**Standard Bridge Drawing**

General:
- The document includes standard bridge drawing templates for Twin Steel Tube Bridge Railing.
- The drawing is detailed with various sections, including View C-C and View B-B, with specific dimensions and notes for each section.

**Railing Elevation on Concrete Slab**
- View C-C: Shows the railing elevation with detailed dimensions, such as 6'-3" MAX for the slab.
- View B-B: Provides close-up details of guardrail connection plate.

**Note:**
- On each side of the bridge, one post spacing per span may be decreased to account for any required construction clearances. No post spacing shall exceed 6'-3".
- Symmetrical about & railing.

**Section F-F**
- The concrete above the construction joint after installation of the railing is complete.
- In lieu of providing the wingwall construction joint, the contractor may field drill holes for post-to-tube rail connections at all flush mounted post locations. Repair galvanizing according to C&MS 711.02.

**Flush Mounted Post Anchor Detail**
- Flanged plate:
  - 1" BASE PLATE
  - HEAVY HEX NUT with WASHER (TYP.)
- Anchor bolts:
  - 2 - 1" £ x 13" long anchor bolts with 5" thread length
  - HEAVY HEX JAM NUT with WASHER (TYP.)

- Tack weld each bolt head to 3⁄8" spacer plate. Use two welds per bolt.
GENERAL: THIS DRAWING PROVIDES DESIGN AND CONSTRUCTION DETAILS. THE PROJECT PLANS FOR EACH STRUCTURE SHALL PROVIDE NECESSARY ADDITIONAL RAILING DIMENSIONS INCLUDING RAILING LENGTHS, POST SPACINGS, POST LENGTHS AND ANY OTHER PERTINENT INFORMATION INCLUDING SPECIAL NOTES AND DETAILS. FOR ADDITIONAL GUARDRAIL DETAILS, SEE STD. CONSTR. DWGS. WDS-1.1, WDS-2.1 AND OTHER DRAWINGS PERTAINING TO DESIGN OF SPECIFIC GUARDRAIL TYPES.

APPLICATION: THIS RAILING SYSTEM HAS BEEN ACCEPTED TO THE TL-4 CRITERIA OF NCHRP REPORT 550. THE TWIN STEEL TUBE RAILING SHALL BE USED ON STRUCTURES DESIGNED TO DRAIN SURFACE WATER OVER THE SIDES OF THE STRUCTURE. THIS RAILING IS NOT APPLICABLE TO COMPOSITE BOX BEAM BRIDGES WITH DESIGN OVERHANGS GREATER THAN 2" OR TOP FLANGE THICKNESSES LESS THAN 5".


DESIGN DATA:
- REINFORCING STEEL = MINIMUM YIELD STRENGTH = 60,000 PSI
- STEEL TUBING = MINIMUM YIELD STRENGTH = 46,000 PSI
- REINFORCING STEEL = MINIMUM YIELD STRENGTH = 60,000 PSI

MATERIALS:
- FURNISH SHAPED STRUCTURAL TUBING ACCORDING TO TDP-10 (ASTM A500, GRADE B). IN LIEU OF THE "SHOP WEIGHT TEST" (ASTM E8), THE MANUFACTURER MAY CHOOSE TO SUPPLY TUBING THAT MEETS IMPACT TOUGHNESS ACCORDING TO ASTM 965, "NOTCHED BAR IMPACT TESTING OF METALLIC MATERIALS (CVN)". THE CVN IMPACT REQUIREMENTS SHALL BE 0 FT-LBS AT 0°F. FOR EACH HEAT SUPPLIED, THE MANUFACTURER SHALL FURNISH ONE 2" X 18" SPECIMEN, MARKED WITH ITS HEAT NUMBER, FOR IMPACT TESTING.
- FURNISH STRUCTURAL STEEL SHAPES, PLATES AND PLATE MATERIALS ACCORDING TO T100.

DOWELING:
- CALVANIZE ALL SHAPED STRUCTURAL TUBES, POSTS, PLATES, HARDWARE AND ACCESSORIES IN ACCORDANCE WITH T100. PRIOR TO CALVANIZING, ROUND ALL STRUCTURAL TUBE ENDS AND REMOVE BURNS FROM ALL STEEL TUBING, SHAPES AND PLATES.

HORIZONTAL CURVATURE: THIS STANDARD IS APPLICABLE TO STRUCTURES HAVING A RAILING CURVATURE RADIUS OF 20 FEET OR MORE. FOR A RADIUS OF LESS THAN 20 FEET, THE DESIGN SHALL BE SPECIAL. FOR ALL CURVED STRUCTURES, HEAT CURVE THE HORIZONTAL RAIL ELEMENTS ACCORDING TO THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS.

TUBE SPLECES: LOCATE SPLICES SO THAT EACH TUBE SEGMENT IS CONNECTED TO NOT LESS THAN TWO POSTS. STAGGER SPLICES IN THE TOP AND BOTTOM TUBES TO AVOID OCCURRENCIES IN THE SAME PANEL.

FASTENERS: FURNISH MATERIAL CONFORMING TO THE FOLLOWING:
- ALL ANCHOR BOLTS, SLEEVE NUTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A 449.
- THE HEX CAP SCREWS (BOLTS), HEX NUTS AND WASHERS SHALL CONFORM TO ASTM A 449.

BOX BEAM:
- THE DISTANCE FROM THE CENTERLINE OF A GUARDRAIL POST TO THE ABUTMENT END OF THE BEAM OR TO THE CENTERLINE OF A TIE ROD SHALL NOT BE LESS THAN 3'-10".
- THE DISTANCE FROM THE CENTERLINE OF A GUARDRAIL POST TO THE PIER END OF THE BEAM SHALL NOT BE LESS THAN 2'-10".
- THE LOCATION OF THE HORIZONTAL TIE RODS MAY NEED TO BE ADJUSTED IN ORDER TO ACCOMMODATE EACH POST ANCHOR DEVICE.


BASIS OF PAYMENT: THE DEPARTMENT WILL CONSIDER THE COSTS ASSOCIATED WITH FURNISHING AND INSTALLING STEEL TUBING, STEEL POSTS, POST ANCHOR DEVICES, ANCHOR PLATES, TUBE SPLICE PLATES, STEEL SHIM PLATES, GUARDRAIL CONNECTION PLATES, ANCHOR BOLTS, 3/8 ROUND HEAD BOLTS, SLEEVE NUTS, NUTS, CAP SCREWS, WASHERS AND OTHER HARDWARE TO BE INCLUDED WITH THE TWIN STEEL TUBE RAILING. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM 517, RAILING (TWIN STEEL TUBE). THE DEPARTMENT WILL PAY FOR BRIDGE TERMINAL ASSEMBLY HARDWARE SEPARATELY.