NOTES:
1. Shop Drawings are required.
2. Work with Specification 515.
3. Materials:
   A. Pan Head Set Screws: Aluminum Alloy 2024-T4 or 7075-T73 or Stainless Steel (SS) Type 316 or 18-8 Alloy.
   C. Structural Pipe Tube and Bars: ASTM B221 or ASTM B429, Alloy 6061-T6.
   D. End Rails: 90° bends and corner bends with a maximum 4 foot spacing: Alloy 6063-T5 is permitted.

<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>2.375&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Rails</td>
<td>2&quot; NPS (SCH. 40)</td>
<td>2.375&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Rail Joint/Splice Sleeves</td>
<td>1½&quot; NPS (SCH. 40)</td>
<td>1.900&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Handrail Joint/Splice Sleeves</td>
<td>1½&quot; NPS (SCH. 40)</td>
<td>1.900&quot;</td>
<td>0.154&quot;</td>
</tr>
<tr>
<td>Handrail Support Bar</td>
<td>1&quot; Ø Round Bar</td>
<td>1.000&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

4. Fabrication:
   A. Place expansion joints at a maximum of 30'-0" spacing.
   B. Field splices are similar to the expansion joint detail and may be approved by the Engineer to facilitate handling, but top rail must be continuous across a minimum of two posts.
   C. Continuity field splice (Detail "E") only to make the railing continuous for unforeseen field adjustments.
   D. 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 when handrails are not required.
   E. For curved longitudinal alignments, shop bend top and bottom rails and handrails to match the alignment radius.
   F. For changes in tangential longitudinal alignment greater than 45°, position posts a maximum of 2'-0" each side of the corner, not at the corner apex.

5. Handrails are required and must be continuous at landings for:
   A. Grades Steeper than 5%.
   B. Three or more steps.

6. Cutting of reinforcing steel is permitted for post installed anchor bolts.

NOTE:
6. Cutting of reinforcing steel is permitted for post installed anchor bolts.
PIPE GUIDERAIL (ALUMINUM)

ELEVATION

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

RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%

NOTES:
- NPS = Nominal Pipe Size
- Structures Expansion Joints Note:
  - Keyed construction joints in Index 400-011 Gravity Structures are not considered to be expansion joints.

CROSS REFERENCE:
- For details "C", "D" and "E", see Sheet 4.

RAMP REQUIREMENTS
- Max. landing slope = 2%
- Max. landing cross-slope = 2%

LANDING REQUIREMENTS
- Max. ramp slope = 8.33%
- Max. ramp cross-slope = 2.0%

RAMP REQUIREMENTS
- For slopes greater than 5%:
  - Max. landing slope = 2%
  - Max. landing cross-slope = 2%
**GUIDERAIL ON STEPS & STAIRS**

**DESCRIPTION:**

**FY 2020-21**

**STANDARD PLANS**

**PIPE GUIDERAIL (ALUMINUM)**

**INDEX**

**515-070**

**SHEET**

**3 of 5**

---

**RAILING CONTINUATION BEYOND STEPS**

(Bottom shown, Top similar)

- Concrete sidewalk to extend 6" min. behind the railing
- See "Typical Railing Details", Sheet 3 for post & rail details

**HANDRAIL TERMINATION DETAIL "A" - PLAN VIEW**

- Aluminum Handrail required for three or more steps
- Continuous at landings
- See Index 400-021 or Contract Plans for Step Details

**ELEVATION**

(At-Grade Steps)

- Handrail Continuous
- See Detail "A" (Typ.)

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**ALTERNATE END TREATMENT**

- See "Typical Railing Details", Sheet 2 for post & rail details

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**GUIDERAIL ON STEPS & STAIRS**

**DESCRIPTION:**

**FY 2020-21**

**STANDARD PLANS**

**PIPE GUIDERAIL (ALUMINUM)**

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(At-Grade Steps)

- Handrail Continuous
- See Detail "A" (Typ.)

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**ALTERNATE END TREATMENT**

- See "Typical Railing Details", Sheet 2 for post & rail details

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PIPE GUIDERAIL (ALUMINUM)

**DETAILED **FOR CROSS SLOPE CORRECTION
(Used in lieu of Beveled Shim Plates)

**SIDEWALK ANCHORAGE DETAIL**
OPTION 1

**SIDEWALK ANCHORAGE DETAIL**
OPTION 2 & 3

**NOTES:**

**2 ~ 2" Ø x 8" or 4 ~ 2" Ø x 6" Steel Anchors:**
Galvanized Steel Bolts (As Shown) (C-I-P); Galvanized U-Bolts Permitted (C-I-P); Galvanized Adhesive Anchors Permitted

*** The minimum embedment for Adhesive Anchors is 6" for 2-Bolt Anchorage or 8" for 4-Bolt Anchorage.

**TYPICAL SECTION ON CONCRETE SIDEWALK**
**TYPICAL SECTION ON GRAVITY WALL**
(Other Retaining Walls Similar)

**TYPICAL SECTION ON STEPS & STAIRS**