NOTES:
1. Shop Drawings are required.
2. Work with Specification Section 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.
   B. Base Plates and Cap Plates: ASTM B209, Alloy 6061-T6
   C. Structural Pipe Tube and Bars: ASTM B821 or ASTM B429, Alloy 6061-T6
   D. End Rails 90° bends and corner bends with a maximum 4 foot spacing; Alloy 6063-T6 is permitted.

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E. Galvanized Steel Fasteners:
   a. Hex Head Bolts: ASTM A 307 Type 1 or ASTM F1554 Grade 36
   b. Adhesive Anchors: ASTM F1554 Grade 36 Fully Threaded Rods
   c. Hex Nuts: ASTM A63
   d. Flat Washers: ASTM F436
   f. Aluminum Shims: ASTM B209, Alloy 6061
   g. Bearing Rods: Plain, Fabric Reinforced, or Fabric Laminated meeting requirements of Specification Sections 515 & 962 for Ancillary Structures.

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

- **Top of Sidewalk or Bikeway**
- **Ground Line**
- Minimum from free end of concrete
- **Continuity Field Splice** 1'-6" Max. (as required) see Detail "E" Sheet 4

**CROSS REFERENCE:**
For Details "C", "D" and "E", see Sheet 4.

**NOTES:**
- NPS = Nominal Pipe Size
- Structures Expansion Joints Note:
  * Keyed construction joints in Index No. 6011 Gravity Structures Expansion Joints

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

**RAMP REQUIREMENTS**
- Max. landing slope = 2%
- Max. ramp cross-slope = 2.0%

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