

## **PROJECT OVERVIEW**

Through State Project No. (SP) 0215-76, State has programmed the reconstruction of US 10 over the Rum River in Anoka County. The project limits are from TH 10 between TH 47 (Ferry St.) and just east of 7<sup>th</sup> Ave. The project includes new bridges at the following locations:

New Bridge 02057 – Replaces Bridge 9700, US 10 WB over the Rum River

New Bridge 02058 – Replaces Bridge 9700, US 10 EB over the Rum River

New Bridge 02059 – Replaces Bridge 9713, will carry US 169 over TH 10

New Bridge 02060 – Replaces Bridge 9715, will carry County State Aid Highway (CSAH) 31 over US 10, 0.2 miles east of the Jct. TH 47

The project is scheduled for a February 9, 2022 construction letting.

Work under this contract includes final bridge design services and preparation of Final Certified Construction Plans and Unique Special Provisions for Bridges 02057, 02058, and 02059. State will complete the design and plans in-house for Bridge 02060.

### **1.0 PROJECT ADMINISTRATION AND MEETINGS**

State will provide a Project Manager 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.

#### **1.1 PROJECT MEETINGS**

**Kick-Off Meeting:** Contractor will participate in a kick-off meeting via WebEx, Skype, or another video meeting application. The meeting will establish communication protocol for the project, discuss known project issues, and review the project schedule. Assume a 4-hour meeting duration.

**Monthly Project Meetings:** Contractor will facilitate monthly progress review meetings to coordinate specific design details and provide project updates with State staff. Assume 2-hour meeting durations. State's anticipated participants will include:

- a) Bridge Office Project Manager

- b) Bridge Office Final Design Unit Leaders
- c) Metro District Project Manager
- d) Metro District Roadway Design Lead

Plan Review Meetings: Contractor will participate in plan review meetings at each plan submittal stage identified in this Scope of Services (as directed by State's Project Manager, assumed for resolution of plan comments if necessary). If needed, Contractor will supply meeting agendas to State's Project Manager at least three business days prior to each meeting. Contractor will also record and furnish meeting minutes within three business days after each meeting. Assume 2-hour meeting durations.

## **2.0 QUALITY MANAGEMENT PLAN (QMP) AND PROCEDURES**

Contractor will develop a project specific QMP for the project. Contractor will update the QMP as necessary at State's request. The QMP will 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 must supply an electronic copy of plan and calculation check prints, along with a comment log documenting resolution of all State plan review comments.

### **2.2 SOFTWARE PROGRAMS**

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 completeness and accuracy of Contractor's work and conformance with Contractor's QA procedures.

## **3.0 FINAL BRIDGE DESIGN**

Contractor will conduct detailed bridge design and prepare a Final Certified Bridge Plan 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 the required engineering to determine the geometric, material, and

procedural requirements for the construction of Bridges 02057, 02058, and 02059.

### **3.1 BRIDGE SURVEYS**

State will provide surveys for Bridges 02057, 02058, and 02059.

### **3.2 FOUNDATIONS**

State will provide Foundations Analysis and Design Recommendations (FADR) reports for the bridges. The proposed foundations are 30" CIP pile bent piers. Contractor will conduct an early investigation to determine that the proposed piling will be sufficient. Contractor will complete this review and provide a formal recommendation to State by the 30% Plan review stage.

### **3.3 BRIDGE AESTHETICS**

The project has a Visual Quality Manual (VQM). Contractor will incorporate aesthetics consistent with the VQM into its design. For this project, the engineering details for aesthetics are found in the VQM, and not in the preliminary plans.

### **3.4 BRIDGE DECK DRAINAGE EVALUATION**

If a bridge deck drainage system is identified in the preliminary plans, then Contractor will incorporate the appropriate deck drainage into its design and plans.

### **3.5 COST ESTIMATING**

Contractor will provide estimated quantities and pay items at the 30%, 60% and 95% submissions, for Bridge Office use in preparing the Engineer's Estimate.

### **3.6 DESIGN STANDARDS AND PLAN PREPARATION**

Certified bridge plans will be prepared in accordance with the following Standards and documents:

- a) MnDOT LRFD Bridge Design Manual
- b) American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications
- c) MnDOT Surveying And Mapping Manual
- d) MnDOT Drainage Manual
- e) MnDOT Checking List for Final Plans (provided by State)
- f) MnDOT Computer Assisted Design and Drafting (CADD) Standards
- g) MnDOT Summary of Recommended Drafting Standards
- h) MnDOT Staff Approved Layout
- i) MnDOT Environmental Documents and Design Memorandums

### **3.7 Final Design Submittals**

#### **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, 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) Any supporting design computations used to develop the aforementioned items.

Contractor will submit two sets of the 30% Plan to State for review, along with an electronic copy of the plan and calculation check prints. State will return 30% Plan comments to Contractor within 15 working days. Contractor may proceed with further design during this review period.

### 3.8.2 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% Plan submittal will include two full sets of in-progress plan sheets, working copies of electronic design files (MicroStation, Geopak), and Draft Unique Special Provisions. 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 an electronic copy of plan and calculation check prints, along with the comment log documenting resolution of State plan review comments from the 30% review. Contractor may continue with design during this submittal.

### **3.8.3 95% PLAN REVIEW**

The intent of the 95% Plan Review is for State to verify that the plan is acceptable for the State Bridge Engineer's signature. The 95% Plan should be complete 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 95% Plan to State with the plan and calculation check prints and comment log or other process documenting resolution of State plan review comments from the 60% review. State's Bridge Office will return 95% Plan review comments within 20 working days. Contractor will also submit finalized Unique Special Provisions (one electronic copy) with the 95% Plan submittal.

### **3.8.4 CONSTRUCTION ELEVATIONS**

Upon reconciliation of State's comments on the 95% Plans, Contractor will produce construction elevations for the bridge. 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.

### **3.8.5 FINAL CERTIFIED BRIDGE PLANS**

Upon incorporation of State's 95% Plan comments, Contractor will submit the Certified Final Bridge Plan to State.

## **4.0 MOMENT SLAB DESIGN**

State will be utilizing construction-contractor designed MSE walls, (see the Mechanically Stabilized Earth Wall Special Provision here for reference: <http://www.dot.state.mn.us/pre-letting/prov/index.html>); however, Contractor will be responsible to design moment slabs with barriers above the four Mechanically Stabilized Earth (MSE) walls that tie into Bridge 02059. Deliverables for this task are Certified Final construction plans and details, associated pay items and quantities and any special provisions required for pay items not covered by the MnDOT 2018 standard construction specifications.

## 5.0 LOAD RATING

Contractor will provide a load rating analysis for the bridges and provide a Bridge Rating and Load Posting report. 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-BrR (VIRTIS) software is used

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) 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.
- b) Contractor will submit a preliminary rating with the 60% bridge plans.
- c) Contractor will submit the final load rating and load posting report with the final certified bridge plans.

## 6.0 APPROACH PANEL DESIGN & DETAILING

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 State's Roadway Design Unit
- d) Submit final plan sheets including pay items and quantities 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 2020 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. 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.

## 7.0 CONTRACT DELIVERABLES

Contractor will submit deliverables directly to State's Project Manager.

### 7.1 CONTRACTOR DELIVERABLES

- a) Quality Management Plan
- b) 30% Plan (two sets, 11" x 17" paper) – **Anticipated due date: late January 2021**
  - 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)
  - 5) Final Geotechnical Recommendation for piling diameter
- c) 60% Plan (two sets, 11" x 17" paper) – **Anticipated due date: late April 2021**
  - 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)
  - 6) Final moment slab design for Bridge 02059
- d) 95% Plan (two sets, 11" x 17" paper) – **Anticipated due date: mid-July 2021**
  - 1) Working copies of electronic design files (MicroStation)
  - 2) .pdf file of in-progress 95% Plan
  - 3) Plan and calculation check prints and comment log (electronic copy)
  - 4) Estimated item quantities and pay item lists
  - 5) Final Unique Special Provisions (electronic copy)
- e) Final Certified Bridge Plan (two sets, 11" x 17" paper) – **Firm due date: late August 2021**

- 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 plan sheets with reference files detached.
- 5) Construction elevation output
- 6) Flash drive with electronic copies of all final deliverables

## **7.2 STATE DELIVERABLES**

- a) Signed Preliminary Bridge Plans for Bridges 02057, 02058, and 02059
- b) Foundations and Other Recommendations report
- c) Bridge Survey deemed necessary during final design
- d) Specific special provision examples to be utilized on the project

## **8.0 CONSTRUCTION SUPPORT**

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. Design office support during construction of the project is not assumed as part of this contract. Assume 120 hours for construction support.

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