**3D VIEW OF RAILING WITH TYPE 1 - PICKET INFILL PANEL**

(42" Height shown, 48" Height Similar)

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**TABLE 1 - RAILING MEMBERS**

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>DESIGNATION</th>
<th>OUTSIDE DIMENSION</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post &quot;A&quot;</td>
<td>HSS 2½ x 1¼ x ½</td>
<td>2.50&quot; x 1.50&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Post &quot;B&quot;</td>
<td>HSS 2½ x 1½ x ½</td>
<td>2.50&quot; x 1.50&quot;</td>
<td>0.188&quot;</td>
</tr>
<tr>
<td>Top Rail</td>
<td>HSS 3.000 x 0.120</td>
<td>3.00&quot;</td>
<td>0.120&quot;</td>
</tr>
<tr>
<td>Handrail Joint/Splice Sleeves</td>
<td>HSS 3.000 x 0.120</td>
<td>3.00&quot;</td>
<td>0.120&quot;</td>
</tr>
<tr>
<td>Handrails</td>
<td>1½&quot; NPS (Sch. 40)</td>
<td>1.500&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>End Hoops</td>
<td>HSS 2 x 2 x ½</td>
<td>2.00&quot; x 2.00&quot;</td>
<td>0.125&quot;</td>
</tr>
<tr>
<td>Intermediate &amp; Bottom Rail</td>
<td>HSS 2 x 2 x ½</td>
<td>2.00&quot; x 2.00&quot;</td>
<td>0.188&quot; (1)</td>
</tr>
<tr>
<td>Top Rail Joint/Splice Sleeves</td>
<td>HSS 1.500 x 0.125</td>
<td>1.500&quot;</td>
<td>0.120&quot; (1)</td>
</tr>
<tr>
<td>Handrail Joint/Splice Sleeves</td>
<td>3½&quot; NPS (Sch. 40)</td>
<td>3.150&quot;</td>
<td>0.133&quot;</td>
</tr>
<tr>
<td>Handrail Bar</td>
<td>3½&quot; Ø Round Bar</td>
<td>0.750&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>¾&quot; Ø Round Bar</td>
<td>0.750&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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**TABLE 1 NOTES:**

(1) 0.125" wall thickness permitted for rails with post spacings less than 5'-6", except that Post Connection Sleeve must be 1½" NPS (Sch. 40).

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**NOTES:**

1. Shop Drawings are required; see Specification Section 515.
2. For bridge mounted railings work with this Index with Index 515-051 Bridge Bicycle/Pedestrian Railing.
3. Materials:
   - A. Pipe Rails and Pickets: ASTM A500 Grade B, C or D, or ASTM A53 Grade B for standard weight pipe (Schedule 40) and ASTM A46 for bars.
   - B. Structural Tube: ASTM A500 Grade A, B, C, or D or ASTM A501
   - C. Steel Plate: ASTM A36 or ASTM A709 Grade 36.
   - D. U-Channels and filler plates: ASTM A36 or ASTM A1011 (Grade 36).
   - E. Stainless steel (SS) screws: Type 316 or 18-8 Alloy.
   - F. Galvanized Steel Fasteners: coated in accordance with Specification Section 962.
     - a. Hex Head Bolts: ASTM A 307 or ASTM F1554
       - 1 ½" diameter single bolt option, Grade 36
     - b. Four bolt option, Grade 55
   - G. Bearing Pads: 1¼ Plain, Fabric Reinforced or Fabric Laminated pads that meet the requirements of Specification Section 962 for Ancillary Structures.
   - H. Crossing over expansion joints is 40'-0". Locate an Expansion Joint between the posts on either side of the Deck Expansion Joint.
   - I. Intermediate and bottom rails must be continuous across a minimum of two posts.
   - J. For curved longitudinal alignments, shop bend the top and bottom rails and handrails to match the radius.
   - K. Handrails are required and must be continuous at landings for:
     - A. Grades Steeper than 5%,
     - B. Three or more steps.
   - L. Installation: Cutting of reinforcing steel is permitted for post installed anchors.
Handrail required for ramps (Handrail continuous at landings between runs)

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

Max. landing slope = 2%
Max. landing cross slope = 2%
**SECTION A-A**

**TYPE 1 - PICKET INFILL PANEL**

- *Picket Spacing of 6" centers is based on a 1/2" Ø Bar for standard applications. When shown in the Contract Plans a 4" picket spacing may be required. See Note 4 (Sheet 1).*

**TYPE 2 - CHAIN-LINK (Continuous Infill Panel)**

**NOTES:**

1. See Plans for Infill Panel option required.

**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 x No. 9 gage wire with knuckled top and twisted bottom selvage)</td>
<td>A 491</td>
<td>Aluminum-Coated Steel - No. 9 gage (coated wire diameter)</td>
</tr>
<tr>
<td></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>Ties @ 1'-0&quot; center (Post and End Rail)</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>Ties @ 2'-0&quot; center (Intermediate &amp; Bottom Rail)</td>
<td>F 626</td>
<td>1/4&quot; (Min. thickness) x 1/8&quot; (Min. width) x 2'-3&quot; (Min. length) Steel Bars</td>
</tr>
<tr>
<td>Miscellaneous Fence Components</td>
<td>F 626</td>
<td>Zinc-Coated Steel</td>
</tr>
</tbody>
</table>

**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.
TYPE 3 - SUNSHINE INFILL PANEL

* Arc, Rays and Sun Segment may be formed in a single panel from ½" steel plate pattern cut with laser or plasma CNC, welded to a 1x1x½ Angle Border or the 2x2x½ Channel Border shown.
NOTES:

1. See Plans for Infill Panel Type required.
**Bolts & Post**

- Edge Shim (8" long x 3/4" wide x thickness as reqd.)
  - 1 1/2" (Min.) wide bed of Adhesive Bonding Material
  - 1/8" Thick Bearing Pad (Typ.)

**TYPICAL SECTION ON CONCRETE SIDEWALK**

(Case I)

- 4' Sidewalk with Thickened Edge
- Slope 2% Max. (away from drop-off)

**TYPICAL SECTION ON RETAINING WALL**

(Case II)

- 45° Washers or Leveling Channel
- Minimum #4 Bars @ 1'-0" (Max.) spacing for Case IIa

**TYPICAL SECTION ON STEPS & STAIRS**

(Case III)

- Minimum 2 ~ #4 Bars in Top of Structure for Case IIa, III & IV

**TYPICAL SECTION FOR 4-BOLT ANCHORAGE**

(Case IV)

- Optional 4-Bolt Anchorage (shown dashed)

**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</td>
<td>6&quot;</td>
<td>11&quot;</td>
<td>3/8</td>
</tr>
<tr>
<td>IIa</td>
<td>Reinforced Concrete</td>
<td>4&quot;-4&quot;</td>
<td>9&quot;</td>
<td>5/8</td>
</tr>
<tr>
<td>IIb</td>
<td>Gravity Wall</td>
<td>4½&quot;-3½&quot;</td>
<td>1&quot;-1½&quot;</td>
<td>5/8</td>
</tr>
<tr>
<td>III</td>
<td>Step Cheekwall</td>
<td>4½&quot;-4½&quot;</td>
<td>9&quot;</td>
<td>5/8</td>
</tr>
<tr>
<td>IV</td>
<td>Varies</td>
<td>5&quot;-5&quot;</td>
<td>7&quot;</td>
<td>5/8</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".

**When required; measured from top of sidewalk.**