Section 2429. Pre-Engineered Steel Truss Recreational Trail Bridge

2429.01 DESCRIPTION.

A. These specifications are for an engineered truss bridge of welded steel construction and are minimum standards for design and construction.

B. Install an engineered truss bridge of welded steel construction manufactured by a company on the approved manufacturer's list in Materials I.M. 557, Appendix D.

2429.02 DESIGN AND MATERIALS.

A. Design.

1. Designer Qualifications.

a. No less than 5 years experience in design and fabrication of engineered bridge trusses. In addition, provide information regarding similar projects that were previously completed, including references.

b. Professional Engineer licensed in the State of Iowa.

2. Design Loads and Related Requirements.

a. Allowable Design Stresses according to the "Standard Specifications for Highway Bridges" adopted by AASHTO.

b. Vertical Loads:

- Live load: 85 pounds per square foot (4 kPa) applied to the complete width of the deck area shown in the contract documents.
- Concentrated load: located at mid-span and equal to 10,000 pounds (4.5 Mg) plus 30% for impact loading.
- Vehicle loads: 20,000 cycles or less.
- Buoyancy due to submergence.

c. Horizontal Loads:

- Minimum horizontal wind load: 30 pounds per square foot (1.4 kPa) applied to the entire truss as if fully enclosed.
- Seismic and loads combinations: applied according to the AASHTO Specifications for Highway Bridges noted in this specification.

d. Bridge camber at center of bridge span of 1% of the total bridge span. Camber to offset full dead load deflections.

e. Bridge designed to accommodate a temperature differential of 100ºF (56ºC).

f. Teflon or other approved slip pads placed between the bearing and setting plates provided by the bridge manufacturer. At least 1 inch (25 mm) clearance provided between the bridges and the abutments.

g. Welded Tubular Connection Design: according to the Structural Welding Code from ANSI/AWS D1.1, Chapter 10 Tubular Structures.

h. Shop Drawings (Manufacturer's standard schematic drawings and diagrams):

1. Unique drawings prepared to illustrate the specific portion of the project.

2. All relative design information such as member sizes, bridge reactions, and general notes clearly specified.

3. Accurately prepared to be complete in every respect. Include cross referenced details and sheet numbers. Signed and sealed by a Professional Engineer licensed in the State of Iowa.

4. Submit shop drawings according to Article 1105.03.

i. Maximum deflection due to live load plus impact not to exceed that specified in the contract documents.

j. If intermediate piers are required for the bridge over a railroad, a minimum 25 foot (7.62 m) horizontal and vertical clearance, or a distance as specified elsewhere in the contract documents, from the track is required.

3. Geometry.

a. Low profile (pony truss) half through truss design.

b. Provide one diagonal per panel. Chords, diagonals, verticals, and bracing shall be tube steel.

c. A minimum of 72 inches (1.8 m) from top of bottom chord to top of railing.

4. Railings and Accessories.

a. All railings:

- Located on the inside surface of the trusses.
- Smooth inside surface with no protrusions or depressions.

b. Top railings: a minimum of 54 inches (1.4 m) above the floor for bicycle applications, according to AASHTO.

c. Safety railings: a maximum opening of 4 inches (100 mm). All ends of angles and tubes welded and ground smooth.

B. Materials.

1. Structural Thickness.

- Structural tubing: minimum material thickness of 1/4 inch (6 mm).
- All other structural members: minimum material thickness of at least 5/16 inch (8 mm).

2. Unpainted Bridges.

- Unpainted and fabricated from high strength weathering steel.
- All fabrications produced from high strength, low alloy, atmospheric corrosion resistant ASTM A 606 or ASTM A 242 plate and structural shapes.
- Minimum yield (F_y) greater than 50,000 psi (345 MPa).

3. Field Splices.

- Bolted with high strength bolts according to ASTM A 325.
- Type 3 bolts are required for Weathering Steel bridges, according to ASTM A 325 or A 490.
- Field connection bolts tightened by the “turn-of-nut method” to obtain proper torque. See Article 2408.03, S, 5, b.

4. Welding.

- Materials: according to AWS.
- Welders: certified according to AWS D1.1.

5. Railings and Accessories.

- Railings (except rub rail): fabricated from steel.
- Rub rail: fabricated from 2 inch by 8 inch (50 mm by 200 mm) treated wood.

6. Toe Plates.

Toe plates are required. Use 6 inch x 5/16 inch (150 mm x 8 mm) plate located 2 inches (50 mm) above the floor decks.

7. Anchor Bolts.

Provided by the manufacturer.

2429.03 CONSTRUCTION.

A. Fabrication.

Ensure quality, fabrication, and shop connections comply with AASHTO Specifications for Highway Bridges noted in this specification.

B. Welding.

1. Welding.

- Comply with Article 2408.03, B.
- Use E70 or E80 series electrodes that have the same weathering characteristics as corrosion-resistance steel, or the gas metal arc welding process (Short Circuiting Transfer) with Carbon Dioxide/Argon shielding gas with ER80-D2 filler material conforming to AWS A5.28.

2. Welding Operators.

Properly accredited experienced operators, each of whom must:

- Submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the project, and
- Have demonstrated the ability to make uniform good welds meeting the size and type of weld required.

C. Quality Assurance.
The Manufacturer pays all costs associated with the following inspection requirements for fabrication and finishes:

1. Welded tubular connections qualified per AWS D1.1-94 using short circuited gas metal arc process.

2. All welds to be visually inspected.

3. Base material certifications to be supplied by the material suppliers.

D. Weld Testing.
Have nondestructive weld testing performed by an independent agency. The Manufacturer pays for nondestructive weld testing.

1. Ten percent of all welds are to be magnetic particle tested.

2. Ultrasonic testing is to be performed on all top and bottom chord, full penetration welds.

E. Finishes.
Sandblast unpainted weathering steel bridges according to SSPC Surface Preparation Specification No. 6.

F. Delivery and Erection.

1. Manufacturer's Responsibilities.
- Deliver the bridge by truck to a location nearest to the site accessible by roadways.
- Notify the Contractor in advance of the expected arrival time.
- Provide the Contractor information regarding delays after the truck departs the plant, such as inclement weather, delays in permits, rerouting by public agencies, or other circumstances, as soon as possible.
- Advise the Contractor of the actual lifting weights, attachment points, and all other pertinent information needed to install the bridge.

2. Contractor's Responsibilities.
- Provide proper lifting equipment.
- Unload the bridge from the truck at the time of arrival.
- Splice and bolt the components.

2429.04 METHOD OF MEASUREMENT.
Measurement will be by count for each Pre-engineered Steel Truss Recreational Trail Bridge installed.

2429.05 BASIS OF PAYMENT.

A. Payment for each Pre-engineered Steel Truss Recreational Trail Bridge furnished and erected will be the contract unit price.

B. Payment is full compensation for:
- Designing, manufacturing, delivering, erecting, and assembling the unit complete as shown in the contract documents, and
- All foundations, footings, abutments, piers, pier caps, bearing plates, pads, bolts, anchor bolts, grouting, decking, railing, and any other materials, labor, and equipment necessary to complete the bridge in place.