



Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS FOR PRE-ENGINEERED STEEL TRUSS RECREATIONAL TRAIL BRIDGE

Effective Date
October 16, 2007

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01051.01 DESCRIPTION.

These Supplemental Specifications are for an engineered truss bridge of welded steel construction and shall be regarded as minimum standards for design and construction.

The bridge shall be manufactured by a company on the approved manufacturer's list in Materials I.M. 557, Appendix D.

01051.02 DESIGN.

A minimum of 5 years experience in design and fabrication of engineered bridge trusses is required for an approval of a manufacturer. In addition, a manufacturer requesting approval shall provide information regarding similar projects that were previously completed, including references.

Structural design of the bridge shall be by a Professional Engineer licensed in the State of Iowa. Allowable Design Stresses shall be in accordance with the "Standard Specifications for Highway Bridges" adopted by AASHTO.

A. Design Loads and Related Requirements.

1. The bridge shall be designed for an evenly distributed live load of 85 pounds per square foot (4 kPa) applied to the complete width of the deck area shown in the plans. The bridge shall also be designed to withstand a concentrated load located at mid-span equal to 10,000 pounds (4.5 Mg) plus 30% for impact loading. Vehicle loads are occasional and shall be 20,000 cycles or less. The bridge shall be designed for buoyancy due to submergence.
2. The bridge shall be designed for a minimum horizontal wind load of 30 pounds per square foot (1.4 kPa) applied to the entire truss as if fully enclosed. Seismic and loads combinations shall be applied in accordance with the AASHTO Specifications for Highway Bridges noted in these Supplemental Specifications. No other horizontal loads need to be applied to the bridge.

3. Bridge camber at center of bridge span shall be 1% of the total bridge span. The bridge shall be cambered to offset full dead load deflections.
4. The bridge shall be designed to accommodate a temperature differential of 100°F (38.56°C). Teflon or other approved slip pads shall be placed between the bearing and setting plates provided by the bridge manufacturer. At least 1 inch (25 mm) clearance shall be provided between the bridges and the abutments.
5. Welded Tubular Connection Design shall be in accordance with the Structural Welding Code from ANSI/AWS D1.1, Chapter 10 Tubular Structures.
6. Shop Drawings: Manufacturer's standard schematic drawings and diagrams:
 - a. Shop drawings shall be unique drawings, prepared to illustrate the specific portion of the project.
 - b. All relative design information such as member sizes, bridge reactions, and general notes shall be clearly specified on the shop drawings.
 - c. Shop drawings shall be accurately prepared to be complete in every respect. The shop drawings shall have cross referenced details and sheet numbers. All shop drawings shall be signed and sealed by a Professional Engineer licensed in the State of Iowa.
 - d. Shop drawings shall be submitted in accordance with Article 1105.03 of the Standard Specifications.
7. Maximum deflection due to live load plus impact shall not exceed that specified in the plans.
8. 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.

B. Geometry.

1. Low profile (pony truss) half through truss design.
2. Provide one diagonal per panel. Chords, diagonals, verticals, and bracing shall be tube steel.
3. The bridge shall be a minimum 72 inches (1.8 m) from top of deck bottom chord to top of railing.

01051.03 MATERIALS.

A. Structural Thickness.

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

B. Unpainted Bridges.

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

C. Field Splices.

Field splices shall be bolted with high strength bolts in accordance with ASTM A 325. Type 3 bolts are

required for Weathering Steel bridges, in accordance with ASTM A 325 or A 490. Field connection bolts shall be tightened by the “turn of the nut method” to obtain proper torque.

D. Welding Materials.

Welding materials shall be in accordance with the AWS. Welders shall be certified in accordance with AWS D1.1.

E. Railings and Accessories.

1. All railings shall be located on the inside surface of the trusses. The railings shall be fabricated from steel. Rub rail shall be fabricated from 2 inch by 8 inch (50 mm by 200 mm) treated wood.
2. The railings shall have a smooth inside surface with no protrusions or depressions.
3. In accordance with AASHTO, the top railings shall be a minimum of 54 inches (1.4 m) above the floor for bicycle applications.
4. Safety railings shall have a maximum opening of 4 inches (100 mm). All ends of angles and tubes shall be welded and ground smooth.

F. 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.

G. Anchor Bolts.

Anchor bolts shall be provided by the manufacturer.

01051.04 CONSTRUCTION.

A. Fabrication.

Quality, fabrication, and shop connections shall be in accordance with AASHTO Specifications for Highway Bridges noted in these Supplemental Specifications.

B. Welding.

1. Welding operators shall be properly accredited experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the project, and who have demonstrated the ability to make uniform good welds meeting the size and type of weld required.
2. Welding shall be in accordance with Article 2408.13 of the Standard Specifications. Welds shall utilize 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.

C. Quality Assurance.

All costs associated with the following inspection requirements for fabrication and finishes shall be paid by the manufacturer.

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.

Nondestructive weld testing shall be performed by an independent agency, and shall be paid for by the manufacturer.

1. Ten percent of all welds to be magnetic particle tested.
2. Ultrasonic testing of all top and bottom chord, full penetration welds.

E. Finishes.

Unpainted bridges of weathering steel shall be sand blasted in accordance with the SSPC Surface Preparation Specification No. 6.

F. Delivery and Erection.

1. The bridge shall be delivered by truck to a location nearest to the site accessible by roadways. The Contractor shall be responsible for unloading the bridge from the truck at the time of arrival.
2. The manufacturer shall notify the Contractor in advance of the expected arrival time. Information regarding delays after the truck departs the plant such as inclement weather, delays in permits, rerouting by public agencies, or other circumstances shall be passed on to the Contractor as soon as possible.
3. The manufacturer shall advise the Contractor of the actual lifting weights, attachment points, and all other pertinent information needed to install the bridge. Unloading, splicing, bolting, and proper lifting equipment is the responsibility of the Contractor.

01051.05 METHOD OF MEASUREMENT.

The Engineer will measure, by count, each Pre-engineered Steel Truss Recreational Trail Bridge installed.

01051.06 BASIS OF PAYMENT.

For each Pre-engineered Steel Truss Recreational Trail Bridge furnished and erected, the Contractor will be paid the unit contract price. This payment shall be full compensation for designing, manufacturing, delivering, erecting, and assembling the unit complete as shown in the contract documents, with 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.