SECTION 504

STEEL STRUCTURES

Special Provisions

504-1.01 DESCRIPTION. Add the following after the first paragraph: This work includes designing, furnishing, erecting and finishing prefabricated steel bridge and support attachments.

Design the prefabricated steel bridge in accordance with the latest edition of the "AASHTO Guide Specification for Design of Pedestrian Bridges". Dimensions of bridge shall conform to plans, otherwise all changes in plans to be approved by Engineer. **Bridge color shall match bridges installed under Phase II Ship Creek Trail.**

Conform to the "AASHTO LRFD Bridge Design Specifications" for pedestrian railing geometry and load requirements.

Conform to the following additional requirements:

1. Qualified Suppliers

    a. Qualified bridge suppliers must have at least 5 years experience fabricating these type structures.

2. Alternate Design

    a. The contractor may submit alternate steel or concrete bridge designs to engineer for approval. The bridge designs must meet the requirements of this section. The engineer reserves the right to refuse the alternate design.

3. General Features of Design

    a. Truss Type

        i. Bridges shall have geometry as shown on plans, otherwise all changes to be approved by Engineer.

    b. Member Components

        i. All members of the vertical trusses (top and bottom chords, verticals, and diagonals) shall fabricated from square and/or rectangular structural steel tubing. Other structural members and bracing shall be fabricated from structural steel shapes or square and rectangular structural steel tubing.

        ii. To provide lateral support for the top flange of open shape stringers (w-shapes or channels), a minimum of one stiffener shall be provided in each stringer at every floor beam location.

c. Camber

i. The bridge shall have a vertical camber dimension at mid-span equal to 100% of the full dead load deflection plus 1% of the full length of the bridge.

d. Elevation Difference

i. The bridge abutments shall be constructed to the elevation shown on the drawings.

4. Engineering

a. Structural design of the bridge structure(s) shall be performed by or under the direct supervision of a Licensed Professional Engineer registered in the State of Alaska and done in accordance with recognized engineering practices and principles.

b. Design Loads

i. Shall be in accordance with the current AASHTO Standard Specifications for highway bridges and the Guide Specifications for design of Pedestrian Bridges.

5. Governing Design Codes/References

a. Structural members and connections shall be designed in accordance with recognized engineering practices and principles as follows:

b. Structural Steel

i. American Institute of Steel Construction (AISC). "Manual of Steel Construction"

ii. American Association of State Highway and Transportation officials (AASHTO). "Standard Specifications for Highway Bridges." "Guide Specifications for Design of Pedestrian Bridges."

6. Dead Load Limitations: Assumed weight of bridge and components is 2.4kPa. Engineer shall be notified if dead load exceeds this amount for verification of foundation capacity.

Modify manufacturer's standard drawings to reflect the exact requirements and conditions unique to this project. Clearly specify relevant information such as member sizes, geometry, bearing reactions, design loads, material properties and other design information on the drawings. A licensed Professional Civil Engineer registered in the State of Alaska must stamp drawings.

504-2.01 MATERIALS. Add the following:

9. Construct prefabricated steel bridge from materials as follows:

   a. Steel

      i. Bridges shall be fabricated for high strength, low alloy, atmospheric corrosion resistant ASTM A847 cold-formed welded square and rectangular tubing and/or ASTM A588, or ASTM A242, ASTM A606 plate and structural steel shapes (Fy = 344.7 Mpa). The minimum corrosion index of atmospheric corrosion resistant steel, as determined in accordance with ASTM G101, shall be 5.8.
      ii. ASTM A572 and ASTM A500 steel may be used by the approval of the Engineer.

   b. Decking

      i. Wood decking shall meet the requirements of Section 712-2.16.
      ii. Substitutions may be used if approved by the Engineer.

504-3.01 FABRICATION. Add the following:

9. Prefabricated Steel Bridge

   a. Bridge Decking Attachment

      i. Wood decking shall be attached per the specifications and the manufacturers recommendations.

   b. Handrail/Guardrail System

      i. The bridge shall be designed to accommodate manufacturer's standard handrail/guardrail system as shown on the drawings.

   c. Secure a nameplate to the structure indicating the bridge manufacturer's name, maximum load limits, and year of installation.

   d. Welding

      i. Welding and weld procedure shall conform to the provisions of ANSI/AWS D1.1 "Structural Welding Code", 2002 Edition.

   e. Submittals

      i. Submittal Drawings

         1. Schematic drawings and diagrams shall be submitted for their review after receipt of order. Submittal drawings shall be unique drawings, prepared to

illustrate the specific portion of the general notes shall be clearly specified on the drawings. Drawings shall have cross referenced details and sheet numbers. All drawings shall be signed and sealed by a Professional Engineer who is licensed in accordance with Paragraph 1.01.

ii. Structural Calculations

1. Structural calculations for the bridge superstructure shall be submitted by the bridge manufacturer and reviewed by the approving engineer. All calculations shall be signed and sealed by a Professional Engineer who is licensed in accordance with Paragraph 1.01. The calculations shall include all design information necessary to determine the structural adequacy of the bridge. The calculations shall include the following:

2. All AISC capacity checks for axial, bending and shear forces in the critical member of each truss member type (i.e. top chord, bottom chord, floor beam, vertical, etc.).

3. Checks for the critical connection failure modes for each truss member type (i.e. vertical, diagonal, floor beam, etc.). Special attention shall be given to all welded tube on tube connections.

4. All bolted splice connections.

5. Main truss deflection checks.

6. U-Frame stiffness checks (used to determine K factors for out-of -plane buckling of the top chord) for all half through or "pony" truss bridges.

7. Deck design and connections.

8. NOTE: The analysis and design of triangulated truss bridges shall account for moments induced in members due to joint fixity where applicable. Moments due to both truss deflection and joint eccentricity must be considered.

9. Vibration check per AASHTO Guide Specifications for Pedestrian Bridges.

f. Quality Certification

i. Bridge(s) shall be fabricated by a fabricator who is currently certified by the American Institute of Steel Construction to have the personnel, organization, experience, capability, and commitment to produce fabricated structural steel for the category "Simple Steel Bridges" as set forth in the AISC Certification Program. Quality control shall be in accordance with procedures outlined for AISC certification.

g. Finishing

i. Blast Cleaning

1. All exposed surfaces of steel shall be blast cleaned in accordance with Steel Structures Painting Council Surface Preparation Specifications No. 7 Brush-Off Blast Cleaning, SSPC-SP7 latest edition.

ii. Bridges may be shop painted or field painted. Field painting shall be in accordance with Section 513.

504-3.02 ERECTION.

2. Handling and Storing Materials.

Add the following: Propose a location for the storage of the prefabricated steel bridge for approval of the Engineer. Notify the Engineer 48 hours in advance of bridge delivery.

4. Method and Equipment.

Add the following: Follow the recommended lifting and erection procedure of the prefabricated steel bridge manufacturer. Provide a copy of the manufacturer's lifting and erection instructions to the Engineer prior to installation. Notify the Engineer 48 hours in advance of the bridge erection.

8. Setting Shoes and Bearings.

Add the following: Verify the abutment geometry for conformance to the specified tolerances prior to bridge installation.

Prefabricated steel bridges shall conform to the following:

Bridge bearings shall consist of a steel setting or slide plate placed on the abutment or grout pad. The bridge bearing plate which is welded to the bridge structure shall bear on this setting plate. One end of the bridge will be fixed by fully tightening the nuts on the anchor bolts at that end. The opposite end will have finger tight only nuts to allow movement under thermal expansion or contraction.

Bridges in excess of 30 meters in length or bridges with dead load reactions of 67 kilonewtons or more (at each bearing location) shall have teflon on teflon or stainless steel on teflon slide bearings placed between the bridge bearing plate and the setting plate. The top slide plate shall be large enough to cover the lower teflon slide surface at both temperature extremes.

504-4.01 METHOD OF MEASUREMENT. Add the following:

3. Prefabricated Steel Bridge. By each unit completed in place and accepted by the Engineer.

504-5.01 BASIS OF PAYMENT. Add the following:

3. Prefabricated Steel Bridge. At the contract unit price shown on the bid schedule, for work, including design, fabrication, erection and painting.

Add the following pay items:

Pay Item	Pay Unit
504(9A) Prefabricated Steel Bridge (76 meters)	Each
504(9B) Prefabricated Steel Bridge (32 meters)	Each
504(9C) Prefabricated Steel Bridge (54 meters)	Each
504(9D) Prefabricated Steel Bridge (61 meters)	Each