DESIGN LOADS, GEOMETRY & APPLICABILITY:
See the Instructions for Design Standards for the design loads, geometry and applicability requirements.

GENERAL:
Adequate foundation support shall be provided for anchorage and stability against overturning. See Index No. 861 for special requirements and modifications for use on bridges. The railing shown on these drawings requires a handrail for ramps steeper than a 3% grade to conform with the requirements of the Americans with Disabilities Act (ADA).

RAILS, PANELS AND POSTS:
Structural Extrusions, Tube, Pipe and Bar shall be in accordance with Table 1 and ASTM B221 or ASTM B429. Top, bottom and intermediate rail corner bars with maximum 4'-0" post spacing, may be Alloy 6063-T6. Perforated panels (Type 5) shall be Alloy 3003-H14. Posts shall be fabricated and installed plumb, ± 1⁄8" tolerance when measured at 3'-6" above the foundation. Picots and vertical panel elements shall be fabricated parallel to the posts, except that Type 4, 5 and 6 panel infills may be fabricated parallel to the longitudinal grade. Corners and changes in tangential longitudinal alignment shall be made continuous with a 9° bend radius or terminate at adjoining sections with mitered end sections when handrails are not required. For changes in tangential longitudinal alignment greater than 45°, posts shall be positioned at a maximum distance of 2'-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.

BASE PLATES AND RAIL CAPS:
Base Plates and Post Cap rails shall be in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be used for foundation height adjustments greater than 1/2" and localized irregularities greater than 1/8". Field trim shim plates when necessary to match the contours of the foundation. Riveted, weldment, or modified trim plates shall be hot-dip galvanized in accordance with Section 962 of the Specifications.

3D VIEW OF RAILING WITH TYPE 1 - PICKET INFILL PANEL
(42" Height shown, 54" Height Similar)

### TABLE 1 - RAILING MEMBERS

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>ALLOY&lt;sup&gt;1&lt;/sup&gt;</th>
<th>DESIGNATION</th>
<th>OUTSIDE DIMENSION</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts</td>
<td>6061-T6</td>
<td>2&quot; Round Top Cap Rail</td>
<td>21/8&quot; x 21/8&quot;</td>
<td>0.250&quot;</td>
</tr>
<tr>
<td>Top Rail</td>
<td>6061-T6</td>
<td>2.750&quot;</td>
<td>1.000&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6063-T5</td>
<td>3.000 OD x 0.125 Wall</td>
<td>3.000&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>End Hoops</td>
<td>6063-T5</td>
<td>3.000 OD x 0.125 Wall</td>
<td>3.000&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Top Joint/Splice Sleeves</td>
<td>6063-T5</td>
<td>2.500 OD x 0.125 Wall</td>
<td>2.500&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Intermediate &amp; Bottom Rail</td>
<td>6061-T6</td>
<td>2&quot; Round Bar</td>
<td>2.000&quot; x 2.00&quot;</td>
<td>0.250&quot;</td>
</tr>
<tr>
<td>Handrail joint/Splice Sleeves</td>
<td>6063-T5</td>
<td>1.500 OD x 0.125 Wall</td>
<td>1.500&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Handrails</td>
<td>6063-T5</td>
<td>1.500 NPS (Sch. 40)</td>
<td>1.500&quot;</td>
<td>0.133&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>6061-T6</td>
<td>3/4&quot; Round Bar</td>
<td>0.750&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Pickets (Type 1 Infill Panel)</td>
<td>6063-T5</td>
<td>3/4&quot; Round Bar</td>
<td>0.750&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Infill Panel Members (Types 2 - 5)</td>
<td>6063-T5</td>
<td>Varies (See Details)</td>
<td>Varies</td>
<td>Varies</td>
</tr>
</tbody>
</table>

### TABLE 1 NOTES:
(1) Alloy 6061-T6 or 6063-T5 & T6 may be substituted for Alloy 6063-T5.
(2) 0.188" wall thickness permitted for rails with post spacings less than 5'-9".

### 3D VIEW OF RAILING

- 3" Round Top Cap Rail
- Top Cap Rail Inner Splice Sleeve
- Intermediate Bottom Rail
- Alternate Top Rail Section

### ALUMINUM PEDESTRIAN/BICYCLE RAILING

**NOTES**

- 01/01/11 Date
- 862 Index No.
- 1 of 8 Sheet No.
TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%

RAMP REQUIREMENTS

LANDING REQUIREMENTS

RAILINGS ON GRADES STEEPER THAN 5%

EXPANDED ELEVATION AT CORNERS

NOTE: Non-continuous corners are permitted when handrails are not required.

CROSS REFERENCE:
For Details "C", "D" and "E", see Sheet 4 of 8.
TYPE 1 - PICKET INFILL PANEL

* Picket Spacing of 4 1/2" centers is based on a 3/8" NPS for standard applications. When shown in the Contract Plans a 4 1/2" picket spacing may be required. If an alternate design is used, maintain a maximum clear opening of 5 1/2" for standard installations and 3/8" for special conditions.

PICKET NOTES:

1. See Plans for Infill Panel option required.

NOTES:

TYPE 2 - CHAIN-LINK (Continuous Infill Panel)

CHAIN-LINK PANEL NOTE:

Chain-Link Fence Fabric shall be continuous along limits of railing. Splicing of Chain-Link panels using Tension Bars at 20'-0" minimum increments is permitted.

TABLE 2 - CHAIN-LINK PANEL COMPONENT MATERIALS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ASTM</th>
<th>COMPONENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain-Link Fence Fabric (2&quot; mesh with twisted bottom and knuckled top selvage)</td>
<td>A 392</td>
<td>Zinc-Coated Steel - No. 9 gage (coated wire diameter), Class 2 Coating</td>
</tr>
<tr>
<td>Chain-Link Fence Fabric (2&quot; mesh, coated)</td>
<td>A 491</td>
<td>Aluminum-Coated Steel - No. 9 gage (coated wire diameter)</td>
</tr>
<tr>
<td>Chain-Link Fence Fabric (2&quot; mesh with coated core wire diameter)</td>
<td>F 668</td>
<td>Polyvinyl Chloride (PVC) Coated Steel - No. 9 gage Zinc-Coated Wire (Metallic-coated core wire diameter) - See Plans for specified color of PVC</td>
</tr>
<tr>
<td>Tie Wires</td>
<td>F 626</td>
<td>Zinc-Coated Steel Wire - No. 9 gage with coating to match Chain-Link Fence Fabric</td>
</tr>
<tr>
<td>Tension Bars</td>
<td>F 626</td>
<td>3/32&quot; (min. thickness) x 3/32&quot; (min. width) x 2'-3&quot; (min. length) Steel Bars</td>
</tr>
</tbody>
</table>

**NOTES:**

1. See Plans for Infill Panel option required.
Section A-A

Detail "3A"
Intermediate Rail/Ray Connection

- Panel Mullion
- Channel 1x1x6/16
- Infill Panel (Cut or Cast)
- Channel 3/8x8/16
- See Detail "4K"

Detail "3B"
Bottom Rail/Ray Connection

- Panel Mullion
- Channel 1/2x8/16
- Infill Panel
- See Detail "4K"

Panel/arc connection

Detail "3C"
Ray/arc connection

- Panel Mullion
- Channel 1x1x6/16
- Infill Panel (Typ.)
- See Detail "4K"

Detail "3D"
arc/post connection

- Panel Mullion
- Channel 1/2x8/16
- Infill Panel
- See Detail "4K"

Section C-C
Panel/splice connection

- Panel Mullion
- Channel 1/2x8/16
- Infill Panel
- See Detail "4K"

Panel adjustment for railings
on grades

- Pan Head Screws (18-8 SS) @ 1'-8" Sp.
- 1/2" Square Bar (Rays)

Panel end cap

- Pan Head Screws (18-8 SS) @ 1'-8" Sp.
- 1/2" Square Bar (Rays)

Notes:
1. See Plans for Infill Panel Option required.

Revisions

Date: 01/01/11

New Design Standard

2010 Interim Design Standard

Sheet No. 6 of 8

ALUMINUM PEDESTRIAN/BICYCLE RAILING

Index No. 862
1. See Plans for Infill Panel Type required.
**Detail "D" (Optional Shimming Detail for Cross Slope Correction)**
(Used in lieu of Beveled Shim Plates)

**Detail "C"**
(Cast-In-Place Anchor Bolts shown, Adhesive Anchors similar)

**Anchor Bolt Table**

<table>
<thead>
<tr>
<th>CASE</th>
<th>STRUCTURE TYPE</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>C.I.P. Hex Head Bolt</th>
<th>Adhesive Anchor</th>
<th>ANCHOR SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unreinforced Concrete</td>
<td>6&quot;</td>
<td>2&quot;-2&quot;</td>
<td>5&quot;</td>
<td>10lg</td>
<td>11&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>IIa</td>
<td>Reinforced Concrete</td>
<td>4&quot;</td>
<td>4&quot;</td>
<td>9&quot;</td>
<td>10lg</td>
<td>11&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>IIb</td>
<td>Gravity Wall</td>
<td>4lg</td>
<td>4lg</td>
<td>9&quot;</td>
<td>10lg</td>
<td>11&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>III</td>
<td>Step Cheekwall</td>
<td>4lg</td>
<td>4lg</td>
<td>9&quot;</td>
<td>10lg</td>
<td>11&quot;</td>
<td>1/2&quot;</td>
</tr>
</tbody>
</table>

*Embedment length "C" may be reduced to 9" for the 42" height railings for Case IIb, when the post spacing does not exceed 5'-0".

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**Typical Section on Concrete Sidewalk**
(Case I)

**Typical Section on Retaining Wall**
(Case II)

**Typical Section on Steps & Stairs**
(Case III)