of ties and wood filler blocks shall be furnished and installed by the Railroad Company.

3. Concrete crossings shall be spaced on 13 mm centers.

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RAILROAD CROSSINGS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION RAIL DIVISION

DESIGN

Contract No. 94-00

BY

560 FOR "A", "B", "FV" FOR "A", "A", "K"
### Types R Rubber & R Full Depth Rubber

**STOP ZONE**

<table>
<thead>
<tr>
<th>Design Speed (Kph)</th>
<th>Zone Length Distance from Stop (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 or Less</td>
<td>80.0</td>
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<tr>
<td>80-90</td>
<td>100.0</td>
</tr>
<tr>
<td>100</td>
<td>150.0</td>
</tr>
<tr>
<td>110</td>
<td>180.0</td>
</tr>
</tbody>
</table>

**NOTES**

1. The crossings shown on this sheet are NOT to be used for multiple track crossings within zones for an existing or future commuter type. Tram length should be standard.
2. Crossings on this sheet may be used for single track crossings within the zones on the chart unless engineering or safety considerations dictate otherwise.
3. The spacing is critical; ties shall be spaced in accordance with the manufacturer's specifications.
4. Details shown are for single track installations. Wood ties may be available for curved track installations.
5. For additional details, materials required and installation procedures refer to the manufacturer's specifications.

**RAILROAD CROSSINGS**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**PLANNING & DESIGN**

**RUBBER CROSSINGS**

**3 of 5 560**
PREFACE

All projects and works on highways, roads and streets shall have a traffic control plan. All work shall be executed under the established plan and Department approved procedures. This index contains information specific to the Federal and State guidelines and standards for the preparation of traffic control plans and for the execution of traffic control in work zones, for construction and maintenance operations and utility work on highways, roads and streets.

Index 600 provides Department policy and standards. Changes are only to be made thru Department approved procedures. Indexes 601 thru 605 provide special application for various situations. Modification can be made in these indexes as long as the changes comply with the MUTCD and Department standards.

The sign spacings shown on the Indexes are typical (recommended) distances. These distances may be increased or decreased based on field conditions, in order to avoid conflicts or to improve site specific traffic controls.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

The Florida Department of Transportation has adopted the "Manual On Uniform Traffic Control Devices For Streets And Highways" (MUTCD) and subsequent revisions and addenda, as published by the U.S. Department of Transportation, Federal Highway Administration, for mandatory use on the State Maintained Highway System whenever there exists the need for construction, maintenance operations or utility work.

ABBREVIATIONS

Abbreviations assigned to the 600 series Roadway Design Standards and applicable to traffic control plans, unless otherwise identified by the plan, are as follows:

- **TOP**: Traffic control plans
- **MUTCD**: Manual On Uniform Traffic Control Devices For Streets And Highways
- **TCZ**: Traffic control through work zones
- **L**: Taper length, buffer length or taper length plus buffer space
- **W**: Width of taper transition in meters, i.e., lateral offset
- **S**: Posted speed or off-peak 85 percentile speed (converted to km/hr)
- **RFM**: Raised reflectorized pavement marker
- **TMA**: Truck mounted attenuator
- **COMM**: Traffic Control Standards Committee

SYMBOLS

The symbols shown are found in the Traffic Control Zone Cell Library (TCZ Cell) on the CAID System. Symbols assigned to the 600 series Roadway Design Standards and applicable to traffic control plans, unless otherwise identified in the plans, are as follows:

- **Work Area, Hazard Or Work Phase (Any pattern within a boundary)**
- **Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light**
- **Drum**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)**
- **Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum**
- **Cone Or Tubular Marker**
- **Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum**
- **Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)**
- **Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Steady Burning Light)**
- **Type III Barricade**
- **Type III Barricade (With Flashing Light)**
- **Type III Barricade (With Steady Burning Light)**
- **Work Zone Sign**
- **Flagger**
- **Traffic Sign**
- **Advance Warning Arrow Panel**
- **Portable Signal**
- **Attenuator**
- **Stop Bar**
- **Work Vehicle With Flashing Beacon**
- **Shadow (S) Or Advance Warning (AW) Vehicle With Advance Warning Arrow Panel And Warning Sign**
- **Truck Mounted Attenuator (TMA)**
- **Orange Flag For TCZ Signs**
- **Type B Light For TCZ Signs**
DEFINITIONS

Regulatory Speed (In Work Zones)
The maximum permitted travel speed posted for the work zone as indicated by the regulatory speed limit signs. The work zone speed must be shown or noted in the plans. This speed should be used as a design speed to determine runout lengths, departure rates, flare rates, lengths of need, clear widths, taper lengths, crash cushion requirements, marker spacings, superelevation and other similar features.

Advisory Speed
The maximum recommended travel speed through a curve or a hazardous area.

Travel Way
The intended path for vehicular traffic through or around obstructions in construction, maintenance, utility and other work zones on highways, roads and streets. For traffic control through work zones, travel way includes auxiliary lanes, shoulders and any other permanent or temporary surface intended for the path of vehicular traffic.

Detour
A temporary travel way that branches from the direct or regular route of travel, to bypass a section of the route which is closed or blocked by construction, major maintenance, roadway damage or traffic emergency and that rejoins the direct or regular route beyond that section.

Above Ground Hazard
An above ground hazard is any object, material or equipment other than traffic control devices that encroaches upon the travel way or that is located within the clear zone which does not meet the Departments safety criteria, i.e., anything that is greater than 50 meters in height and is firm and unyielding or doesn't meet breakaway requirements.

REGULATORY SPEEDS IN WORK ZONES

Traffic Control Plans (TCPs) for all projects must include specific regulatory speeds for each phase of work. This can either be the posted speed or a reduced speed. The speed shall be noted in the TCPs. The posted speed may not be reduced below the minimum statutory speed for the class of facility. This reduction is to be done in 10 mph per 1500.0 foot increments.

TEMPORARY REGULATORY SPEED LIMIT SIGNS

Temporary regulatory speed signs shall be removed as soon as practical when the conditions requiring the reduced speed no longer exist. Once the work zone regulatory speeds are removed, the regulatory speed existing prior to construction will automatically go into effect unless new speed limit signing is provided for in the plans.

On projects with interspaced work activities speed reductions should be located in proximity to those activities which merit a reduced speed, and not "blanketed" for the entire project. At the departure of such activities, the normal highway speed should be given to the motorist notice that normal speed can be resumed.

If the existing regulatory speed is to be used, consideration should be given to supplementing the existing signs when the construction work zone is between existing regulatory speed signs. For projects where the reduced speed conditions exist for great distances, additional temporary signs may be placed at or more than 1,500 foot intervals. Engineering judgement should be used in the placement of the additional signs. Locating these signs beyond ramp entrances and beyond major intersections are examples of proper placement. For urban situations (non-interstate), additional speed signs are to be placed at a maximum of 500.0 meters apart.

When field conditions warrant speed reductions greater than those shown in the TCP the contractor may submit to the project engineer for approval by the Department, a signed and sealed study to justify the need for further reducing the posted speed, or the engineer may request the District Traffic Operations Engineer (DOTE) to investigate the need, it will not be necessary for the DOTE to issue regulations for regulatory speeds in work zones due to the revised provisions of P-I-360.024-21(b). Advisory Speed plates will be used at the option of the field engineer for temporary use while processing a request to change the regulatory speed specified in the plans upon deemed necessary. Advisory Speed plates cannot be used alone but must be placed below the construction warning sign for which the advisory speed is required.

For additional information refer to the FDOT Roadway Plans Preparation Manual, Volume I, Chapter 10.

RAILROADS

Railroad crossings affected by a construction project should be evaluated for traffic controls to reduce queuing on the tracks. The evaluation should include as a minimum the traffic volumes, distances from the tracks to the intersections, lane closure or taper locations, signal timing, and etc.

ADJOINING AND/OR OVERLAPPING WORK ZONE SIGNING

Adjoining work zones may not have sufficient spacing for standard placement of signs and other traffic control devices in their advance warning areas or in some cases other areas within their traffic control zones. Where such restrictions or conflicts occur or are likely to occur, one of the following methods will be employed to avoid conflicts and prevent conditions that could lead to misunderstanding on the part of the traveling public as to the intended travel way by the traffic control procedure applied.

(a) For scheduled projects the engineer in responsible charge of project design will resolve any anticipated work zone conflicts during the development of the project traffic control plan. The project plans may entail revision of plans on preceding projects and coordination of plans on concurrent projects.

(b) Unanticipated conflicts arising between adjoining or progress highway construction projects will be resolved by the Resident Engineer for projects under his residency, and, by the District Construction Engineer for in-progress projects under adjoining residencies.

(c) The District Maintenance Engineer will resolve anticipated and occurring conflicts under the following work zone conditions:

1. Between scheduled maintenance operations, and
2. Between maintenance operations, construction permitted works and/or in progress highway construction projects.

(d) The Unit Maintenance Engineer will resolve conflicts that occur within routine maintenance works; between routine maintenance work, unscheduled work and/or permitted work, and, between unit controlled maintenance works and highway construction projects.

INTERSECTING ROAD SIGN AND SIGNALS

Signage for the control of traffic entering and leaving work zones by way of intersecting highways, roads and streets shall be adequate to make drivers aware of work zone conditions. Under no condition will intersecting leg signing be less than a ROAD CONSTRUCTION AHEAD sign, including light and flag, for approaching vehicles and a END CONSTRUCTION sign for departing vehicles.

Existing traffic signal operations that require modification in order to carry out work zone traffic control shall be included in the TCP and be approved by the District Traffic Operations Engineer. The need for temporary signal loops or other methods of signal operations shall be determined by the District Traffic Operations Engineer and the designer and included in the TCP.
CHANNELIZING AND LIGHTING DEVICES

Channelizing and lighting devices for work zone traffic control shall be as prescribed in Part III of the MUTCD, subject to supplemental revision and approval by the office of Construction.

Primary work zone traffic control devices are shown on Sheet 7 of 10 for the purpose of ready identification. Specifications for the devices are under the authority of the office of Construction. Approved devices are listed on the Departments Qualified Product List.

DROPPOFFS IN WORK ZONES

Acceptable warning and barrier devices for traffic control at dropoffs in work areas are detailed on Sheet 5 of 10. Unless otherwise specified in the plans, the contractor may use any of the barrier types (including optional shoulder treatment) shown in note 3 on sheet 5 of 10. Optional shoulder treatment shall be included under Lump Sum MT.

WARNING LIGHTS

Warning lights shall be in accordance with Section 6E-5 of the MUTCD except for the application limitations and methods of payment stipulated below:

Flagging

Type A Low intensity Flashing Warning Lights are to be mounted on barricades, drums, vertical panels or advance warning signs (except as noted below) and are intended to continuously warn drivers that they are approaching or proceeding in a hazardous area. Flashing lights shall not be used to delineate the intended path of travel, and not placed with spacings that will form a continuous line for the driver's eyes. The Type A light shall be used to mark obstructions that are located adjacent to or in the intended travel way. Type A lights shall not be used in conjunction with the first advance warning sign nor the second such sign when used.

Type B High intensity Flashing Warning Lights shall be mounted on the first advanced warning sign and on the first and second advanced warning sign where two or more signs are used; this applies to all approaches to any work zone.

Steady Burn

Type C Steady Burn Lights are to be mounted on barricades, drums, concrete barrier walls or vertical panels and used in combination with these devices to delineate the travel way through and around obstructions in the transition, buffer, work and termination areas of the traffic control zone. Their intended purpose is to aid in warning drivers that they are approaching or proceeding through a hazardous area.

SIGHT DISTANCE TO DELINEATION DEVICES

Transition tapers should be obvious to drivers. If restricted sight distance is a problem, a sharp vertical or horizontal curve in the taper should begin well in advance of the view obstruction. The beginning of tapers should not be hidden behind curves.

CHANNELIZING AND LIGHTING DEVICE CONSISTENCY

Barricades, vertical panels, cones, tubular markers and drums shall not be intermixed within either the lateral transition or within the tangent alignment.

PEDESTRIANS AND BICYCLISTS

When an existing pedestrian way or bicycle way is located within a traffic control work zone, accommodation must be maintained.

NIGHTTIME FLAGGING

Nighttime flagging will require proper illumination of the flagger. A well lighted flagging station and/or a reflectorized paddle or reflectorized flag, plus a flashlight, lantern or other light signal that will display a red warning light shall be used.

Lights, reflectorized paddles, reflectorized flags and reflectorized vests, shirts or jackets approved by the Department must be used to flag traffic at night. The STOP face of paddles shall be reflectorized red with white reflectorized letters and border, and the SLOW face shall be reflectorized orange with black letters and border. Floater vests, shirts or jackets shall be reflectorized orange.

The flagger must be clearly visible to approaching traffic for a distance sufficient to permit proper response by the motorist to the flagging instructions, and to permit traffic to reduce speed or to stop as required before entering the work site. Flaggers shall be positioned to maintain maximum contrast between the flaggers' reflective garments and equipment and the work area background.

REFLECTORIZED RAISED PAVEMENT MARKERS

Class A or B RPM's shall be installed on the lane lines of transitions, crossovers and detours and on the edge lines of gore areas within the work zone. The spacing shall be 12.0 meters on tangent sections and 6.0 meters on transitions, curves and crossovers. It shall be the contractor's responsibility to maintain proper RPM height in the lateral location. The contractor's responsible for the maintenance of the RPM's installed. Approved RPM's are listed on the Departments Qualified Product List.

SIGN COVERING AND INTERRUPTED WORK STOPPAGE SIGNING

Existing signs that conflict with temporary work zone signage shall be removed or covered as approved by the engineer. Traffic control signs that require covers when no work is being performed in a work area shall be fully covered with a durable opaque sheet material. Plastic film and woven fabrics including burlap will not be permitted. Covering of the only legend or symbol will not be permitted. Reflective coverings will not be permitted. Hinged covers designed to cover folded and sign blanks will be permitted. Covers, blanked, hinged panels and intermittent work stoppage shields and plaques are incidental to work operation signs and are not to be paid for separately.

REMOVING PAVEMENT MARKINGS

Existing pavement markings that conflict with temporary work zone delineation shall be removed by any method approved by the Engineer, where operations exceed one day shift period, however, painting over existing pavement markings will not be permitted. Full pavement width overlays of either asphalt concrete Type III, or FC-3 is a positive means to achieve obliteration.

SUPERELEVATION

Horizontal curves constructed in conjunction with work zone traffic control should have the required superelevation applied to the design radius. Under conditions where normal cross slope controls curvature, the minimum radii that can be applied are listed in the table below.

<table>
<thead>
<tr>
<th>MINIMUM RADIUS FOR NORMAL CROSS SLOPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURVE TYPE</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MTPH</td>
</tr>
<tr>
<td>65</td>
</tr>
<tr>
<td>65</td>
</tr>
<tr>
<td>65</td>
</tr>
<tr>
<td>55</td>
</tr>
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<td>55</td>
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<tr>
<td>55</td>
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<tr>
<td>55</td>
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<tr>
<td>45</td>
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<td>45</td>
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<td>45</td>
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<td>45</td>
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<tr>
<td>35</td>
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<td>35</td>
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<td>35</td>
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<td>35</td>
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<tr>
<td>35</td>
</tr>
<tr>
<td>35</td>
</tr>
<tr>
<td>35</td>
</tr>
</tbody>
</table>

LANE WIDTHS

Lane widths of through roadways should be maintained through work zone travel ways wherever practicable. The minimum widths for work zone travel lanes shall be as follows: 3.3 meters for Interstate with at least one 3.6 meter lane provided each direction, unless formally excepted by the Federal Highway Administration, 3.3 meters for freeways, and 3.0 meters for all other facilities.

LENGTH OF CONSTRUCTION SIGN

The length of construction sign (C201) bearing the legend ROAD CONSTRUCTION NEXT— MILES is required for all projects of more than 3.2 kilometers in length. The sign shall be located at the beginning construction point.
END CONSTRUCTION SIGNS

The END CONSTRUCTION sign (G20-2) should be erected approximately 150 meters beyond the end of a construction or maintenance project, unless other distance called for in the plans. Where other Construction or Maintenance Operations occur within 1.6 kilometers this sign should be omitted and signed coordinating in accordance with Index No. 600.

ADJACENT AND/OR OVERLAP SIGNING.

DETOURS

Detours can be located either within the direct or regular route boundary or over highways, roads or streets outside the direct or regular route boundary. Engineering judgement should be used to determine when detour signing is required for minor shift to the direct or regular route.

VARIABLE MESSAGE SIGNS (VMS)

The VMS can be used for:
1. Supplement standard signing in construction/maintenance work zones.
2. Reinforce static advance warning messages.
3. Provide motorists with updated guidance information.

The message should be visible and legible at a minimum distance of 270.0 meters. All messages should be cycled so that two message cycles are displayed to a driver while approaching the sign from 270.0 meters at 55 mph.

VMS should be placed approx. 150.0 to 240.0 meters in advance of the work zone conflicts or 2.4 to 3.2 kilometers in advance of complex traffic control schemes which require new and/or unusual traffic maneuvers.

If VMS are to be used at night, the intensity of the flashers shall be reduced during darkness while flashers are desirable.

For additional information refer to the FDOT Roadway Plans Preparation Manual, Volume 1, Chapter 10.

ROADSIDE BARRIERS

When connecting temporary concrete barrier wall to guardrail the connection shall be made in accordance with Index No. 460.

ABOVE GROUND HAZARD

Above ground hazards (see definitions) are to be considered work areas during working hours and treated with appropriate work zone traffic control procedures. During non-working hours, all objects, materials and equipment that constitute an above ground hazard must be stored/placed outside the travel way and clear zone or be shielded by a barrier or crash cushion.

For above ground hazards within a work zone the clear zone required should be based on the regulatory speed posted during construction.

CONSTRUCTION SIGN SUPPORTS

All post mounted construction signs shall be installed on either round aluminum or steel channel post as specified in the table below.

<table>
<thead>
<tr>
<th>SUPPORTS FOR MAINTENANCE OF TRAFFIC SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGN SIZE</td>
</tr>
<tr>
<td>600 x 900</td>
</tr>
<tr>
<td>1200 x 1200</td>
</tr>
<tr>
<td>1500 x 1200</td>
</tr>
<tr>
<td>600 x 1500</td>
</tr>
<tr>
<td>1200 x 1200</td>
</tr>
<tr>
<td>1500 x 1500</td>
</tr>
</tbody>
</table>

* F/M indicates Type F or Type M
** Requires two 1.36 kg/m steel channel (F/M) at 762 mm center to center.

All sign brackets shall be Type 1. The total number of brackets shall be per post, as tabulated, except the "Diamond" sign which shall use two Type 1 brackets per post.

The 1.18 kg/m steel channel shall be installed with approved breakaway bases.

Refer to Design Standard H965, Sheet 2 of 2, for round aluminum sign bracket details, and H965 Sheet 7 of 1 for steel channel sign attachment details, approved steel channel breakaway bases and notes.

CLEAR ZONE WIDTHS

The term 'clear zone' describes the unobstructed relatively flat area, impacted by construction, extending outward from the edge of the travel way. The table below gives clear zone widths in work zones for medians and roadside conditions other than for roadside canals where roadside canals are present, clear zone widths are to conform with the distances to canals as described in Vol. I, Ch. 4, Sec. 4.2 and Exhibits I-4-C and I-4-D of the Plans Preparation Manual.

<table>
<thead>
<tr>
<th>CLEAR ZONE WIDTHS FOR WORK ZONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORK ZONE SPEED (MPH)</td>
</tr>
<tr>
<td>60-70</td>
</tr>
<tr>
<td>55</td>
</tr>
<tr>
<td>45-50</td>
</tr>
<tr>
<td>30-40</td>
</tr>
<tr>
<td>ALL SPEEDS</td>
</tr>
</tbody>
</table>

SIGN MATERIALS

Mesh signs may be used only for Daylight Operations as noted in the standards. Type B Lights and Orange Flags are not required.

Vinyl signs may be used for Day or Night Operations not to exceed 12 hours except as noted in the standards. Type B Lights and Orange Flags are not required.

All signs shall be post mounted if operation exceeds 12 hours except as noted in the standards.
**CONDITION I**

**SHOULDER DROP**

1. This condition is to be used when extending adjacent to lane(s) being used for traffic control.
2. Distance X is to be the maximum practical under project conditions.
3. Distance Y should be maximum practical for project conditions, 0.6 meters is desirable.
4. Warning devices or barriers are not to encroach on lane width X1 designated for traffic control.
5. For specific requirements use Chart A or B, below as applicable.

**CHART A**

**ALL SPEEDS**

**NO CURB AND GUTTER**

<table>
<thead>
<tr>
<th>X (m)</th>
<th>D (m)</th>
<th>BI, A</th>
<th>Device Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1.2</td>
<td>1.2</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>0-1.2</td>
<td>1.75</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>1.2-1.5</td>
<td>1.75</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>1.5-2</td>
<td>1.75</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2-3</td>
<td>1.75</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>3-4.5</td>
<td>1.75</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>4.5+</td>
<td>1.75</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

(a) Clear Zone (C1) is to be determined per Index No. 650 sheet 1 of 41.
(b) Optional shoulder treatment allowed.

**NOTES**

1. These conditions and treatments can be applied only in work areas that fall within a properly signed work zone.
2. The following are defined as acceptable warning devices:
   - For further details, see Part 22 of the MUTCD.
   a. Vertical Signs
   b. Type 1 or Type II Barrels
   c. Drum
   d. Cone
   e. Tubular Marker
3. Where barrier is specified either of the types below may be used.
   a. Temporary barrier wall installed in accordance with Standard Index No. 45 and Standard Specifications.
   b. Temporary barricade installed in accordance with the Standard Specifications and Standard Index No. 400. Materials may be new and/or used, but used material(s) must be structurally and functionally sound as determined by the Engineer. End anchoring per Standard Index No. 400 will also be required.
   c. Temporary Carbureted in accordance with Standard Index No. 650.

**OPTIONAL SHOULDER TREATMENT**

1. This optional method may be used in lieu of warning devices or barriers when required by Charts A or B.

**CHART B**

**70 km/h (45 MPH) OR LESS (CABLE)**

**CURB AND GUTTER**

<table>
<thead>
<tr>
<th>X (m)</th>
<th>D (m)</th>
<th>BI, A</th>
<th>Device Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>3</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>3.5</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>4</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>4.5+</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>5</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>5.5+</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>6</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>0-3</td>
<td>6.5+</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

(a) Clear Zone (C1) is to be determined per Index No. 650 sheet 4 of 41.
(b) Optional shoulder treatment allowed.

**NOTES**

1. These conditions and treatments can be applied only in work areas that fall within a properly signed work zone.
2. The following are defined as acceptable warning devices:
   - For further details, see Part 22 of the MUTCD.
   a. Vertical Signs
   b. Type 1 or Type II Barrels
   c. Drum
   d. Cone
   e. Tubular Marker
3. Where barrier is specified either of the types below may be used.
   a. Temporary barrier wall installed in accordance with Standard Index No. 45 and Standard Specifications.
   b. Temporary barricade installed in accordance with the Standard Specifications and Standard Index No. 400. Materials may be new and/or used, but used material(s) must be structurally and functionally sound as determined by the Engineer. End anchoring per Standard Index No. 400 will also be required.
   c. Temporary Carbureted in accordance with Standard Index No. 650.

**OPTIONAL TRAVEL LANE TREATMENTS**

1. This optional method may be used in lieu of warning devices when required by Chart C.
2. Optional treatment allowed only when D is 7.5 mm or less.

**MILLING OR SURFACING**

1. These conditions and treatments can be applied only in work areas that fall within a properly signed work zone.
TEMPORARY CURB

1. Applications: Temporary curb shall not be used on facilities with posted speeds greater than 45 mph and dropoffs greater than 1.2 meters deep. It shall not be used on Interstates or limited access facilities.

2. Vertical panels, tubular markers or barriers shall also be used to delineate the work area. These devices could be placed on top of the temporary curb or on the outside of between the curb and the dropoff.

3. Edge lines shall be provided, as well as painting the face of the curb (white or yellow as appropriate) to further delineate its presence. The paint shall be in accordance with the traffic striping specifications, including reflective beads.

4. The temporary curb is to be bonded to the existing surfacing by use of a tack coat, or other methods approved by the engineer. It is important that the curb adhere to the base material in order to provide the strength necessary to restrict errant vehicles.

5. Temporary curb is to be paid for under Lump Sum Maintenance of Traffic Item No. 2 (L). The designer should include a pay item note to perform this task and to include the estimated number of meters to be used. Payment for the curb is to include all materials and work necessary to construct it, including painting of the curb, maintenance and removal of the temporary curb. Traffic striping (line lines only) and warning devices are to be paid for separately. Any damage to existing pavement caused by the removal of existing curb shall be satisfactorily repaired, and the cost of such repairs are to be included in the cost of the temporary curb.

6. The temporary curb is to be constructed of miscellaneous asphalt or class I concrete. The type of material (asphalt or concrete) is up to the contractor, unless otherwise noted by the engineer.

7. The designer must specify, in the plans, which alternate is to be used/alternate for 2. The choice is strictly up to the designer. At this time, there is no preference or guidelines on the use of one versus the other. However, the designer should consider speed, volume, offset space available, dropoff depth, etc. Obviously, increasing the offset between the travel lane and the dropoff will increase safety.

8. If concrete is used to construct the temporary curb, joints must be made every 3.0 meters in order to control cracking.

9. The designer must also consider drainage needs when using temporary curbs. If driveways or other accesses are not frequent enough to allow for water runoff, the designer may need to provide for "drainage slots" at an appropriate location based on grades, number of lanes, etc. Typically, a drainage slot should be 300 millimeters wide (a break in the curb) or 15.0 meter spacings.

10. All openings such as driveways and business accesses, the temporary curb should be transplanted in height from 100 millimeters up to 225 millimeters of a 1:4 shape in order to eliminate a potential hazard at the end points.

* 300 millimeters (or more) is desirable in order to enhance/improve stability. However, it is recognized that there may be cases where 300 millimeters (or more) is not feasible or obtainable. In these instances, engineering judgement must be used to balance this offset distance with the depth of dropoff, soil type and etc.
CHANNELIZING AND LIGHTING DEVICE NOTES

1. Only approved traffic control devices may be used.

2. The FDOT approval number shall be engraved on the device at a convenient and readily visible location. Where engraving is not practical a water-resistant type label may be used.

3. The details shown on this sheet are for the following purposes: (a) For ease of identification and (b) To provide information that supplements or supersedes that provided by the MUTCD.

4. The Type III Barricade shall have a unit length of 1.8 meters only. When barricades of greater lengths are required those lengths shall be in multiples of the 1.8 meter unit. Signs used in conjunction with Type III Barricades shall be mounted above the Barricade and shall not block the reflective area of the Barricade.

5. During hours of darkness, warning lights shall be used on drums, vertical panels, Type I, Type II or Type III barricades.

6. Ballast shall not be placed on top rolls or any striped rolls or higher than 325 millimeters above the driving surface.

7. For rolls less than 900 millimeters long, 100 millimeter stripes shall be used.

8. When Advance Warning Arrow Panels are used at night, the intensity of the flashers shall be reduced during darkness when lower intensities are desirable.

9. When used at night, cones shall:
   1. Be used only in active work zones, such as milling and resurfacing or other moving operations where cones can be monitored.
   2. Be reflectorized as per the MUTCD.
   3. Be used only with Department approved reflective collars.
COMMONLY USED WARNING AND REGULATORY SIGNS IN WORK ZONES

COLOR CODES
Legend and/or Symbol / Background
- Orange (Reflected)
- Red (Reflected)
- Black (Non-Reflected)
- Yellow (Reflected)
- White (Reflected)
- Green (Reflected)

SIGN CODES AND DESCRIPTIONS

Note: The sign symbols, symbols and messages contained on this sheet are prorated for ready reference to those signs used in the development of the 600 series Roadway Design Standards and are commonly used in the development of traffic control plans.

For additional signs and sign detail information refer to the SJAMU HIGHWAY SIGNS MANUAL as specified in the MUTCD. Special signs for traffic control plans will be as approved by the State Traffic Plans Engineer.

The sign codes shown on this sheet are for the purpose of identifying cell names found in the Traffic Control Cell Library (TCCL) on the CASIO system. The STANDARD HIGHWAY SIGNS MANUAL should be referenced for the official sign codes for use in the development of traffic control plans. See Index No. 1755 for MOT sign details.
**REFLECTIVE PAVEMENT MARKERS**

**CLASS**

A. Permanent Applications in Non-Traffic Areas Or Can Be Used in Work Zone Applications for Traffic and Non-Traffic Areas.

B. Permanent Application In Traffic And Non-Traffic Areas Or Can Be Used In Work Zone Applications For Traffic And Non-Traffic Areas.

D. Work Zone Application Only. For Traffic And Non-Traffic Areas. Maximum spacing 1.5 meters center to center.


**NOTES**

1. For spacing of CLASS A or B RPMS to supplement Temporary Tape or Paint, see index no. 600 sheet 3 of 10.

2. Basic color rules: Colorless reflectors replace white lines and amber reflectors replace yellow lines.

3. In work zones, CLASS A, B, or D RPMS may be used to form lane lines, edge lines, and temporary gore areas. In lieu of tape or paint however, tape or paint must be used in all transition areas in addition to the RPMS. In short-term work zones, where the RPMS will be used for five (5) days or less, CLASS "E" RPMS may be used to form lane or edge lines.

4. To provide contrast on Concrete Pavement, and light asphalt, the five (5) colorless RPMS shall be followed by five black RPMS. The spacing between RPMS shall be 0.75 meters. Black RPMS will not be required for contrast with Amber RPMS.

**TYPICAL PLACEMENT OF REFLECTIVE PAVEMENT MARKERS IN LIEU OF TEMPORARY TAPE OR PAINT IN WORK ZONES**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES**
GENERAL NOTES

1. If the work operation requires that two or more work vehicles cross the 4.5 m zone in any one hour, traffic control will be in conformance with index No. 602.

2. No special signing is required.

3. Arrows denote direction of traffic only and do not reflect pavement markings.

4. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ indexes.

5. For general TCZ requirements and additional information refer to Index No. 600.

TYPICAL APPLICATIONS
- Landscaping Work
- Utility Work
- Fencing Work
- Cleaning Drainage Structures
- Reworking Ditches

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE MORE THAN 4.5 m FROM THE EDGE OF PAVEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
HIGHWAY DESIGN

TRAFFIC CONTROL THROUGH WORK ZONES
TWO-LANE, TWO-WAY, RURAL DAY OR NIGHT OPERATIONS

[Diagram and symbols are visible but not transcribed.]
Maximum spacing between cones and tubular markers shall be 7.5 m. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:
- 5.0 m up to 25 MPH
- 10.0 m for 30 MPH - 40 MPH
- 15.0 m for 45 MPH and greater.

When Other Construction or Maintenance Operations Occur Within 1.6 kilometers (1 mile) To Be Omitted and Signs To Be Coordinated In Accordance With Index No. 600.

Cones or Tubular Markers at 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I or Type II Barricades or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

GENERAL NOTES
1. All vehicles, equipment, workers (except flagger) and their activities are restricted at all times to one side of the roadway.
2. If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
3. If the work operation encroaches on the through traffic lanes or when four or more work vehicles enter the through traffic lanes in a one hour period a flagger shall be provided and the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs see Index No. 603.
4. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
5. All Warning Signs shall be mounted if the closure time exceeds 12 hours.
6. All signs shall be posted mounted if the closure time exceeds 12 hours.
7. L (min) = \frac{W 	imes 70}{S} for speeds ≤ 70 km/h
   \frac{W 	imes 60}{S} for speeds > 70 km/h
   Where:
   W = Width of shoulder in meters, 2.4 m minimum.
   S = Posted speed limit (converted to km/h).
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. WORKERS sign to be removed or fully covered when no work is being performed.
11. END CONSTRUCTION signs required only when work exceeds one day/night period.
12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCJ Indexes.
13. For general TCJ requirements and additional information refer to Index No. 600.

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel
- Work Zone Sign

TYPICAL APPLICATIONS
- Utility Work
- Culvert Extensions
- Sidewalk Repairs
- Guardrail Work
- Landscaping Work
- Cleaning Drainage Structures
- Reworking Ditches
- Sign Installation And Maintenance
- Shoulder Repair

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCLOSE A ROADWAY CLOSER THAN 4.5 M BUT NOT CLOSER THAN 0.6 M TO THE EDGE OF PAVEMENT
### GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.

2. All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the pavement.

3. If the work operation does not exceed 60 minutes, traffic control will be in accordance with Index No. 600.

4. Additional one-way control may be effected by the following means:
   - (1) Flag carrying vehicle
   - (2) Official vehicle
   - (3) Pilot vehicles
   - (4) Traffic signals

   When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.

5. The first two warning signs shall have a 450 mm x 450 mm (in.) orange flag and a Type B light attached and operating at all times.

6. Mesh signs may be used for (Daylight Only) operations.

7. The FLAGGER legend sign may be substituted for the symbol sign.

8. L = (min) * WS for speeds > 70 km/h
   \[ L = \frac{WS}{3.6} \] for speeds < 60 km/h

   Where:
   - W = Width of lateral transition in meters.
   - S = Posted speed limit (converted to km/h).

9. The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.

10. Arrows denote direction of traffic only and do not reflect pavement markings.

11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCI Indexes.

13. For general TCI requirements and additional information, refer to Index No. 600.

### TYPICAL APPLICATIONS

- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work

### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF PAVEMENT
Maximum spacing between cones and tubular markers shall be 7.5 m. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:
- 5.0 m up to 25 MPH
- 10.0 m for 30 MPH
- 15.0 m for 40 MPH
- 20.0 m for 45 MPH and greater.

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**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.)
- Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)
- Tubular Markers May Be Used During Daylight Only; Cones May Be Used During Daylight And As Permitted At Night.
- Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)
- Work Zone Sign
- Flogger

---

**GENERAL NOTES**

1. Construction operations shall be confined to one traffic lane, leaving the opposite lane open to traffic and their activities are restricted to all times to one side of the pavement.
2. All vehicles, equipment, workers, except flaggers, and their activities are restricted to all times to one side of the pavement.
3. Additional one-way control may be effected by the following means:
   - (1) Flag carrying vehicle
   - (2) Official vehicle
   - (3) Pilot vehicles
   - (4) Traffic Signals
   - When flaggers are the sole means of one-way control, flaggers shall be in sight of each other or in direct communication at all times.
4. The first two warning signs shall have a 450 mm x 450 mm (Min.) orange flag and a Type B light attached and operating at all times.
5. The FLAGGER legend sign may be substituted for the symbol sign.
6. All signs shall be posted mounted if the closure time exceeds 2 hours.

---

**TYPICAL APPLICATIONS**

- Pavement Repair
- Culvert Construction
- Utility Work
- Bridge Repair

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**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF PAVEMENT

---

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**TWO-LANE, TWO-WAY • RURAL NIGHT OPERATIONS OR OPERATIONS EXCEEDING ONE DAYLIGHT PERIOD**

---

**DESIGNED BY**

[Signature]

**APPROVED BY**

[Signature]

[Date]

**SHEET:**


d of 1

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**604**
Max spacing between cones and tubular markers shall be 7.5 m.
Max spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:
5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH; 15.0 m for 45 MPH and greater.

**GENERAL NOTES**

1. All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the roadway.
2. If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
3. If the work operation encroaches on the through traffic lanes at any time, traffic control shall be provided and the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs see Index No. 653.
4. The first two warning signs shall have a 450 mm x 450 mm (Min.) Orange Flag and a Type B Light, and be placed at the entrance to the work area and operating at all times.
5. The WORKERS legend sign may be substituted for the symbol sign.
6. Where work activities within 0.6 meters of the edge of pavement is incidental to paving, mowing, litter removal, the engineer may delete requirements for cones and signs provided a vehicle with flashing warning lights is present.
7. \( L \) (min.) = \(
\begin{align*}
& \frac{m \times S}{3.6} \quad \text{for speeds } \leq 70 \text{ km/h} \\
& \frac{m \times S}{5 \times 3600} \quad \text{for speeds } > 70 \text{ km/h}
\end{align*}\)
Where:
\( S \) = Width of shoulder in meters, 0.4 m minimum.
\( S \) = Speed limit (converted to km/h).
8. Arrows denote direction of traffic and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to suit field conditions. See Index No. 650.
10. When a side road intersects the highway, the work shall be performed in such a manner as to reflect traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
11. For general TCZ requirements and additional information, refer to Index No. 600.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag and Type B Light
- Type I or Type II Barricade or Vertical Panel
- Or Cone or Tubular Marker or Drum
- Work Zone Sign

**TYPICAL APPLICATIONS**

- Shoulder and Slop Work
- Utility Work
- Guardrail Work
- Landscape Work
- Delineator Installation and Maintenance

**CONDITIONS**

**WHERE ANY VEHICLE, EQUIPMENT, WORKMEN OR TRAFFIC ACTIVITIES REQUIRE AN INTERMITTENT OR CONTINUOUS MOVING OPERATION ON THE SHOULDER OR SHOULDER AND SLOPES**

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**TWO-LANE, TWO-WAY • RURAL MOVING OPERATIONS—DAYLIGHT ONLY**

- Two Lane
- Two Way
- Rural
- Moving Operations—Daylight Only

- Index No. 605
- June 1993
- Rev. D
- 1/6/93

- Michael R. Adams
- Project Supervisor

- 08/15/93
- Revision Date
- 06/15/93
- Rev. No.
GENERAL NOTES

1. All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the pavement.

2. Minimum length of work area is 60.0 meters. Maximum length to be determined by the Engineer, but in no case to exceed the length of one-half (1/2) days operation or 3.2 kilometers whichever is less.

3. If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 600.

4. Additional one-way control may be effected by the following means:
   - (1) Flag-carrying vehicle
   - (2) Official vehicle
   - (3) Pilot vehicles
   - (4) Traffic signals

   When flaggers are in the same work area, the flaggers shall be in sight of each other or in direct communication at all times.

5. The first two warning signs shall have a 450 mm x 450 mm orange flag and a Type B light attached and operating at all times.

6. Mesh signs may be used for (Daylight Only) operations.

7. Type B Lights and Orange Flags are not required.

8. The FLAGGER (legend sign may be substituted for the symbol sign).

9. The ONE LANE ROAD AHEAD and FLAGGER signs are to be removed or fully covered when no work is being performed and the highway is open to two-way traffic.

10. Arrows denote direction of traffic only and do not reflect pavement markings.

11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with the applicable TCC Indexes.

13. For general TCC requirements and additional information, refer to Index No. 600.

SYMBOLS

- Work Area
- Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel
- Work Zone Sign
- Flogger

TYPICAL APPLICATIONS
- Pavement Repair
- Pavement Surfacing
- Utility Work
- Delineator Maintenance
- Crack Sealing
- Core Boring

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE AN INTERMITTENT OR CONTINUOUS MOVING OPERATION ON THE PAVEMENT WHERE THE AVERAGE SPEED OF MOVEMENT IS LESS THAN 6.4 KILOMETERS PER HOUR
CONDITIONS

FOR ANY OPERATION THAT ENCROACHES IN THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF 15 MINUTES OR LESS.

CONDITIONS

FOR ANY OPERATION THAT ENCROACHES IN THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES.

CONDITIONS

FOR ANY OPERATION THAT IS 0.6 m OR MORE OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Work Zone Sign
- Flagger

GENERAL NOTES

1. The maximum length of work area to be determined by the Engineer, but in no case to exceed the length of one-half (1/2) days operation or 3.2 kilometers whichever is less.
2. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the pavement.
3. Additional one-way control may be effected by the following means: (1) Flag carrying vehicle (2) Official vehicle (3) Piloted vehicles (4) Traffic signals
   When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
4. The first two warning signs shall have on 450 mm x 450 mm (Min.) orange flag and a Type B light attached and operating at all times.
   Mesh signs may be used for Daylight Only operations.
   Type B lights and orange flags are not required.
5. The FLASHER legend sign may be substituted for the symbol sign.
6. Arrows denote direction of traffic only and do not reflect pavement markings.
7. Longitudinal dimensions are to be adjusted to fit field conditions. See index No. 600.
8. When a slide road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ indexes.
9. For general TCZ requirements and additional information refer to index No. 600.

TYPICAL APPLICATIONS

- Marking Patches
- Field Patches
- String Line
- Utility Work
- Cleaning Up Debris On Pavement
- Pavement Coring And Straight Edging

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
- ROAD DESIGN

TWO-LANE TWO-WAY RURAL
SHORTTIME
DAY OR NIGHT OPERATIONS

TWO-LANE TWO-WAY RURAL
SHORTTIME
DAY OR NIGHT OPERATIONS

Designated by:

<table>
<thead>
<tr>
<th>Designated By</th>
<th>Date</th>
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<tbody>
<tr>
<td>Clark O. Smith</td>
<td>1/29</td>
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</tbody>
</table>

Project No: 607

Fiscal Year: 1960

N. M. Appointed: 607

N. M. Authorized: 607 (1st)
SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Work Zone Sign
- Traffic Signal
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only), Tubular Markers May Be Used During Daylight Only, Cones May Be Used During Daylight And As Permitted At Night
- Type III Barricade
- Stop Bar
- Flagger
- Portable Signal

GENERAL NOTES

1. Work operations shall be confined to one traffic lane, except for haul road crossings, leaving the opposite lane open to traffic.
2. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the pavement, except for haul road crossings.
3. The installation and timing of signals shall be approved by the District Traffic Operations Engineer prior to signals being placed in operation.
4. Where sight distance to the signal is limited, the signals may be mounted on an upper wire at the discretion of the Engineer.
5. The maximum distance between portable traffic signals (receiver/controllers) shall be 0.4 kilometers, however, to no case shall the distance exceed the maximum distance at which the remote operator (transmitter) can positively and safely operate both portable signals.
6. Flaggers to supplement the signal operator/flagger shall be used when needed to assure safe movements between traffic and operating equipment, as determined by the Engineer.
7. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
8. All signs shall be post mounted if the closure time exceeds 4 hours.
9. SIGNAL AHEAD and EQUIPMENT CROSSING AHEAD signs are to be removed or fully covered when no work is being performed and the highway is open to two-way traffic. Type III Barricades shall be in place to block haul road access when the haul road is not in operation and a flagger/signal operator is not on duty, except when the haul road is an existing properly marked road.
10. Arrows denote direction of traffic only and do not reflect pavement markings.
11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with applicable TCZ indexes.
13. For general TCZ requirements and additional information refer to Index No. 600.
14. Span wire signals are to be used only in active work zones, where the contractor can maintain signal operation and maintain traffic with flaggers in the event of a power failure.

TYPICAL APPLICATION

- Pavement Repair
- Shoulder & Roadside Work
- Bridge Work
- Box Culvert Work
- DRAINAGE WORK
- Utility Work
- Haul Road Crossing

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCROACH ON ONE LANE OR MOMENTARILY ENCROACH ON BOTH LANES OF A TWO-LANE TWO-WAY ROADWAY AND TRAFFIC SIGNALS ARE NEEDED.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

TYPICAL CONSTRUCTION WORK ZONES
TWO-LANE, TWO-WAY
LANE CLOSURE BY SIGNAL CONTROL DAY OR NIGHT OPERATIONS

Drawn By
G.A.

Approved By
C.J.

Revised

4-12-15

Sheet No.
608

1 of 4
SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS

SINGLE LANE CLOSURE • SHORT BRIDGES
GENERAL NOTES

1. The first two warning signs shall have an 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.

2. For speed sign applications see Index No. 600.

3. Where the tangent distance (T) exceeds 180.0 meters, spacing between cones or tubular markers may be increased to 15.0 meters or spacing between Type I or Type II bollardes or vertical panels or drums may be increased to 30.0 meters within limits of the tangent, or post mounted delineators at 15.0 meter centers may be substituted for the bollardes, vertical panels or drums.

4. On the existing pavement all existing markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for marking a new centerline and edge lines.

5. Where the tangent distance (T) exceeds 180.0 meters and no passing or stopping sight distance restrictions exist, the yellow reflectorized markings used to indicate the centerline of the traveled way may be replaced with yellow reflectorized markings in a broken pattern. For raised pavement marker application see Index No. 600 and Index No. 7350.

6. Arrows denote direction of traffic only and do not reflect pavement markings.

7. Longitudinal dimensions are to be adjusted to fit field conditions, See Index No. 600.

8. Where a slip road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ indexes.

9. If temporary structures are required on the detour traffic control will be in conformance with Index No. 600.

10. For general TCZ requirements and additional information refer to indexes Nos. 600 and 7350.

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Bollardo Or Vertical Panel Or Drum (With Steady Burning Light At Night Only), Tubular Markers May Be Used During Daylight Only, Cones May Be Used During Daylight And As Permitted At Night.
- Type III Bollardo (With Flashing Light)
- Work Zone Sign

TYPICAL APPLICATIONS

Bridge Construction
Subgrade Restoration
Culvert Repair Or Construction

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF BOTH LAKES AND A TEMPORARY DETOUR IS CONSTRUCTED

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL THROUGH WORK ZONES

TWO-LANE, TWO-WAY RURAL
TEMPORARY DETOUR
DAY OR NIGHT OPERATIONS

Designed By
Approved By
Issued By
Received By

T.T.M.A. Approved

609
GENERAL NOTES

1. If the work operation requires that two or more work vehicles cross the 4.5 m zone in any one hour, traffic control will be in accordance with Index No. 602.

2. No special signing is required.

3. This index also applies when work is being performed on a multiline undivided highway.

4. This index also applies to work performed in the median more than 4.5 m from edge of travel way, both roadways.

5. Arrows denote direction of traffic only and do not reflect pavement markings.

6. When a side road intersects the highway on which work is being performed, additional traffic control devices shall be erected in accordance with other applicable TCZ indexes.

7. For general TCZ requirements and additional information refer to Index No. 600.

TYPICAL APPLICATIONS

- Landscaping Work
- Utility Work
- Fencing Work
- Cleaning Drainage Structures
- Reworking Ditches

CONDITIONS

WHERE ALL VEHICLES, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE MORE THAN 4.5 m FROM THE EDGE OF PAVEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

TRAFFIC CONTROL THROUGH WORK ZONES
MULTILANE DIVIDED OR UNDIVIDED
RURAL • DAY OR NIGHT OPERATIONS

Designer: [Name]
Drawn: [Name]
Inspected: [Name]
Published: [Date]
Sheets: 01 of 01
Scale: 1:50

[Scale and other technical details]
CONNECTIONS WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 4.5 m BUT NOT CLOSER THAN 0.6 m TO THE EDGE OF PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES

Maximum spacing between cones and tubular markers shall be 7.5 m. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH; 15.0 m for 45 MPH and greater.

GENERAL NOTES

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the roadway.

2. If the work operation encroaches on the through traffic lanes or when four or more work vehicles enter the through traffic lanes in a one hour period a flagger shall be provided and a FLAGGER sign shall be substituted for the WORKERS sign. The flagger shall be positioned at the point of vehicle entry or departure from the work area.

3. This TCZ plan also applies to work performed in the median more than 0.6 meters but less than 4.5 meters from the edge of either pavement.

4. The first two warning signs, each side, shall have a 450 mm x 450 mm (Min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for Daylight Only operations. Type B Lights and orange flags are not required.

5. The WORKERS legend sign may be substituted for the symbol sign.

6. \[ L (\text{m}) = \frac{W^2}{50} \text{ for speeds } 10 \text{ km/h} \]
   \[ L (\text{m}) = \frac{W^2}{300} \text{ for speeds } 60 \text{ km/h} \]
   Where:
   - \( W \) = Width of lateral transition in meters
   - \( L \) = Posted speed limit (converted to km/h)

7. Arrows denote direction of traffic only and do not reflect pavement markings.

8. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

9. When work is being performed on a multiline undivided roadway the signs normally mounted in the median (as shown) shall be omitted.

10. WORKERS signs to be removed or fully covered when no work is being performed.

11. END CONSTRUCTION signs required only when work exceeds one daylight period.

12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.

13. If the work operation does not exceed 15 minutes, signs, barricades, vertical panels, cones, tubular markers, or drums will not be required provided vehicles in the work area have warning lights operating.

14. For general TCZ requirements and additional information refer to Index No. 600.

TYPICAL APPLICATIONS

- Utility Work
- Culvert Extensions
- Side Slope Work
- Guardrail Work
- Landscaping Work
- Cleaning Drainage Structures
- Recontract Ditches
- Sign Installation and Maintenance
- Shoulder Repair
CONFLICTS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT FOR A PERIOD OF MORE THAN 15 MINUTES BUT LESS THAN 60 MINUTES

CONFLICTS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT FOR A PERIOD OF 15 MINUTES OR LESS

GENERAL NOTES
1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.
2. All vehicles, equipment, workers, and their activities are restricted at all times to one side of the pavement.
3. The first two warning signs, each side, shall have on 450 mm x 450 mm (18 in.) orange flag and a Type B light attached and operating at all times.
4. Mesh signs may be used for Daylight Only operations, Type B Lights and Orange Flags are not required.
5. On undivided highways the median signs as shown are to be omitted.
6. When work is performed in the median lane on divided highways the bollarding plan is inverted and left lane closed and lane reduction signs substituted for the right lane closed and lane reduction signs. The same applies to undivided highways with the following exceptions:
   (a) Work shall be confined within median lane.
   (b) Additional bollards, chains, or drums shall be placed along the centerline doubling the work area and across the trailing end of the work area.
   (c) When work on undivided highways occurs across the centerline so as to encroach on both median lanes, the inverted plan is applied to the approach of both roadways.
7. The LEFT LANE CLOSED signs are to be removed or fully covered when no work is being performed and the highway is open to traffic.
8. L [m/min] Length of taper meters =
   \[ W \times \text{speed} \times 60 \times \text{length} \]
   Where:
   \( W \) = Width of lateral transition in meters
   \( S \) = Posted speed limit (converted to km/h)
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. When work is being performed on a divided roadway the signs normally mounted in the median can be shown side by side.
12. CCz plan does not apply when work is being performed in the middle or inside lane of any of the above lane configuration. See Indexes 616 and 617.
13. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable CCz Indexes. See Index No. 600.

SYMBOLS
- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Bollard Or Vertical Panel
- Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Flagger
- Advance Warning Arrow Panel

TYPICAL APPLICATIONS
Pavement Resurfacing
Pavement Repair
Utility Work
Bridge Repair
Guardrail Work
Pavement Coring And Straight Edging

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
Maximum spacing between cones and tubular markers shall be 7.5 m.
Maximum spacing between Type I or Type II barricades or vertical
panels or drums shall be based on the speed limit as follows:
5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH;
15.0 m for 45 MPH and greater.

GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving
the adjacent lane open to traffic.
2. All vehicles, equipment, workers and their activities are
restricted at all times to one side of the pavement.
3. The first two warning signs, each side, shall have a
450 mm x 450 mm (Min.) orange flag and a Type B light
attached and operating at all times.
4. All signs shall be post-mounted if the closure time exceeds
12 hours.
5. On undivided highways the median signs as shown are to be omitted.
6. When work is performed in the median lane on divided highways
the barricade plan is inverted and left lane closed and lane reduction
signs substituted for the right lane closed and lane reduction
signs.
7. Signs and traffic control devices are to be modified in accordance
with INTERMITTENT WORK STOPPAGE details (sheet 2 of 2) when no
work is being performed and the highway is open to traffic.

8. L (min) = Length of lapper in meters:
   \( \frac{L}{S} \) for speeds ≥ 70 km/h
   \( \frac{L}{S} \) for speeds ≤ 60 km/h
   \( \frac{S}{W} \) for speeds ≤ 60 km/h
   \( \frac{L}{S} \) for speeds ≤ 60 km/h

   Where:
   \( W \) = Width of lateral transition in meters
   \( S \) = Posted speed limit (converted to km/h).
9. Arrows denote direction of traffic only and do not reflect
   pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field
    conditions, See Index No. 600.
11. When work is being performed on a multilane undivided roadway
    the signs normally mounted in the median (as shown) shall be
    omitted.
12. When a side road intersects the highway on which work is
    being performed, additional traffic control devices shall
    be erected in accordance with other applicable TTI indexes.
13. For general TTI requirements and additional information
    refer to index No. 600.

TYPICAL APPLICATIONS

- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR OTHER ACTIVITIES
ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE
AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT
**Entire Separator Shall Be Painted Reflectorized Yellow (Included in cost of separator)**

**Asphalt Separator**

**Long Term Tubular Warning Device**

Based on speed limit as follows:
- 5.0 m for 25 MPH
- 10.0 m for 30 MPH
- 15.0 m for 45 MPH and greater.

**PLAN**

**DETAIL OF TEMPORARY ASPHALT SEPARATOR**

**NOTES**

- **(a)** The tubular device is to be made of a flexible material or have a flexible joint at the base such that it will not cause damage to vehicles upon impact and will return to its original shape after being struck by a 2265 kilogram vehicle at a velocity of 22.5 m/sec.
- **(b)** The tubular device shall be orange with two white reflectorized collars.
- **(c)** The tubular device may be attached by bimetallic adhesive or other methods approved by the Engineer.
- **(d)** Reflectorized materials shall have a smooth sealed outer surface which will display the same approximate color day and night.
- **(e)** Three hundred Millimeter (300 mm) openings for drainage will be constructed in the separator between every 7.5 meters in areas of grades over 1% as directed by the Engineer.

**APPLICATIONS**

- **Scheme 1:** Restricted Construction Limits
- **Scheme 2:** Unrestricted Construction Limits And Light To Moderate Traffic
- **Scheme 3:** Unrestricted Construction Limits And Moderate To Heavy Traffic

**SYMBOLS**

- Work Area
- Sign With 450 m x 450 m (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel, Or Drum (With Steady Burning Light At Night Only), Tubular Markers May Be Used During Daylight Only, Cones May Be Used During Daylight And As Permitted At Night
- Work Zone Sign
- Advance Warning Arrow Panel

**GENERAL NOTES**

1. All vehicles, equipment, workers, and their activities are restricted at all times to one side of the roadway.
2. The first two warning signs, each side, shall have a 450 mm x 450 mm, orange flag and a Type B light attached and operating at all times.
3. All signs shall be post mounted.
4. **TWO-WAY TRAFFIC** signs shall be repeated every four tenths (0.4) kilometer, in each direction, throughout the tangent distance (T).
5. **L (min.)** for speeds ≥ 70 km/h

   \[ L = \frac{W^2}{100} \]

   **W** = speed limit in kilometers per hour

   **L** = length of critical segment in meters

6. Where the tangent distance (T) exceeds 75.0 meters, spacing between cones or tubular markers may be increased to 15.0 meters or spacing between Type I or II barricades, or vertical panels or drums may be increased to 30.0 meters within the limits of the tangent, or post mounted delineators at 15.0 meter centers may be substituted for barricades, vertical panels, cones, tubular markers or drums.

7. All existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement marking used for marking new edge lines.

8. Arrows denote direction of traffic only and do not reflect pavement markings.

9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

10. When site roads, cross roads or interchanges are located within the limits for work zone traffic control additional traffic control devices shall be erected in accordance with other applicable TCJ Indexes.

11. For general TCJ requirements and additional information refer to Index No. 600.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF ONE ROADWAY AND THE OPPOSING ROADWAY IS CONVERTED TO TEMPORARY TWO-WAY TRAVEL BY WAY OF CROSSES.
GENERAL NOTES

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.

2. The first two warning signs shall have a 450 mm x 450 mm (Min.) orange flag and a Type B light attached and operating at all times.

3. All signs, except those required in paved areas, shall be post mounted if the closure time exceeds 12 hours.

4. TWO WAY TRAFFIC signs shall be repeated every four-tenths (0.4) kilometer in each direction, through the tangent distance (T).

5. L (Min.):
   \[ L = \frac{5.5}{S} \text{ for speeds > 70 km/h} \]
   \[ L = \frac{8.0}{S} \text{ for speeds \leq 60 km/h} \]
   Where:
   \[ S \] = Width of lateral transition in meters.
   \[ L \] = Posted speed limit (converted to km/h).

6. Where the tangent distance (T) exceeds 75.0 meters, spacing between cones or tubular markers may be increased to 15.0 meters or spacing between Type I or Type II barricades or vertical panels or drums may be increased to 30.0 meters within the limits of the tangent.

7. This index does not apply when work is being performed in the middle lanes of a six or more lane highway. Special maintenance of traffic details will be required.

8. Arrows denote direction of traffic only and do not reflect pavement markings.

9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

10. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCI indexes.

11. For general TCI requirements and additional information refer to Index No. 600.

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel

Conditions

Where any vehicle, equipment, workers or their activities require the closure of the lanes in one direction and a detour is provided by utilizing one lane of the opposing traffic lanes.

State of Florida Department of Transportation

Traffic Control Through Work Zones

Multilane Undivided • Rural Day or Night Operations

[Diagram with various symbols and notes relevant to traffic control and work zones]
Symbols:

Work Area
- Sign with 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light) At Night Only. Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Work Zone Sign
- Advance Warning Arrow Panel

General Notes:
1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the highway.
2. The first two warning signs, each side, shall have a 450 mm x 450 mm (Min.) orange flag and a type B light attached and operating at all times.
3. Mesh signs may be used for Daylight Only operations. Type B Lights and Orange Flags are not required.
4. All signs shall be post mounted if closure time exceeds 12 hours.
5. L (min.) x W5 for speeds: 70 km/h
   - 5
   - W5 x S for speeds: 60 km/h
   Where:
   - W = Width of laterai transition in meters.
   - S = Posted speed limit (converted to km/h).
6. The LEFT LANE CLOSED and lane reduction signs are to be removed or fully covered when no work is being performed and the inside lane is open to traffic.
7. Advance warning arrow panels are required for both day and night operation. Either the right flashing arrow or the right sequential arrow modes may be used. The caution mode shall not be used.
8. Arrows denote direction of traffic only and do not reflect pavement marking.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
11. For work performed in the outside lane refer to Index Nos. 612 and 613.
12. For general TCZ requirements and additional information refer to Index No. 600.

Conditions:
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCROACH ON ANY PORTION OF THE INSIDE LANE OF A MULTILANE HIGHWAY

State of Florida Department of Transportation
Traffic Control Through Work Zones
Multilane Divided • Rural

1. For general TCZ requirements and additional information refer to Index No. 600.
CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE
PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREA LESS THAN
60.0 m DOWNSTREAM FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

GENERAL NOTES

1. Work operations shall be confined to one travel lane, leaving
the opposing travel lane open to traffic.

2. All vehicles, equipment, workers (except flaggers) and their
activities are restricted at all times to one side of the
pavement.

3. For work operations of 60 minutes or less see Index No. 607.

4. When vehicles in a parking zone block the line of sight to TCZ
signs or when TCZ signs encroach on a normal pedestrian
walkway, the signs shall be placed mounted and located in
accordance with Index No. 7322.

5. If work area is confined to an outside auxiliary lane the work
area shall be barricaded and the FLAGGER signs replaced by
ROAD CONSTRUCTION AHEAD signs. Flaggers are not required.

6. Flaggers shall be in sight of each other or in direct
communication at all times.

7. The ROAD CONSTRUCTION AHEAD and FLAGGER signs shall
have a 400 mm x 450 mm (Min.) orange flag and a Type B
light attached and operating at all times.

8. The FLANGER legend sign may be substituted for the symbol sign.

9. All signs shall be placed if the closure time exceeds
12 hours.

10. The maximum spacing between devices shall be not greater
than 7.5 meters.

11. Arrows denote direction of traffic only and do not reflect
pavement markings.

12. Longitudinal dimensions are to be adjusted to fit field conditions
See Index No. 600.

13. For general TCZ requirements and additional information refer
to Index No. 600.

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel
  Or Drum (With Steady White Light At Night Only)
  Tubular Markers May Be Used During Daylight Only.
  Cones May Be Used During Daylight And As
  Permitted At Night
- Type I Or Type II Barricade Or Vertical
  Panel Or Drum (With Flashing Light At
  Night Only)
- Work Zone Sign
- Flagger

TYPICAL APPLICATIONS

Utility Work
Pavement Repair
Structure Adjustments
GENERAL NOTES

1. All vehicles, equipment, workers (except flaggers) and their activities are forbidden in lane and intersection areas reserved for traffic.

2. For work operations of 60 minutes or less see Index No. 607.

3. The first two warning signs shall have a 450 mm x 450 mm (Min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.

4. All signs shall be post mounted if closure time exceeds 12 hours.

5. The WORKERS legend sign may be substituted for the symbol sign.

6. Dual signs are required for divided roadways.

7. Arrows denote direction of traffic only and do not reflect pavement markings.

8. Maximum spacing between barricades, vertical panels, cones, tubular markers and drums shall be not greater than 7.5 m.

9. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.

10. Work performed for a period of 60 minutes or less is to be conducted in accordance with Index No. 607 or emergency condition procedures as described in Index No. 600, whenever applicable.

11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

12. For general TCZ requirements and additional information refer to Index No. 600.

TYPICAL APPLICATIONS

Utility Work
Pavement Repair
Structure Adjustments

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCRUSH ON THE PAVEMENT REQUIRING THE CLOSURE OF AT LEAST ONE MEDIAN TRAFFIC LANE FOR A PERIOD OF MORE THAN 60 MINUTES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TOWN CENTER TRAFFIC CONTROL WORK ZONE
MULTILANE, TWO-WAY • URBAN DIVIDED OR UNDIVIDED DAY OR NIGHT OPERATION

Date: 03/03/2023

Colorado Springs, CO

Hour: 02:50

Crew No.: 001

Work: Site No.: 001

Design: 001

Job: 001

Contractor: 001

L. 270

GEO. 536

CO. 3001

FL. 2000

1 of 1

622
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENTRAP THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE, AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENTRAP THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

Work Area

Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light

Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.

Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)

Advance Warning Arrow Panel

Stop Bar

GENERAL NOTES

1. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the roadway.

2. Work operations shall be confined to either one lane or lane combinations as follows:
   a) Outside travel lane
   b) Outside auxiliary lane
   c) Outside travel lane and adjoining auxiliary lane
   d) Inside travel lane
   e) Inside auxiliary lane
   f) Inside travel lane and adjoining auxiliary lane

3. For work operations of 60 minutes or less see Index No. 612.

4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 7302.

5. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.

6. Mesh signs may be used for (Daylight Only) operations.

7. Dual signs are required for divided roadways.

TYPICAL APPLICATIONS

Utility Work
Pavement Repairs
Structure Adjustments

(Continued)
 CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE INSIDE TRAVEL LANE AND/OR ADJACENT AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS
- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- Type III Barricade
- Work Zone Sign
- Advance Warning Arrow Panel

GENERAL NOTES (CONT.)
8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters for 25 MPH, 10.0 meters for 30 MPH, 15.0 meters for 45 MPH or greater.

Spacing for devices parallel to the travel lanes shall be 7.5 meter centers for cones or tubular markers and 15.0 meter centers for Type I or Type II barricades or vertical panels or drums for 75.0 meters, or at Type I or Type II barricades or vertical panels or drums or 30.0 meter centers.

9. Arrows denote direction of traffic only and do not reflect pavement markings.

10. Longitudinal dimensions are to be adjusted to fit field conditions.

See Index No. 600.

II. For general TCZ requirements and additional information refer to Index No. 600.

TYPICAL APPLICATIONS
Utility Work
Pavement Repairs
Structure Adjustments
SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)
- Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.

2. For work operations of 60 minutes or less (daylight only), see Index No. 662.

3. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be posted mounted and located in accordance with Index No. 756.

4. The first two warning signs shall have a 245 mm x 450 mm (Min.) Orange Flag and a Type B Light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.

5. All signs shall be posted at the closure time exceeds 12 hours.

6. Dual signs are required for divided roadways.

7. Channelizing devices are to be spaced with cones or tubular markers at 7.5 meter centers and Type I or Type II barricades or vertical panels or drums at 2.5 meter centers, except in lane on work areas spacing may be increased to 10.0 meter centers for cones or tubular markers and 30.0 meters for barricades or vertical panels or drums after the first 75.0 meters when approved by the Engineer.

8. Removable reflectorized pavement markings shall be used when closure time exceeds one daylight period.

9. Arrows denote direction of traffic only and do not reflect pavement markings.

10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

11. For general TCZ requirements and additional information refer to Index No. 600.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

TYPICAL APPLICATIONS

Utility Work
Pavement Repair
Structure Adjustments
CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR THE MEDIAN TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m (200 ft) FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS
- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only)
- Tubular Markers May Be Used During Daylight Only, Cones May Be Used During Daylight And At Night When Permitted At Night
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES
1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
2. Work operations shall be confined to either one lane or a combination of lanes as follows:
   a) Outside travel lane
   b) Outside auxiliary lane
   c) Outside travel lane and adjoining auxiliary lane
   d) Outside travel lane and adjoining center lane
   e) Outside travel lane and adjoining auxiliary and center lanes
   f) Median travel lane
   g) Median auxiliary lane
   h) Median travel lane and adjoining auxiliary lane
   i) Median travel lane and adjoining center lane
   j) Median travel lane and adjoining auxiliary and center lanes
   k) See Sheet 2 of 2

   If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT LANE CLOSED AHEAD signs replaced by ROAD CONSTRUCTION AHEAD signs and the merge left symbol signs eliminated.

3. For work operations, that require a single lane closure only, of 60 minutes or less see Index No. 602.
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs obstruct a normal pedestrian walkway, the signs shall be posted mounted and located in accordance with Index No. 17302.
5. When work is performed in the median lane or the median and adjoining center lanes the barricading plans are inverted and LEFT LANE CLOSED AHEAD and merge right symbol signs shall be substituted for the RIGHT LANE CLOSED AHEAD and merge left symbol signs.
6. If work is confined to the median auxiliary lane the work area shall be barricaded and the LEFT LANE CLOSED AHEAD signs replaced by ROAD CONSTRUCTION AHEAD signs and the merge right symbol signs eliminated.

TYPICAL APPLICATIONS
- Utility Work
- Pavement Repair
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
HIGHWAY DESIGN

MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRaversable MEDIAN • URBAN
DAY OR NIGHT OPERATIONS
GENERAL NOTES (CONT.)

7. All signs shall be posted at least 12 hours.

8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters for 15 M.P.H.; 10.0 meters for 30 M.P.H.; 15.0 meters for 45 M.P.H. or greater. Spacing for devices parallel to the travel lanes shall be 7.5 meters for cones or tubular markers and 15.0 meters for Type I or Type II barricades or vertical panels or drums for 30 M.P.H. or greater and Type I or Type II barricades or vertical panels or drums at 30.0 meters centers.

9. Arrows denote direction of traffic only and do not reflect pavement markings.

10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

11. For general TCZ requirements and additional information refer to Index No. 600.

SYMBOLS

Work Area

Stop Sign

Advance Warning Arrow Panel

Stop Bar

END CONSTRUCTION

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRE THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

TYPICAL APPLICATIONS
Utility Work
Pavement Repair
Structure Adjustments
**SYMBOLS**

- **Work Area**
- **Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May be Used During Daylight And As Permitted At Night.**
- **Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)**
- **Work Zone Sign**
- **Advance Warning Arrow Panel**

**GENERAL NOTES**

1. All vehicles, equipment, workers and their activities are prohibited at all times from the lane areas reserved for traffic.
2. Work operations shall be confined to one center travel lane, leaving the adjacent travel lanes open to traffic.
3. For work operations of 60 minutes or less see Index No. 62.
4. When vehicles in a parking zone block the line of sight to TCC signs or when TCC signs encroach on a normal pedestrian walkway, the signs shall be posted and located in accordance with Index No. 17302.
5. The first two warning signs, each side, shall have a 450 mm x 450 mm orange flag and a type B light attached and operating at all times.
6. Mesh signs may be used for daylight only if operations Type B Lights and Orange Flags are not required.
7. Advance warning arrow panels are required for both day and night operations.
8. Channelizing devices are to be spaced with cones or tubular markers at 7.5 m centers Type I or Type II barricades or vertical panels or drums at 15.0 m centers for the first 75.0 m, thereafter cones or tubular markers at 15.0 m centers and Type I or Type II barricades or vertical panels or drums at 30.0 m centers.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See index No. 600.
11. For general TCC requirements and additional information refer to index No. 600.

**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repair
- Structure Adjustments

**CONDITIONS**

Where any vehicle, equipment, workers or their activities encroach on the pavement requiring the closure of the center lane.

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRAVERSABLE MEDIAN - URBAN DAY OR NIGHT OPERATIONS**

- **Sign No.:** 626
- **Date Signed:** 07-20-05
- **Issue No.:** 07-20-05

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRAVERSABLE MEDIAN - URBAN DAY OR NIGHT OPERATIONS**

- **Sign No.:** 626
- **Date Signed:** 07-20-05
- **Issue No.:** 07-20-05
GENERAL NOTES

1. These illustrations are representative of general conditions. Conditions differing from those shown shall be treated as directed by the Engineer.

2. The intensity of light and the position of panels shall be as specified in Index No. 600.

3. The Advance Warning Vehicle (Optional) may be used at the direction of the Engineer. If an Advance Warning Vehicle is operated within the travel way, an approved Truck Mounted Attenuator will be required on the Advance Warning Vehicle but not required on the Shadow Vehicle. The Advance Warning Arrow Panel and Warning Sign are required on both the Advance Warning and Shadow Vehicles.

4. For general TCZ requirements and additional information refer to Index No. 600.

5. If the work vehicle speed exceeds the minimum legal speed limit on limited access facilities and one half the posted speed limit on other facilities the engineer in charge may delete requirements for shadow vehicle and attenuators. The work vehicle will be required to have an advance warning arrow panel and warning sign.

TYPICAL APPLICATIONS

- Stripping
- RPM Placement
- Vegetation Control

CONDITIONS

MOVING OPERATION

MOVING OPERATIONS

SYMBOLS

- Work Vehicle With Flashing Beacon
- Shadow (S) Or Advance Warning (AW) Vehicle
- With Advance Warning Arrow Panel And Warning Sign.
- Truck Mounted Attenuator (TMA)
- Lane Identification And Direction Of Traffic
**CONDITION A**

*When the paving train is in lane 1, the U-turning vehicle shall cautiously turn into lane 2 and proceed in lane 2 to the front of the train.*

**CONDITION B**

*When the paving train is in lane 2, the U-turning vehicle shall cautiously turn into lane 1, and proceed in lane 1 to the front of the paving train.*

**CONDITION A & B**

*The advance warning arrow panels are required, under no circumstances shall the traffic transition be located within the limits of the crossover.*

---

**SYMBOLS**

- Work Area
- Type I or Type II Barricade or Vertical Panel
  - Or Drum (with steady burning light at night only)
  - Tubular Markers may be used during daylight only.
  - Cones may be used during daylight and as permitted at night.
- Type I or Type II Barricade or Vertical Panel
  - Or Cone or Tubular Marker or Drum
- Work Zone Sign
- Advance Warning Arrow Panel
- Lane Number

---

**TRAFFIC TRANSITION AREA UPSTREAM FROM CROSSOVER**

### CASE I

**GENERAL NOTES**

1. When crossovers do not exist, the contractor will construct temporary crossovers in accordance with index No. 57.

2. L<sup>2</sup> = Length of taper in meters
   - For speeds ≥ 70 km/h:  
   - For speeds < 60 km/h:  
   - Where:  
     - W = Width of lateral transition in meters  
     - $S$ = Plotted speed limit (converted to km/h)

3. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH, 10.0 meters for 30 MPH to 40 MPH; 15.0 meters for 45 MPH or greater.
   - Spacing for devices parallel to the travel lanes shall be 7.5 m centers for cones or tubular markers and 15.0 m for Type I or Type II barricades or vertical panels or drums.
   - Arrows denote direction of traffic only and do not reflect pavement markings.
When This Sign Conflicts With ROAD CONSTRUCTION 1/2 MILE Sign, The ROAD CONSTRUCTION 1/2 MILE Sign Shall Be Temporarily Removed And The Orange Flag And Type B Light Attached To This Sign

CONDITION A

WHEN THE PAVING TRAIN IS IN LANE (1) THE U-TURNING VEHICLE SHALL CAUTIOUSLY TURN INTO LANE (2) AND PROCEED IN LANE (2) TO THE FRONT OF THE TRAIN

CONDITION B

WHEN THE PAVING TRAIN IS IN LANE (2) THE U-TURNING VEHICLE SHALL TURN INTO LANE (2), CAUTIOUSLY MERGE INTO LANE (1) AND PROCEED TO THE FRONT OF THE PAVING TRAIN

CONDITION A & B

THE ADVANCE WARNING ARROW PANEL IS REQUIRED. UNDER NO CIRCUMSTANCES WILL THE TRAFFIC TRANSITION BE LOCATED WITHIN THE LIMITS OF THE CROSSOVER

TRAFFIC TRANSITION AREA DOWNSTREAM FROM CROSSOVER

CASE II

Note: See Sheet 1 of 2 For General Notes, Sign No. Details, And Conditions.
**PHASE I**

1. Maintain two-lane two-way traffic over existing pavement. Construct new roadway within the proposed 4-lane limits, excluding the friction course. Sign as shown if roadway construction area falls within 4.5 meters of existing pavement edge. When the construction area falls more than 4.5 meters from the existing pavement edge, traffic shall be controlled in accordance with Index Nos. 60, 602, or 607.

2. Construct shoulder pavement to provide two-lane two-way traffic over shoulder and existing pavement during Phase II roadway construction. For lane width requirements see Index 600. Signage as shown, with the near 450.0 m zone modified in accordance with Index 604, 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 Index No. 606. For lane width requirements see Index No. 600.

2. Route through traffic to temporary and existing pavement.

3. Construct transitions, excluding friction course.

---

**LEGEND**

- Sign With 450 mm x 450 mm (Min.)
- Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel
- Or Drum (With Slowly Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Work Zone Sign
PHASE III

1. Remove temporary marking from the existing pavement and temporary shoulder pavement.
2. Route traffic to newly constructed roadway.
3. Resurface or reconstruct existing pavement including required shoulder pavement and friction course.

PHASE IV

1. Reroute through traffic as shown in Phase II. Signage to be as shown in Phase II.
2. Construct friction course over pavement constructed in Phases I and II.

GENERAL NOTES

1. The first two warning signs shall have a 450 mm × 450 mm (Min.) Orange Flag and Type B Light.
2. Existing signs and pavement markings that conflict with construction signage and marking shall be obliterated or removed.
3. Lane widths for maintenance of two-way traffic should be equal to lane widths of the existing facility, but lanes shall be not less than 3.0 meters in width. When one-lane direct traffic operations are necessary, a minimum width of 3.6 meters shall be maintained and traffic controlled in accordance with indexes No. 623, 624, 625 and 627. Minimum width for the temporary shoulders is 1.8 meters.
4. Within the interchange transition, the minimum spacing between cones and tubular markers shall be 7.5 meters. Minimum spacing between Type I or Type II Barrioles or vertical panels or drums shall be 300 mm or 450 mm or greater.
5. The minimum spacing between warning devices used for delineation of the travel way and construction area to be 7.5 meters for cones or tubular markers and 15.0 meters for Type I or Type II Barrioles or vertical panels or drums.
6. For speed sign applications see Index No. 500.
7. For reflectorized raised pavement marker application see Index No. 600 and Index No. 5000.
8. Additional barrels, signing, lighting or other traffic controls shall be provided for limited work areas in accordance with other applicable TCC Indexes.
9. Arrows desile direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions.
11. When a side road intersects the highway, which work is being performed, overhead traffic control devices shall be erected in accordance with other applicable TCC Indexes.
12. Provision approved by the Engineer shall be made for the removal of storm water from the roadway as during construction.
13. For general TCC requirements and additional information refer to Index No. 600.
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 middle course over Phase I pavement. Side street traffic to be maintained. Through and cross traffic to be controlled. In accordance with index No. 620, 621 or 623. When work extends through an intersection, temporarily route cross traffic to other cross streets. When routing is not possible, provide one lane access to minimum for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets.

GENERAL NOTES

1. All signs, pavement markings, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 620.
2. The first two warning signs shall be in 450 mm x 450 mm or to one lane warning lights shall be in 450 mm (min.) orange flag and a Type B lighted and shaking at all times.
3. 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 3.0 meters in width. Where one-lane one-way operations are necessary, a minimum width of 3.6 meters should be maintained.
4. All signalized intersections shall be controlled or regulated as required to the center of required lanes.
5. For freeways, red painted pavement marker shall conform to Index No. 620 and Index No. 925.
6. Additional barricades, signs, and other traffic controls shall be provided in accordance with applicable TCS indexes as conditions warrant in each case.
7. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway as during construction.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit site conditions. See Index No. 620.
10. For general TCS requirements and additional information refer to Index No. 620.

LEGEND

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
CONVERTING TWO LANES TO FOUR LANES DIVIDED - URBAN

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PHASE I
1. Maintain two-lane two-way traffic over existing facility.
2. Construct temporary structure, approaches, guardrail and crash cushions.
3. The signing shown in the Phase I diagram is required whenever equipment workers or their activities are within 4.5 meters of the existing pavement edge.

PHASE II
1. Re-sign and mark as shown in Phase II plan.
2. Herd traffic to detour and maintain two-way traffic on detour. Install Type III barriers.
3. Construct proposed structure and reconstruct or resurface existing approaches.

PHASE III (See Sheet 2 of 2)

GENERAL NOTES (See Sheet 2 of 2)

LEGEND

SYMBOLS

- Sign With 450 mm x 450 mm (Min.)
- Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel
- Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only. Cones May Be Used During Daylight And As Permitted At Night.
- Type III Barricade (With Flashing Light)
- Work Zone Sign

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL THROUGH WORK ZONES

TWO-LANE, TWO-WAY • RURAL STRUCTURE REPLACEMENT
PHASE II

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

GENERAL NOTES

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 600.

2. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.

3. For speed sign applications see Index No. 600.

4. For lane width requirements see Index No. 600. When one-way one-lane operations are necessary, a minimum width of 3.6 meters shall be maintained and traffic controlled in accordance with Indexes Nos. 601, 604, 606, 607 or 608. Minimum width for the detour shoulders is 1.8 meters.

5. Method of attaching temporary guardrail to the detour structure to be approved by the Engineer.

6. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.

7. Temporary crash cushions shall be the inertial type in accordance with Index No. 415 or others as called for in the plans.

8. Arrows denote direction of traffic only and do not reflect pavement markings.

9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.

10. Where the temporary structure is not required the detour may be constructed in accordance with Index No. 609, unless otherwise stipulated in the plans.

11. For reflective raised pavement marker application see Index No. 600 and Index No. 1752.

12. For general TC2 requirements and additional information refer to Index No. 600.
CORNER SIDEWALK CLOSURE
WITH TEMPORARY CROSSWALKS

GENERAL NOTES

1. Arrows denote direction of traffic only and do not reflect pavement markings.
2. Only the signs controlling pedestrian flows are shown. Other work zone signs will be needed to control traffic on the streets.
3. For spacing of traffic control devices and general TCZ requirements refer to Index No. 600. Maximum spacing between barricades, vertical panels, drums or tubular markers shall not be greater than 7.5 m.
4. Street lighting should be considered.
5. For nighttime closures use type A flashing warning lights on barricades supporting signs and closing sidewalks. Use type C steady-burn lights on channelizing devices separating the work area from vehicular traffic.
6. Pedestrian traffic signal display controlling closed crosswalks shall be covered or deactivated.
7. Temporary walkways shall be a minimum of 1.2 m wide and kept free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials and etc.
8. Post Mounted Signs located near or adjacent to a sidewalk shall have a 2.1 m minimum clearance from the bottom of sign to the sidewalk.
9. When construction activities involve sidewalks on both sides of the street, efforts should be made to stage the construction so that both sidewalks are not out of service at the same time.
10. In the event that sidewalks on both sides of the street are closed, then pedestrians shall be guided around the construction zone.

TYPICAL APPLICATIONS
Sidewalk Repairs
Pavement Widening
Utility Work

CONDITIONS
WHERE ANY VEHICLE, EQUIPMENT WORKERS OR THEIR ACTIVITIES ENCROACH ON THE SIDEWALK FOR A PERIOD OF MORE THAN 60 MINUTES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PEDESTRIAN CONTROL FOR CLOSURE OF SIDEWALKS

PEOPEL APPL pleasant

660
### TABLE I

**CLEAR ZONE OF CURVED ALIGNMENT \( (CZ_c) \) (METERS)**

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**Notes:** Curves flatter than 300 m do not require an adjusted clear zone.

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**CLEAR ZONE WIDTHS ON CURVES FOR HIGHWAYS WITH FLUSH SHOULDERS**

- **Step 1.** Select CZ value from chart on Sheet 1. 2.
- **Step 2.** In Table 1 above, locate the "Design Speed" and "Tangent" CZ values that match the speed and CZ value from Step 1.
- **Step 3.** Move down the "RADIUS" column to the radius of curve under consideration, then across the table to the column found under Step 2, to find the CZ_c value.

---

**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**DESIGN ELEMENTS RELATED TO HIGHWAY SAFETY**

**Designer No.** 1234

**Appraiser No.** 5678

**Components:**

- **Element No.:** 1234
- **Element Name:** Clear Zone
- **Element Type:** Roadway Safety

---

**Sheet:** 1 of 2

**Page:** 700
WIND LOADING CHART BY ZONES

The following values for various sections of the state are in general agreement with the loading charts and are recommended for use in the design of sign structures.

ZONE NO. 1 (15 mph)

ZONE NO. 3 (100 mph)
- Breckenridge, Chelan, Clallam, Douglas, Pierce, Port Townsend, Sequim, Port Angeles, and Vancouver.
- Vancouver, Seattle, Tacoma, Everett, and Portland.

ZONE NO. 4 (145 mph)
- Snohomish, Skagit, Island, Whatcom, and Whatcom.

The following wind speeds are applied to the sections of the state as indicated above:

- 125 mph in the flat areas of the state.
- 100 mph in the mountainous areas.
- 75 mph in the coastal areas.
- 50 mph in the desert areas.

NUMBER OF WIND BEAMS FOR GIVEN DEPTH & WIND SPEED

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Wind Loading Chart by Zones:
- ZONE NO. 1 (15 mph)
- ZONE NO. 2 (35 mph)
- ZONE NO. 3 (100 mph)
- ZONE NO. 4 (145 mph)

Design Specification:
- Standard specification for structural supports for highway signs, lightposts, and traffic signs. ASHTO 2010.
- SAEHT-70 / PLATS shall meet the requirements of Aluminum Association A600-06 and ASTM B209. Sheets are to be degassed, annealed, and treated with a coating of 500°C, 30 to 60 minutes, 10 mA, or equivalent. No standardization on sheets.
- MATERIALS: All materials shall meet the requirements of the Aluminum Association A600-06 and ASTM B209. The following ASTM specifications shall be met:
  - Sheet 7075-T6: Tensile strength of 450 MPa (65 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.
  - Sheet 5182-T4: Tensile strength of 518 MPa (75 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.

General Notes for Aluminum Supports:
- Design Specification: Standard specification for structural supports for highway signs, lightposts, and traffic signs. ASHTO 2010.
- SAEHT-70 / PLATS shall meet the requirements of Aluminum Association A600-06 and ASTM B209. Sheets are to be degassed, annealed, and treated with a coating of 500°C, 30 to 60 minutes, 10 mA, or equivalent. No standardization on sheets.
- MATERIALS: All materials shall meet the requirements of the Aluminum Association A600-06 and ASTM B209. The following ASTM specifications shall be met:
  - Sheet 7075-T6: Tensile strength of 450 MPa (65 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.
  - Sheet 5182-T4: Tensile strength of 518 MPa (75 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.

Design Specification:
- Standard specification for structural supports for highway signs, lightposts, and traffic signs. ASHTO 2010.
- SAEHT-70 / PLATS shall meet the requirements of Aluminum Association A600-06 and ASTM B209. Sheets are to be degassed, annealed, and treated with a coating of 500°C, 30 to 60 minutes, 10 mA, or equivalent. No standardization on sheets.
- MATERIALS: All materials shall meet the requirements of the Aluminum Association A600-06 and ASTM B209. The following ASTM specifications shall be met:
  - Sheet 7075-T6: Tensile strength of 450 MPa (65 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.
  - Sheet 5182-T4: Tensile strength of 518 MPa (75 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.

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  - Sheet 5182-T4: Tensile strength of 518 MPa (75 ksi) and elongation of 12%. For uniformly loaded and strengthened beams, the requirements of ASTM A529 shall be met.
PROCEDURE FOR ASSEMBLY OF BASE CONNECTION: FOR BOLTS L2
1. Assemble post to stub with bolts and with one flat washer on each bolt between plates.
2. Shim as required to plumb post! See Shime Detail L1.
3. Tighten all bolts the maximum possible with 300 mm to 380 mm wrench to bed washers and shim washers to create bolt threads and then tighten each bolt in turn and retighten in a Systemic order to the prescribed torque! See Table J.
4. Burr threats at junction with nut using a center punch to prevent nut loosening.
GENERAL SPECIFICATIONS: Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1989) and Supplements thereto.


ALUMINUM: Except as noted below, all aluminum materials shall meet the requirements of Aluminum Association 6061-T6 (ASTM B209M, B221M, or B209M).
- Sign Brackets: 6063-T5 (ASTM B221M)
- 2. Permitted Alternate for Sheets and Plates: 6061-T6 (ASTM B209M)

CONCRETE: All concrete shall be Class II Special, the specified compressive strength of 28 days (F cu) shall be 2,700 psi min.

SIGN PANELS: Sign panels shall be 2 mm min. thick, made Aluminum Plate with corners rounded. See sign layout sheet. Panels are to be degreased, cleaned, neutralized and treated with Alodine 120B, White 12, Bonderite 7B or equal. No staining permitted on panels.

ALUMINUM BOLTS, NUTS & LOCKWASHERS: Aluminum bolts shall meet the requirements of Aluminum Association 2024T4 or 6061-T6 (ASTM B209M). The bolts shall have anodic coating of at least .005 mm thick and be color coded. Lockwashers shall meet the requirements of Aluminum Association 7075-T6 (ASTM B209M). Nuts shall meet the requirements of Aluminum Association 6061-T6 or 6056-T6.

STAINLESS STEEL BOLTS, NUTS AND LOCKWASHERS: Stainless Steel Bolts Nuts and Lockwashers conforming to AISI 304L may be provided in lieu of Aluminum Bolts, Nuts and Washers.

U-BOLTS, NUTS & LOCKWASHERS: U-Bolts, Nuts and Lockwashers shall meet the requirements of ASTM A 307 and shall be galvanized in accordance with ASTM A53.

INSTALLING FRAMABLE COLUMN SUPPORTS: Column/brackets may be installed by driving the columns in accordance with Index A30, A30M or A30S, or as alternate method the contractor may set the columns (piers) to the depth indicated in processed tops specified (suitable material temeped in layers not thicker than 50 mm to provide adequate compaction).

SIGN DRAWINGS: When Type “C” ground sign supports are furnished and fabricated in accordance with these plans, shop drawings will not be required for approval by the Engineer.

HOW TO USE THIS TABLE: Select the appropriate Sign Profile and Size to determine the Sign Identification Number. If the exact Sign Size of an Component is not listed, select the appropriate profile and larger Component Sizes. This table also gives the Quantity and Type of Sign Brackets required for each Sign. The Sign Size is given as a Vertical Dimension (Height) and a Horizontal Dimension (Length) is given last. For Columns, Heights and Footings see appropriate (Wind Zone or Height -4.2 in Max.) sheets titled “Column Sizes, Column Heights and Footings” Index Numbers 1801 thru 1806. No Step or Fixed Spacing is allowed in Sign Panels. All Panels shall be furnished in one piece.

CANTILEVER SIGN

Note: All cantilever sign installations shall comply with standard index 930.

The sign shall be supported by an aluminum round column with concrete footer and ground support. All sign brackets shall be Type B.

WIND LOADING

ZONE NO. 1: 100 km/h

ZONE NO. 2: 120 km/h

ZONE NO. 3: 130 km/h
- Brevard, Charlotte, Collier, Indian River, Lee, Monroe, Martin, Palm Beach, Sarasota, St. Lucie and Volusia Counties.

ZONE NO. 4: 145 km/h
- Broward, and Martin Counties.
SLIP BASE AND FOOTING DETAIL

SLEEVE & BASE PLATE DETAILS

SLIP BASE NOTES:
1. The Inside Diameter (I.D.) of the sleeve shall be no more than 1.5 mm larger than the Outside Diameter (O.D.) of the Column.
2. The sleeve bolts shall be 13 mm O.D. with threads. The bolts shall be galvanized steel A-325 E-2071 or 114mm A-325 E-2071.
3. The base bolts, nuts and washers shall be high strength ASTM A-325 H and shall have an uncoated zinc coating 0.020 in accordance with ASTM 923.
4. An alternate cast base of mild steel A-36 and C-750 in lieu of the fabricator base may be substituted for approval of the Engineer. If so cast base is used the ship will be the same as the column and will be bolted to the casting.
5. Assemble the slip base connection in the following manner: Connect column to sleeve using two (2) 13 mm O.D. machine bolts. Assemble top base plate to slip base plate using four (4) 13 mm high strength bolts with three (3) hardened washers per bolt. One (1) washer per bolt and two (2) bolt keeper plates go between the base plates. Use shim stock as required to plumb the column. Tighten all bolts the maximum possible with a 300 to 375 mm wrench to bed the washers and shims and to clear the bolt threads. Leave each bolt 1/4 turn and re-tighten to the guaranteed torque (see Table). Bolts shall be tightened with properly calibrated wrenches under the supervision of the project engineer. Nut threads at junction with nut using a center punch to prevent nut loosening.
6. Size galvanized steel plates to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the 13 mm O.D. sleeve bolts. The shim length shall be 36 mm shorter than the height of the column.

SLIP BASE DATA

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS

NOTE:
- All dimensions are in mm.

SINGLE COLUMN GROUND SIGNS

COLUMN SIZE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ENGINEERING STRUCTURES DIVISION

SINGLE COLUMN GROUND SIGNS

100 WIND LOADING
<table>
<thead>
<tr>
<th>COL. SIZE</th>
<th>COL. HEIGHT</th>
<th>COLUMN FOOTINGS</th>
<th>STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION</th>
<th>SINGLE COLUMN GROUND SIGNS</th>
</tr>
</thead>
</table>

**130 MPH WIND LOADING**

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</table>

**NOTE:**

- The table provides column sizes, heights, and footings for single column ground signs.
- The units are in feet and inches.
- The table is designed to be used for 130 mph wind loading conditions.
- The columns are categorized by height, with different sizes available for each category.
- The footings are specified for each column size.

**Legend:**

- COI.: Column Size
- H: Height
- F: Footings

**Approvals:**

- Approved by: [Signature]
- Date: [Date]
- Inspector: [Signature]
- Date: [Date]
<table>
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<tr>
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<td>9.7 - 9.9</td>
</tr>
<tr>
<td>9.9 - 10.1</td>
</tr>
</tbody>
</table>

The Column Size and Footings are in mm.
<table>
<thead>
<tr>
<th>Column Size</th>
<th>Column Height</th>
<th>Column Footings</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 90 x 50.8 | 5.3 m | FIRENOSE  | G-19901-120900-00-00 |}

### Column Diagram

- **Type 1 Bracket**
  - **Top of Sign Post**
  - **Steel Post**

### Aluminum Round Post

- Aluminum Round Post dimensions are given in millimeters (mm). The size is shown as an outside diameter (mm) with thickness.

### Steel Flanged Channel Post

- Steel Flanged Channel Post sizes are given in millimeters (mm). The size is shown as an outside diameter (mm) with thickness.

### Steel Square Post

- Steel Square Post dimensions are given in millimeters (mm). The size is shown as an outside diameter (mm) with thickness.

### Notes

1. This standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

2. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

3. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

4. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

5. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

6. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

7. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

8. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

9. The standard (AASHTO) provides design for the steel area under the following conditions:
   - Net of Flexure
   - Net of Flexure
   - Net of Flexure

10. The standard (AASHTO) provides design for the steel area under the following conditions:
    - Net of Flexure
    - Net of Flexure
    - Net of Flexure
EXIT NUMBERING PANELS TO HIGHWAY SIGNS

ELEVATION

GENERAL NOTES

DESIGN SPECIFICATIONS: Latest standard specifications for structural supports for highway signs, luminaires and traffic signals, AASHTO.

SHEETS AND PLATES: Material used shall meet the requirements of Aluminum Association Alloy 6061-T6 and ASTM B209M. Sheets are to be degassed, etched, neutralized and treated with a cadmium (200) or anodized (202) surface (T5), or equal.

No stenciling permitted on sheets.

MATERIALS: All aluminum materials shall meet the requirements of the Aluminum Association Alloy 6061-T6 and also the following ASTM specifications for the following: Sheet and plates (B209M); extruded shapes (B210M) and standard structural shapes (B209M).

ALUMINUM BOLTS, NUTS & LOCK WASHERS: Aluminum bolts shall meet the requirements of the Aluminum Association Alloy 6061-T6 or 6063-T6 (ASTM B241). The nuts shall have an average coating of not more than 0.0001 inch and be chromate treated. Lockwashers shall meet the requirement of Aluminum Association Alloy 7075-T6 (ASTM B209M). Nut shall meet the requirement of Aluminum Association Alloy 6061-T6 or 6063-T6.

SIGN FACES: All sign face corners shall be rounded. See sign detail sheet for dimension "L" and sign face details.

MATERIAL STRESSES: All allowable stresses are in accordance with standard specifications for structural supports for highway signs, luminaires and traffic signals, AASHTO for all materials shown in the plans.

For mounting details refer to Index No. 1037.
1. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSS-WALK AT A SIGNALIZED INTERSECTION

Note: Special speed restrictions are not normally applicable to these two cases.

2. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSS-WALK AT A STOP CONTROLLED INTERSECTION

Notes:
- Signs shall be erected in accordance with Index No. 17350.
- When computing pavement markings quantities do not include transverse lines.
- All school signs shall be reflective.

For signalized intersections or multi-lane signalized crossings where flashing beacon speed limit signs (post mounted or overhead) are installed, the minimum distance from the speed limit sign to the stop line shall be 20.0 m. The sign shall not block the view of the sign.

SCHOOL SIGNS & MARKINGS
6. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSS-WALK WITHOUT A SPEED REDUCTION
(2 LANES - 2 WAY TRAFFIC)

7. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSS-WALK
WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS
(4 LANES DIVIDED - 2 WAY TRAFFIC)

<table>
<thead>
<tr>
<th>APPROACH SPEED LIMIT</th>
<th>APPROACH SPEED (km/h)</th>
<th>SUGGESTED DISTANCE IN METRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-80</td>
<td>40-60</td>
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<tr>
<td>60-70</td>
<td>50-70</td>
<td>50.0</td>
</tr>
<tr>
<td>50-60</td>
<td>60-80</td>
<td>40.0</td>
</tr>
</tbody>
</table>

School cross walk width shall be 0.8 m wth, 3.0 m int., without curb cut ramps.
3.0 m int., with curb cut ramps.
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

Note: The school bus stop school zone signs should be used in advance of locations where a school bus, when stopped to pick up or discharge passengers, is not visible for a distance of 300 ft in advance. It shall be a minimum size of 750 x 750 ft. The signs shall be used whenever a school bus stops to pick up or discharge passengers. These signs are intended for use only where harsh and rugged features limit the approach sight distance and where there is no opportunity to relocate the stop to another location with adequate visibility.
SCHOOL ZONE
00 MPH
WHEN FLASHING

OVERHEAD STANDARD
* Flashing beacon may be placed within or below panel

300 mm Signal Head
(amber lane)

600

SCHOOL ENTRANCE

600

SCHOOL ZONE

END
SCHOOL ZONE

SPEED LIMIT ASSEMBLY

SCHOOL SPEED LIMIT
00
SCHOOL DAYS
0:00-0:00
0:00-0:00

Notes:
1. Standard size signs should be used whenever possible. Minimum sizes may be used only on rural routes. Special sizes should be used on expressway facilities where special requirements are needed.
2. The value of the actual school zone speed limit shall be determined by the Director Traffic Operations Engineer in cooperation with local school superintendents. In no case shall it be less than the 15 mph min. as set by law.
3. See index No. 0355 for sign details.

Ground Mount Standard

Notes: Existing ground mount school speed limit signs utilizing a single 200 mm size beacon or two 150 mm min. size beacons inside the sign border are considered meeting the standard. However, replacement or upgrading of these school speed limit signs shall conform to the above standard. Numerical speed limit displayed shall be established by appropriate regulatory authorities.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN

SCHOOL SIGNS & MARKINGS
NOTE

In absence of lane drops at exit ramps a special marking pattern may be used to distinguish the lane drop situation from a normal exiting ramp at auxiliary lane.
A diagonal special marking for lane drop consists of 200 mm wide by 900 mm long white stripes separated by 50.8 mm gaps. If used, this special marking should begin 0.8 kilometers in advance of the theoretical gore point, where intermediate lane changes may occur. In normal lane drops, 200 mm wide solid white centerline may be extended 50 m upstream from the theoretical gore point (M.O.T.C.O. Section 34-8.4).
NORMAL TAPERED ENTRANCE

FOR STRIPLING SEE DETAIL "A" (SHEET OF 4)

150 mm SAIL LINE ENDS AT POINT WHERE LINE WIDTH AND RAMP WIDTH ARE EQUAL (1.5 m)

SHOULDER PAVEMENT

SHOULDER LINE

COLORLESS-RED REFLECTIVE MARKERS (EVERY 50.0 m) SHALL END AT END OF TRANSITION

NORMAL TAPERED ENTRANCE

WITH ADDED LANE

FOR STRIPLING SEE DETAIL "A" (SHEET OF 4)

150 mm SAIL LINE

150 WHITE

150 YELLOW

SHOULDER PAVEMENT

SHOULDER LINE

150 WHITE SAIL LINE

COLORLESS-RED REFLECTIVE PAVEMENT MARKERS (EVERY 50.0 m) SHALL END AT TERMINATION OF THE YELLOW EDGE LINE

COLORLESS-RED REFLECTIVE PAVEMENT MARKERS (EVERY 4.5 m) TYPICAL

SHOULDER GUTTER

ISO WHITE EDGE LINE

ISO YELLOW EDGE LINE

ISO WHITE

ISO YELLOW
PARALLEL ACCELERATION AND DECELERATION LANE

Direction of Travel

White Arrow With Colorless Red Reflective Markers
For Arrow details see Index No. 7346
sheet 1 of 3.

WRONG WAY ARROW

INTERCHANGE MARKINGS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN

DESIGNER

CHECKED

DATE

SHEET

17345 3 of 4
Notes:
- Post delineators spaced at 12.0 m depth of the P.C. and end at the P.T. of the
- entrance and terminus of ramps. The spacing on the ramp section between
- the entrance and terminus shall be 900 m. All delineators are to be without
- 1.2 m frank shoulder breaks. Post delineators shall not be discontinued in
- sections with guardrail.

**INTERCHANGE MARKINGS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

DESIGNED BY

CHECKED BY

APPROVED BY

NORMAL SCALE 1:400

4-4-94
NOTE:

Yellow left turn edge marking may be used adjacent to relaxed curves or grass medians if lane use is not readily apparent to drivers approaching a left turn storage lane.

Turn lanes longer than 60.0 m odd one arrow for each 30.0 m additional length.

Arrows Should Be Evenly Spaced Between First And Last Arrow.

Placement message ONLY is not required for crested (shoulder I) turn lanes, single or dual, where the driver must exit the turn lane to enter a turn lane.

STOP CONTROLLED OR SIGNALIZED INTERSECTIONS

PAINTED LEFT TURN STORAGE LANE(S) DETAILS

600 White

ISO White

ISO Yellow Skip

ISO Yellow Solid

30.0 m Max Intervals Between Double Arrows

For use in congested urban areas where available storage length between intersections is limited and a permanent point of transition from the two-way turning lane to the exclusive turning lane can not be determined.

SCHEME ONE

Stage Point

ISO White

ISO Yellow

ISO Yellow

90.0 m Max Intervals Between Double Arrows

Typical spacing reference page 36-6 in the MUTCD.

For use in rural & suburban areas where an adequate storage lane length can be specifically determined.

SCHEME TWO

(WITH SINGLE LANE LEFT TURN CHANNELIZATION)

TWO WAY LEFT TURN LANE

REFER TO INDEX NO.11346 SHEET 9 OF 9.

TYPICAL CROSSWALK MARKINGS FOR CURB CUT RAMPS
PAVEMENT MARKINGS FOR TRAFFIC CHANNELIZATION AT GORE
(TRAFFIC FLOWS IN SAME DIRECTION)

PAVEMENT MARKING FOR TRAFFIC SEPARATION
(TRAFFIC FLOWS IN OPPOSITE DIRECTION)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN
SPECIAL MARKING AREAS
RAILROAD CROSSING AT 2-LANE ROADWAY

- Stop Bar Perpendicular To Edge Of Trackway On 2.4 m From & Parallel To Gate When Present.
- DO NOT STOP ON TRACKS

RAILROAD CROSSING AT 4-LANE ROADWAY

- Stop Bar Perpendicular To Edge Of Trackway On 2.4 m From & Parallel To Gate When Present.
- ISO Bar Yellow

NOTES:

1. When computing pavement messages, quantities do not include transverse lines.

2. When dynamic devices are not available, the crossbar sheeted located of the future location of the RR gate or signal gate in accordance with index No. MB82.

3. Placement of sign WO 1 in a residential or business district, where the streets are present, the WO 1 sign may be placed a minimum distance of 30.0 m from the crossing, where street intersections occur between the RR pavement marking and the tracks on additional WO 1 sign.

4. Recommended location for FTP 38 or FTP 38 B sign, 30.0 m in urban and 90.0 m in rural in advance of the crossing.

5. A portion of the pavement marking symbol should be directly opposite the WO 1 sign.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

SPECIAL MARKING AREAS

PAVEMENT MARKINGS FOR TERMINATION OF TWO WAY LEFT TURN AT R/R CROSSINGS

TYPICAL PAVEMENT MARKINGS FOR R/R CROSSING

NOTE:
- Pavement markings symmetrical about centerline
- See notes 3, 4 & 5 for sign placement.
Markings in an adjacent to bike lanes should be thermoplastic with a mixture of 50 percent glass spheres and 50 percent sharp silica sand applied at a rate of 307 g/m² for each 3.29 m².

The symbols shown shall meet the following pavement requirements:

- U.S.poke Hunter: Percent Posting
- 0.21 m
- 1.0 m
- 0.60 m
- 0.39 m
- 1.0 m
- 0.60 m

Recommended spacing of diamond symbols immediately after intersections and on major driveways and at a minimum spacing of 100 meters for urban sections and 400 meters for rural sections.

Rotated pavement markings and vertical barriers can cause steering difficulties and should not be used to designate bicycle lanes.

Pavement markings shall be white.

NOTE: When used in a bike lane adjacent to vehicle lane markings shall be placed adjacent to markings for vehicles. The 1.0 sign shall be sized and placed for vehicles.
**CASE 1**

- **Yellow Reflectors**

**CASE 2**

- **Red Reflectors**

**NOTES:**

1. This index is applicable to residential and minor streets only.
2. "T"-intersection - Two-way arrows and reflectors are optional. The need should be based on a review of each situation.
3. For additional details on aluminum round post, steel flanged channel post, sign panel material and bolts, nuts and washers see Index Nos. 1000 and 1005.
4. Case I application - The arrow panels and object markers shall be spaced approximately 9.0 m, but not less than 3.6 m from the edge of the travel lane.
GENERAL NOTES

1. Only those services meeting criteria established by the Department and approved by the State Traffic Operations Engineer for each interchange shall be shown. Symbol signs for maintenance services shall always appear in the following order reading from left to right and top to bottom: Gas, Food, Lodging, Phone, Hospital, Camping.

2. Symbol shall appear consecutively on the sign with no positions left blank or reserved for intermediate symbols not currently approved for a particular interchange.

3. All motorist service signs to have White Legend and Border with Blue Background.

4. For mounting details see Index 9553 for Type "A" broadway or Index 9880 for Type "C" freeways.

NOTE: When approved for attachment to the advance guide signs, up to 3 services may be cited for an exit. The symbol signs shall be separated from the guide sign panel or existing guide signs and supported by vertical guide panels. The mounting height of the advance guide sign shall be increased where necessary, to provide 2.4 m. between the top of the pavement edge and the bottom of the guide sign, prior to mounting the supplementary panels.
STATE OF FLORIDA
WELCOME CENTER
1 MILE

Tourist Information Center
NEX TO RIGHT

Note: Sign FTP-21 shall be used as a supplemental guide sign at
interchanges which have a Tourist Information Center approved for such
signing (locate half-way between normal guide signs).

STATE OF FLORIDA
OFFICIAL
WELCOME CENTER

Sign No. FTP-19

STATE OF FLORIDA
WELCOME CENTER

Sign No. FTP-18

WELCOME CENTER

Sign No. FTP-20

Note: Roadway not drawn to scale.
Distances shown are approximate for adequate driver communication
but may be altered slightly if field conditions require.

Notes:
(1) Signs and sign structures shall be erected in accordance
with the details shown on Index 5535.
(2) Sign FTP-19 shall be located on the Welcome Center grounds
in proximity to the building and as far from the main line
roadway as possible (12' signs back to back).
(3) Sign FTP-17, 18, 19 shall be located on limited access highways only.
(4) All signs to be Series E.
(5) (Sign No. F1P - B To Be Paid For By The Dept. Of Tourism)
(6) See Index 7555 for sign details.
STATE OF FLORIDA
WELCOME CENTER
1 MILE

SIGN NO. FTP-22A

STATE OF FLORIDA
OFFICIAL
WELCOME CENTER

SIGN NO. FTP-19

SIGN NO. FTP-23

1/2 MILE

SIGN NO. FTP-22B

FTP - 22A

FTP - 22B

FTP - 23

240.0

FTP - 19

Note:
One sign FTP-22A or 22B should be used depending on speed, roadside development & geometric conditions.

NOTE:
Roadway not drawn to scale

* 240.0 m Maximum For Rural Conditions
0.0 m Minimum For Congested Areas

Notes:
1) Signs and sign structures shall be erected in accordance with the details shown on Index 9035.

2) Sign FTP-19 shall be located on the Welcome Center grounds in proximity to the building and as far from the Main Line Roadway as possible (2 signs back to back)

3) All legend to be Series E

4) (Sign No. FTP-19 to be paid for by the Dept. of Tourism)
1. Reflective Pavement Markers shall be spaced at 0.0 m on all skip lane lines and only center lines. This spacing may be reduced to 0.0 m if specifically called for in the plan.

2. The spacing on solid lines and solid/skip combination lines shall be 0.0 m.

3. All R.P.M.s shall be offset 25 mm from solid lines.

4. These spacings may be reduced for sharp curves if required.

5. All R.P.M.s shall be class "B".
NOTE
Raised pavement markers shall be set 125 mm outside of line.

RPM PLACEMENT FOR TRAFFIC CHANNELIZATION AT GORE
(TRAFFIC FLOWS IN SAME DIRECTION)

NOTE
Raised pavement markers (Bi-Directional Red and Colorless) should be used in all gores of this type

RPM PLACEMENT FOR TRAFFIC SEPARATION
(TRAFFIC FLOWS IN OPPOSITE DIRECTION)

PLACEMENT OF RPMS ON SHOULDER MARKINGS
Shoulder Markings For Left Side Of Roadway Shall Be Yellow.
For Placement Of RPMS On Ramps See Index 17345.
ENGERITE SYSTEM

TOP VIEW

PLACEMENT OF OBJECT MARKER

DETAIL A

HEX-FOAM SANDWICH SYSTEM

G・R・E・A・T SYSTEM

OBJECT MARKER

GENERAL NOTES

1. Cost for Object Marker to be incidental to the cost of Attenuator Systems.
TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE

DETAIL OF SIGN CLAMP

See Index IT/27 2 of 2 for pole attachment.

In order to ease installation, Sign Face No. 2 should be installed after mounting to span wire.

6 mm Stainless steel round head bolts with nuts and lock washers. Bolts shall be spaced on 300 mm centerline rage.

The maximum number of adjustment brackets shall be a minimum of 2 bolts with a minimum spacing between bolts of 50 mm.

TYPICAL SPAN WIRE INSTALLATION

Notes:
1. Bottom edge of signs shall be approximately at the same elevation.
2. Type B & C attachments with one hanger shall have wire beams for signs wider than 1.0 m. The beams shall extend to within 150 mm of the sign edge.
3. Type B & C attachments for signs 1.0 m and wider shall have 2 hangers. Signs 2.0 m and wider shall have wire beams that extend to within 150 mm of the sign edge.
4. Type D attachments shall be for signs 1.0 m in width or less.
5. Sign panels shall meet the requirements of Item 9530.
6. Refer to section 6.34 of the Standard Specifications for Road and Bridge Construction.
7. All parts, nuts, and washers shall be passivated stainless steel, AISI 300 series, commercial grade, type 36.
SIGN LOCATIONS TYPICAL

NOTE:
1. See Standard Highway Signs note
   NHR for sign M2 5 deleted.
2. Sign location No. 3 may require some field adjustment.
3. Signs FTP-S2, FTP-S4 & FTP-S5 shall have a
   0.7 mm edge and 15 mm border with a 0.03 mm radius.
4. The Cross Road is in the last section around the restricted bridge.
5. Sign location No. 3 shall be established from
   the Cross Road the following approximate distances:
   Interstate = 150 Kilometer
   Non-Interstate = 0.8 Kilometer
6. See Index 17355 for sign details.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

BRIDGE WEIGHT RESTRICTIONS

[Diagram showing sign locations typical]
NOTES:

1. Bridges should be marked as narrow bridges under the following conditions:
   (1) For approach roadways with paved shoulders when the bridge width including shoulders is less than the width of the approach roadway including paved shoulders.
   (2) For approach roadways without paved shoulders when the bridge shoulder width is less than 0.5 m.

2. No passing zone should be extended 45.0 m in advance of narrow bridge.

3. The posted speed limit should be posted on both sides of the roadway.

4. Delimiteds on both sides of roadway shall face traffic approaching bridge.

RURAL NARROW BRIDGE TREATMENT
1.1 Ground rods shall have a resistivity of ground not to exceed 25 ohms. Where the resistivity is greater than 25 ohms, two or more ground rods connected in parallel shall be used. Contractor shall provide necessary test equipment and current validation certificates required at final inspection to ensure acceptability of grounding system.

1.2 Grounding system not to exceed 10 ohms. See note 23.

2.1 The contractor shall be responsible for contacting all utility companies prior to any underground work. The utility company will locate and identify their facilities.

2.2 Contractor shall determine the service required and for the power company’s transformer installation at the pre-construction conference.

3.1 The power company reserves the right to insist the river, switch gear and weatherproof power company poles at the expense of the contractor. Contact the power company for cost or, if unsatisfactory, for an alternative procedure.

3.2 Any damaged portions of insulated steel pipes and branches shall be replaced in accordance with section 26 of the Standard Specifications.

3.3 Poles and bracket arms shall be designed in accordance with the design criteria as indicated in the plans and using the applicable equations found in “Standard Specifications For Structural Supports for Highway Signs, luminaires and Traffic Signals” published by AASHTO dated 1965. The calculations shall be based on the actual projected area of the luminaries or 0.09 square inches whichever is greater.

3.4 The luminaires shall place a permanent tag on the luminaire housing in which is included the following information: manufacturer, model type, design, plan, date of installation, installation date, and type of lamp installed with this lamp in the position specified. Input voltage and power factor, luminaire location and dimensions, required.

3.5 Before final acceptance, the contractor shall provide 2 sets of full size detail plans to the monitoring agency.

3.6 Completion of the pole to pole, maintaining separation distance of pole from the ground. Any cable running in any direction where a quadrant 0.5 square miles behind the center of the quadrant past cord and underground circuit to the ground. (See note 23)

3.7 Poles and cables shall be designed, as approved by the Engineer, in proper conflict with utility and drainage structures, etc., and prevent ground past conflict with underground circuit.

3.8 Code of the National Electrical Code, Article 250, shall be followed.

3.9 The various of the pole, the pole and where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.10 Where ground rod is installed, the plastic shall be placed at least 12 inches above ground level and the face of the quadrant 0.5 square miles behind the center of the quadrant past cord and underground circuit to the ground. (See note 23)

3.11 Pole foundation specifications shall be specified to the top of the foundation, composed of 6 to 8 inches of stable foundation, approximately equal to that of the ground level. The pole shall conform to existing grade and be fully excavated.

3.12 The heights of the pole, the pole and where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.13 The heights of the pole, the pole and where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.14 All metal conduit shall be connected to ground with a copper ground wire. The ground wire shall be continuous with the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.15 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.16 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

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3.23 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.24 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.25 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.26 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.27 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

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3.32 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

3.33 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

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3.36 All conduits shall be joined in the ground wire connected to the pole, where the luminaire and lighting circuit shall be placed shall be in accordance with the Codes of the National Electrical Code, Article 250, shall be followed.

Notes:

1. All Pull Boxes And Pole Bases, Ends Of Conduit Should Be Sealed In Accordance With Section 630 Of The Standard Specifications For Highway And Bridge Construction.

2. 1/8" AWG Insulated 1/4" Green Copper Clad Bare Wire Connecting All Poles, And Insulated 1/8" Black or Thorax Stranded Copper Circuit Conductors In Schedule 40 PVC Conduit, Circuit Conductors And Conduit Size As Shown In Plans. (Typical)

# 6 Ground
Simple Protector

"Ground meeting the requirements of specification Section 514, bare steel strap, shall be provided beneath the base plate of the high-mast pole. In addition, a 1/16 inch diameter stake should be provided in the ground to prevent water from accumulating in the pole base."

Schedule 40 PVC Conduit

4/0 AWG Stranded Copper Bond Wire Connecting All Poles, And Insulated 1/8" Black or Thorax Stranded Copper Circuit Conductors In Schedule 40 PVC Conduit, Circuit Conductors And Conduit Size As Shown In Plans. (Typical)
METAL POLE CONCRETE FOUNDATION DETAIL

Foundations apply only to slopes of 1 in 4 or flatter.

If Who Mix, Class I Concrete

# 6 A.W.G. Bare Band May Be Coat In
Base Or Run Through 1 1/2 in PVC Elbow

2 5 mm Cleat

6.25 in Circle

Bolt Projection Diameter, And Bolt Length Per
Manufacturer's Spec. (Subcontract Data Required)

SOIL MOUNTING LENGTH BOLT CIRCLE

LENGTH (in) (in) (in)

COMPACT SAND 5.0 1.8 25G

MEDIAN CLAY 9.0 1.8 25G

GERSE CLAY 12.0 1.8 25G

ALL SOILS 15.0 - 15.0 7.0 38

Anchor Bolts To Be Grouted Per
Section MB-35 Of Fia, G.O.F, Standard
Specifications For Road And Bridge
Construction dated 1996

15 mm Clear

25 mm Circle

1 3/4" To Watch Job

15 W Bars @ 1300 mm On Center With
Top & Bottom 8 1/2 in On Center
B-25 # Reinforcing Cage

As Required Permitted On Reinforcing
Cage.

Reinforcing Steel To Be Grade
40 K 60.

300 mm Bed Of Pea Gravel Or
Crushed Stone For Drainage

Approved Ground Connection

PULL BOX WIRING DETAIL

At All Pull Boxes, And Pole Bases.
Ends Of Conduit Shall Be Sealed
In Accordance With Section 630
Of The Standard Specifications
For Road And Bridge Construction

All Splices Shall Be Made In Pull Box
Or Pole Base With Compression Sleeves
Or Snap Bolt Connectors Properly Taped
And Weatherproofed.

"R" A.W.G. Insulated "T" Wires
Striped Copper Circuit Conductors In
Schedule 40 PVC Conduit Circuit Conductors And
Circuit Sizes As Shown In Plans. (Typical)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
FUNDING DESIGN

ROADWAY LIGHTING DETAILS

17503
SIGN LIGHTING INSTALLATION

The roadway lighting contractor shall provide a means for sign service entry into a pole base or a pull box channelized in the lighting circuit, and cap 0.6 meters of lighting circuit conductors for connection by sign contractor.

The sign contractor shall furnish and install luminaires, 30 ft. Enclosures, 10 Amp Breaker, Conduit, Conductors, and all other electrical equipment necessary for connection to roadway lighting circuit as provided by the roadway lighting contractor.

When roadway lighting circuits are not available the designer shall include pay items numbers in the plans to furnish and install conduct, Conduit, Pull Box, and Service Plate equipment.

Compression type connectors properly tapered and waterproof shall be used.

See Roadway Lighting Plans for sign service locations.

PLACEMENT OF SIGN LIGHTS

1. Luminaires shall be mounted so that the lamp center is 0.2 m in front of the sign face.
2. Luminaires shall be mounted so that the back of the fixture is placed 0.5 m below the bottom edge of the sign face.
3. Luminaires from manufacturers who recommend that the fixture be tilted shall be mounted in a bracket which provides this recommendation (N).
4. Protective device for mercury vapor luminaires proposed for sign lighting shall be submitted for approval to the District Lighting Engineer, Florida Department of Transportation.

See 20 mm Liquid Tight Flexible Conduit From Junction Box To Bollard And From Junction Box To Sign Chord With Weatherproof Cast Aluminum Junction Box Mounted On Sign Chord.

Bollard shall Be Mounted To Sign Chord With Stake-In Steel Stud. Bracket For Bollard To Be Fabricated From Soughtown Steel Pipe For Sign Structures And Aluminum Plate For Aluminum Sign Structures. (Submittal Data Required)

Overhead Power Supply

D-19 T.W.H. TO TRIMM IN 20 mm GALVANIZED RIGID STEEL CONDUIT.

Ground Lug Attached To Metal Sign Structure

L.I.L. Approved Ground Rod HE32 mm x 3.0 m.

Copper Wire With Approved Ground Connection To Be Placed In Pull Box For Inspection Purposes. Resistance To Ground Not To Exceed 20 OHMS.

I.E.E. Approved Ground Rod HE32 mm x 3.0 m.

Copper Wire With Approved Ground Connection To Be Placed In Pull Box For Inspection Purposes. Resistance To Ground Not To Exceed 20 OHMS.

- Power Line To Run From Power House To Ground Lug In Sign Structure Galvanized Rigid Steel Conduit.

- Power Line To Run From Power House To Ground Lug In Sign Structure Galvanized Rigid Steel Conduit.

- Power Line To Run From Power House To Ground Lug In Sign Structure Galvanized Rigid Steel Conduit.
FOR USE IN AREAS NOT EXPOSED TO VEHICULAR TRAFFIC AND UNDER DRAWSAYS

**FIGURE A**

*May be adjusted due to field conditions upon approval of project engineer.*

FOR USE IN ASPHALT ROADWAY ADJACENT TO GUTTER WHEN PLACEMENT OUTSIDE OF THE PAVEMENT IS NOT FEASIBLE.

**FIGURE B**

1. Trench not to be open more than 75.0 m at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asperl to be sawed and removed to expose neat links on both sides of the 300 m pavement cut.
3. See note 3 Figure C.

FOR USE IN INSTALLING CONDUIT UNDER EXISTING ASPHALT PAVEMENT NOT ADJACENT TO GUTTER WHEN JACKING IS NOT FEASIBLE.

**FIGURE C**

1. Right conduit must be used when jacking under existing pavement at 900 m minimum depth.
2. Asperl to be sawed on the edges of the trench.
3. The removal and replacement of the additional pavement width (100 m) will not be required when the trench can be constructed without disturbing the asphalt surface on either side.

FOR USE IN INSTALLING CONDUIT UNDER A NEW ROADWAY PRIOR TO INSTALLATION OF CURBS, BASE, AND PAVEMENT

**FIGURE D**

FOR USE IN INSTALLING CONDUIT UNDER A new SIDEWALK

**FIGURE E**

Note:
1. Sidewalk patches to match existing joints.
2. Entire sidewalk slab must be replaced when specified in the plans.
3. Backfill and top with material from trench except at driveways. At driveways, backfill a length of trench within the driveway entirely with Class I concrete.
PULL BOX ENTRY OF CONDUIT UNDER SIDEWALKS

FIGURE A

Notes:
- Ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications for Road and Bridge Construction.

FOR USE UNDER RAILROADS

FIGURE C

Note:
- Conduit depth to be at R/R requirement but not less 1.5 m.
- After splicing, leave right conduit at a sleeve extending to R/R right of way (CFA).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CONDUIT INSTALLATIONS DETAILS

CONTRACTOR: ODOT

CONTRACT NO.: 123-456

DESIGNED BY:

ENGINEER:

ARCHITECT:

DATE:

Scale:

Sheet No.:

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CAD Drafting

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
Notes:
1. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the joint.
2. Locking wire should never be used for distances of 3.6 m or greater.
3. The overlapping connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing between bolts of 50 mm.

METHOD OF FRAMING:
Center Studs Places
Angles 0° to 90°

The last face of pole shall be perpendicular to load.

ADJUSTABLE HANGERS:

200 mm To 300 mm Drip Coil or
Drip Loop

Adjust To Signal Head
With Broadway Clips

VERTICAL CLEARANCE OF:
Not Less Than 5.1 m
And Not More Than
5.7 m Measure Under
The Most Critical Signal
Assembly (In Regards To
Clearance) For That Span.

20 mm Oulg Eye Bolt

20 mm Oulg Eye Bolt

20 mm Oulg Eye Bolt
Notes:
1. The service head hole for joint use poles may be drilled by the utility company at an angle of 45° but not less than 30° to the face of the pole.
2. Locking wire should normally be used for distances of 3.6 m or greater.
3. The overlapped connection of adjustable hangers shall use a minimum of 2 wires with a minimum spacing between wires of 30 mm.

Method of Framing Corner Strain Poles Angles 10° to 120°

Automatic Compression Type Clamps (Feed Through Inside)

Load

Automatic Compression Type Clamp
(Feed Through Outside)
**FIGURE A**
CABLE DROP AND TERMINATION DETAIL
AERIAL INTERCONNECT FIGURE "B"

**FIGURE C**
CABLE DROP DETAIL
AERIAL INTERCONNECT MESSENGER WIRE WITH CLAMPS

**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 upper ground wire of the pole or the external wire extending down the pole.
2. When utilizing the external ground wire to the pole, a piece of size 0.5-inch conduit shall extend up the pole externally to a point 24 m above finish grade to protect the ground wire connecting the messenger wire to the ground rod.
3. Locking clip ties or clamping wire when used shall be placed no further than 300 mm apart except at the point of cable drops or terminations where they shall be placed at the point where the cables separate from the messenger wire and another placed 60 mm (max.) from that point. When using figure "B," Interconnect cable only the locking clip ties shall be used.
4. If accessible the internal ground wire of the support pole may be used to ground the messenger wire.
5. Locking wire should normally be used for distances of 3.6 m or greater.
FIGURE A
AERIAL FEED
(NO METER USED)

FIGURE B
AERIAL FEED
(METER USED)

FIGURE C
UNDERGROUND FEED
(NO METER USED)

FIGURE D
TYPE "B" UNDERGROUND FEED
(METER USED)

FIGURE E
UNDERGROUND CABINET MOUNTED
(METER USED)

NOTES:
1. The lightning arrester can be located on the side or bottom of the main disconnect enclosure at the Contractor's option.
2. Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.
Notes:

1. As an option, the contractor will be allowed to install pedestrian signals on concrete poles and pedestals with the use of steel anchors. Two bars one size per hub. 1 in 11 of the standard steel bands.

2. Holes drilled or punched in metal poles or pedestals shall be thoroughly reamed, cleaned of all burrs, and squared with two 1/2 spats of zinc-rich paint as specified in the standard specifications for road and bridge construction. Screws or bushings shall be installed in holes.

3. Grounding to be in accordance with Section 620 of the Standard Specifications.
** DETAILS FOR SPLACING LOOP WIRE TO LEAD-IN WIRE **

**STEP 1**
- Strip Loop And Lead-In Cables.[-] Conductors.- Use Shrinkable Slick-Line, Cross Linked Polyethylene Insulating Tubing To Be Used. Skip Tubing Over Lead-In Cables And Individual Conductors.

**STEP 2**
- Twist The Bare Conductors Together.
- Crimp The Bare Conductors Together With An Uninsulated Butt Connector.

**STEP 3**
- Separate Each Splice Using Resin-Core Sleeves.

**STEP 4**
- Strip Each Splice With Silica Tape. Half Loop Starting At Center Of Splice And Processing To The Right (Or Left) 15 Mm. 20 Mm Past End Of Splice. Then Prepare A Tab To The Left (Or Right) 15 Mm. 20 Mm Past End Of Splice And Returning To Center. Strip Each Splice, With An All-Weather Heavy Duty Electrical Tape In The Same Manner 15 Mm. 20 Mm Past End Of Silica Tape.

**STEP 5**
- Half Loop The Two Splices Together With An All-Weather Heavy Duty Electrical Tape = 25 Mm Past End Of The Lead-In In Gable Outside Cover And = 25 Mm Past Further Lead-In Of Step A.

**TWISTED PAIR AND LOOP LEAD-IN INSTALLATION WITH CURB & GUTTER**

**ALTERNATIVE 1**
- Cut A Hole Through The Curb At The Point Where The Required Row Cut Depth Is Obtained And Plug To Filling The Top Inside Edge Of The Curb. Slide A Section Of Flexible Conduct At An Angle 90 Mm Into The Hole. From The Back Side Of The Curb But Not Within 50 Mm Of The Top Of The Hole. The Conductors Shilt Be Stabilized In The Shilt Hole. Pull The Top Of The Hole To Avoid Separation To The Level Of The Curb Surface. A Nonmetallic Material Should Be Used To Prevent Excessive Loop Splits From Entering The Flexible Conduct.

**ALTERNATIVE 2**
- Cut A Hole (15 Mm) To 25 Mm Larger In Diameter Than The Right Conduct To Be Used Through The Roadway. Align The Conductors To The Surface And Bend At An Appropriate Angle To Introduce The Right Conduct On The Roadway. Place A Precutted Length Of Right Conduct In The Hole And Drive The Conduct Into The Right Conduct On The Roadway End Of The Right Conduct. The Top Of The Right Conduct Should Be Approximately 90 Mm Below The Roadway Surface. Fill The Hole With A Nonmetallic Material Should Be Used To Prevent Excessive Loop Splits From Entering The Right Conduct.

**GENERAL NOTES**
1. If the loop lead-in is 22.5 m or less from the edge of the loop to the detector or controller cabinet, continue the twisted pair to the cabinet. If the loop lead-in is greater than 22.5 m continue the twisted pair to the specified pull box, splice to shrinkable lead-in wire and continue to the detector or controller cabinet.
2. The length of all pull boxes shall be sufficient to allow unobstructed placement of loop wires and lead-in cables into the pull box. The depth of all pull boxes is to be determined by the manufacturer's standard 75 millimeters stand-off with a maximum of 100 millimeters.
3. On resurfacing or new roadway construction projects, the loop wires and lead-in cables may be installed in the approved structural course prior to the placement of the final asphalt course. The loop wires and lead-in cables shall be placed in a pull box in the structural course. The depth of the cabinet below the top of the final asphalt course comply with note 2.
4. A nonmetallic hand-down connector shall be used to secure loop wires and lead-ins to the bottom of low cuts. Hand-down connectors shall be spaced at approximately 300 mm intervals around loops and 500 mm intervals on low cuts.
5. The minimum distance between the twisted pairs of loop lead-in wire is 150 mm from the loop lead-in of the loop lead-in of the loop lead-in.

**Vehicle Loop Installation Details**

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**STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**

**Vehicle Loop Installation Details**

**Vehicle Loop Installation Details**

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**Vehicle Loop Installation Details**

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**Vehicle Loop Installation Details**
CONCRETE PAVEMENT EXPANSION JOINTS

PLANT

LOOP CORNER AND LEAD-IN DETAILS
WHITE BACKGROUND WITH BLACK LEGEND AND BORDER  
WALK PLAQUE - WHITE LEGEND ON BLACK BACKGROUND  
DON'T WALK PLAQUE - ORANGE LEGEND ON BLACK BACKGROUND  
THE INTERNATIONAL SYMBOLS MAY BE USED FOR WALK AND  
DON'T WALK.

FTP-49
FTP-48
FTP-47

Case I
POLE PARALLEL TO CURBLINE
ALTERNATE TO FIGURE F

Case II
POLE DIAGONAL TO CURBLINE

Notes: 1. See Index IF555 for sign details.
Liquid tight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.

**POLE MOUNTED CABINET**

*If holes for cabinet mounting require relocation, original holes shall be filled in with concrete or covered with a non-corrosive cover plate.*

**BASE MOUNTED CABINET**

Notes:

1. The number, size, and orientation of conduit entrance will vary according to site condition or location. Two equal size 33 PVC conduits shall be provided in all boxes. The spares shall exit in the direction of the center rear of the cabinet base, into a pull box and capped with a weather tight fitting. All spares shall exit from exiting to the rear, or the rear of the cabinet is located on the right side, the pipe exit of the spare conduit will require to be approved by the structural engineer. All spare conduit shall be capped with a weather proof fitting.

2. Grounding to be in accordance with Section 628 of the Standard Specifications.
**TRACK CLEARANCE FOR ACUTE OR RIGHT ANGLE CROSSINGS**

**Typical Location Plan For Gate Or Flashing Signal With Gate When Tracks Are At Oblique Angle.**

**Note:**
- It is intended that the full shoulder width of the existing roadway be paved where an existing shoulder in supplementary standards for the facility invades, the shoulder width should be upgraded to meet current standards.

**SIGNAL PLACEMENT AT RAILROAD CROSSING**

(2 - LANE DESIGN)

**GANG TYPE**
- Highway Crossing Belt
- 100 ft. Minimum
- Per Crossing

**Back-2-Back Flasher Units**
- Crown Of Roadway
- 100 ft. Minimum
- Per Crossing

**Paved Shoulder**
- 7.5 ft. Minimum
- Per Crossing

**NUMBER OF TRACK SIGNS IN THE OPTION OF THE INSTALLING AGENCY WHEN AUTOMATIC GATES ARE USED**

**Approach Lane**
- 100 ft. Minimum
- Per Crossing

**Back-2-Back Flasher Units**
- Crown Of Roadway
- 100 ft. Minimum
- Per Crossing

**Paved Shoulder**
- 7.5 ft. Minimum
- Per Crossing

**FIGURE 1**

**Gate Length Requirements**
See Note 6 & Sheet 3

**GENERAL NOTES**

1. An endeavor is proposed for signals; however, some form of impact attenuation device may be specified for certain locations.
2. Advance Flasher to be激励d where and if called for in express or special applications.
3. Top of foundation shall be no higher than 600 mm above finished shoulder plane.

4. Type of traffic control device
   - Flashing signals
   - Flashing signals with controller
   - Flashing signals with gate
   - Water
   - Gate

5. Class of traffic control devices
   - Flashing signals
   - Flashing signals with controller
   - Flashing signals with gate
   - Gate

**RAILROAD GRADE CROSSING TRAFFIC CONTROL DEVICES**

*These limits minimum - where field conditions dictate absolute minimum may be as per needs on site.*

**TYPE I**

**TYPE II**

**TYPE III**

**TYPE IV**

**NOTE:** Two separate foundations may be required for gate, depending on type of equipment used.
RAILROAD CROSSING AT TWO (2) - LANE ROADWAY

RAILROAD CROSSING AT MULTI-LANE ROADWAY

RELATIVE LOCATION OF CROSSING TRAFFIC
CONTROL DEVICES

NOTES:

1. When computing pavement markings, quantities do not include transverse lines.

2. Placement of signs WO-1 is in residential or business districts, where low speeds are permitted, the WO-1 sign may be placed a minimum distance of 3.0D m from the crossing, WIDE street intersections where between the R A pavement marking and the tracks are additional WO-1 sign and additional pavement marking should be used.

3. Recommended location for signs FLP-35, 35.0 m urban & 90.09 m Rural in absence of the crossing.

4. A portion of the pavement markings should be directly overlapping the WO1 sign.

5. Recommended location for signs FLP-38 A or B signs, 35.0 m urban and 90.0 m rural. See index 1788 for sign details.

6. Gate Length Requirements

   For two-way unidirectional:
   The gate should extend to within 300 mm of the centerline. On multilane approaches the maximum gate length may not extend to within 300 mm of the centerline. For these cases, the distance from the gate to the centerline shall be a minimum of 1.8 m.

   For one-way or divided sections:
   The gate shall be of sufficient length such that the distance from the gate to the inside edge of pavement is a minimum of 1.2 m.

SPEED

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For Urban: 15.0 MPK

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RAILROAD GRADE CROSSING TRAFFIC CONTROL DEVICES

[Diagram showing railroad crossing at two-lane and multi-lane roadways, with notes and specifications for pavement markings and gate length requirements.]
RAILROAD GATE ARM LIGHT SPACING

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MEDIAN SIGNAL GATES FOR
MULTI-LANE UNDIVIDED URBAN SECTIONS
(FOUR OR MORE DRIVING LANES IN ONE DIRECTION, 45 mph (70 km/h) OR LESS)

NOTE:

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC DESIGN
RAILROAD GRADE CROSSING
TRAFFIC CONTROL DEVICES

575 (931)
Wires (750 lbs.)
450
Mounting Cup
100 Min. range

PLAN

MEDIAN SECTION AT SIGNAL GATES
TYPICAL BRIDGE MOUNTS

TYPE I

TO BE USED WHERE BRIDGE OPERATORS ARE FULL TIME OR A DAILY BASIS

- FLASHING BEACON
- DRAWBRIDGE AHEAD
- STOP HERE ON RED
- ENTRANCE GATES
- EXIT GATES
- 205.0' STOP BAR
- THROWBAR SUPPORT MOUNTED (On Bridge)
- DRAWBRIDGE SIGN
- DIRECTION OF Vehicular Traffic

NOTES:
1. A siren switch shall be installed to override each timing interval in case of a malfunction.
2. "STOP HERE ON RED" is stated in Type I operation and "TRAFFIC SIGNALS" are stated in Type II operation.
3. The time between beginning of flashing yellow on "Drawbridge Ahead" sign and the clearance of traffic signals to red, or beginning of flashing red signal 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 then 5 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 II), all four red signals shall be on the same two circuit flashers, with the two yellow signals on one circuit, and the two red signals on the other.
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 traveling at the 85 percentile speed from having continuous view of at least the sign installation for approximately 5 seconds.
10. Requirements on gate installation are contained in Section 4E-14 through 4E-17 of the Manual on Uniform Traffic Control Devices.
DRAWBRIDGE SIGNAL

750 x 1500
50 mm Border - 400 mm Radius
150 mm Series "O" Letters

BLACK OPAQUE LEGEND AND BORDER ON REFLECTORIZED YELLOW BACKGROUND

TO BE USED WITH TYPE I OPERATION, AS SHOWN ON PREVIOUS SHEET

MONOTUBE SUPPORT MOUNTING

GATE & ARM DETAIL

TYPICAL LAMP PLACEMENT