



**SPECIAL PROVISIONS
FOR
PRE-ENGINEERED STEEL TRUSS RECREATIONAL TRAIL BRIDGE**

**Dubuque County
EDP-C031(50)--7Y-31**

**Effective Date
April 17, 2012**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

097042.01 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.

097042.02 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 General Requirements.

- a. Load and Resistance Factor Design according to the *LRFD Guide Specifications for the Design of Pedestrian Bridges, December 2009* (Guide Specifications), adopted by AASHTO.
- b. **Vertical Loads.**
 - 1) Uniform live load: 90 pounds per square foot applied to the entire deck area shown in the contract documents.
 - 2) Concentrated live load: 1,000 pounds applied over a square area measuring 4 inches per side.
 - 3) Vehicle load: AASHTO H-10 vehicle (20,000 lbs.)
 - 4) Uplift wind load: 20 pounds per square foot applied at the windward quarter point of the bridge width.
- c. Horizontal Loads (Wind Load): apply per the AASHTO Guide Specifications, with a minimum of 35 pounds per square foot applied to the entire truss as if fully enclosed.

- d. Seismic loads and requirements: applied according to the *AASHTO LRFD Bridge Design Specifications*, 4th Edition, with 2008 and 2009 Interims.
- e. Bridge designed to accommodate a temperature differential of 150°F (75°F each way from 50°F).
- f. Teflon or other approved slip pads placed between the expansion bearing and setting plates provided by the bridge manufacturer. Provide at least 1.5 inches clearance between the bridge and the abutments.
- g. Welded Tubular Connection Design: according to Chapter K of the *AISC Steel Construction Manual* (2005) or Section 2.20.6 of the *Structural Welding Code ANSI/AWS D1.1*.
- 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 vertical deflection due to unfactored pedestrian live load not to exceed $L/360$.
- j. Maximum horizontal deflection due to unfactored wind load not to exceed $L/360$.
- k. Vibration: as specified in the *AASHTO Guide Specifications* referenced above.

3. Geometry.

- a. Parallel chord truss with sloped or vertical ends.
- b. Web member configuration to be of Pratt or Warren style.
- c. Overhead (portal) bracing is required. Minimum vertical clearance above top of deck to bottom of overhead bracing shall be 8.5 feet.
- d. Bridge camber to exactly match the profile specified in the contract documents. Camber to offset full dead load deflections.
- e. Structure depth: maximum of 18 inches from top of deck to bottom of bottom chord (low steel).
- f. Span length: 136 feet 10 inches measured as the horizontal clearance between abutment backwalls along skew.
- g. Deck width: 12 feet clear distance between railings and/or curbs.
- h. Skew: skew bridge ends at 25 degrees as shown in the contract documents.
- i. Abutment backwall height: as shown in the contract documents, with a minimum of 1.5 feet and maximum of 2.5 feet
- j. Bridge seat: bridge bearings must fit within the abutment bridge seat width and length dimensions as shown in the contract documents.
- k. Both abutments will be constructed at the same elevation.

4. Decking.

Reinforced concrete deck is required. Apply Section 2412 of the Standard Specifications.

a. Design.

- 1) Concrete deck design to be provided by the manufacturer.
 - 2) Consideration of composite action from the metal deck forms is prohibited.
 - 3) Provide upper and lower layers of longitudinal reinforcing, one layer of transverse reinforcing for a deck thickness of 6 inches or less, and two layers of transverse reinforcing for a deck thickness greater than 6 inches.
 - 4) Minimum clear cover to be 2 inches at the top of deck and 1 inch to all other surfaces and forms.
- b. Formwork: use stay-in-place metal forms designed for a construction live load of 20 pounds per square foot or a 200 pound point load. Deflection due to wet concrete is limited to $L/180$ and $3/4$ inch.
 - c. Cross-slope: crowned with 2% transverse slopes.
 - d. Curbs: provide 6 inch tall by 4 inch wide concrete curbs poured integral with the deck, in lieu of toe plates.

5. Railings and Accessories.

a. All railings:

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

- b. Top railing: minimum of 54 inches above the floor for bicycle applications, according to AASHTO.
- c. Safety railing: horizontal with a maximum opening of 4 inches. All ends of angles and tubes welded and ground smooth.
- d. Rub railing: minimum of 32 inches above the floor.
- e. Screening: provide chain-link fence fabric with a 2 inch maximum opening on the sides of the truss above the top railing and below the top chord. Fabric can be placed either inside or outside of the truss, and framing shall be integral with the bridge.
- f. Cover plates: provide plates to cover expansion gaps at the bridge ends. Cover plates shall fit tightly to the top of backwall without any bridge weight bearing on the backwall. Consider joint size and weight of vehicles to determine plate thickness.

6. Bearing System.

Bearing systems and anchor bolts shall be designed by the manufacturer to resist the vertical and horizontal loading as specified above, and to provide structural continuity of superstructure with the substructure. One bridge end shall be fixed and the other shall allow movement under thermal expansion and contraction.

B. Materials.

All chords, diagonals, verticals, and bracing shall be fabricated from square and/or rectangular structural steel tubing.

1. Structural Thickness.

- a. Structural tubing: minimum material thickness of 1/4 inch.
- b. All other structural members: minimum material thickness of at least 5/16 inch.

2. Unpainted Bridge.

- a. Unpainted and fabricated from high-strength weathering steel.
- b. All fabrications produced from high-strength, low-alloy, atmospheric corrosion resistant ASTM A 847 structural tubing and ASTM A 588 or ASTM A 242 plate and structural shapes.
- c. Minimum yield (Fy) greater than 50,000 psi.

3. Field Splices.

Up to two bolted field splices will be allowed.

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

4. Welding.

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

5. Decking.

Use materials meeting the requirements of the respective materials in Division 41 of the Standard Specifications.

- a. Metal decking: 20 gage (min.) galvanized stay-in-place metal decking with steel side and end dams, according to ASTM A 653.
- b. Concrete: normal weight concrete with a minimum 28-day strength (f'c) of 3,500 psi.
- c. Reinforcement: Grade 60 deformed bars.

6. Railings and Accessories.

- a. Railings (except rub rail): fabricated from corrosion-resistant steel.
- b. Rub rail: fabricated from 2 inch by 8 inch Ipe wood.
- c. Screening: polyvinyl chloride-coated chain-link fabric according to ASTM F 668 Class 2, fabricated from No. 9 wires, with a 2 inch maximum opening. Color shall be black, according to ASTM F 934.

7. Anchor Bolts.

Use anchor bolts meeting the requirements of Article 2405.03, H, 1 of the Standard Specifications.

- a. Anchors shall be set in drilled holes, installed with a chemical adhesive system, except that they may be preset in concrete when design forces require.
- b. Number, diameter and locations of anchors shall be designed by the bridge manufacturer.
- c. Anchors shall conform to ASTM F 1554.

097042.03 CONSTRUCTION.

A. Fabrication.

Ensure quality, fabrication, and shop connections comply with the *AASHTO LRFD Bridge Design Specifications*. Where water collection inside of structural tubing is possible during construction or service, weep holes shall be provided at low points.

B. Welding.

1. Welding.

- a. Comply with Article 2408.03, B.
- 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:

- Welded tubular connections qualified per AWS D1.1-94 using short circuited gas metal arc process,
- All welds to be visually inspected, and
- 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 (SSPC-SP6).

F. Delivery and Erection.

1. Manufacturer's Responsibilities.

- a. Deliver the bridge by truck to a location nearest to the site accessible by roadways.
- b. Notify the Contractor in advance of the expected arrival time.
- c. 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.
- d. Advise the Contractor of the actual lifting weights, attachment points, and all other pertinent information needed to install the bridge.

2. Contractor's Responsibilities.

- a. Provide proper lifting equipment.
- b. Unload the bridge from the truck at the time of arrival.
- c. Splice and bolt the bridge components.
- d. Provide and install the abutment anchor bolts.
- e. Place the reinforced concrete deck.

097042.04 METHOD OF MEASUREMENT.

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

097042.05 BASIS OF PAYMENT.

- A. Payment for each Pre-engineered Steel Truss Recreational Trail Bridge furnished and delivered will be the contract unit price.
- B. Payment is full compensation for:
 - Designing, manufacturing and delivering the unit complete as shown in the contract documents, and
 - All bearing plates, pads, railing, fencing, structural bolts and any other materials, labor, and equipment necessary to furnish the bridge as shown in the contract documents.