This railing is not applicable for shielding drop-off hazards for vehicular traffic. This railing is applicable for all areas where a pedestrian or bicyclist drop-off hazard exceeds 2'-0" or when a drop-off hazard is less than 2'-6" and is required by design. See Index No. 861 for special requirements and modifications for use on bridges. 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. The railing shown on these drawings requires a handrail for ramps steeper than a 5% grade to conform with the requirements of the Americans with Disabilities Act (ADA). Refer to FDOT Plans Preparation Manual (Volume I) Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards.

ALTERNATE DESIGN:
Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified Products list as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the design life, live loads, geometry and deflection requirements specified herein. 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 located at a maximum of 15' by 2' 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.

Rails shall be fabricated and installed plumb, ± 1" tolerance when measured at 3'-6" above the foundation. Railings should be fabricated in accordance with the American Welding Society Structural Welding Code (Aluminum) AW51554 Grade 36. Handrail posts shall be set plumb with base plates and post caps shall be in accordance with Specification Section 962 of the Specifications. 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 F436 and Distorted threads and tack welds shall be coated with a galvanizing compound in accordance with Section 962 of 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.

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. Expansion Anchors are not permitted. 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 F436 and Plate Washers (for long slotted holes only), shall be in accordance with ASTM A36 or ASTM A709 Grade 36.

WELDING:
All welding shall be in accordance with the American Welding Society Structural Welding Code (Aluminum) ANSI/AWS D1.1 (current edition). Filler metal shall be either ERS183, ERS356 or ERS556. Nondestructive testing of welds is not required. Filler metal for picket welds may be ER4043.

SHIM PLATES:
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 1/4" unless longer anchor bolts are provided for the exposed thread length.

BASE PLATES & POST CAPS:
Base Plates and Post Cap plates shall be in accordance with ASTM A820, Alloy 6061-T6.

SHIM PLATES:
Shim plates shall be aluminum in accordance with ASTM B920, Alloy 6061 or 6063. Shim plates shall be used for foundation height adjustments greater than 1/2" and localized irregularities greater than 1/2". Field trim shim plates when necessary to match the contours of the foundation. Beveled shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of 1/4".

Notes:
1. Joint welds shall be made from the faces of the plate in accordance with the American Welding Society Structural Welding Code (Aluminum) ANSI/AWS D1.1 (current edition) Filler metal shall be either ERS183, ERS356 or ERS556. Nondestructive testing of welds is not required. Filler metal for picket welds may be ER4043.

2. Shop Drawings shall be in accordance with the Specifications. Payment:
Railing shall be paid for per linear foot (Item No. 860-2-abb). Payment will be plan quantity measured as the length along the center line of the top rail, and includes rails, posts, pickets, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the railing.

RAILS, PICKETS & POSTS:
Structural Tube, Pipe and Bar shall be in accordance with ASTM B221 or ASTM B429, alloy 6061-T6. End rail 90° bends and corner bends with maximum 4'-0" post spacing may be alloy 6063-T6. Posts shall be fabricated and installed plumb, ± 1" tolerance when measured at 3'-6" above the foundation. Filler metal for picket welds may be ER4043. The aluminum railing shall be mill finish unless otherwise noted in the Contract Documents. All nuts, bolts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications. Flat Washers shall be in accordance with ASTM F436 and Distorted threads and tack welds shall be coated with a galvanizing compound in accordance with Section 962 of the Specifications.

Expansion Anchors are not permitted. 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 F436 and Plate Washers (for long slotted holes only), shall be in accordance with ASTM A36 or ASTM A709 Grade 36. After the nuts have been snug tightened, the anchor bolt threads shall be distored 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 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.

Joint's:
All fixed joints are to be welded all around and ground smooth. Expansion joints shall be spaced at a maximum 35'-0". Field splices similar to the expansion joint detail may be approved by the Engineer to facilitate handling, but railing must be continuous across a minimum of two posts. Only use the Continuous 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 (Aluminum) ANSI/AWS D1.1 (current edition). Filler metal shall be either ERS183, ERS356 or ERS556. Nondestructive testing of welds is not required. Filler metal for picket welds may be ER4043.

Shop Drawings:
Complete details addressing project specific geometry (line & grade) showing post and expansion joint locations, anchor bolt installation "Case" or lengths, must be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.

Payment:
Railing shall be paid for per linear foot (Item No. 860-2-abb). Payment will be plan quantity measured as the length along the center line of the top rail, and includes rails, posts, pickets, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the railing.

Notes:
1. In lieu of design calculations, submit certified test reports from an approved independent testing agency. For unusual site conditions a site specific railing is to be designed by the responsible engineer. The railing shown on these drawings requires a handrail for ramps steeper than a 5% grade to conform with the requirements of the Americans with Disabilities Act (ADA). Refer to FDOT Plans Preparation Manual (Volume I) Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards.

2. All welding shall be in accordance with the American Welding Society Structural Welding Code (Aluminum) ANSI/AWS D1.1 (current edition). Filler metal shall be either ERS183, ERS356 or ERS556. Nondestructive testing of welds is not required. Filler metal for picket welds may be ER4043.

Shop Drawings:
Complete details addressing project specific geometry (line & grade) showing post and expansion joint locations, anchor bolt installation "Case" or lengths, must be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.

Payment:
Railing shall be paid for per linear foot (Item No. 860-2-abb). Payment will be plan quantity measured as the length along the center line of the top rail, and includes rails, posts, pickets, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the railing.
**Interim ALUMINUM PEDESTRIAN/BICYCLE PICKET RAILING**

See Detail "K" termination, Bottom Rail

2'-6" + 2'-10" (Typ.)

Min. 1'-0" see Detail "J"

Top Rail termination See Detail "L"

Handrail Termination, tread width Equal to one side

2'-10" Min.

2" Length Of Landing 5'-0" Min.

cheekwall Bottom of 2" 3'-6" (Typ.)

R 6"

Min.

1'-10" (Typ.)

Handrail Continuous At Landing & picket details

See "Typical Railing Details", Sheet 2 of 5 for post, rail & picket details

Elevated Stairs similar

(At-Grade Steps shown, Elevated Stairs similar)

Concrete sidewalk to extend 6" min. behind railing

RAILING CONTINUATION BEYOND STEPS OR STAIRS
(Bottom shown, Top similar)

See Index No. 521 or Contract Plans for Step Details

Aluminum Handrail required for three or more steps (Handrail and cheekwalls continuous at landings)

Handrails – 1½" NPS (Sch. 40) pipe

Varies – Equal spacing

5'-0" Max. on Steps

Handrail termination (Typ.) See Detail "C"

Equal To One tread length

Varies – Equal spacing

5'-0" Max. on Steps

Handrail Continuous At Landing & Handrail

See "Typical Railing Details", Sheet 2 of 5 for post, rail & picket details

Length Of Landing 5'-0" Min.

Top Landing

9" (Min.) Wide cheekwall both sides

ELEVATION
(At-Grade Steps shown, Elevated Stairs similar)

See Index No. 521 or Contract Plans for Step Details

Top Rail termination, See Detail "T"

Handrail Termination. See Detail "T".

Bottom Rail termination, see Detail "X"
Notes:
1. Type B connection is required for use with Index No. 861
2. Optional for other installations and for connection to bottom rail.
   - Provide #10 x 1" Pan Head Stainless Steel (316 or 18-8 Alloy)
   - Screw in the last picket at each expansion or field splice joint to secure the end of the top rail.

** Embedded length may be 4" for plug welded 1/8" Ø plug weld. Set Screws must be set fine.

4 Sp. @ 2" for Anchor Bolts with Flat Washers (Typ.) or 1/8" Ø Max. Holes for Anchor Bolts with Flat Washers (Typ.)
**Type A**  (Cast-In-Place Anchor Bolts shown, Adhesive Anchors similar)

**Type A**  (Cast-In-Place Anchor Bolts shown, Adhesive Anchors similar)

**Anchor Bolt Table**

<table>
<thead>
<tr>
<th>Case</th>
<th>Structure Type</th>
<th>Dimensions</th>
<th>Anchor Length</th>
<th>Anchor Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Unreinforced Concrete</td>
<td>9&quot;</td>
<td>10 1/2&quot;</td>
<td>1/4&quot; Ø</td>
</tr>
<tr>
<td>Ia</td>
<td>Reinforced Concrete</td>
<td>4&quot;</td>
<td>9&quot;</td>
<td>10 1/2&quot;</td>
</tr>
<tr>
<td>IIb</td>
<td>Gravity Wall</td>
<td>4 1/2&quot;</td>
<td>3 1/2&quot;</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>III</td>
<td>Step Cheekwall</td>
<td>4 1/2&quot;</td>
<td>4 1/2&quot;</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>

*Embedment length C may be reduced to 9" for the 3'-6" height railings for Case Ia, when the post spacing does not exceed 5'-0".*