Final Bridge Design – TH 53 Mainline and Ramp Bridges, Twin Ports Interchange  
State Project No. (SP) 6915-136  
Exhibit A – Scope of Services

PROJECT OVERVIEW
State has programmed the construction of the Twin Ports Interchange Project (TPI) in Duluth, Minnesota as part of S.P. 6915-136. The TPI Project will be located at the Junction of I-35, I-535, and TH 53 in Duluth and will replace the existing interchange known locally as the “Can of Worms”. The bridges included in this contract are the TH 53 mainline and ramp bridges (Bridge Nos. 69907, 69908, 69139, 69140, and 69141).

Project goals include:
- Enhancing safety by eliminating blind merges and left exits
  a) Moving left exits to the right
  b) Relocating merges
- Replacing aging infrastructure
- Reconstructing weight restricted and non-redundant bridges
- Reducing maintenance and closures
- Eliminating some bridge structure
- Improving freight mobility
- Allowing oversize/overweight (OSOW) freight on the Interstate

The overall project includes four separate components: the main interchange, Trunk Highway (TH) 53 bridges from I-35 to approximately 3rd Street, and the I-535 and Garfield Avenue interchange. Construction is anticipated in the 2020 – 2023 timeframe. The most up-to-date project information and draft design files can be found at: ftp://ftp2.dot.state.mn.us/pub/outbound/Duluth/Twin%20Ports%20Interchange%20RID/

State intends to deliver this project through the Construction Manager/General Contractor (CMGC) delivery method. To this end, Contractor will be part of a collaborative project delivery team consisting of State, Contractor, Roadway and Grading Plan Designer, other final bridge designers, the CMGC, Independent Cost Estimator (ICE), Engineer’s Estimator (EE) and other stakeholders. State has procured CMGC services and is actively working with the CMGC to receive design input on construction means and methods, construction sequencing, risk mitigation strategies, innovations, and cost estimating. While the CMGC’s input will serve to reduce changes and inefficiencies during construction, responsibility for the construction plans and specifications (i.e. Engineer of Record services included in this contract) will remain with Contractor and not with the CMGC.

State is in the process of acquiring a Roadway and Grading Plan Designer under a separate contract. The roadway contract is anticipated to include the geotechnical recommendations for embankment and wall support.

1.0 PROJECT ADMINISTRATION AND MEETINGS (Source Type: 1010)
State will provide a Project Manager (i.e. Bridge Office Design Unit Leader) to give direction to Contractor’s activities. It will be the responsibility of State’s Project Manager to receive the work produced by Contractor, review the work for accuracy and compliance with State standards, and to recommend payment for such work.

Contractor will conduct the administration of the project, which will include communication with State, invoicing, preparation of any necessary supplemental agreements, cost and schedule updates, and other non-technical work.
No changes in Contractor’s project management or lead design personnel will be permitted without prior written notice to State’s Project Manager. State will notify Contractor immediately if there are changes to State’s assigned project management personnel.

Specific to the TPI Project, State has procured the services of a Design Oversight Manager (DOM), who will act as the lead final design liaison, responsible for ensuring appropriate collaboration of design items among the final designers working on the project. Contractor will collaborate with the DOM regularly as plans are developed.

1.1 Project Meetings

1.1.1 Kick-Off Meeting
Contractor will participate in a kick-off meeting at State’s Bridge Office in Oakdale, Minnesota. The meeting will establish coordination and communication protocols for the project, discuss the final design process, discuss known project issues, and review the project schedule.

1.1.2 Monthly Meetings
Contractor’s Project Manager will participate in 12 monthly status update meetings with the DOM, State’s Project Manager, and the Major Bridge Projects Engineer (Keith Molnau). District staff, the roadway design consultant, the CMGC, and will also be involved at State’s District 1 discretion. Assume two-hour meeting durations.

1.1.3 Plan Review Meetings
Following the review of each final design plan submittal, Contractor’s Project Manager and Lead Bridge Designer will participate in up to six meetings (assumed for resolution of plan comments if necessary). If needed, Contractor will coordinate meeting agenda items, provide response to plan review redlines and provide comment logs with comment resolution responses to State’s Project Manager for each submittal. Contractor will also record and furnish meeting minutes within three business days after each meeting. Assume two-hour meeting durations.

2.0 QUALITY MANAGEMENT PLAN AND PROCEDURES (Source Type 1010)
Contractor will submit a project specific Quality Management Plan (QMP) to State within five days of Notice to Proceed with contracted services. The QMP must specify how Contractor will perform Quality Assurance (QA) and Quality Control (QC) activities throughout the duration of the project to ensure delivery of a quality product in a timely manner that conforms to established contract requirements.

2.1 Design and Plan Sheet Check
Contractor is responsible for the completeness and accuracy of its work. Design calculations and plan sheets must be independently checked and reconciled prior to submittal to State. Review comments from State on Contractor’s various plan review submittals does not relieve Contractor of liability for an inaccurate or incomplete bridge plan. With each plan submittal, Contractor will supply the plan and calculation check prints, along with the comment log (or other approved resolution process) documenting resolution of all State plan review comments.

2.2 Software Programs
All software programs and/or spreadsheets utilized by Contractor must be verified by Contractor’s in-house Quality Assurance Program.

2.3 Quality Assurance Verification
Contractor’s Project Manager or Quality Assurance Manager must review the entire plan design and production process to ensure the complete and accuracy of Contractor’s work and conformance with Contractor’s QA procedures.

3.0 FINAL BRIDGE DESIGN (Source Types: ABUT, DECK, GEOM, PIER)
Contractor will conduct detailed bridge design and prepare Final Certified Bridge Plans in accordance with the provisions detailed below. If State determines at any time during design that major plan revisions are necessary due to Contractor plan errors, Contractor will furnish revised plan sheets at no cost to State.

Contractor will perform all required engineering to determine the geometric, material, and procedural requirements for the construction of the bridges.

3.1 Design Standards and Plan Preparation
The Final Certified Bridge Plan sheets will be prepared in accordance with the following manuals, standards and documents:

- a) MnDOT Load and Resistance Factor Design (LRFD) Bridge Design Manual
- b) American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications
- c) MnDOT Bridge Details Manual (Parts I and II)
- d) MnDOT Standard Specifications for Highway Construction
- e) MnDOT Computer Assisted Design & Drafting (CADD) Standards
- f) MnDOT Summary of Recommended Drafting Standards
- g) AASHTO Manual for Bridge Evaluation, current edition
- h) MnDOT Staff Approved Layout (provided by State)
- i) MnDOT Checking List for Final Plans
- j) MnDOT Preliminary Bridge Plans
- k) In-progress Visual Quality Manual
- l) MnDOT Roadway Design Plan

All plan submittals will be on 11x17 paper, 20 lb. white bond or approved equivalent. Plan sheets will be produced using the current version of MicroStation.

3.2 Bridge Surveys
State will provide survey sheets. Contractor must review the survey sheets and report any additional survey needs to State’s Project Manager as soon as possible. If needed, additional survey work will be added to this contract by amendment.

3.3 Foundations
The Foundation Analysis and Design Recommendations (FADR) will be provided by State’s Foundations Unit.

3.4 Deck Drainage System
If the Preliminary Plan indicates the need for deck drainage, then Contractor will design a deck drainage system(s) on the bridges based on the allowable spread criteria for the given roadway geometrics based on MnDOT Technical Memorandum No. 11-14-8-05. Use design frequency storm data from the Atlas 14 Regionalization Intensity-Duration-Frequency for the region in which the bridge is located. Contractor must coordinate the drainage system design with the roadway design consultant.

3.5 Aesthetics
Contractor will incorporate aesthetic details consistent with the Visual Quality Manual (VQM) developed for the TPI Project. State anticipates having a draft VQM available at the kick-off meeting.

3.6 Cost Estimates
Contractor will provide estimated item quantities and pay item lists with all submittals. Contractor will consult with State to obtain Pay Items for inclusion with 30% Plans, and will updated estimated quantities with each submittal for use by CMGC and Estimating Teams.
3.7 Final Design Submittals
Contractor will coordinate plan reviews with an assigned Final Bridge Design Unit of State’s Bridge Office. The District 1 Project Manager and DOM will be copied on all significant correspondence. For each submittal, Contractor must submit a flash drive containing all electronic files and documents required in the subarticles below.

3.7.1 30% Plan Review
The 30% Plan provides State an early review of the final plan preparation for conformance with the approved Preliminary Plan, aesthetic guidelines, and key design specifications. The intent of this review is to identify design discrepancies at an early stage and avoid major plan modifications resulting from future reviews. At a minimum, the 30% Plan will include:

a) General Plan and Elevation Sheet(s)
   For this submittal, the General Plan and Elevation sheet(s) need to be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed box type, architectural features, stage construction information, and basic design data. The sheet(s) will be based on the approved Preliminary Plan.

b) Framing Plan
   Include a preliminary beam run with computations.

c) Bridge Layout Sheet(s)
   For this submittal, the Bridge Layout Sheet(s) must show a line diagram that indicates the control point, work line, reference lines, and proposed working point locations. The tabulations required do not need to be completely filled in; however, the sheet(s) will indicate the diagonal and other dimensions that will be included in the Final Plan. It will also contain any corner views sections, and notations (i.e. expansion joint details at gutters, sidewalks, barriers, etc.) needed to clarify the working point locations. Corner details may be detailed on a separate sheet for clarity.

d) Abutment Layout Sheet(s)
   For this submittal, the abutment layout sheet(s) need to be completed only to the extent necessary to show footing size and the top/bottom elevations for coordination with Final Road Design. It will also contain any tie-in points to adjacent bridges, retaining walls, or both. Contractor will promptly coordinate any changes in footing size, elevation, or both that occur between the 30% Plan and the 60% Plan that would impact the Final Road Design plans.

e) Architectural or Special Detail Sheet(s)
   Architectural or special detail sheet(s) showing any standardized shapes proposed to maximize repeatability of pier forms and other special details that require early coordination between Contractor and State prior to Final Plan preparation.

f) Bridge Survey Sheet(s)
   Survey sheets from the approved Preliminary Plan are to be included in this submittal; however, they are not required to be completed.

g) Stage Construction Detail Sheet(s)
   Stage construction and deconstruction of the project is under development by others. Preliminary Plans will indicate general staging schemes and note(s) for any specific bridges requiring refined stage construction details that will be required for inclusion in Final Bridge Plans.

h) Any supporting design computations used to develop the aforementioned items.

Contractor will submit two sets of the 30% Plans to State for review, along with plan and calculation check prints. State will return 30% Plan comments to Contractor within 20 working days. Contractor will be allowed to proceed with further design during this review period.

3.7.2 60% Plan Review
The intent of the 60% Plan Review is to verify Contractor’s progress toward plan completion and evaluate against project and contract timelines. The 60% Plans must include two full sets of in-progress plan...
sheets, working copies of electronic design files (MicroStation, Geopak), Draft Unique Special Provisions, and updated pay items and estimated quantities for use by CMGC and estimating teams. Include PC beam design, abutment details, and pier design and details. State’s Bridge Office will return 60% Plan review comments within 20 working days. Include plan and calculation check prints, along with the comment log or other process documenting resolution of all State plan review comments from the 30% review. Contractor will be allowed to continue with design during this submittal.

3.7.3 90% Plan Review
The intent of the 90% Plan Review is for State to verify that the plan is acceptable for the State Bridge Engineer’s signature. The 90% Plans should be complete in all areas to the extent that it can be certified by Contractor, although a certification signature is not required until after this review has been completed. Contractor will submit the 90% Plan to State with updated pay items and estimated quantities for use by CMGC and estimating teams, together with the plan and calculation check prints and comment log or other process documenting resolution of all State plan review comments from the 60% review. State’s Bridge Office will return 90% Plan review comments within 20 working days. Contractor will also submit finalized Unique Special Provisions (one electronic copy) with the 90% Plan submittal.

3.7.4 Construction Elevations
Upon reconciliation of State’s comments on the 90% Plans, Contractor will produce construction elevations for the bridges. Regardless of the software used, the output format for construction elevations must be consistent with State’s construction elevation program. State will provide instructions and an example of construction elevations output upon request. The construction elevations output must be submitted to State with the Final Certified Bridge Plans.

3.7.5 Final Certified Bridge Plan
Upon incorporation of State’s 90% Plan comments, Contractor will submit the Certified Final Bridge Plan to State.

4.0 FINAL BRIDGE PLAN DELIVERABLES
Contractor will submit all deliverables directly to State’s Project Manager.

4.1 Contractor Deliverables
a) Quality Management Plan
b) 30% Plan (two sets, 11” x 17” paper) – Anticipated due date: June 2019
   1) .pdf file of in-progress 30% Plan
   2) Plan and calculation check prints and comment log (electronic copy)
   3) Estimated item quantities and pay item lists
   4) Draft construction elevations output (to verify formatting)
   c) 60% Plan (two sets, 11” x 17” paper) – Anticipated due date: November 2019
      1) Working copies of electronic design files (MicroStation)
      2) .pdf file of in-progress of 60% Plan
      3) Plan and calculation check prints and comment log (electronic copy)
      4) Estimated item quantities and pay item lists
      5) Draft Unique Special Provisions (electronic copy)
   d) 90% Plan (two sets, 11” x 17” paper) – Anticipated due date: March 2020
      1) Working copies of electronic design files (MicroStation)
      2) .pdf file of in-progress 90% Plan
      3) Plan and calculation check prints and comment log (electronic copy)
      4) Estimated item quantities and pay item lists
      5) Unique Special Provisions (electronic copy)
   e) Final Certified Bridge Plan (two sets, 11” x 17” paper) – Anticipated due date: May 2020
      1) Final Design Calculations (electronic copy)
      2) Final Quantity Calculations and Pay Items (electronic copy)
3) Plan and calculation check prints and comment log (electronic copy)
4) MicroStation files of Final Bridge Plans. MicroStation files will allow direct reproduction of all plan sheets with reference files detached.
5) Construction elevation output
6) CD with electronic copies of all final deliverables

4.2 State Deliverables
   a) Signed Preliminary Bridge Plan
   b) Checking List for Final Plans
   c) Soil borings analysis
   d) Foundations recommendations
   e) Geopak (.gpk) files
   f) Visual Quality Manual for the TPI Project
   g) Plan review comments
   h) Signature and distribution of the Final Bridge Plan
   i) Bridge Special Provisions (covering common items)
   j) Foundation Analysis and Design Recommendation (FADR)

5.0 LOAD RATING ANALYSIS (Source Type: 2850)
Contractor will provide a load rating analysis for its assigned bridge(s) and provide a Bridge Rating and Load Posting report. All load rating work will be done in accordance with the AASHTO Manual for Bridge Evaluation, current edition with interims.

Contractor will provide the load rating using AASHTOware BrR software. Guidelines for AASHTOware BrR input requirements will be provided by State upon request. If the bridge cannot be rated with AASHTOware BrR, Contractor must use another commercially available structural analysis software with the approval of State. The software must be capable of running overweight vehicles as described below.

Contractor will load rate the bridge carrying vehicular traffic for Load and Resistance Factor Rating (LRFR) using the following:
   a) HL-93 loading
   b) Minnesota Standard Permit Trucks G-80
   c) Minnesota Standard Permit Trucks G-07, when a non-VIRTIS software is used
   d) Project specific OSOW Design Rating Vehicles (if any). A separate TPI OSOW Load Study is under development by others. Any additional project specific Design Vehicles will be noted on the Approved Preliminary Bridge Plans.
      i. The OSOW study work done to date has demonstrated that the MnDOT Modified HL-93 loading will continue to be the baseline for the Bridge Design Vehicle, with the typical permit vehicles used for the bridge rating, plus perhaps one additional vehicle. State will provide an update at the kick-off meeting.
      ii. Vertical clearances for OSOW vehicles are being considered with development of Preliminary Bridge Plans for the project. The end result will be shown on preliminary plans, which will require 16’-6” portals at over most spans, with 17’-6” at designated spans.

The LRFR rating factor for new bridges must be a minimum of 1.0 at the Inventory level for HL-93 loading and 1.15 at the Operating level for permit loading. Contractor must demonstrate that the minimum rating factors are being provided during the design of the bridge. For bridges with a minimum of one span over 200 feet long, the permit vehicle loading must consist of a combination of the permit vehicle and lane load. The lane load must be in accordance with Article 3.6.1.2.4 of the AASHTO LRFD Bridge Design Specifications, except that the load will be 0.20 klf.

Contractor will rate the deck for any design that deviates from MnDOT standard design tables. Rate and report each separate superstructure component, segment, or type within the overall bridge; at a minimum, rate for moment and shear at the tenth points of each span. The overall rating must be the lowest rating of any individual component,
segment, or type. The final rating and each component rating must be accompanied by the location of the rating, the limit state, and the impact factor. Where ramps extend onto a bridge, rate the ramp as a separate member. For culverts, complete MnDOT Form 90.

5.1 Contractor Deliverables

a) At the 60% Plan Submittal, Contractor will submit the following:
   1) AASHTOware BrR software file or the file from another commercially available software.
   2) Any supplemental documentation in memo format that cannot be found in the plan sheets provided with the 60% Plan.

b) Contractor must investigate the applicability of AASHTOware BrR. If this software will not work for the bridge, then Contractor must submit a brief memo documenting the investigation and findings.

c) At the Final Certified Plan Submittal, Contractor will submit the following:
   1) Bridge Rating and Load Posting Report. The AASHTOware BrR software file or the file from another commercially available software must be submitted with the Bridge Rating and Load Posting Report. The ratings must be based on the final configuration of the bridge.

6.0 APPROACH PANEL DESIGN & DETAILING (Source Type: 1250)

For bridge approach panels, Contractor will:

a) Choose and modify the appropriate standard plan sheets necessary for the bridge approach panels
   [http://standardplans.dot.state.mn.us/StdPlan.aspx]

b) Prepare any other necessary details needed for the construction of the bridge approach panels

c) Coordinate the approach panel design with the roadway design consultant (hired by State’s District 1)

d) Submit final plan sheets to State for bridge approach panels

e) Submit any necessary special provisions for the bridge approach panels (for any construction requirements in addition to the 2014 MnDOT standard provisions)

f) Submit Microstation files to State for bridge approach panels designed

Contractor will provide plans signed by a professional engineer registered in the State of Minnesota and any special provisions needed for the approach panels. The approach panel plan sheets will be included in the grading plans being prepared by State. Contractor will provide a list of approach panel sheets expected for detailing at the same time as the 30% bridge plans. The approach panel sheets are not expected to be complete with the 30% submittal. Contractor must provide finalized approach panel plans sheets at the same time as the 60% bridge plans.

6.1 Contractor Deliverables

a) At the 30% Plan Submittal, Contractor will submit the following:
   1) Standard approach panel sheets with no modifications done, but a list of proposed sheets and the indication whether or not those sheets will be modified. The primary purpose is to identify an approximate sheet count for the grading plans.

b) At the 60% Plan Submittal, Contractor will submit the following:
   1) Certified approach panel sheets and any special provisions needed for approach panels.

7.0 CONSTRUCTION SUPPORT (Source Type 1800)

During the construction phase of the project, Contractor will respond to Requests for Information (RFIs) and provide supporting design analysis as needed. If these services are needed, State’s Project Manager will send the RFIs to Contractor, and Contractor will direct its responses back to State’s Project Manager. Assume 120 hours for construction support.