Bridge Design Scope of Work

NOTE: This is a DRAFT of the RFP work scope for the Winona Bridge Project. All items contained herein are subject to change at MnDOT’s sole discretion.

1.0 PROJECT OVERVIEW

STATE has programmed the construction of Bridge 85851 to carry Trunk Highway 43 over the Mississippi River in Winona, Minnesota as part of State Project No. 8503-46. Bridge 85851 will carry two lanes plus shoulders and a pedestrian trail, for a total structure length of approximately 2,290 feet. Bridge 85851, as depicted on the draft Preliminary Plan, is composed of multiple bridge types as follows: the southerly approach spans consist of a 2-span post-tensioned slab span, followed by 6 spans of prestressed concrete beams, followed by 3 spans of cast-in-place segmental, post-tensioned box girders (assumed to be constructed by the balanced cantilever method), followed by 4 spans of prestressed concrete beams.

Work under this Contract includes final bridge design services and preparation of certified construction plans for Bridge 85851, and grading plans for the entire project as shown on the project layout, and described in Exhibit B (Roadway Design Scope of Work). Design work and bridge plans for rehabilitation and reconstruction of existing Bridge No. 5900 will be issued in a separate professional/technical contract, to be executed at a later date.

Project information and documents can be found at:
ftp://ftp2.dot.state.mn.us/pub/outbound/district6/Winona%20Bridge/Proposal_Information/

(Check these websites frequently for updates.)

STATE intends to deliver this project through the Construction Manager/General Contractor (CMGC) delivery method. CONTRACTOR will become part of a collaborative project delivery team consisting of STATE, CONTRACTOR, PEER REVIEWER, Independent Cost Estimator (ICE) and the CMGC. STATE will procure the CMGC through a separate process to provide design input regarding 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) will remain with CONTRACTOR and not with the CMGC. Information on STATE’s CMGC program, and information specific to the CMGC Request for Qualifications (RFQ) for this project can be found at: http://www.dot.state.mn.us/const/tools/const-manager-general-contractor.html

Opinion of Probable Construction Cost (OPPC) submittals will occur at the 30%, 60%, and 90% design phases based on CONTRACTOR submittals. This applies to Work Package 1 (early foundations package) and Work Package 2 (the remainder of Bridge 85851 and Roadway Design). The 90% OPCC is optional, based on STATE’s discretion.

CONTRACTOR’S Submittal of Plans, Specifications, and Estimated Quantities will be assembled into Issue For Bid (IFB) Work Package 1 (early foundations package), and Issue for Bid (IFB) Work Package 2 (the remainder of Bridge 85851 and Roadway Design).

Ultimately, the CMGC will have the opportunity to bid the project competitively against an Independent Cost Estimate (ICE) for construction of the project. If the CMGC bidding efforts are unsuccessful, the Construction Plans and Specifications prepared by CONTRACTOR may be used to advertise the project to other bidders.

NOTE: A major project goal is to begin construction of the river piers beginning in July 2014. CONTRACTOR will need to plan for an aggressive schedule to meet this goal. This will require substantial completion of the design of the segmental superstructure and piers, northerly approach spans superstructure and piers, and the north abutment. This effort will include all work required to produce an early foundations package as described in this exhibit.

An anticipated list of tasks for this project includes:
• Segmental design and load rating criteria development
Bridge Design Scope of Work

- Vessel Impact Study
- Development of Foundations Load Test Program for Bridge 85851
- Development of Foundations and Design Recommendations for Bridge 85851
- Development of Visual Quality Management Plan (VQMP) based on aesthetic exhibits completed to date
  - (incorporate previous work completed into VQMP, create updated renderings, provide support to STATE by leading Visual Quality Advisory Committee (VQAC) only as needed for refinements)

Work Package 1 (submitted at the 30%, 60%, 90%, and Final Early Foundations Package stages for early foundations package):
- 30% Plan (for the entire bridge, with estimated quantities for early foundations package)
  - CMGC OPCC process (30% Plans)
- 60% Early Foundations Package (with updated quantities and Draft Special Provisions)
  - CMGC OPCC process (60% Plans)
- 90% Early Foundations Package (with fully checked design, quantities and Special Provisions)
  - CMGC OPCC process (90% Plans)
- Final Early Foundations Package (with completed peer review)
  - CMGC Issue for Bid (IFB) Plan Package process

Work Package 2 (submitted at the 30%, 60%, 90%, and Final Plans for Entire Bridge stages for entire design of Bridge 85851)
- 30% Plans (updated plans for entire bridge, estimated quantities, Draft Special Provisions)
  - CMGC OPCC process (30% Plans with updates)
- 60% Plans (updated plans for entire bridge, estimated quantities, Draft Special Provisions)
  - CMGC OPCC process
- 90% Plans (updated plans for entire bridge, estimated quantities, Draft Special Provisions)
  - CMGC OPCC process
- Final Plans for Entire Bridge (with completed peer review input)
  - CMGC Issue for Bid (IFB) Plan Package process

Other submittals:
- Load Rating, including development of a bridge rating manual
- Development and certification of entire Division SB special provisions specific to each Work Package, including segmental superstructure special provisions, MnDOT standard special provisions, and any other unique items not covered in the MnDOT Standard Specifications for Construction for Bridge 85851.
- Continuous coordination of design and plan review with PEER REVIEWER, including resolution of review comments at 30%, 60%, and 90% submittals for each Work Package.

All work on this project will be performed in English units, and the plans, specifications, estimates, reports, etc. produced will be shown in English units. Final submittals of plans and specifications will be made in both reproducible hard copy originals and electronic files.

2.0 PROJECT MANAGEMENT
2.1 Contract Administration and Schedule Management
2.1.1 Contract Administration
STATE will provide a Bridge Office Project Manager to give direction to CONTRACTOR’s activities. It will be the responsibility of the Bridge Office Project Manager to receive the work produced by CONTRACTOR, review the work for compliance with contract requirements, and to recommend payment for such work.

CONTRACTOR’s Project Manager will conduct the administration of the project, which will include communication with STATE, invoicing, supplemental agreements, cost and schedule updates, billing preparation, and other non-technical work. CONTRACTOR will also create an electronic project directory for project file sharing. Project directory standards and file naming standards are available upon request to the Bridge Office Project Manager.
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No changes in CONTRACTOR project management or lead design personnel will be made without prior written consent of the Bridge Office Project Manager. STATE will notify CONTRACTOR immediately if there are changes to STATE’s project management or lead design personnel.

2.1.2 Schedule Management
STATE anticipates that the CMGC will provide a Critical Path Method (CPM) schedule for the project. CONTRACTOR’s task will be to respond to the CMGC’s proposed schedule. It is anticipated that the early foundations package will be the initial focus of the CPM schedule. CONTRACTOR’s design must be completed for all components of the bridge that are included in the early foundations package. Complete design and detailing of the segmental river portion of the superstructure will likely be a high priority on the CPM schedule to enable concurrent review by the PEER REVIEWER.

2.2 Project Meetings
2.2.1 Design Team Kick-Off Meeting
CONTRACTOR will schedule a design kick-off meeting to establish communication protocol for the design, discuss known project issues, and review the project schedule. CONTRACTOR will receive available project information from STATE, including the most up-to-date Preliminary Plan. At the kick-off meeting CONTRACTOR will provide its Quality Management Plan (QMP) to STATE. Note: CONTRACTOR must submit its list of meeting attendees to STATE’s Project Manager five days prior to the meeting.

2.2.2 Project Design Team (PDT) Meetings
STATE will establish a Project Design Team, which will be led by CONTRACTOR. Other participants will include:
- Bridge Office Project Manager
- Roadway Project Manager (MnDOT District 6)
- PEER REVIEWER’s Project Manager
- Federal Highway Administration (FHWA)
- CMGC
- MnDOT Cultural Resources Unit (CRU) (as needed)
- MnDOT CMGC Program Manager

STATE will schedule bi-weekly progress meetings for the PDT that will be held at either the Bridge Office in Oakdale, Minnesota, or via teleconference (assume that six of the PDT meetings will be teleconferences). CONTRACTOR will coordinate meetings and agenda items with other project stakeholders as necessary. Note: For PDT meetings, CONTRACTOR’s Project Manager and lead superstructure designer must be in attendance. Subcontractors will attend PDT meetings on an as-needed basis, upon approval of the Bridge Office Project Manager. (Assume half-day meeting durations).

Immediately following the bi-weekly progress meetings, CONTRACTOR will meet with the Bridge Office Project Manager and PEER REVIEWER to discuss design-specific issues and peer review comments on deliverables that require resolution. CONTRACTOR will record and submit meeting minutes to the Bridge Office Project Manager within three business days after each meeting. (Assume half-day meeting durations).

2.2.3 Comprehensive Project Team Kick-off Meeting
This meeting is intended to be the kick-off for the overall project team when the following parties are under contract: CONTRACTOR, PEER REVIEWER, Bridge 5900 designer, Bridge 5900 peer reviewer (if available), ICE, and the CMGC. STATE or STATE’s General Engineering Consultant (GEC) will lead this meeting. The anticipated meeting date is mid-January 2014. The goal of the
Meeting will be to review project information submitted to date, review the CMGC process, schedule, and to review an outline for project risk assessment procedures. STATE anticipates that CMGC process refinements will occur as a result of this meeting.

2.2.4 Additional Project Meetings (as necessary)
One week after each PDT meeting, the CONTRACTOR’s Project Manager and superstructure design lead will meet with the Bridge Office Project Manager and PEER REVIEWER via teleconference to provide updates on progress of design activities. These teleconferences are assumed as 2 hour teleconferences.

2.2.5 Public Outreach Activities
CONTRACTOR will lead and provide support and necessary information for public outreach activities through open houses. At a minimum, there will be open houses in Winona near the 30%, 60%, and 90% plan stages. CONTRACTOR will provide all graphics and handouts. STATE will provide a location and notification of open houses. This effort may include dissemination of summarized information on the design of the rehabilitation and reconstruction of Bridge 5900 (provided by the rehabilitation and reconstruction Engineer of Record).

2.2.5.1 Supplying Information to Third Parties
Upon request from STATE’s Project Manager, CONTRACTOR will furnish project information, including plan sheets, electronic data files (description of content), and design information to third parties within 10 business days. Information requests received directly by CONTRACTOR will be routed through and approved by the Bridge Office Project Manager. When appropriate, this information may be furnished via ftp site, or disseminated by either paper or electronic format. Information may be supplied to only one recipient of an interested party (i.e. a property owner, an owner’s attorney, etc.).

2.3 Quality Management Plan (QMP) and Quality Assurance/Quality Control Procedures
CONTRACTOR will develop a Quality Management Program/Plan that specifies 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. CONTRACTOR will prepare the QMP and distribute it to all project team members, including subcontractors. Components of the QMP must include the following:

- A List of Requirements
- Intent of the QMP
- Philosophy of the QMP
- Process to integrate PEER REVIEWER, CMGC, and STATE input
- Technical Document Review Process
- Checking Procedures
- Quality Control Verification
- Definitions

A complete independent design and analysis check is required for the superstructure and substructure designs. The personnel performing this check must be completely independent from the main design team responsible for plan production.

CONTRACTOR must ensure that the following Quality Control procedures are performed:

- Design and Plan Sheet Check
CONTRACTOR is responsible for the completeness and accuracy of its work. Final design calculations and plan sheets must be independently checked and reconciled prior to submittal. Review comments from STATE, CMGC, and PEER REVIEWER on various plan submittals do not relieve CONTRACTOR of its liability for an inaccurate or incomplete bridge plan. At the 60% and 90% submittals, CONTRACTOR will submit a memo—certified by the Lead Quality Control Checker—that confirms that all aspects of the independent check have been performed in accordance with the QMP.
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- **Quantity Check**
  Final quantities shown in the plans will be the reconciliation of two independently made sets of calculations. Each set of calculations will be included with CONTRACTOR’s submittals and deliverables.

- **Computer Programs**
  All computer programs and/or spreadsheets utilized by CONTRACTOR must be verified by CONTRACTOR through its in-house Quality Assurance Program. Input and output forms with the specific title of the program/spreadsheet will be included in CONTRACTOR’s design and quantity calculations.

- **Quality Assurance Verification**
  CONTRACTOR’s Project Manager or Quality Assurance Manager will review the entire plan design and production process to assure the completeness and adequacy of their work, and that it is in conformance with the CONTRACTOR’s Quality Assurance procedures.

- **Peer Review Comment Resolution**
  At the 30%, 60%, and 90% submittals, PEER REVIEWER will submit comment logs, which document Peer Review comments, CONTRACTOR’s responses, and the status of final disposition. CONTRACTOR is responsible for resolution of comments from PEER REVIEWER and the CMGC, and resolution of red-lined revisions from STATE.

2.4 **Peer Review Coordination**

STATE has determined this project to be a major structure based on MnDOT’s Bridge Design Manual criteria; therefore, a design review with independent design computations will be made by a PEER REVIEWER. CONTRACTOR will cooperate with PEER REVIEWER as part of the project team, and will coordinate the development of Design and Load Rating criteria with PEER REVIEWER at the onset of design. Coordination efforts will be continuous throughout all design phases of the project, and will be coordinated through project meetings and conference calls to be scheduled weekly after each PDT meeting.

CONTRACTOR will coordinate formal reviews for concurrence with PEER REVIEWER at the following stages of design:
- Design and load rating criteria development
- Vessel Impact Study
- Model development review for superstructure and substructure analysis and design
- 30% Plan (with estimated quantities for Work Package 1)
- 60% Early Foundations Package
- 90% Early Foundations Package
- Final resolution of 90% plan comments (for Issue for Bid Package)
- 30% Plans submittal for Work Package 2
- 60% Plan, with independent calculations for each bridge, checking moments, shear and stresses at segment joints or other appropriate locations along girder lines and all primary connections, as well as other points of interest. Final design of bridge is expected to be complete by this stage of the project
- 90% Plan, completely checked and ready for the peer review
- Final resolution of 90% plan comments (for Issue for Bid Package)
- Load Rating with independent calculations, checking moments, shear and stresses at segment joints or other appropriate locations
- Special provisions (with 30%, 60%, and 90% submittals for each Work Package)

The results of the reviews will determine that the design and plans comply with design standards and the established design criteria. The Bridge Office Project Manager will resolve any outstanding issues with CONTRACTOR and PEER REVIEWER.

2.4.1 **Peer Review Process**

Contract deliverables that require peer reviews (see above) will follow these general guidelines:
- CONTRACTOR will coordinate the reviews with PEER REVIEWER, the CMGC, and the Bridge Office Project Manager.
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- CONTRACTOR will submit four copies (or sets) of each deliverable to STATE (2), PEER REVIEWER (1), and the CMGC (1) in accordance with the contract deliverables schedule.
- PEER REVIEWER and the CMGC will return contract deliverables to CONTRACTOR with red-lined notations and corrections in accordance with the contract deliverables schedule.
- CONTRACTOR will arrange a meeting with PEER REVIEWER, the CMGC and the Bridge Office Project Manager to discuss corrections and provide plan interpretation. Any design related issues that arise during the peer reviews should be resolved during these meetings.
- CONTRACTOR will either make the revisions suggested by PEER REVIEWER and the CMGC or provide written justification to the Bridge Office Project Manager for proceeding without incorporating PEER REVIEWER’s suggested revisions.
- Upon resolution of any design related issues, CONTRACTOR will submit final deliverables to STATE in accordance with the contract deliverables schedule.

3.0 DESIGN STANDARDS

All designs will conform to applicable requirements of the following:

- Approved Bridge Preliminary Plan (with any approved changes from this project);
- The current American Association of State Highway and Transportation Officials (AASHTO) Load Resistance Factor Design (LRFD) Design Specifications;
- American Segmental Bridge Institute (ASBI) Bridge Construction Manual;
- CEB/FIP Model Code for Concrete Structures, 1990 (For Time Dependent Behavior of Concrete) or other model as agreed upon in design criteria;
- LRFD Bridge Design Manual;
- MnDOT Bridge Details Manual Parts I and II;
- In-progress Visual Quality Manual;
- MnDOT Aesthetic Guideline for Bridge Design;
- The Manual for Bridge Evaluation, AASHTO, (current edition);
- MnDOT Computer Assisted Design & Drafting (CADD) Standards;
- Segmental Bridge Rating Requirements, provided by the STATE;

Construction requirements of STATE’s current Standard Specifications for Highway Construction and any supplements thereto on file in the Office of the Commissioner of Transportation must be incorporated into the plans.

Current standard details and plans for various bridge components as illustrated in STATE’s Bridge Details Manual Part I and Part II will be incorporated into the detail plans whenever applicable. MicroStation files are available on the Bridge Office website. It is CONTRACTOR’s responsibility to modify these details when necessary for conformance with design.

4.0 BRIDGE FOUNDATIONS

4.1 River Piers, Approach Piers, and Abutments

CONTRACTOR will review geological, hydrological and environmental data collected by STATE for the project. CONTRACTOR will collect and evaluate the following data:

- Live load, wind, ice and barge impact forces, as well as demands imposed by cantilever bridge construction, including construction live load and LRFD balanced cantilever construction load combinations.

  NOTE: CONTRACTOR must complete a vessel impact study and submit a certified vessel impact study report to STATE and PEER REVIEWER in accordance with the AASHTO Guide Specifications and Commentary of Vessel Collision Design of Highway Bridges, current edition with interims.
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- Bridge hydraulic and environmental studies for ascertaining scour potential at river piers and the constraints on river and near-shore construction necessary to preserve marine habitat and to address seasonal weather conditions and constraints. CONTRACTOR must provide water pier footing and column geometrics to STATE, which will be used to determine the estimated scour for structural modeling.
- Vessel traffic and local agency data to assess requirements for accommodating local river traffic and complying with US Coast Guard (USCG) regulations during foundation construction.
- Pier cofferdam loads (include with design).
- Preliminary foundation and boring information provided by STATE, which will include preliminary foundations sizes as shown on the preliminary bridge plan.
- Foundation cofferdam construction details.

CONTRACTOR will establish a pile load test program, which will include a statnamic load test for the river piers, and a static load test for the approach piers with input and review by MnDOT Foundations Unit. CONTRACTOR will include appropriate number of load tests for development of LRFD resistance factors, for foundation design based on further development of the foundation load test program.

STATE will provide soil borings near each of the substructures, along with the MnDOT preliminary foundation report.

CONTRACTOR is responsible for any other geotechnical parameters needed for river pier foundation modeling and design, such as sub-grade modulus and other parameters required for pile soil interaction analysis.

CONTRACTOR will perform geotechnical engineering analysis for all bridge foundations, and will provide Foundation Analysis Design Recommendations (FADR) for substructures based on STATE’s preliminary foundation and boring information. This includes analysis of various foundation options, including driven piles of varying type and diameter. CONTRACTOR will collect and evaluate cost data for various pile sizes and shapes. Pile analysis will be performed using FHWA’s Driven Program (or similar analysis program). Pile drivability will be evaluated, and CONTRACTOR will conduct wave equation analysis (GRLWEAP) of potential hammer types. CONTRACTOR will analyze lateral resistance capabilities with LPILE/GROUP software (or similar analysis program). At a minimum, CONTRACTOR will evaluate spread footings and 2 pile types/sizes for approach piers, and 3 pile types/sizes for river piers.

In general, the work and services to be provided will follow STATE’s Specifications for Subsurface Investigation and Geotechnical Analysis and Design Recommendations. This document, entitled “consultdrillreport.doc” may be found downloaded from the following website: http://www.mrr.dot.state.mn.us/geotechnical/foudnations/tcontract.asp.

4.2 Additional Items for Approach Piers and Abutments
CONTRACTOR will collect and evaluate the following data:
- Abutment fill and settlement surcharge recommendations to determine pile down drag conditions;
- Information on any existing utilities that may need to be either moved or replaced. If utilities are not moved or replaced, CONTRACTOR will need to design foundations to avoid or mitigate the presence of any existing utilities;
- Groundwater elevations and corrosive material data to assess pile construction and durability requirements.

4.3 Final Foundation Recommendation
Final determination of recommended foundation types will be made based on recommendations from CONTRACTOR, with concurrence from STATE. A standard summary form of the recommended foundation alternatives for each substructure will be provided by STATE.
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5.0 DESIGN AND LOAD RATING CRITERIA

5.1 Design and Load Rating Criteria Development
CONTRACTOR will coordinate the development of design and load rating criteria for this project with PEER REVIEWER at the onset of the design.

5.2 Design and Load Rating Criteria Requirements
CONTRACTOR will design Bridge 85851 in accordance with design parameters and special design criteria. The design criteria will be developed as project-specific requirements in addition to the basic codified design requirements for the bridges. CONTRACTOR will perform the following tasks:
- Review segmental bridge preliminary plans provided by the STATE;
- Develop segmental design and load rating criteria to be utilized by the designer and reviewed by the PEER REVIEWER and STATE for the bridge, including design specifics such as specified concrete material properties, recommended allowable stresses, load factors, erection loads and other parameters;
- Development of Design and Load Rating Criteria will be based on the Bridge 85851 Preliminary Bridge Plans, and the Draft Design and Load Rating Criteria as a baseline, with input and concurrence from the Bridge Office Project Manager and PEER REVIEWER at the onset of the project. (Refer to Appendix A for Draft Design and Load Rating Criteria – General Notes I and General Notes II.)

5.3 Design and Load Rating Criteria Peer Review
CONTRACTOR will coordinate the peer review of the design and load rating criteria with PEER REVIEWER.

6.0 FINAL DESIGN COORDINATION (Activity Codes ABUT, DECK, GEOM, PIER)

6.1 Structure Site Data
CONTRACTOR will obtain current structure site data including final proposed roadway geometry and typical sections, topographic maps of the site, and other data on features affecting the bridge design such as rail lines, hydraulic structures, right-of-way, city streets, and existing utilities.

6.2 Foundation Recommendations Analysis
CONTRACTOR will review available foundation information and reports and provide geotechnical engineering analysis for all bridge foundations, and will provide Foundation Analysis Design Recommendations (FADR) for substructures based on STATE’s preliminary foundation and boring information. Final determination of recommended foundation types will be made based on recommendations from CONTRACTOR, with concurrence from STATE. A standard summary form of the recommended foundation alternatives for each substructure will be provided by STATE. Refer to section 4 for a detailed description of this work.

6.3 Hydraulics Data Review
CONTRACTOR will review available hydrology and hydraulics data and reports, and review preliminary deck drain locations. CONTRACTOR to provide final deck drainage size and locations and design of deck drainage system. CONTRACTOR will provide final pier and footing sizes to STATE for final hydraulic and scour analysis. CONTRACTOR will also provide cofferdam dimensions for all piers early on in the design process for scour analysis by STATE.

6.4 Visual Quality (Source Code: 1071)
Visual Quality (VQ) for this project will be determined in collaboration with the City of Winona, STATE’s District 6 staff, Bridge Office staff, MnDOT Cultural Resources Unit (CRU)/State Historic Preservation Office (SHPO), and other select stakeholders. CONTRACTOR will provide a Visual Quality Manager (VQM) to lead the VQ effort, as needed, for the duration of project development. A Visual Quality Advisory Committee (VQAC) was established during the preliminary design phase to provide input leading to the development of project specific exhibits for incorporation into the Final Design and a Visual Quality Management Plan (VQMP).
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The overall goals are to incorporate the provided project specific exhibits into the final design, finalize any aesthetic elements for the project that are not completed as part of the initial visual quality planning process, develop and present any possible alterations that may be proposed during the final design process, and to provide a Visual Quality Management Plan as Final Design project documentation. CONTRACTOR’s VQM will be responsible for developing visuals and leading presentations with the VQAC and/or SHPO as needed.

CONTACTOR’S VQM and superstructure engineer will plan to participate in six visual quality meetings. It is intended that these meetings would be conducted with the original VQAC. The intent of these meetings is to provide a transition into the final design process and continue with the consensus decision making design approach into final design for evaluation of further refinements or alterations to previously completed work, and to finalize development of details for incorporation into the VQMP.

CONTACTOR will develop the Visual Quality Management Plan (VQMP) for the project based on incorporation of previously completed work and additional input received during the visual quality planning meetings. The final VQMP will be a comprehensive brief report for the entire project, including all architectural elements of Bridge 85851, and also showing companion Bridge 5900. (For cost estimating purposes, rehabilitated Bridge 5900 is assumed to be rebuilt “in kind.”)

- Visual Quality Planning and Process
  CONTRACTOR is to participate in a visual quality planning process and develop a VQMP for the Winona Bridge over the Mississippi River. The process is to ensure context sensitive visual quality and aesthetic design results that satisfy the area’s transportation needs and preserve the historic, natural and cultural resources.

- Visual Quality Advisory Committee
  Representatives from STATE, local, and federal agencies; and select stakeholders will be invited to participate as members on a VQAC. The VQAC will serve as the advisory group for the river crossing project.

- Visual Quality Advisory Committee Meetings, planning meetings, and post meetings
  These meetings will be facilitated by the CONTRACTOR’S VQM.

  It is anticipated to have up to six VQAC meetings to accomplish this effort. CONTRACTOR will provide the necessary graphics, figures, etc., to present the various aspects of the project. The VQAC meetings will be held in the vicinity of the project site.

  It is anticipated that up to six pre-meeting conferences may be needed between the CONTRACTOR and STATE to prepare the agenda and agree on presentation materials, such as exhibits and PowerPoint presentations to be displayed at the VQAC meetings.

  It is anticipated that up to six post-meeting conferences may be needed to review the comments made at the VQAC meetings to decide on the necessary course of action.

- Items Provided by STATE:
  - Meeting facility
  - VQAC participants
  - Pertinent project correspondence and project data
  - Attendance by appropriate staff at all VQAC and/or CRU SHPO meetings
  - Previous exhibits developed in preliminary VQAC meetings
  - Meeting minutes from preliminary VQAC meetings
  - Visual Quality materials or details from projects in the vicinity of the project area.
  - Access to bridge plans, photo simulations, and power-point presentations and any animation prepared during the preliminary design phase of the project.
CONTRACTOR Tasks:  
CONTRACTOR will co-host the meetings with STATE staff, lead the presentation with respect to visual quality, provide engineering support with technical questions, coordinate preparation of necessary handouts, documents, and exhibits related to the river crossing project, and prepare minutes of the VQAC meetings.

Visual Quality Planning Process tasks:  
CONTRACTOR will participate in a visual quality planning process that incorporates ongoing agency, stakeholder, and public input through the representatives on the VQAC. Acceptable visual quality planning employs a systematic process that explores, documents, and illustrates consensus decision-making by recommending feasible design solutions and options that successfully avoid, minimize, or reduce adverse visual impacts while further enhancing elements of existing visual quality. CONTRACTOR’s VQM must be an architectural engineer, architect, or transportation planner, with at least ten (10) years of experience in visual quality planning and context sensitive design and solutions for large transportation projects.

CONTRACTOR will provide graphic support to capture ideas and concepts brought forth during the visual quality planning process. Sketches, 2D and 3D drawings, renderings, and photo simulations are all inclusive mediums to convey the information collected from the VQAC. Graphics developed during the planning process will be the basis for exhibits used for committee meetings, public meetings, and the Visual Quality Management Plan (VQMP). Information developed in the final VQMP will be incorporated into graphics and renderings to be displayed at Public Information Meetings.  

NOTE: some visualizations will need to include Bridge 5900 in photo-touched background imagery.

6.5 Deliverables:  
- Meeting Agenda: Coordinate the preparation of an agenda with input from STATE staff for each VCAC meeting. Provide agenda 5 working days prior to each VQAC meeting.
- Graphics: Prepare graphics as required for each VQAC meeting, including but not limited to sketches, 2D and 3D drawings, renderings, photo simulations, and/or 3D models. Provide for STATE review 5 days prior to each VQAC meeting.
- Record minutes of each VQAC meeting. Provide to STATE within working days after each VQAC meeting.
- Maintain a decision list which will be reviewed and expanded after each VQAC meeting. Include with minutes after each meeting. Provide to STATE within 5 working days after each VQAC meeting.

6.5.1 Visual Quality Management Plan (VQMP)  
CONTRACTOR will prepare the VQMP based on previously completed project specific exhibits with sufficient detail to communicate intent for the final design and construction of the project. Project specific exhibits completed during the preliminary visual quality planning process will be assembled and provided to CONTRACTOR for review and incorporation into the final design. CONTRACTOR proposed alterations that are approved during the final design process will be incorporated into the VQMP. The VQMP is envisioned to be highly graphical in nature, with bullet points to support key ideas, themes, and graphics. Exhaustive language to support graphics is not desired or encouraged.

Completion of the preliminary Visual Quality Planning process is anticipated to include project specific exhibits for the project, including details of the following elements. CONTRACTOR is expected to initiate final design based on provided exhibit details. The VQMP must, at a minimum, include the previously completed exhibits, and any accepted modifications thereto for the following:

- Photo-realistic renderings of Bridge 85851 shown in its environment with companion Bridge 5900
- Pier shapes for Bridge 85851
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- Abutment shapes
- Traffic barriers
- Ornamental bridge railing and transition over Union Pacific Railroad (if required)
- Approach spans
- Retaining walls
- Texture and color treatments
- Slope protection
- Grading plan elements
- Signing
- Roadway lighting
- Accent lighting at the river piers (if directed by Bridge Office Project Manager)
- Overlooks (if directed by Bridge Office Project Manager)
- Design guidelines, directives, and recommendations documented by plan layouts, elevations, sections, and details drawn to scale
- Landscape planning and design

All scale drawings must show proportional relationships, approximate color representation, and appropriate textures. The drawings must be shown on 11x17” plan sheets with borders, title blocks, and text descriptors.

CONTRACTOR Tasks:
- Provide STATE with schedule that demonstrates the management of VQ Critical Path items in accordance with overall project schedule.
- Collect and present information needed to further develop the VQMP.
- Edit and refine exhibits to be incorporated into the VQMP.
- Develop a consensus design process with stakeholders and CRU/SHPO
- Document stakeholder input to ensure that the final design of Bridge 85851 is compatible with the design of rehabilitated Bridge 5900.
- Submit an exhibit that summarizes final river pier aesthetics and other elements needed for construction of the early foundations package. CONTRACTOR must propose a deliverable date within its schedule for this submittal.
- Submit draft and final VQMPs to STATE. The final VQMP is expected with the 60% bridge plan submittal for the Early Foundations Package.

6.5.2 Visual Quality Details Coordination
CONTRACTOR will coordinate design elements such as bridge drainage, utilities carried by the bridges, sign supports, lighting supports, and aesthetics/urban design details as they relate to the construction. Ensure all details are in accordance with project goals.

7.0 Final Structure Design and Plan Preparation
CONTRACTOR will complete final structural design and plan preparation for Bridge 85851, including analysis and design of the bridge superstructure, substructure, and foundations. At a minimum, this task includes:

7.1 Finalize Bridge Geometry and Layout
Review the final three-dimensional geometry of the associated roadways as it affects the bridge design. If CONTRACTOR, the CMGC, or PEER REVIEWER proposes substantial changes to the Preliminary Plan—and STATE accepts the proposed changes—CONTRACTOR will update the Preliminary Plan, including any associated roadway geometric changes. CONTRACTOR will submit the updated Preliminary Plan and/or roadway geometric modifications for STATE’s approval.
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7.2 Develop Load Cases
Develop AASHTO LRFD load cases and combinations, and perform concurrent load rating analysis with the segmental design and load rating criteria and Article 13.0 of this exhibit.

7.3 Superstructure Design
Design superstructure in accordance with applicable LRFD provisions and MnDOT standards. The superstructure will be designed as cast-in-place post-tensioned concrete trapezoidal box girders. Superstructure design will include attachments for signs, lights, drainage, and utilities, based on loads provided by others.

7.4 Longitudinal Superstructure Design/Detailing
Determine superstructure longitudinal post-tensioning and reinforcing requirements based on applied loads, and include necessary details in the final plans. Develop post-tensioning details to allow for installation of additional longitudinal post-tensioning in the future per AASHTO.

7.5 Transverse Superstructure Design/Detailing
Determine superstructure transverse post-tensioning and reinforcing requirements based on applied loads, and include necessary details in the final plans.

7.6 Pier, Deviation, and Abutment Diaphragms
Design required superstructure diaphragms including load determination, analysis, and design of all post-tensioning and reinforcing.

7.7 Special Elements Design and Detailing
Design superstructure special elements necessary for the post-tensioning system including anchorage zones, deviation ribs, anchorage blisters, and protection systems.

7.8 Substructure Design
Design substructure elements in accordance with applicable LRFD provisions and MnDOT standards, including piers, abutments and foundations. CONTRACTOR will evaluate any conflicts between the in-place bridge and new bridge foundations and piling.

7.9 Aesthetic Element Design
Provide structural engineering necessary for incorporation of aesthetic features.

7.10 Drainage and Utility Design and Detailing
Incorporate details for accommodating bridge deck drainage and utilities to be carried by the bridge. Required river hydrology will be completed by STATE. Required roadway hydraulics, including size and placement of deck drains and design of deck drainage system will be provided by CONTRACTOR. Utility design loads will be included in the design criteria. Location of any bridge mounted signs will be determined early on by CONTRACTOR’s roadway designer so that loads from sign structures can be incorporated into the design.

7.11 Constructability Analysis and Design
CONTRACTOR will perform constructability studies of the structure and details at the 30%, 60% and 90% stages of plan development. The CMGC, PEER REVIEWER, and STATE will provide constructability input; however, CONTRACTOR will remain responsible for the adequacy of all constructability studies.

Prior to submittal of the 30% Plan submittal, CONTRACTOR will present project development to the CMGC and PEER REVIEWER. At a minimum CONTRACTOR will provide the following:
- Segmental superstructure modeling, including river piers to permit PEER REVIEWER to perform concurrent analysis (prior to 30% Plan submittal).
Prior to the 60% Early Foundations Package submittal, CONTRACTOR will present the following information to the CMGC, and PEER REVIEWER (see Article 17.1.3):

- Presentation of foundation alternatives, with emphasis on river piers.
- Preliminary construction access considerations (with CMGC input), including consideration of materials delivery, temporary railroad crossing needs, and placement of barges in the river in accordance with temporary navigation channel requirements (pending US Coast Guard coordination).
- 60% early foundations plan sheets.
- Draft special provisions for early foundations.

Immediately following each plan submittal stage, CONTRACTOR’s schedule will accommodate a 3-week comment resolution period to address CMGC and PEER REVIEWER comments on constructability. CONTRACTOR will not proceed with elements of design that are subject to change based on CMGC and PEER REVIEWER input until directed by the Bridge Office Project Manager.

(Refer to Article 7.19 for instructions on 3D drawings for constructability reviews).

7.12 Construction Load and Analysis
Analyze and design the structure for anticipated construction loads after finalizing necessary construction phasing. Schematic drawings of the construction procedures and loads assumed during design will be included in the final bridge plans.

7.13 Bridge Coordinate Geometry
Calculate bridge deck geometry based on final roadway plan and profile. Provide all coordinate geometry, including approach slab and immediate transition areas, in the plans.

7.14 Security Assessment
Provide Security Assessment following the guidelines of current Federal Highway Administration (FHWA) practice in conformance with project guidelines. The security assessment is yet to be completed; however, STATE anticipates that CONTRACTOR will develop details to install security cameras on and off the bridge. Specifically, the security camera system may include: two forward looking infrared (FLIR) cameras mounted on standalone poles to monitor either end of the bridge using software analytics to automatically monitor the FLIR images continuously and provide an alarm when a human is detected in specified areas; one standard color Capital Community Television (CCTV) camera with pan tilt zoom mounted on one of the poles with the FLIR camera, and necessary equipment for connection to a fiber connection network to include poles for mounting. CONTRACTOR must review these details with the Bridge Office Project Manager to determine which elements are applicable to this project. Further direction will be provided upon execution of this Contract.

7.15 Miscellaneous Design
Provide design and detailing for miscellaneous bridge elements, including, but not limited to, anti-graffiti coating, bridge access, navigational lighting, box lighting, etc. CONTRACTOR’s electrical design lead (or subconsultant) will provide engineering, plans, and specifications for aesthetic, navigation, roadway sidewalk, and box interior lighting systems. All electrical plan sheets must be certified by an electrical engineer registered in the State of Minnesota.

7.16 Utility Hanger Design/Coordination
Provide coordination and design detailing for hangers and associated details to accommodate utilities.

7.17 Maintenance and Inspection Access
CONTRACTOR will coordinate maintenance and inspection access with STATE.
Bridge Design Scope of Work

7.18 Contract Plans
CONTRACTOR will prepare contract drawings for Bridge 85851 as design plans requiring shop drawings. Design plans will include bar bending diagrams, reinforcing bar dimensions, bar lists, and details necessary to describe the work. CONTRACTOR will review shop drawings prepared by the CMGC (include in RFP cost proposal).

STATE anticipates the potential need for CONTRACTOR to prepare integrated shop drawings for Bridge 85851. If authorized by the Bridge Office Manager, CONTRACTOR will prepare and furnish a full set of integrated shop drawings for each segment of Bridge 85851. (For the RFP cost proposal, include the development of integrated shop drawings as an optional task. This price will not be evaluated as part of the best value for this Contract selection.)

7.19 3D Drawings for Constructability Studies
CONTRACTOR will prepare sufficient 3D drawings for constructability reviews. 3D drawings will illustrate that highly congested areas maintain minimum clearances, allow for bar bends, and do not result in interference issues. These 3D drawings will be used by CONTRACTOR to present to the CMGC and PEER REVIEWER during the constructability review process (see Article 7.11).

7.20 Shop Drawing Review
STATE will receive, log and track all shop drawings related to this project. STATE will distribute three copies of the shop drawings to CONTRACTOR for review, comment, and distribution. CONTRACTOR will review all segmental bridge shop drawings for general conformance with design concepts and intent of the construction contract documents. Work will consist of the following:

7.20.1 Annotated Shop Drawings
CONTRACTOR will return two annotated copies of shop drawings to STATE for distribution. Shop drawings will be annotated as necessary and marked with one of the following actions to be addressed:

a) No exceptions taken  
b) Make corrections noted  
c) Revise and resubmit  
d) Rejected – see remarks

7.20.2 Superstructure Box Girder Shop Drawings
a) Segment shop drawings (integrated drawings) for all superstructure segments  
b) Segment shop drawings (integrated drawings) for all pier tables  
c) C.I.P. on falsework shop drawings  
d) Segmental construction systems (traveler)  
e) Stationary construction systems (falsework)  
f) Post-tensioning system and details

7.20.3 Substructure Shop Drawings
a) Piers 8, 9, 10, and 11 formwork

7.20.4 Miscellaneous Shop Drawings
a) Site plan  
b) Expansion devices and armor  
c) Bearing assemblies  
d) Vehicular tube railing and ornamental pedestrian railing  
e) Navigation lighting system  
f) Box girder interior lighting system  
g) Access doors to bird screening
Bridge Design Scope of Work

h) Drainage system
i) Scour monitoring system

7.20.5 Responses to Requests for Information (RFIs)
STATE will receive RFIs for the project. STATE will distribute RFIs related to the bridge design to CONTRACTOR. CONTRACTOR will provide responses to RFIs to STATE. (CONTRACTOR will not directly correspond with the submitter of RFIs).

CONTRACTOR will include a work plan for this effort and a description for these activities with its response to this RFP. CONTRACTOR is not required to submit a cost for this effort with its RFP cost proposal. STATE and CONTRACTOR will negotiate this task at an appropriate time during the project.

8.0 Plan Content
NOTE: Plan submittals will include an early foundations package for construction of foundations for piers 9-14 with lower portions of the pier columns, and the north abutment footing. All plan sheets will be assembled in conformance with the MnDOT LRFD Bridge Design Manual (emphasis on Section 2) and the Bridge Details Manual Parts I and II in the general order of, and as supplemented by, the following:

- Title Sheet
  Minimum items that must appear on the Title Sheet are a Plan View of the bridge showing adjacent structures and features, a Title Block with provisions for the State Bridge Engineer’s approval signature, and an Engineering Certification Block for the Engineer of Record’s signature.
- Index of Sheets and Schedule of Quantities
  This sheet will include a numerical listing of all plan sheets and Schedule of Pay Items and Quantities in tabular form. Multiple sheets may be required to avoid crowding of information.
- Design Criteria/Construction Notes Sheet(s)
- General Plan and Elevation Sheet(s)
- Bridge Working Point Layout Sheet(s)
  Layout sheet(s) will be detailed in accordance with Section 2.4.2.4 of the LRFD Bridge Design Manual. (Note: Corner views required for the Partial Plan Review Submittal may be included in the Bridge Layout Sheet(s) or may be integrated into the superstructure plan sheets, at the CONTRACTOR’s option.)
- Foundation Layout Sheet(s)
  A pile plan view will be detailed for each bridge foundation. Plan views to include pile spacing and test pile identification at each foundation. Piles are to be tied into workline and working points. A pile load table with applicable pile notes is included for each foundation.
- Architectural Detail Sheet(s)
- Bridge Abutment Sheets
  Abutments will be separately detailed and reinforced. Discrete detail sheets and reinforcement sheets will be prepared for each abutment. Reinforcement sheets for each abutment will include complete reinforcement bar bending details and reinforcement bar lists to allow separate shipment for each abutment. Details, reinforcement dowels, and piling will be tied in and referenced to the working points. A tabulation of quantities will be provided for each abutment. Architectural details will be incorporated into the drawings.
- Bridge Pier Sheets
  Piers will be separately detailed and reinforced. Discrete detail sheets and reinforcement sheets will be prepared for each pier. Reinforcement sheets for each pier will include complete reinforcement bar bending details and reinforcement bar lists to allow separate shipment for each pier. A tabulation of quantities will be provided for each pier. Architectural details will be incorporated into the drawings.
- Superstructure Segmental and Post Tension Sheets
  o The superstructure for the bridge will be designed to address any staged construction considerations that are critical to the design stresses, such as sequence of closure pours and any portions of the structure that are designed to be cast on falsework;
  o Segment layout sheet with superstructure summary of quantities;
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- Tendon layout showing details of tendon bends;
- Any vertical post-tensioning details;
- Diaphragm details;
- Transverse post-tensioning;
- All reinforcement bars will be completely detailed and called out in bar lists;
- Segment erection sequence;
- Any portions of superstructure supported by falsework will be noted;
- Bearing replacement procedure showing all details required;
- Other segmental bridge details, such as future post tension ducts and anchorages.

- Miscellaneous Superstructure Sheets
  - Railing Standard Plan Sheet(s) with complete reinforcement bar bending details and reinforcement bar list;
  - Conduit Sheet(s) detailing conduit size, locations, hanger details and spacing, and a tabulation of quantities for each conduit system;
  - Bearing Details;
  - Bearing Replacement;
  - Access Openings;
  - Expansion Device;
  - Lighting Sheets;
  - Deck Drainage.

- Standard Bridge Plan Sheet(s)
  Applicable standard plan sheets that appear in Bridge Details Manual Part II will be incorporated into the final plan. CONTRACTOR will modify standard plan sheets to meet plan design requirements. It is the CONTRACTOR’s responsibility to examine the Details Manual and to incorporate all necessary standard sheets into the final plans and if required to appropriately modify each sheet.

- Standard Bridge B-Detail Sheet(s)
  Applicable standard B-Detail sheets that appear in Bridge Details Manual Part I will be incorporated into the final plan. CONTRACTOR will modify the B-Details to meet plan design requirements. It is the CONTRACTOR’s responsibility to examine the Details Manual and to incorporate all necessary B-Details into the final plans and if required to appropriately modify each sheet. (NOTE: All modified details will display the word “MODIFIED” below the detail number.

- As-Built Standard Plan Sheet
  From Bridge Details Manual Part II.

- Bridge Survey Sheet(s)
  From Preliminary Plan supplied by STATE.

- Bridge Survey Sheet(s) Plan and Profile
  From Preliminary Plan supplied by STATE. Sheets to be completed as follows: 1) Detail a sectional plan layout and centerline sectional elevation of the proposed substructure with each unit identified; 2) When test piles are to be used, they will be numbered and shown in proper plan location and also shown to proper batter and scale length in the sectional elevation view.

8.1 Final Plan Certification
The final plans for each bridge will be certified by a professional engineer licensed under the laws of the State of Minnesota and as provided for under Minnesota Statute Section 326.12 and the Minnesota State Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience, and Interior Design. All plan sheets must be certified.

8.2 CADD Files
Electronic CADD files of the final certified bridge plan are included in the final deliverables for this Contract. All files must be submitted in MicroStation. Files will be assembled in accordance with the following conventions and procedures:
8.2.1 File Requirements:
- Use the correct file naming convention for all files.
- For each plan set there will be only one file per file naming convention; therefore, merge/copy plan sheets/details or files into one file. (Example: if you have separate files for the north and south abutment details, and/or reinforcement, combine them into one file with the “abt” file extension. If you have separate files for each pier combine them into one file with the “pir” file extension).
- All reference files that are part of the finished plan sheet must be merged into a master file. Reference files are not allowed; therefore, detach all reference files after merging needed files and details.
- Remove all elements that are not part of the final plan sheet; remove all elements that do not reside within the boundaries of the sheet border.
- Sheet numbers are to be numeric. The exception is on revised plan sheets where an “R” follows the sheet number.

8.2.2 File Naming Convention
- File name will be: “BR” + “bridge number” + “_” + “file extension.dgn” (Example: BR12345_abt.dgn).

8.2.3 File Extension
New Plans:
- abt Abutment Details and Reinforcement
- det B-Details, Standard Sheets, and As-Built Bridge Data Sheet
- exp Expansion Device Details ***
- pcb Concrete Beam Details ***
- pir Pier Details and Reinforcement
- ral Railing and Median Details ***
- s12 General Plan and Elevation, Bridge Layout, Variable Super Charts, and Quantities
- stl Steel: Beams, Framing Details, etc.***
- sup Superstructure: Deck Plan, Framing Plan, Integral Diaphragm, Deck Transverse and Longitudinal Sections, and Sidewalk and Median Sheets.
- sur Survey: Plan and Profile
- sys Conduit Systems: Power, Lighting, Phone, Signals, etc.

*** These plan sheets may be included in the “sup” file extension.

9.0 30% PLAN
CONTRACTOR will provide project management services, including peer review coordination, for the development of the concept (30%) design and 30% Plan. The 30% Plan allows PEER REVIEWER, STATE, and the CMGC 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. These partially completed plans will be used to share technical information for purposes of coordination and to build consensus with STATE and PEER REVIEWER.

CONTRACTOR will provide concept dimensions for all segments of the member and coordinate findings with PEER REVIEWER, as well as validate clearances and complete the working point layout sheet. CONTRACTOR will also validate the locations of the fixed and expansion bearings, and modular joints.

At this stage, there will be a discussion of potential revisions to the design criteria, development and presentation of project standard details, and development of a draft list of pay items and an outline of the special provisions.

The plans will be on 11” x 17”, 20-lb white bond paper or approved equivalent. STATE and PEER REVIEWER may meet with CONTRACTOR to return a copy of the 30% Plan containing its red-lined notations and
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corrections. STATE will authorize CONTRACTOR in writing to proceed with final design in conformance with the red-lined copy of the 30% Plan. If CONTRACTOR disagrees with PEER REVIEWER’s notations and corrections these differences must be resolved. CONTRACTOR may proceed to final design prior to the written authorization at its own risk.

9.1 Design Considerations
The following items will be considered:
- Contaminated soils
- Utilities (identified in Preliminary Plan, with potential for additional utilities identified during final design)
- Deck drainage (provided by CONTRACTOR)
- Foundation type for river piers
- Construction staging
- Navigational lighting
- Verification that profile grade and structure depth provide the required clearances over the navigation channel
- Vessel Impact Study
- Security Assessment
- Internal lighting and power for the superstructures boxes
- Aesthetic lighting
- Preliminary locations of bridge mounted signs

9.2 Constructability Analysis
STATE has planned approach spans as post-tensioned concrete slab spans and prestressed concrete beam spans, and the three-span river portion as cast-in-place box girders, constructed by the balanced cantilever method. CONTRACTOR will review proposed span layouts for foundation locations and identify advantages and disadvantages of any other appropriate alternative construction method. CONTRACTOR will either concur with, or propose alternative construction methods. Use of concrete segmental boxes on the Winona approach spans is not to be regarded as betterment to the visual quality of the project.

CONTRACTOR will submit a 2-3 page superstructure/optimal construction method evaluation to STATE with the 30% Plan submittal. This submittal must include concurrence of the CMGC as to the initial assumptions of cast-in-place balanced cantilever construction, and prestressed concrete beam approach spans, or adjusted in accordance with directive from the Bridge Office Project Manager.

9.3 30% Plan Submittal
At a minimum the 30% Plan will consist of the following:
- General Plan and Elevation Sheet(s)
  For this submittal the General Plan and Elevation sheet(s) need 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 preliminary Bridge Plans supplied by the STATE.
- Draft pay item list for the early foundation and final bridge plans
- Draft quantities for early foundations package
- Bridge Layout Sheet(s)
  For this submittal the Bridge Layout sheet(s) will show a line diagram that indicates the control point, working line, reference lines, and proposed working point locations. The tabulations required need not be completely filled in; however the sheet(s) will indicate the diagonal and other dimensions that will be included in the final plans. 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.
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- **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.

- **Bridge Survey Sheet(s)**
  Survey sheets provided by STATE in the Bridge Preliminary Plan are to be included. For this submittal they are not required to be completed.

- Any supporting design computations used to develop the aforementioned items.

9.4 **30% Plan Peer Review**
CONTRACTOR will coordinate the peer review of the 30% Plan with PEER REVIEWER and the CMGC.

10.0 **Early Foundations Package Submittals**
CONTRACTOR will submit early foundations package submittals in accordance with the CMGC work package review schedule (see article 16.2). For each submittal, CONTRACTOR will supply all necessary information to STATE, the CMGC, and PEER REVIEWER.

Note: With each plan submittal, CONTRACTOR will include draft special provisions. At the 60% submittal, CONTRACTOR will provide the final FADR.

CONTRACTOR will submit its final, complete design of the segmental superstructure, piers 9-14, cofferdams, and the north abutment. The following completed plan sheets will be included in the Final Early Foundations Package:

- General Plan & Elevation Sheet
- Bridge Layout Sheet
- Final plan sheets for piers 9-14 foundations, footings, piling or drilled shafts, cofferdam details, and pier columns, footing and column reinforcement, pier column stems (which extend to construction joints to enable “out of water” construction), north abutment footing, abutment footing reinforcement, abutment piles, and complete removal of cofferdams.
- All reinforcement details and quantities for this portion of the project.
- Final pay items and quantities for this portion of the project.
- Bridge Survey Sheet(s)
- Final Special Provisions for this portion of the project.

10.1 **Peer Review of Early Foundations Package**
CONTRACTOR will coordinate the peer review of the Early Foundations Package with PEER REVIEWER and the CMGC.

11.0 **60% PLAN**
The 60% Plan will be a “snapshot” of the final bridge plan’s progress. It is expected that the geometric details for piers and abutments will be complete by the 60% Plan submittal.

CONTRACTOR will submit two sets of the 60% Plan, along with draft Special Provisions, draft quantities, two bound hard copies of draft design calculations, and electronic (.pdf) files of the Plan, to STATE, PEER REVIEWER, and the CMGC. The plans will be on 11” x 17", 20-lb white bond paper or an approved equivalent. STATE will perform a cursory review to assess CONTRACTOR’s progress. CONTRACTOR may continue with final plan preparation during this review. PEER REVIEWER and the CMGC will return a copy of the 60% Plan containing red-lined notations and corrections to CONTRACTOR. If CONTRACTOR disagrees with any suggested revisions, these differences must be resolved. If necessary, a meeting will be held with STATE, CONTRACTOR, PEER REVIEWER, and the CMGC to resolve issues.
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11.1 Preliminary Rating Factor Results
CONTRACTOR will submit Preliminary Rating Factor Results to STATE and PEER REVIEWER with the 60% Plan, showing that rating factors meet minimum LRFR requirements.

11.2 60% Plan Peer Review
CONTRACTOR will coordinate the review of the 60% Plan and 60% Constructability Study with PEER REVIEWER and the CMGC.

12.0 90% PLAN
The 90% Plan submittal is to be considered 100 % complete by CONTRACTOR, ready for peer review. Plan should be ready for CONTRACTOR’s certification and approval by the State Bridge Engineer.

The plan will be prepared in conformance with Articles 3.0 and 5.0 of this Exhibit and will contain corrections provided by previous plan submittals. The 90% Plan Submittal will contain the following:

- Two plan sets on 11" x 17", 20-lb white bond paper or approved equivalent
- One hard copy of bound and indexed design calculations
- Bound and indexed quantity calculations, two independent sets – one hard copy each
- One bound hard copy of Special Provisions

CONTRACTOR will submit the 90% Plan to STATE, PEER REVIEWER, and the CMGC. STATE, PEER REVIEWER, and the CMGC may meet with CONTRACTOR to return a copy of the 90% Plan with red-lined notations and corrections. PEER REVIEWER and the CMGC will return the 90% Plan with red-lined notations and corrections to CONTRACTOR. If CONTRACTOR disagrees with any suggested revisions, these differences must be resolved. All corrections must be made prior to submittal of final deliverables. CONTRACTOR will make corrections and submit a Final Certified Plan to STATE.

12.1 90% Plan Peer Review
CONTRACTOR will coordinate the peer review of the 90% Plan and 90% Constructability Study with the PEER REVIEWER and the CMGC.

If STATE or PEER REVIEWER determines that major plan revisions are necessary, CONTRACTOR will prepare and furnish a revised 90% plan.

13.0 LOAD RATING ANALYSIS
CONTRACTOR will perform a load rating analysis for Bridge 85851. Work under this task will include rating the bridge on the conditions below, and providing inventory and operating rating factors using design loads. The final operating rating factor will be shown in the design data block on the bridge plans. The ratings will be in accordance with the following design criteria:

- The Manual for Bridge Evaluation, AASHTO, (current edition);
- LRFD Bridge Design Specifications;
- The CEB/FIP Model code for Concrete Structures, 1990 (For time Dependent Behavior of Concrete) or other model as agreed upon in design criteria;
- Other applicable criteria as defined in the Project’s Design Specifications;
- Segmental Bridge Rating Requirements provided by STATE.

CONTRACTOR Tasks:
Each separate component, segment, or type within the overall bridge will be rated and reported. At a minimum, CONTRACTOR will rate for:

- Moment and shear at the tenth points of each span.
- Design live loads placed on one or more design lanes with the appropriate multiple presence factor for the number of lanes occupied.


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Prestressed Concrete Beam (PCB) Approach Spans:
CONTRACTOR will rate Bridge 85851 PCB based on the MBE, current edition. CONTRACTOR must rate PCB spans using VIRTIS software. CONTRACTOR will also be required to provide VIRTIS input files for PCB spans. The entire beam span structure must be rated for each unique span. PCB spans will not be required as part of the bridge ratings manual.

Post-Tensioned Concrete Box Girder Spans:
CONTRACTOR will rate post-tensioned concrete box girder spans in accordance with established design criteria for the project.

For design loadings, CONTRACTOR will rate for:
- HL-93 loading for single lane, 2-lane, and 3-lane design loadings across the entire bridge neglecting the sidewalk loading (considers possible future condition with bridge reconfigured to accommodate 3 lanes)
- HL-93 loading for 1-lane, and 2-lane design loadings with pedestrian sidewalk loading
- HL-93 loading for 1-lane, and 2-lane design loadings with HL-93 truck in sidewalk area
- HL-93 loading for 1 lane, and 2-lane design loadings with inspection vehicle in sidewalk area
- Include appropriate corresponding multiple presence factor.
- Rating analysis will include consideration of the most critical loading for both transverse and longitudinal analysis.
- This portion of the analysis includes rating using the HL-93 loading, with rating factors reported for both inventory and operating rating.

For permit loadings, CONTRACTOR will rate for:
- Five different MnDOT overweight permit vehicles, each analyzed individually, and placed on one or more lanes with the appropriate multiple presence factor for the number of lanes occupied.
- Each permit vehicle along with a uniform lane load equal to 200 lbs. per linear foot placed on each lane, plus the addition of Minnesota legal loads shown in Appendix 15-D and Appendix 15-E (MnDOT LRFD Bridge Design Manual, current edition) placed on the remaining lanes of the bridge. The permit vehicle and lane load will have a multiple presence factor of 1.00 and the Minnesota legal loads will have the appropriate multiple presence factor for the number of lanes occupied. If CONTRACTOR can demonstrate that use of the HL-93 loading does not result in substantial inefficiencies, STATE may permit the use of HL-93 loading in lieu of legal loads (combined with permit vehicle loads).
- Rating analysis will include consideration of the most critical loading for both transverse and longitudinal analysis.
- This portion of the analysis includes rating using the HL-93 loading, with rating factors reported for the operating rating.
- All bridge types for LRFR.
- See LRFR Load Factors table for load factors of design loads and permit loads (Appendix A).

Post-Tensioned Slab Span:
Ratings for the post-tensioned slab will be included in the bridge ratings manual. Procedures for rating the PT slab are similar to those defined above for the box girder. An example bridge ratings manual will be available upon request.

13.1 Operating Rating
CONTRACTOR will provide an operating rating factor. The operating rating will be included in the Design Data in the bridge plans.

13.2 Inventory Rating and Rating Report
CONTRACTOR will provide a Bridge Rating and Load Posting Report. A standard form will be provided by STATE. In lieu of a rating table included in the standard form, CONTRACTOR will provide a table similar to the rating factor table included in Appendix A to this Exhibit. The overall rating will be the
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lowest rating of any individual component, segment, or type. The final rating and each component rating will be accompanied by the location of the rating, the limit state, and the impact factor. The minimum inventory rating factor will be 1.0.

13.3 Post-Letting Activity: Rating Manual
CONTRACTOR will proceed with the development of a rating manual upon written authorization from STATE. CONTRACTOR will provide the load rating in VIRTIS software format, using system input. If VIRTIS is unable to rate the bridge type, another commercially available bridge rating software – accepted by STATE – may be used. The software must be capable of running overweight vehicles as described herein. CONTRACTOR will submit the computer files with the rating.

For any bridge type that is not compatible with VIRTIS, CONTRACTOR will provide a rating manual. This manual will include methods, – which use influence lines and surfaces – instructions, and examples of how to rate the bridge for any type of future permit vehicles. Such vehicles may range up to 600,000 lbs, have as many as 25 axles, two to eight tires per axle to a width of 20 feet, and length up to 200 feet. A rating manual example will be provided by the STATE upon request.

13.4 Peer Review Coordination
CONTRACTOR will coordinate the peer review for the Load Rating with PEER REVIEWER.

14.0 POST-CONSTRUCTION OWNER’S MANUAL
Upon written authorization from the Bridge Office Project Manager, CONTRACTOR will provide an Owner’s Manual that provides maintenance guidance for specific bridge components. The following items will be included:

- Description of the bridge.
- Creep, shrinkage, and thermal monitoring with data tables, with inspection
- Inspection and maintenance of bearings with movement tables and inspection form.
- Inspection and maintenance of expansion joints with movement tables and inspection form.

When authorization is provided, the Bridge Office Project Manager and CONTRACTOR’s Project Manager will establish a deliverable schedule for the Owner’s Manual. CONTRACTOR will provide a Draft Owner’s Manual to STATE for review. STATE will return the Draft Owner’s Manual with comments and suggested revisions. CONTRACTOR will make necessary revisions and re-submit to STATE within 10 working days.

15.0 SPECIAL PROVISIONS AND COST ESTIMATE
CONTRACTOR will perform the following tasks:

15.1 Special Provisions
- Develop and maintain a list of materials and procedures required for the project early and throughout the development process so items requiring special provisions are not overlooked when final special provisions are being prepared;
- Develop and certify entire Division SB Project Special Provisions, including foundation and concrete superstructure design and any other unique items not covered in the MnDOT Standard Specifications for Construction, including post-tensioning system requirements.

15.2 Cost Estimates
Cost Estimates will be prepared by others (no cost estimates are included within this Contract) based on Plans, Special Provisions, and Estimated Quantities provided by CONTRACTOR.

16.0 PLAN DELIVERABLES
16.1 CONTRACTOR Deliverables
CONTRACTOR will submit deliverables in accordance with the schedule indicated below in article 16.2.

16.1.1 Design and Load Rating criteria deliverables:
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- Draft Design and Load Rating criteria – two copies to both STATE and PEER REVIEWER within 2 weeks of Notice to Proceed.
- PEER REVIEWER will return draft Design and Load Rating criteria to CONTRACTOR with red-lined notations and revisions within 4 weeks of Notice to Proceed.
- Final Design and Load Rating criteria – one copy to STATE within six weeks of Notice to Proceed.

16.1.2 Vessel Impact Study (anticipated due date: prior to 30% plan)
- hard copies - STATE (1), PEER REVIEWER (1), and the US Coast Guard (1)

16.1.3 30% Plan deliverables
- Draft 30% Plan four plan sets - STATE (2), PEER REVIEWER (1), and the CMGC (1), including:
  - General Plan and Elevation Sheet(s)
    For this submittal the General Plan and Elevation sheet(s) need 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 preliminary Bridge Plans supplied by STATE.
  - Draft pay item list for the early foundation and final bridge plans
  - Draft quantities
  - Bridge Layout Sheet(s)
    For this submittal the Bridge Layout sheet(s) will show a line diagram that indicates the control point, working line, reference lines, and proposed working point locations. The tabulations required need not be completely filled in; however the sheet(s) will indicate the diagonal and other dimensions that will be included in the final plans. 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.
- 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.
- Bridge Survey Sheet(s)
  Survey sheets provided by STATE in the Bridge Preliminary Plan are to be included. For this submittal they are not required to be completed.
- Any supporting design computations used to develop the aforementioned items.
- Electronic files of in-progress plan
  Draft cross sections showing box girder dimensions and location of tendons
  Constructability analysis with 2-3 page superstructure/optimal construction method report
  Draft FADR
  PEER REVIEWER and CMGC will return the 30% Plan to CONTRACTOR with red-lined notations and revisions within two weeks of receipt from Bridge Office Project Manager
  Incorporation of CMGC comments (as directed by Bridge Office Project Manager)
  Final 30% Plan – two sets to STATE (with draft pay items for the entire bridge, and estimated quantities for early foundations)

16.1.4 60% Early Foundations Package
(Refer to Section 7.11)
- 60% early foundations plan sheets (four sets) STATE (2), PEER REVIEWER (1), and CMGC (1).
- Final FADR
- Draft special provisions for early foundations.
Bridge Design Scope of Work

16.15 90% Early Foundations Package
90% Plans and special provisions should be completely checked by CONTRACTOR, and ready for peer review.
- 90% early foundations plan sheets (four sets) STATE (2), PEER REVIEWER (1), and CMGC (1).

16.1.6 Final Early Foundations Package:
Four plan sets – STATE (2), PEER REVIEWER (1), and the CMGC (1)
Complete design of segmental superstructure, piers 9-14, cofferdams, and the north abutment must be completed prior to this submittal.
- General Plan & Elevation Sheet.
- Bridge Layout Sheet(s).
- Final plan sheets for piers 9-14 foundations, footings, piling or drilled shafts, cofferdam details, and pier columns, footing and column reinforcement, pier column stems (which extend to construction joints to enable “out of water” construction), north abutment footing, abutment footing reinforcement, abutment piles, and complete removal of cofferdams. CONTRACTOR will submit 2 plan sets to STATE, PEER REVIEWER, and the CMGC.
- All reinforcement details and quantities for this portion of the project.
- Final pay items for the early foundations
- Bridge Survey Sheet(s)
- Final Special Provisions for the early foundations
- PEER REVIEWER and the CMGC will return red-lined comments to the CONTRACTOR within 3 weeks of receipt from Bridge Office Project Manager.

16.1.7 Updated 30% Plan
This submittal includes superstructure, piers, abutment details that are in development. This plan set will include the most up-to-date information available for evaluation through the OPCC process.

16.1.8 60% Plan deliverables:
- Draft 60% Plan (four plan sets) – STATE (2), PEER REVIEWER (1), and CMGC (1)
- Electronic files of in-progress plan
- Final foundation recommendations and the geotechnical engineering review
- Draft Special Provisions
- Draft pay items and anticipated quantities
- Electronic files (.pdf) of the plan
- Constructability Review
- PEER REVIEWER and the CMGC will return the draft 60% Plan to CONTRACTOR with red-lined notations and suggested revisions within four weeks of receipt from the Bridge Office Project Manager.

16.1.9 90% Plan deliverables:
- 90% Plan (four plan sets) – STATE (2), PEER REVIEWER (1), and the CMGC (1)
- Electronic copy of final design and quantity calculations
- Electronic copy of Special Provisions
- Electronic copy of the Plan (MicroStation)
- Constructability Review
- PEER REVIEWER and the CMGC will return the 90% Plan to the CONTRACTOR with red-lined notations and suggested revisions within three weeks of receipt from the Bridge Office Project Manager;
- Final Certified Plan to STATE no later than November 12, 2014. CONTRACTOR will deliver the Final Certified plan on 11" x 17", 20-lb white bond paper or approved equivalent. The plan will contain all corrections as noted by STATE on the red-lined final review print.
Bridge Design Scope of Work

16.1.10 Final Plans for Entire Bridge
This submittal is the final Issue for Bid Package for Bridge 85851. At this stage, the peer review and the OPCC processes will be completed, and all revisions from processes will be incorporated into the plans, quantities, and special provisions.

16.1.11 Rating Manual: (upon written authorization from STATE, due dates subject to change)
- Draft Rating Manual to both STATE and PEER REVIEWER 120 days after written authorization to proceed;
- PEER REVIEWER will return draft Rating Manual to CONTRACTOR with red-lined notations and revisions no later than 160 days after written authorization to proceed;
- Final Rating Manual to STATE no later than 200 days after written authorization to proceed.

16.1.12 Owner’s Manual: (upon written authorization from STATE, due dates subject to change)
- Draft Owner’s Manual to STATE 90 days after written authorization to proceed;
- Final Owner’s Manual to STATE 10 working days after receipt of STATE-reviewed Draft Owner’s Manual.

16.1.13 Shop Drawing Review
- Two sets of annotated shop drawings

16.2 Submittals for CMGC Work Packages
(See Appendix B for additional information). CONTRACTOR will assemble and submit work packages one week prior to workshops at the project stages listed below. Work packages will include draft plans, estimated quantities, and draft special provisions. The anticipated meeting date is mid-January 2014 (see article 2.2.3 for details).

Submittals for Bridge 85851 Work Package 1:
- 30% Plans (with estimated quantities for early foundations package) (anticipated due date: 1/29/14)
  - Initiates 30% OPCC process
  - Present submittal at OPCC workshop (2/5/14)
  - 3 weeks for CMGC Interim Pricing (OPCC) Milestone process (2/26/14)
- 60% Early Foundations Package submittal (anticipated due date: 3/26/14)
  - 60% OPCC
  - Present submittal at OPCC workshop (4/2/14)
  - 2 weeks for CMGC Interim Pricing (OPCC) Milestone process (4/16/14)
- 90% Early Foundations Package submittal (anticipated due date: 5/7/14)
  - 90% OPCC
  - Present submittal at OPCC workshop (5/14/14)
- Final Early Foundations Package (with completed PEER REVIEW)
  - Issue for Bid Plan Package (IFB)
  - Present submittal at Final Pre-Bid Plan Review workshop (6/4/14)
  - Target date to begin construction: 7/2/14

Submittals for Bridge 85851 Work Package 2:
- Updated 30% Plans (includes superstructure, piers, abutment details that are in development. This plan set will include the most up-to-date information available for evaluation through the OPCC process). (anticipated due date: 7/9/14)
  - Initiates 30% OPCC process
  - Present submittal at OPCC workshop (7/16/14)
  - 3 weeks for CMGC Interim Pricing (OPCC) Milestone process (8/6/14)
- 60% Plans (anticipated due date: 8/27/14)
  - 60% OPCC
  - Present submittal at OPCC workshop (9/3/14)
Bridge Design Scope of Work

- 2 weeks for CMGC Interim Pricing (OPCC) Milestone process (9/17/14)

- 90% Plans (anticipated due date: 11/12/14)
  - Present submittal at OPCC workshop (11/19/14)
  - 2 weeks for CMGC Interim Pricing (OPCC) Milestone process (12/3/14)

- Final Plans for Entire Bridge (with completed PEER REVIEW)
  - Issue for Bid Plan Package
  - Present submittal at Final Pre-Bid Plan Review workshop (12/17/14)

CONTRACTOR will assemble submittals for respective Work Packages with notation clearly identifying each submittal. Work Packages for the 30%, 60%, and 90% submittals will include Plans, Special Provisions, and estimated quantities. Each work package will be used to prepare cost estimates by the CMGC, and by others (Refer to Appendix B).

The Issue for Bid Plan Package for each Work Package will initiate the development process for the Guaranteed Maximum Price for with the CMGC. (Refer to Appendix B).

16.3 STATE Deliverables:
The following items will be provided by STATE:

- Bridge Preliminary Plan
  A bridge preliminary plan, prepared by STATE Bridge Office and approved by the State Bridge Engineer, will be provided. CONTRACTOR’s design will be based on information contained in the preliminary plan and other information defined in this Exhibit. The preliminary plan will have been prepared by the Bridge Office in accordance with MnDOT Bridge Design Manual - Section 300 and will consist of preliminary design, architectural, and survey data as follows:
  - General Plan and Elevation Sheet
    This sheet will identify the bridge type. It will show general dimensions and geometries, substructure locations and types, a bridge plan, elevation, and bridge deck-cross section.
  - Architectural Sheet (if applicable)
    This sheet will contain aesthetic details (i.e. rustication) to be incorporated into the final plan.
  - Bridge Survey Sheet
    This sheet includes a survey of the site or sites, platted alignments, grades, profiles, and cross-sections.
  - Bridge Survey Sheet Plan and Profile
    This sheet includes plotted foundation test borings. The borings will have been provided by the MnDOT Foundations Unit.
  - Utility Locations
    Location of existing utilities will be shown on the preliminary bridge plans. Further utility information will be collected, identifying elevations. This will be provided to CONTRACTOR during the design process as an update to all currently available utility information.

- Preliminary Bridge Foundation Recommendations and Foundation Boring Information
  The foundation boring information will be provided by the MnDOT Foundations Unit. Upon completion of the CONTRACTOR-provided FADR, STATE will provide a recommendation form that includes pile type, capacity, and estimated lengths and/or foundation earth pressures for spread footings for each approach span foundation. These recommendations will be subject to change, particularly the pile configuration.

- Segmental Bridge Rating Requirements
- Final River Hydraulic Analysis
  Final hydraulic and scour analysis will be provided when pier size is finalized.

- Bridge Deck Drainage
  STATE will provide the deck drainage spacing and storm drainage tie-in design and location.

It is CONTRACTOR’s responsibility to examine all materials provided by STATE for completeness and to notify STATE in a timely manner if additional information is required.
**Bridge Design Scope of Work**

CONTRACTOR may request modifications to information contained in the preliminary plan to improve its design; however, CONTRACTOR will not base its design on the suggested modifications unless approved in writing by the Bridge Office Project Manager.

17.0 ADDITIONAL PROJECT INFORMATION
CONTRACTOR is advised that the Status of the NEPA process is incomplete. STATE anticipates completion of the Finding of No Significant Impact (FONSI) by January 1st, 2014. Prior to completion of the National Environment Policy Act (NEPA) process, no commitment will be made as to any alternative under evaluation in the NEPA process, including the no-build alternative. CONTRACTOR’s work will be limited to those preliminary design activities that will not bias the outcome of the NEPA process.

Upon notice to proceed, CONTRACTOR may proceed with Preliminary Design and development of the 30% Design including all work and all submittals specified for the 30% Early Foundations Work Package.

No commitments will be made to any alternative being evaluated in the NEPA process and that the comparative merits of all alternatives presented in the NEPA document, including the no-build alternative, will be evaluated and fairly considered, prior to proceeding with Final Design.

CONTRACTOR will not proceed with Final Design until specifically authorized by STATE.

See also:

Appendix A –Draft design and load rating criteria and LRFR rating table
Appendix B – CMGC OPCC flow charts

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