

BRIDGE ST – BIG FORK

STPB 9015(128)

STEEL TRUSS – DESIGN AND FABRICATION

(For Information Only)

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A. General. MDT will furnish the steel through-truss bridge for contractor installation. Materials provided by the State include: weathering steel 144-ft Pratt through truss bridge superstructure, elastomeric bearing devices, and deck design details for construction by contractor. The following provisions describe the design and fabrication requirements for the prefabricated truss that were included in the procurement documents for these state furnished materials:

B. Design, fabricate, rate, and deliver a new steel through-truss bridge utilizing bolted steel connections in accordance with this Special Provision and the latest version of the Montana Standard Specifications for Road and Bridge Construction ([link to specifications](#)). Partial Bridge Plans are being provided so the Truss Manufacturer can see the design intent of the project. Several items are to be included in this work:

Design, fabricate, and deliver a steel through-truss that meets the specifications of this Special Provision and the design intent, and requirements, provided on the attached Partial Bridge Plans.

- 1) Design, procure, and deliver elastomeric bearing assemblies, including the masonry plate and sole plate on all four corners of the truss.
- 2) Design a reinforced concrete deck with curb. Match the roadway cross slope and profile as shown in the attached plans. Use epoxy coated reinforcing steel. The deck must be composite with the stringers. Account for relative deck displacements by providing a positive means of connection to supporting members. Use 2½ inch concrete cover over the top reinforcement in the bridge deck. Assume that ½ inch of that cover is a sacrificial wearing surface for design of the bridge. Refer to MDT issued Bridge Deck Design Memos, dated June 9, 2015 ([link](#)), June 10, 2015 ([link](#)), and February 6, 2017 ([link](#)). Use the curb geometry specified on the plans. The deck, curbs, reinforcing steel, railings, and all associated hardware will be provided and installed by the contractor.
- 3) Do not use stay in place deck forms or any other system that restricts in any manner the long-term ability to inspect all bridge elements.
- 4) Provide a preliminary load rating and resubmit a final in-service load rating in accordance with MDT's Load Rating Requirements for Bridge Design Contracts ([link](#)).
- 5) Miscellaneous related design and materials for the steel truss as described in this Special Provision.
- 6) No substructure design is required below the bearings.

C. Truss Bridge Requirements.

Provide a Pratt through-truss superstructure with the bay geometry similar to the configuration shown on the attached Partial Bridge Plans.

- 1) The single span superstructure is 144'-0" CL Brg to CL Brg with a planned edge-of-slab to edge-of-slab deck width of 26'.
- 2) Bolted Double Gusset Plate Connections: The truss girders must be designed using gusset plates on each side of the chord member and high strength structural fasteners (bolts) to connect web (diagonal and vertical) members to the chord members. Shim or fill plates will be used where web members do not dimensionally fit up with the larger chord members. Shop welding on truss members is prohibited.
- 3) Use decorative lacing on upper transverse bracing and end portals but limit or eliminate the use of decorative lacing on vertical truss members.

4) Design and detail foundation connections to allow access to the anchor bolts for ease of installation, maintenance, and inspection. Design the bearing system for easy removal of the bearing pads, with keepers or pockets. See bridge plans for foundation geometry.

5) Provide updated truss reactions if steel truss dead loads are over 10% of assumed service dead load of 110 kips per abutment, or 55 kips per bearing.

6) Modifications to the substructure dimensions and elevations, and road profile will not be considered without direct consent of the MDT Bridge Bureau.

7) Include all bolts and associated hardware to fully assemble the truss and attachments.

8) Any miscellaneous items are to be provided for the steel truss super structure and bearing assemblies as specified in the attached Partial Bridge Plans.

9) Provide a 3-coat paint system per MDT Standard Specifications. See attached Partial Bridge Plans for the locations of isolated painting of steel truss members. SAE-AMS-STD 595 color 30111 and 30059 have been used in the past to match weathering steel. Other paint colors to match weathering steel may be submitted for approval with the MDT Bridge Bureau.

10) Include portal plaque and attachment details similar to the attached Partial Bridge Plans as part of truss. Blast clean the plaque to SSPC-SP 6 to match the structural steel of the truss.

D. Loads, Movements, and Displacements. Design the steel truss as a single span, single lane bridge with bolted connections with the following design criteria:

Future Wearing Surface: 35psf (pounds per square foot).

1) Bridge rails, pedestrian rails, and curbs as specified in the attached plans.

2) Future Utility Load: 50plf per side (pounds per linear foot).

3) Vehicular Live Load Design: Design the live load using HL93 per the AASHTO LRFD specifications. Consider pedestrian loads in combination with the single lane, as well as potential 2 lane loading for future use.

4) Vehicular Live Load Rating: HL-93, AASHTO Legal Loads, AASHTO SHV loads, and EVs.

5) Live Load Deflection: Less than the span length divided by 1000 (L/1000) for vehicular and pedestrian loads.

6) Camber the bridge to offset dead load deflections, excluding future wearing surface, such that there is no sag in the finished grade profile. Show the bridge camber on the drawings. Dead load deflection must be accommodated by forming camber into the unloaded geometry of the members. Profile grade curvature must be considered when determining the fabricated (or induced) camber of the members. Sag due to pin and pin-hole clearance contributes to a structure's total deflection and is undesirable and prohibited. Bidders with panel bridge types that sag will be considered unresponsive.

7) Shop assembly must conform to AASHTO Construction Specifications and AASHTO/NSBA S2.1 Guide Specifications. The Truss Manufacturer must shop assemble the entire span, to conform to the camber and blocking requirements shown in the Shop Drawings in an unloaded, laydown process. If the span is too long for a complete shop assembly, the Manufacturer must check-assemble a minimum of three adjacent units of the bridge, in a sequential manner, to ensure that an accurate fit-up of assemblies is possible in the field. Stringer beams, transverse bracing and accessory pieces are not required to be check-assembled to their primary members.

8) Design the bridge bearings to accommodate expansion and contraction within a temperature range of 110°F to -40°F. Show expected movements from the setting temperature in the design and on the plans. The bearings shown in the attached Partial Bridge Plans are preliminary, and dimensions and final configuration may be different from what is shown. The layout of the bearings on the substructure must remain the same as shown on the Partial Bridge Plans without direct consent of the MDT Bridge Bureau.

- E. Design, Engineering, and Fabricator Certification.
- 1) Design the bridge in accordance with AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) including all interims.
 - 2) For the fabrication of the steel truss and components, follow AASHTO LRFD Bridge Construction Specifications, unless otherwise specified in the contract.
 - 3) Use metal fabricators that are pre-qualified for Certified Bridge Fabricator – Advanced (ABR) with Fracture Critical Endorsement.
 - 4) Welding is allowed on bearing plates if required in design. All welding must conform to the AASHTO/AWS D1.5 Bridge Welding Code. Welding of tubular connections is covered in the AWS D1.1 Welding Code. Welding operators must be properly accredited and experienced. Qualifications of welders must be made available upon request.
- F. Materials. Provide materials to meet the following requirements:
- 1) Steel Through-Truss. The structural steel is specified in the attached Partial Bridge Plans. Secondary weathering members may be tubular shapes carrying the ASTM A847 (50ksi) designation. All steel should be provided by an AISC recognized supplier and meet the requirements of the Buy America per MDT Standard Specification requirements.
 - a) Charpy V Notch testing. See MDT Standard Specification 711.02 Structural Steel.
 - b) Identify all fracture critical members on shop drawings. Fracture critical members to meet impact test requirements in AASHTO M 270 Table 12.
 - 2) Bearings. Furnish bearings in accordance with MDT Standard Specifications, this specification, manufacturer's recommendations, and attached Partial Bridge Plans. See MDT Standard Specification 711.14 – Elastomeric Bearing Devices.
 - 3) Reinforcing Steel. Specified in the attached plans.
 - 4) Anchor Bolts. Furnish as specified for the bearing design and the attached plans.
 - 5) All shop and field bolting must comply with the AASHTO Construction Specifications and the Research Council on Structural Connections (RCSC) for structural connections using ASTM F3125 grade A325 Type 3, or grade A490 Type 3, hex head bolts. This includes the workmanship requirements of the Research Council on Structural Connections (RCSC) where slip critical connections are specified.
 - 6) Nuts must be ASTM A563 grade DH3 and washers must be ASTM F436. Washers must have the same surface condition and weathering characteristics as the bolts specified in the contract.
 - 7) All shop and field bolting must be pre-tensioned with any pre-approved method except tension controlled (TC) wrench and bolt system. Refer to section 556.03.8 of the MDT Standard Specification.
- G. Submittals. Submit shop drawings and all supporting hand and computer design calculations to the MDT Bridge Bureau for approval prior to fabrication. Submit all material and construction submittals to the Engineering Project Manager (EPM). Shop drawings, calculations, and other submittals may be furnished in Adobe Acrobat Reader (.pdf) format or 11"x17" sheets. All design plans and calculations must be signed and sealed by a Professional Engineer registered in the State of Montana. Calculations are to include:
- 1) Submit design and rating calculations for the steel truss, reinforced concrete deck, bridge bearings, gusset plates, and anchorages to the MDT Bridge Bureau.
 - 2) Buy America. Meet the requirements of the Buy America Act for steel. Submit the Contractor's Certificate of Compliance for Miscellaneous Steel & Iron Items form to the EPM upon delivery of all supplied items to the delivery site.
 - 3) As allowed for bearing design and fabrication, submit all welding procedure specifications and welder qualification records to the MDT Bridge Bureau for approval prior to any welding.
- H. Delivery And Erection.
- 1) Deliver the bridge to the address provided herein no later than March 17, 2025.

2) Deliver bearings and anchor bolts no later than January 01, 2025, to allow for abutment construction if required. Contact the EPM to coordinate delivery details.

3) Delivery of the steel truss components will be coordinated between the manufacturer and owner. Contact the EPM to coordinate delivery details. Deliver to address below:

a) MDT Ferndale Maintenance Yard, 13114 MT-83, Bigfork, MT 59911

4) MDT or the Contractor will be responsible for unloading and potential storage of the truss per the Manufacturer's recommendations. Notify the EPM 14 calendar days prior to delivery.

5) The Truss Manufacturer will advise the owner and/or contractor of the attachment points and other necessary information required to install the bridge. A truss erection submittal from the contractor will be reviewed by the truss manufacturer during construction. The Contractor's erection submittal requirements are detailed in MDT Standard Specification 556.03.14 - Erection.

6) The Truss Manufacturer to provide onsite technical assistance for 5 days to assist installation of the steel truss during the time of construction. Provide the additional cost of technical assistance for extended days if required by the Contractor.

7) The Truss Manufacturer must warrant, at the time of delivery, that it has conveyed good title to its steel structure, free of liens and encumbrances created by the Bridge Manufacturer, and that its steel structure is free of defects in design, material and workmanship.