This Index is not approved for use on bridges. This railing is not applicable for shielding drop-off hazards for vehicular traffic. This railing is applicable for all cases where a pedestrian or bicyclist drop-off hazards do not exceed 2'-6". Pedestrian/Bicycle Railings for commercial applications are provided in Index Nos. 850 or 880. Also applicable for select uses on sidewalks within service areas and similar locations or maintenance areas where the drop-off exceeds 2'-6". Adequate foundation support shall be provided for anchorage and stability against overturning. For unusual site conditions, a site-specific railing is to be designed by the responsible engineer. Refer to FDOT Plans Preparation Manual (Volume I) Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist drop-off hazards.

Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the live load and geometric requirements specified herein, provides a minimum 50 year design life and that deflections due to the Design Live Loads do not exceed 1½" at midpoint of the top rail. All fixed joints are to be either welded or commercially designed fixed joint systems. Each field section of railing must be identified with a permanently affixed label with the manufacturer's name and the FDOT QPL approval number. Labels must be a minimum of ½" by 3" and located at the base of a post within the field section. Project specific shop drawings are required for QPL approved railings, see Shop Drawings note. In lieu of design calculations, submit certified test reports from an approved independent testing agency. Test railing systems in accordance with ASTM E935 (Test Method A & C) using test loads at least 175% of the design load. Test proprietary or nonstandard anchorage systems in accordance with ASTM E894 (Flexural Test). Anchorage systems must resist the minimum loads at least 175% of the design load. Test railing systems in accordance with ASTM E935 (Test Method A & C) using test loads at least 175% of the design load. Test proprietary or nonstandard anchorage systems in accordance with ASTM E894 (Flexural Test). Anchorage systems must resist the minimum loads at least 175% of the design load for failure of the steel anchors or 220% of the design load for failure of the concrete foundation.

PIPE RAILING & POSTS:
Pipe Rails and Posts shall be in accordance with ASTM A53 Grade B for standard weight pipe and ASTM A36 for pipe B, C or D or ASTM A502 for structural steel. Bars for Handrails shall be in accordance with ASTM A36. Posts and End Rails shall be fabricated and installed plumb, ± 1° tolerance when measured at 3'-6" above the foundation. Corners and changes in tangential longitudinal alignment, may be made continuous with a 9" bend radius or terminated at adjoining sections with a standard end hoop where handrails are not required. For changes in tangential longitudinal alignment greater than 45°, posts shall be positioned at a maximum distance of 2'-0" each side of the corner and shall not be located at the corner apex. For curved longitudinal alignments the top and bottom rails and handrails shall be shop bent to match the alignment radius.

**RAILING MEMBER DIMENSIONS TABLE**

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>DESIGNATION</th>
<th>OUTSIDE DIMENSION</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td>2&quot; NPS (Sch. 40)</td>
<td>3.035&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Railings</td>
<td>2&quot; NPS (Sch. 40)</td>
<td>3.035&quot;</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Handrail Sleeves</td>
<td>3½&quot; NPS (Sch. 40)</td>
<td>3.375&quot;</td>
<td>0.135&quot;</td>
</tr>
<tr>
<td>Handrails</td>
<td>1½&quot; NPS (Sch. 40)</td>
<td>3.190&quot;</td>
<td>0.139&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>1&quot; Round Bar</td>
<td>3.000&quot;</td>
<td>0.145&quot;</td>
</tr>
</tbody>
</table>

**BASE PLATES:**
Base Plates shall be in accordance with ASTM A36 or ASTM A709 Grade 36.

**SHIM PLATES:**
Shim Plates shall be aluminum in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be used for foundation higel adjustments greater than 1" and localized irregularities greater than ½". Field trim shim plates when necessary to match the contours of the foundation. Revealed shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of ½" unless longer anchor bolts are provided for the exposed thread length.

**COATINGS:**
The railing shall be hot-dip galvanized after fabrication in accordance with Section 962 of the Specifications. All nuts, bolts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications.

**ANCHOR BOLTS:**
Anchor bolts shall be in accordance with ASTM F1554 Grade 36. Headless anchor bolts for Adhesive Anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. All anchor bolts shall have single self-locking hex nuts. Tack welding of the nut to the anchor bolt may be used in lieu of self-locking nuts. All nuts shall be in accordance with ASTM A563 or ASTM A194. Flat Washers shall be in accordance with ASTM F136 and Plate Washers (for long slotted holes only), shall be in accordance with ASTM A36 or ASTM A199 Grade 36. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and tack welds shall be coated with a galvanizing compound in accordance with the Specifications.

**RESILIENT AND NEOPRENE PADS:**
Resilient and Neoprene pads shall be in accordance with Specification Section 932, except that testing of the finished pads shall not be required. Neoprene pads shall be durometer hardness 60 or 70. Use Shims when necessary to match the contours of the foundation. Revealed shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of ½", unless longer anchor bolts are provided for the exposed thread length.

**RESILIENT AND NEOPRENE PADS:**
Resilient and Neoprene pads shall be in accordance with Specification Section 932, except that testing of the finished pads shall not be required. Neoprene pads shall be durometer hardness 60 or 70.

**JOINTS:**
All fixed joints are to be welded all around and ground smooth. Expansion Joints shall be spaced at a maximum of 30'-0". Expansion Joint/Splice Sleeves are also acceptable. Field splices similar to the expansion joint detail may be approved by the Engineer to facilitate shipping and handling, but rails must be continuous across a minimum of two posts. Only use the Continuity Field Splice (Detail "E") to make the railing continuous for unforeseen field adjustments.

**WELDING:**
All welding shall be in accordance with the American Welding Society Structural Welding Code (Steel) AWS/D11.1 2012 Edition or AWS/D1.1 (current edition). Weld metal shall be E60XX or E70XX. Nondestructive testing of welds is not required.

**SHOP DRAWINGS:**
Complete details addressing project specific geometry (size & grade) showing post and expansion joint locations must be submitted by the Contractor for the Engineer's approval prior to fabrication. Shop drawings shall be in accordance with the Specifications.

**PAYMENT:**
Guiderail shall be paid for under the contract unit price for Pipe Guiderail (Steel), 1.5 (Item No. 515-1). Payment for the Guiderail will be plan quantity measured as the length along the centerline of the top rail, and includes rails, posts, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the Guiderail.
ELEVATION

**TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%**

**RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%**

**RAMP REQUIREMENTS**
For slopes greater than 5%:
- Max. ramp slope = 8.33%
- Max. ramp cross-slope = 2.0%

**LANDING REQUIREMENTS**
- Max. landing slope = 2%
- Max. landing cross-slope = 2%
**Handrail Termination**

*See Index No. 521 or Contract Plans for Step Details*

**Rail Continuation Beyond Steps**
(Bottom shown, Top similar)

- Steel Handrail required for three or more steps (Handrail and cheekwalls continuous at landings)
- Handrail = 1 1/2" NPS (Sch. 40)

**Elevation**
(At-Grade Steps)

- Handrail continuous
- See Index No. 521 or Contract Plans for Step Details

**Alternate End Treatment**
(At-Grade Steps)

- Handrail Termination
- See "Typical Railing Details", Sheet 2 of 5 for post & rail details

**2010 Interim Design Standard**

- Sheet No. 2 of 5 for post & rail details

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**REVISIONS**

- Changed 2'-10" dimension to mid-height of handrail.
- Changed 2'-10" dimension to mid-height of handrail.

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For locations of Details "C", "D" and "E", see Sheet 2 of 5.

**CROSS REFERENCE:**

- Bottom Rail
- Post
- Top Rail
- Ramp or Stairs
- Match Grade of Handrail to maintain plumb posts (Typ.)
- Bevel bottom of post as required to maintain plumb posts (Typ.)
- 2" NPS, Sch. 40
- (Typ.) 5" (Typ.)
- CJP
- CJP
- CJP
- NPS, Sch. 40
- Post ~ 2"
- Top Rail ~ 2"
- 1'-0" Holes, Bottom Rail
- "Ø Venting Hole
- " Pan Head Stainless Steel (Type 316 or 18-8 Alloy) Set Screws. Set Screws must be set flush against outside face of rail (Typ.)
- Rail or Handrail Section
- "Ø x " Pan Head Stainless Steel (Type 316 or 18-8 Alloy) Set Screws. Set Screws must penetrate the full wall thickness of the inner sleeve and set flush against outside face of rail (Typ.)
- Rail or Handrail Section
- "Ø Max Gap
- 3 Sp. @ 29"
- Rail or Handrail Section
- Steel Sleeve: 1½" NPS (Sch. 40) for Rails
- 1½" NPS (Sch. 40) for Handrails
- Steel Sleeve: 1½" NPS (Sch. 40) for Rails
- 1½" NPS (Sch. 40) for Handrails
- "Ø Bar & Rod
- (centered) "Ø Hole
- 1½" NPS (Sch. 40) for Handrails
- 1½" NPS (Sch. 40) for Rails
- Steel Sleeve: (Typ.) 8 of rails
- Round over both ends of rails ½" (Typ.)
- Round over both ends of rails ½" (Typ.)
- At the Contractor's option, embedded length may be 6" when a ½" plug weld is substituted for the ½" set screw.
- Stainless Steel (Type 316)
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- Stainless Steel (Type 316)
STEEL PIPE GUIDERAIL

**TYPICAL SECTION ON CONCRETE SIDEWALK**

- **Base Plate:** Full size Shim Plates when required for height adjustment.
- **Edge Shim:** 18" long x ½ wide x thickness as reqd.
- **2 ~ 3¼ Ø Anchor Bolts (**) with Self-Locking Hex Nuts & Washers.

**DETAILED "F" (OPTIONAL SHIMMING DETAIL FOR CROSS SLOPE CORRECTION)**

- **1½ (Min.) wide bed of Adhesive Bonding Material.**
- **½ Thick Resilient or Neoprene Pad.**

**DETAILED "F" (OPTIONAL SHIMMING DETAIL FOR CROSS SLOPE CORRECTION)**

- **3½ Ø Core Drilled Hole (Min.), Clean hole in accordance with Specification Section 416.**
- **3½ Ø Anchor Bolts:** Permitted (C-I-P); Galvanized Adhesive Anchors Permitted Galvanized Steel Bolts (As Shown) (C-I-P); Galvanized U-Bolts
- **2 ~ 1½ Ø Bar:** Change 2'-10" dimension to mid-height of handrail.

**TYPICAL SECTION ON GRAVITY WALL**

- **Base Plate with Shim plates as required:** ½ thickness Resilient or Neoprene Pad.
- **Slope 2% Max. (Away from drop-off):**
- **6" Standard, 7½" for Ramps requiring handrails.**

**OPTIONAL SIDEWALK ANCHORAGE DETAIL**

- **Seal end of post with a plastic or galvanized steel plug.**

**NOTES:**

- **2 ~ 3½ Ø x 8" Steel Anchors:** Galvanized Steel Bolts (As Shown) (C-I-P); Galvanized U-Bolts Permitted (C-I-P); Galvanized Adhesive Anchors Permitted (**). Expansion Anchors Not Permitted.
- **Adhesive anchors shall be fully threaded headless anchor bolts set in drilled holes (manufacturer recommended diameter) with an Adhesive Bonding Material System in accordance with Specification Section 416 and installed in accordance with Specification Section 401. The minimum embedment is 6"**

**SPECIFICATION SECTIONS:**

- **Sections 416:** The minimum embedment is 6".
- **Sections 926, 937:** Adhesive Bonding Material System.
- **Sections 926, 937:** Epoxy Mortar (Type F) in accordance with Specification Section 926.