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1.0 Project Overview
The St. Croix Crossing Project has been developed in response to traffic congestion, operational deficiencies, safety concerns, and structural deficiencies of the Stillwater Lift Bridge. The overall project, as described in the 2006 Supplemental Final Environmental Impact Statement (SFEIS), includes construction of a new river crossing and a mitigation package to offset project impacts to the local environment. Documents prepared in preparatory phases of this project can be found at the following website: www.dot.state.mn.us/metro/projects/stcroix.

The design of the new river bridges and mitigation items must be consistent with the requirements of the St. Croix River Crossing Project’s Project Management Plan, dated January 15, 2009, and any subsequent amendments.

The scope of this Contract is to design and prepare three separate Bridge Plans, special provisions, cost estimates, and conduct an independent review of the hydraulic analysis for Bridges 82045, 82047, and 82048. This Contract also includes design of and separate plans for the Xcel barge unloader facility and removal of this facility (mitigation) following construction of the new river bridge. This Contract also includes development of several specialized reports and Bridge Manuals that are required for the design of these signature bridges. The bridge designs include a new extradosed river bridge with mainline approach spans (Bridge 82045) and ramp bridges (Bridges 82047 and 82048), and approach panels with the minimum amount of grading required to ensure that adequate erosion control measures and best management practices are employed to minimize any uncontrolled release of sediment into the St. Croix River.

MnDOT and Xcel Energy have a Memorandum of Understanding (Appendix “K” of the SFEIS) for use of Xcel’s barge unloader facility and other site constraints. Xcel’s barge unloader facility is proposed as a staging area during construction and is planned to be removed following construction of the new river bridge and will be included in the Contractor’s design with separate plans prepared by the Contractor specific to the particular St. Croix River Bridge staging yard requirements.

Plans will be prepared by others (MnDOT/WisDOT) for pond construction—riverside, temporary and energy dissipater and the associated piping/drop shafts, based on the Contractor’s independent review of the hydraulic analysis for the entire construction project.

Requirements for Bridges 82045, 82047 and 82048 have been developed and are documented in the 2006 Supplemental Final Environmental Impact Statement (SFEIS), the 2011 Visual Quality Manual Addendum (VQMA), the 2007 Visual Quality Manual (VQM), the current draft Preliminary Bridge Plans (March 2012), the Concept Refinement Report dated June 2010, and the 2006 Water Resources Preliminary Drainage Design, as amended by HZ United in 2012. These requirements include, but are not limited to, the following:
- The extradosed river spans will have no more than six piers in the water;
- The extradosed towers vary in height from approximately 220 feet on the Wisconsin side to approximately 175 feet on the Minnesota side (tower heights are above normal pool elevation and include approximately 60 feet of tower above the deck);
- The extradosed span lengths are approximately 480 feet and the backspans approximately 290 feet;
- The extradosed typical section consists of two 12’ lanes in each direction, 6’ inside shoulders, 10’ outside shoulders, and a 12’ walk on the north side of the bridge;
- Lookout platforms are provided on every other pier, outside of the walkway;
- Aesthetics, landscaping, and context sensitive designs as detailed in the VQM and the VQMA.

Plan sets: to be let as one package by MnDOT as early as March 2014 (date subject to change):
1. New river bridge and ramp bridges & Barge Unloader Mitigation item – provided by Contractor.
2. Grading, drainage off the main river bridge, approach panels in Minnesota - Provided by MnDOT.
3. Grading, drainage off the main river bridge, approach panels in Wisconsin – Provided by WisDOT and MnDOT.
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Bridge 82045
Bridge 82045 spans Minnesota Trunk Highway (TH) 95, the Union Pacific Railroad (UPRR), wetlands, and the St. Croix River. The total bridge length (abutment to abutment) is approximately 5,002 feet. The mainline approach portion of the structure varies in depth from 10’ to 16’. The depth transition occurs in span 2. The remaining approach spans and main river bridge extradosed spans are at a 16’ constant depth. The main river spans have an extradosed superstructure that combines concrete box girders with cable stays. The approach spans have a concrete box girder superstructure. The transition from approach spans to river spans occurs at a common pier located just inland from the Minnesota shoreline. The approach span for Bridge 82045 includes a variable transition gore section that aligns with Bridge 82047 at Pier 5R and aligns with Bridge 82048 at Pier 7R.

Bridges 82047 and 82048
Bridges 82047 and 82048 span the UPRR, local roadways, and wetlands. These bridges have concrete box girder superstructures that align with the gore area transitions of the approach spans of Bridge 82045. The structure depth for both bridges varies from 10’ to 16’ to match the depth of Bridge 82045 river spans. The typical sections have a variable lane width ranging from 16’ to 32’. Bridge 82047 is the off-ramp for westbound traffic to TH 95 and includes the 12’ trail, 16’ ramp width, and 4’ inside and outside shoulders and transitions in width to 60’-6” to accommodate left and right turn lanes at the west end of the bridge. Bridge 82048 is the on-ramp for eastbound traffic from TH 95.

To summarize, Contractor will prepare and submit Certified Final Bridge Plans for Bridges 82045, 82047 and 82048. Tasks for this contract include, but are not limited to the following:

- Design and Load Rating Criteria Development for each bridge;
- Concept Design (30% Plan) for each bridge;
- Final Design (60% Plan) for each bridge;
- Final Construction Plans (95% Plan) for each bridge;
- Final Certified Bridge Plans (completed Plan) for each bridge;
- Load Rating for each bridge, and the development of a Bridge Rating Manual;
- Development of complete SB Division Special Provisions for Bridges 82045, 82047, and 82048, including foundation and superstructure sections, and any other unique items not covered in the MnDOT Standard Specifications for Construction (assume that the upcoming edition of the MnDOT Standard Specifications for Construction will be used);
- Development of a Final Engineer’s Estimate for each bridge;
- Development of CPM (Primavera P6) schedule for bridge design activities;
- Project meetings, including peer review coordination for the aforementioned items;
- Development of a Bridge Maintenance and Inspection Manual, considering input from MnDOT and WisDOT and other extradosed bridge owners;
- Bridge 82045 may include smart bridge technology (to be determined during final design).

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 (latest version of MicroStation and Microsoft Word).

2.0 PROJECT COORDINATION
2.1 Contract Administration
State will provide a Bridge Design Project Manager to give direction to Contractor’s activities. It will be the responsibility of the State Bridge Design 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 will conduct the administration of the project, which will include communication with both States and Peer Reviewer, invoicing, monthly progress reports, supplemental agreements, verification of
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physical percent complete of individual tasks (Activities), and schedule updates, billing preparation, and other non-technical work.

No changes in Contractor project management or lead design personnel will be made without a written notice to State prior to change incurring cost. State will notify Contractor if there are changes to State’s project management personnel.

2.1.1 Critical Path Management
This project will be managed using a Critical Path Method (CPM) schedule. Guidance for the CPM schedule is attached as Appendix A.

2.1.2 Electronic Submittals
All electronic deliverables will be uploaded to a MnDOT document control system. Complete guidance for use of document control system will be provided prior to execution of contract.

2.2 Contract Schedule and Payment (P6 for Contract only)
All deliverables for this Contract will be paid on a percent complete basis of each individual task (Activities) and will be managed with a cost and resource loaded CPM schedule. Contractor will use Primavera P6 to prepare and utilize a cost/resource loaded CPM schedule to manage deliverables. The Baseline Schedule will include the entire scope of work, and will detail Contractor’s plans to complete all contracted work.

2.3 Project Design Team (PDT)
State and Contractor will collaborate to establish a Project Design Team (PDT) for this project. Members of the PDT may include, but are not limited to:
- Contractor
- State Bridge Design Project Manager
- State Project Coordinator
- State SCC Project Director
- State Construction Project Manager
- State Metro District Project Manager (Road Designer)
- State SCC Project Controller
- Peer Reviewer
- Minnesota FHWA
- Wisconsin DOT Structures and Roadway Design staff
- Wisconsin FHWA
- Visual Quality Advisory Committee (VQAC)

2.4 Peer Review Coordination
State has determined this project to be a major structure based on MnDOT’s Bridge Design Manual criteria: “Major bridges are generally defined as bridges containing spans 250 feet and greater in length;” and/or “Bridge Design Engineer may elect to require a peer review for unique bridge types;” 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 communicated during project meetings and weekly conference calls.

Contractor will coordinate reviews for concurrence with the Peer Reviewer for the following stages of design:
- Design and Load Rating Criteria;
- Deck Drainage Details Review;
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- Wind Engineering Study Review;
- Concept Design (30% Plan Review);
- Concept Constructability Review (30% Plan Review);
- Model development review for superstructure and substructure analysis and design;
- Final Design (60% Plan Review) 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.
- Review design of all extradosed piers, providing independent calculations;
- Plan Constructability Reviews (60% and 95% Plan Reviews);
- Load Rating with independent calculations for each bridge, checking moments, shear and stresses at segment joints or other appropriate locations along girder lines, as well as other points of interest;
- Special Provisions.

The results of the reviews will determine that the design and plans comply with design standards and established design criteria. The State Bridge Design Engineer will collaborate with Contractor and Peer Reviewer to resolve issues.

2.4.1 Peer Review Process
Contract deliverables that require peer reviews will follow these general guidelines:

- Contractor will coordinate the reviews with Peer Reviewer and State Bridge Design Project Manager.
- Contractor will submit two copies (or sets) of each deliverable to both State and Peer Reviewer in accordance with the contract deliverables schedule (see Article 14).
- Peer Reviewer will return the contract deliverables to State with red-lined notations and corrections.
- Contractor will arrange a meeting with Peer Reviewer and State Bridge Design Project Manager to discuss corrections and provide plan interpretation if necessary. 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 or provide written justification to the State Bridge Design 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 (see Article 14).

2.5 Quality Management Program/Plan (QMP)
Contractor will prepare and submit a project-specific Quality Management Plan that specifies how Contractor will perform Quality Assurance and Quality Control (QA/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 distribute the QMP to all project team members, including subcontractors. The Draft and Final QMP will be submitted in accordance with the contract deliverables schedule and must include the following:

- A List of Requirements
- Intent of the QMP
- Philosophy of the QMP
- Technical Document Review Process
- Checking Procedures
- Quality Control Verification
- Definitions
- Process to integrate Peer Reviewer and State into design process to enhance quality

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 their work. Final design calculations and plan sheets must be independently checked and reconciled prior to submittal. Review comments from State on Contractor’s various plan review submittals does not relieve Contractor of its liability for an inaccurate
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or incomplete bridge plan. At the 60% and 95% Plan submittals, Contractor will submit a memo, certified by the Lead Quality Control Checker, that confirms that all aspects of the independent check has been performed in accordance with the Quality Management Plan.

- **QA Verification for Extradosed Specialty Design Items**
  Contractor will give attention to the specialty design items for this project. This includes, but is not limited to:
  - Materials and details
  - Wind Engineering Study
  - Corrosion protection system, including the deck anchorage blister and associated cable connection
  - Maintenance and inspection access
  - Cable Replacement
    - Cable Corrosion Protection
    - Cable color for thermal protection
    - Consideration of duct couplers at Design Criteria development stage
    - Cable damping requirements
  - Design criteria

- **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 in Contractor’s submittals and deliverables.

- **Computer Programs**
  All computer programs and/or spreadsheets utilized by Contractor must have been verified by Contractor in its in-house Quality Assurance Program. Input and output forms with the specific title of the program/spreadsheet will be included in the contractor’s design and quantity calculations. (Refer to Section 4.1 of the MnDOT LRFD Bridge Design Manual for computer software requirements.)

- **Quality Assurance Verification**
  Contractor’s Project Manager and Quality Assurance Manager will independently review the entire plan design and production process to assure the completeness and adequacy of their work and conformance with the Contracting firm’s Quality Assurance procedures.

- **Peer Review Comment Resolution**
  Contractor is responsible for resolution of comments from Peer Reviewer, and resolution of red-lined revisions from State.

3.0 **PROJECT MEETINGS**

3.1 **Kick-off Meeting**
Upon establishment of the PDT, the Contractor will attend a project kick-off meeting to establish communication protocol for the project, discuss known project issues, review the project schedule, and obtain other available project information from the State.

3.2 **PDT Meetings**
After the kick-off meeting, the Contractor will arrange monthly PDT meetings, to be held at the Bridge Office in Oakdale, Minnesota. The Contractor will be required to coordinate meetings with the State Bridge Design Project Manager and other project stakeholders such as the Visual Quality Advisory Committee (Cities of Oak Park Heights and Stillwater, Town of St. Joseph and National Park Service) as necessary. The PDT meetings are assumed as 4-hour meetings.

Immediately following the monthly PDT meetings, Contractor will meet with the State Bridge Design Project Manager and Peer Reviewer to discuss design specific issues and peer review comments on deliverables that require resolution. Contractor will record meeting minutes from these meetings, and will submit the minutes to the State Bridge Design Project Manager within five days of the meetings.

3.3 **Additional Meetings**
Two weeks after each PDT meeting, the Contractor’s Project Manager and superstructure design lead will meet with the State Bridge Design Project Manager and the Peer Reviewer via teleconference to provide updates as design activities progress. These teleconferences are assumed as 2-hour teleconferences.
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3.4 Contractors Information Meeting
At the 60% design review stage, Contractor will facilitate a half-day (4 hours) Contractors Information Meeting focusing on construction of the new St. Croix Crossing. Tasks include, but are not limited to organizing the meeting, arranging for use of audio/visual equipment, providing refreshments, presenting bridge concepts for the project, and participating in a question-answer session. State will provide the meeting location. Contractor will arrange for advertisement of the meeting in *Engineering News Record* magazine (2-week ad) and coordinate a letter of invitation to prospective contractors. This meeting will be scheduled around a PDT meeting to avoid additional travel.

3.5 Pre-Bid Meeting
Several weeks (10-15) prior to the construction letting ad, Contractor will lead a half-day (4-hours) Pre-Bid Meeting focusing on construction of the new St. Croix Crossing. The meeting must be facilitated near the project site. Contractor’s tasks include organizing the meeting, audio/visual equipment, and refreshments, presenting the bridge concepts for this project, and participating in a question-answer session. Contractor will arrange for advertisement of the meeting in *Engineering News Record* magazine (2 weeks) and coordinate a letter of invitation to prospective contractors. This meeting will be scheduled around a monthly Project Design Team meeting to avoid additional travel.

3.6 Public Outreach Activities
Contractor will lead or provide support, and provide necessary information for the Public and Outreach Activities through open houses. At a minimum, there will be open houses in each State near the 30%, 60% and 95% plan stages. Contractor will provide a location and notification of open houses and all graphics and handouts. MnDOT and WisDOT will issue press releases of the open houses.

4.0 DESIGN STANDARDS AND GOVERNING DOCUMENTS
All designs will conform to applicable requirements of the following:
- Signed Preliminary Bridge Plans;
- The current American Association of State Highway and Transportation Officials (AASHTO) Load Resistance Factor Design (LRFD) Bridge Design Specifications;
- American Segmental Bridge Institute (ASBI) Bridge Construction Manual;
- Post Tensioning Institute Recommendations for Stay-Cable Design, Testing and Installation;
- Applicable Draft PTI standards for extradosed bridges (per development of Design Criteria);
- FHWA Post Tensioning Installation and Grouting Manual;
- CEB/FIP Model Code for Concrete Structures, 1978 (For Time Dependent Behavior of Concrete) or other model as agreed upon in design criteria;
- MnDOT LRFD Bridge Design Manual;
- MnDOT Bridge Details Manual Parts I and II;
- MnDOT Road Design Manual;
- Concept Refinement Report dated June 2010;
- 2011 St. Croix River Crossing VQM Addendum;
- 2007 St. Croix River Crossing VQM;
- MnDOT Aesthetic Guideline for Bridge Design;
- 2006 SFEIS for the St. Croix River Crossing Project, and all project development supporting documents;
- 2006 Water Resources Preliminary Design Report, as amended by HZ United in 2012;
- MnDOT Preliminary Subsurface Investigation and Foundation Evaluation;
- MnDOT Staff-approved Geometric Layout;
- MnDOT Design Memorandum dated July 2009;
- Cost Risk Assessment -Value Engineering (CRAVE) Study findings;
- Federal Aviation Administration (FAA) guidelines for aerial beacons;
- Results from wind engineering study.
Any conflicts between MnDOT and WisDOT specification standards will be resolved in consultation with MnDOT, WisDOT, and Contractor.

Construction requirements of the MnDOT Standard Specifications for Highway Construction and any supplements thereto on file in the Office of the Commissioner of Transportation will be incorporated into the plans.

5.0 BRIDGE FOUNDATIONS

5.1 River Piers, Approach Piers, and Abutments
Contractor will review geological, hydrological and environmental data collected by State for the project. To establish the criteria for the foundation type selection and design, Contractor will collect and evaluate the following data:

- Live, wind, ice and barge impact forces, as well as the demands imposed by cantilever bridge construction, including construction live load and LRFD balanced cantilever construction load combinations;
- 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 habitant and to address seasonal wither conditions and constraints;
- Vessel traffic and local agency data to assess requirements for accommodating local river traffic and complying with USCG regulations during foundation construction;
- Abutment fill and settlement surcharge recommendations to determine pile downdrag conditions;
- Precast cofferdam details designed to include sufficient detail to serve as a conceptual design;
- Piers designed to include loads from traditional cast-in-place seal or precast cofferdam, (whichever is governing);
- 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;
- Foundation and boring information provided by State, including preliminary specified size and capacity of approach span foundations;
- Groundwater elevations and corrosive material data to assess pile construction and durability requirements;
- Foundation substructure construction details to establish foundation types conducive to either in-the-wet construction using off-site prefabrication or construction within dewatered excavations.
- Load Test Program information, including vertical and lateral Statnamic testing for drilled shaft and large diameter steel piling.

State will provide soil borings near each of the river piers and a foundation report detailing factored bearing resistance and skin resistance for all of the river piers. The foundation report will be finalized subsequent to completion of the statnamic pile load test in the fall of 2012. Preliminary results will be shared with the Contractor as they become available. The lateral load test results will be provided by the State to Contractor to validate the soil properties used in the model. The State will provide the lateral load test results from the 2005 load test program at the onset of final design. The Contractor is responsible for any other geotechnical parameters needed for the river pier foundation design.

Note: State may elect to perform a static load test program during construction of this project. If this occurs, it will be noted in State’s finalized Foundation Recommendations.

5.2 East and West Approach Land Piers and Abutments
State will provide a recommendation form for each bridge approach span foundation that includes pile type, capacity, and estimated pile lengths. State will provide a foundation report detailing the soil borings near the substructures and provide additional recommendations on settlement and other geotechnical issues.
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6.0 DESIGN AND LOAD RATING CRITERIA
Contractor will coordinate the development of Design and Load Rating criteria and the peer review of Design and Load Rating criteria for this project with Peer Reviewer at the onset of the design.

6.1 Design and Load Rating Criteria Requirements
Each bridge will be designed 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 bridge Preliminary Plans provided by the State;
- Develop Design and Load rating criteria to be utilized by Contractor and reviewed by the Peer Reviewer and the State for each bridge, including design specifics (specified material properties, recommended allowable stresses, load factors, erection loads, etc.).
- Design and Load Rating Criteria will be based on the St. Croix River Crossing Preliminary Bridge Plan Design Criteria as a baseline with input, review, and concurrence between the Contractor, Peer Reviewer, and State at the onset of the final design activities.

6.2 Preliminary Plan Design Revisions
The Contractor will review the bridge Preliminary Plans for the entire project (Bridges 82045, 82047, 82048) at the onset of the final design and modify the geometry of the box girder shape to accomplish the following geometric improvements:

a) On the main river bridge (Bridge 82045) the current configuration for the box girder and extradosed cable connection will be reviewed for “zone of intrusion encroachment.” The Contractor will be required to maintain no encroachment into the “zone of intrusion,” as defined in the MnDOT LRFD Bridge Design Manual. Any proposed adjustments to anchorage connection nodes must have concurrence by MnDOT with input from the Peer Reviewer prior to the 30% submittal stage of the project.

b) On the separate approach ramp structures (Bridges 82047 and 82048), the current configuration for the box girder geometry will be reviewed and modified with consideration of balancing the visual quality of the box girder bridges with consideration of the external drainage pipes that are required along the outside of these box girder bridges. The Contractor will propose various schemes (up to 3) that best balance the hydraulic, maintenance, and visual quality needs to explore how best to integrate and/or mask the drainage pipes on these structures. The pipe must remain external to the box girder bridges, but a modified box shape and shroud will be investigated, along with other schemes that incorporate a balanced hydraulic, maintenance, and visual quality solution. Final concurrence on this modification will include input from the MnDOT Visual Quality Manager with input and concurrence from the Peer Reviewer prior to the 30% submittal stage of the project.

c) Prior to submittal of the 30% Plan, the Contractor will perform a study and prepare a Bridge Fixity Study Report for Bridge 82045. The Contractor will make an early assessment of the longitudinal fixity of the structure, considering all extradosed piers as integral with the superstructure. An assessment will also be made of a mid-span hinge composed of a sacrificial and re-constructible hinged section. Evaluation and comparison of these two fixity schemes will be considered with risk management of construction of jacking forces and required deflections. The Contractor must consider provisions for jacking at 30 years, 50 years, and 75 years.

6.3 Wind Loads for Extradosed Structure (Wind Engineering Study)
Contractor will conduct a Wind Engineering Study for Bridge No. 82045 main spans to determine wind forces for the extradosed structure requirements for wind design.

Lift, drag and moment coefficients from the Wind Engineering Study will be used to determine design member forces.

Wind forces will be applied in accordance with the AASHTO LRFD Bridge Design Specifications and the Wind Engineering Study Report based on Aeroelastic model tests performed by wind testing facility
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approved by MnDOT. The Wind Engineering Testing Facility will be capable of providing full scale model testing of the extradosed portion of the bridge in accordance with the following requirements:

The Contractor will conduct a Wind Engineering Study and prepare a Wind Engineering Study Report for the Br. No. 82045 main spans. The study will determine the design wind velocities, wind forces, critical wind speeds, and structure stability both during and after construction. The report will document the results of the Wind Engineering Study and must include a detailed discussion of the procedures and methodologies used.

Prior to conducting the study, the Contractor will submit credentials of the firm performing the study to the State, including documentation of at least two previous studies on similar structures.

The Wind Engineering Study will include the effects of ice accumulation on the stay cables.

Requirements for the Wind Engineering Study and Report will include:
1. Meteorological site analysis for the Project Site establishing the following:
   - 50-year, 100-year, 1,000 year and 10,000-year recurrence wind speeds at the project site
   - Directional probability of wind at various speeds
   - Design wind speed for the onset of flutter
   - Design wind speed for structural design of the completed bridge
   - Design wind speed for the partially completed bridge during construction

2. Preliminary sectional model tests performed in a wind tunnel (scale model tests) to investigate the response of candidate bridge cross-section configurations.
   - The section models must accurately represent all elements of the superstructure. The models will represent both the completed configuration as well as the partially completed bridge configuration during construction.
   - The section models will simulate the scaled mass and mass moment of inertia and will simulate the stiffness of the deck vertically and torsionally.
   - The models will be constructed at a scale greater than or equal to 1:60.
   - Wind tunnel flow tests will be used to estimate wind force coefficients of the completed structure.
   - The section models will examine the vertical and torsional dynamic motions of the bridge. Torsional to vertical frequency ratios will be identified.
   - Wind tunnel flow tests will be used to estimate the speed at the onset of vortex-induced oscillations, the magnitude of the oscillations and the speed when the oscillations cease. Both smooth and turbulent flow will be investigated.
   - The Study will determine the deck’s stability against flutter. Both smooth and turbulent flow will be investigated.

3. Cable vibration study, including the following:
   - Evaluate wind-induced cable vibrations resulting from combined rain, ice, and wind effects; vortex shedding, buffeting, wake galloping, and structure-induced cable motion.
   - Identify requirements necessary to suppress cable vibrations.
   - Theoretical analysis of wind induced cable vibrations will be conducted and mitigation measures will be evaluated. The analysis will include the effect of ice accumulation on the stay cables.

4. Aeroelastic model tests performed in a wind tunnel (scale model tests):
   - The model of the entire Bridge No. 82045 main spans will accurately reflect the structural stiffness and inertial properties and geometry of all bridge components.
   - The model will establish critical wind speeds, the vortex shedding response and speed at which flutter occurs.
   - The models will be tested for a series of wind speeds covering the design range, as well as wind speed exceeding the design range. The effects of wind normal to the span as well as from other directions will
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be investigated. Tests will also assess the impacts of variation in turbulence levels to provide a realistic simulation if the structure’s response in strong winds where some turbulence is always present.

- Vertical and horizontal displacements and angular rotations will be measured and corresponding internal forces identified.
- Wind loading due to buffeting will be measured at selected points.

5. Theoretical buffeting analysis will be used to augment the aerelastic model in establishing design wind loading distributions.

The Contractor will, at a minimum, investigate the stability of the bridge during construction and in its final configuration.

6.4 Extradosed Structure Redundancy Analysis

At a minimum, tension members and connections identified below will be included in a Redundancy Analysis Report. Additional tension members and connections identified by the Contractor will also be included. Structural design and performance criteria for some of the identified members are included in the sections below.

A. Cable Stay System
The bridge will be designed for the loss of any one cable at a time. Such design must evaluate the capacity-to-demand ratios on other adjoining cables, box girders, piers, pier cross girders, struts between box girders and any other bridge members or connections.

B. Strut Between Box Girders
The system will allow for one strut to fracture. The fracture will be analyzed at each strut on the bridge.

Evaluation of the capacity-to-demand ratios for the structural system resulting from the fracture of a single strut will include effects on remaining struts, connection details, box girders and closure strips; deck serviceability and cracking, and localized increased loads to cable stays and any other bridge member or connection.

6.5 Maintenance and Inspection Access

The cable stays from the pier towers to the box girder are orientated in a way that precludes full access to the exterior of the box girder bridge by MnDOT’s Under Bridge Inspection Vehicle (UBIV).

The Contractor will provide a design of maintenance and inspection access platforms which allow access to the exterior box anchorage zones as shown in Appendix B. The maintenance access platforms will be designed to be deployed and suspended from the exterior of the bridge with attachment to the stainless steel guide way installed into the exterior cast-in-place barrier and cast-in-place anchorage cover on the bridge. The Contractor will provide a concept design for inspection platforms with the 60% Plan submittal.

The inspection requirements will be reviewed during the development of the final design of the project with input from MnDOT and WisDOT. Inspection means will be developed during the 30% and 60% design phase of the project, concurrent with the final bridge design. Designs will include all necessary details to deploy, attach, and maintain the maintenance inspection platforms. A maintainable connection to the bridge will include all necessary safety considerations for the inspection platform(s) and the connection hardware. Redundancy will be included as a design requirement for the inspection platforms.

Separate utility inspection platforms for inspection and maintenance of the underside of the bridge will be designed and included in the Plans that allow for inspection of the underside cross-frames and maintenance of the drainage system between the duel box girder extradosed bridge superstructure.

Inspection access doors will be designed and detailed to allow passageway for inspections to occur from span to span by accessing doors through the outer faces of the pier walls between the boxes. Access door
locations and inspection platforms will be designed with durability considerations. Drainage system components likely to leak will be fitted with redundant pipes and other means in consideration of providing corrosion protection and long-term durability to the structure.

The shared-use path and shoulder portions of the superstructure will be detailed to be fully traversable by MnDOT’s UBV and will include a means of ingress and egress at each end of the bridge without traveling in reverse. The pedestrian overlook will not be designed for the access by MnDOT’s UBV, but will be reviewed during the 30% design phase to allow for consideration and modifications to accommodate the UBV truck turning radius over the lead-in portion of the overlook area. The Contractor will investigate specific turning radius with modified structure geometry to determine extent of improved UBV access for inspection means. Final determination of improved access at the pier overlooks will be made concurrent with the development of the 30% Plan submittal for consideration of modified overlook geometry and partial UBV loading onto a portion of the overlook area.

The cable anchor box of the piers for the extradosed structure will be accessible by an access hatch. The access hatch will be located in the soffit of the cable anchor box, a minimum of 17 feet above the top of the deck. The Contractor will provide access to the top of the extradosed bridge piers by means of an access door located inside the cable anchor box. The Contractor will provide a means of fall protection for persons working on top of the extradosed bridge piers.

The interior of all closed elements will provide permanent means for inspection, including walkways, steps, and ladders, so all elements of a member are within arm’s reach.

Extradosed bridge piers will be provided with anchoring points and access hatches to allow jacks to be hoisted and positioned in the piers for re-jacking of the stay cables.

Ventilation openings will be installed for all confined spaces so as to accommodate a minimum air exchange rate of 6 times per hour. Contractor will not be required to provide fans.

All structural members will have measures to prevent access of vermin and birds. All openings on the bridge including those near abutments, joints and pier caps will be enclosed and/or sealed off with screens to prevent access of vermin and birds.

Stay cables will be fully accessible for inspection, testing, and repair.

All bridge joints and bearings will be accessible for inspection and maintenance. These elements will be designed and detailed by Contractor to allow for replacement of joints and bearings.

Interior safety platforms and ladder systems, and fall protection system will be provided for inspection and maintenance of all voided substructure components. For caps above voided piers or columns, an access hole of at least 2.5 feet in diameter will be provided.

The Contractor will design the inspection facilities in accordance with all applicable laws, including laws related to occupational health and safety.

Components development for these maintenance and inspection of the bridge structures, maintenance platforms, drainage system, and access considerations will be considered from an overall systems approach with particular protection means identified and included in the Corrosion Protection Plan, the Bridge Inspection and Maintenance Manual, and final plan details within the Bridge Plans.

6.6 Bridge Security
Bridge Design Scope of Work

Bridge Nos. 82045, 82047, and 82048 will be designed to prevent disproportionate or progressive collapse resulting from any localized damage associated with attacks from all hazards and intentional threats. Redundancy will be incorporated into the structural design wherever possible. All critical load-carrying elements will be designed with sufficient strength and ductility to provide adequate resistance against attacks to prevent loss of function and/or will incorporate means of ensuring standoff or access restriction measures such that the vulnerability of the element is substantially reduced.

The Contractor will incorporate two or more of the following security strategies to enhance the security of the bridge for all design elements and any bridge detail:

A. Deter – Deterrence measures may include clear lines of sight to critical components, lighting of critical components, visible closed-circuit television cameras, structural protection measures such as barriers and armored protection, or other visible protection measures that send a message that actions have been taken to protect the Project and critical components.

B. Deny – Denial measures may include fencing, barriers, berms, locked hatches and access ways using locks that meet federal standards, out-of-reach access ways, plugging holes, barriers to eliminate access from deck to superstructure and substructure components, and other means of restricting access to critical components to reduce probability of occurrence and reduce potential physical contact or proximity contact.

C. Detect – Detection measures may include alarmed doors and hatches, motion-activated devices, and manned closed-circuit television cameras tied to an operation center. Timeliness of response and sensitivity to false alarms must be considered in evaluating the effectiveness of such measures.

D. Defend – Defend measures are intended to prevent failure of critical components under extreme events. Measures include providing standoff to critical elements, increasing redundancy by providing alternate load paths, increasing ultimate strength, and structural toughening of vulnerable components to meet ductility and rotation requirements.

For Bridges 82045, 82047, and 82048 the Contractor will include a Defend strategy as one of the required security strategies. Specific details will be developed during the final design process that are in accordance with recognized Defend strategies and approved by MnDOT and WisDOT.

6.6.1 Bridge Construction Security

All hazard designs incorporating security elements will be included throughout bridge construction.

6.6.2 Safeguarding Documents

All Project documents, as defined in Article 4.0, will include the necessary information for satisfactory construction of the structure, system, or component, and training necessary to operate any security system.

These documents will not indicate that the construction, structure, system, or component shown meets any security standard, or contains any reference to the limits or capabilities of the construction, structure, system, system operation, or component.

The Contractor will establish processes and procedures for safeguarding secure information, particularly with regard to design criteria for security, behavior of the structure under attacks from natural hazards and intentional threats; and security system operation. At a minimum, the Contractor will include a process and procedure for all of the following:

- Establish appropriate points of contact for the Contractor and Mn/DOT;
- Limit reproductions and account for electronic and paper documents;
- Release secure information only to those who have a need to know as determined by Mn/DOT;
- Identify appropriate storage methods;
- Control transmitting and shipping information;
- Dispose of documents as necessary to control security information.
6.7 Federal Aviation Administration (FAA) guidelines for aerial beacons
The Contractor will conduct a study in accordance with the Federal Aviation Administration (FAA) guidelines to determine specific requirements for aerial beacons for Bridge No. 82045 main spans and will submit the study to the FAA for approval. The Contractor will design the light system for the extradosed towers and other bridge elements in accordance with project goals, but in accordance with the established and agreed upon requirements for beacons in accordance with the findings of the approved study.

6.8 Electrical Engineering
The Contractor will provide electrical engineering services related to the review and certification of bridge roadway lighting, bridge pier architectural lighting, bridge trail lighting, navigational lighting, aircraft lighting, and interior box lighting.

6.9 Internal Box Power Lighting Plan
Power and lighting will be required inside box girders and piers. Internal lighting will be a minimum of 5-foot candles on all surfaces in compliance with OSHA Standards 29 CFR - Illumination. - 1926.56. Light switches will be located within 1’ of the entrance way to each section. Switches will be three-way if there are multiple entrances to a section. Electrical outlets will be provided at 50-foot intervals throughout closed sections and within 10’ of all major inspection or maintenance locations.

6.10 Architectural Lighting
The Contractor will provide bridge architectural lighting for Piers 8 to 14, and bridge trail lighting. The Contractor will be required to provide design and detailing expertise for a specialized LED architectural system lighting.

6.11 Lightning Protection
The Contractor will include appropriate provisions for protection against lightning strikes on the bridge during construction, and when the bridge is in service. Required provisions for lightning protection will be included in the Plans and defined in the concept staging plan.

7.0 PLAN PREPARATION (Activity Codes ABUT, DECK, GEOM, PIER)
7.1 Final Design Coordination
7.1.1 Structure Site Data
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.

7.1.2 Foundation Recommendations Analysis
State is letting a load test program in April 2012, with work anticipated to start in June 2012. State will provide all available load test program information to Contractor as it becomes available.

7.1.3 Hydraulics Data Review
The Contractor will review available hydrology and hydraulics data and reports, and confirm deck drainage design, and drop shaft design.

7.1.4 Construction Staging
To minimize wetland impacts, the Contractor will develop construction staging that will be consistent with staging recommendations previously developed and which minimizes temporary and permanent impacts to wetlands in Minnesota. See the “Wetland Plan” sheet in the Preliminary Bridge Plan.

The Contractor will consider staging of construction using Xcel’s barge unloader facility per the MOU and the area underneath the new bridge along the Wisconsin shore.
Bridge Design Scope of Work

Staging area along Wisconsin shore – Appendix “C” of the SFEIS describes the potential mussel habitat along the WI shore under the new river bridge. MnDOT and MnDNR are planning on an underwater inspection in this area for the spring of 2012 to determine if the protected mussel species exist and relocate them if they do. If relocation occurs, the area would then be cleared as a staging area.

7.1.5 Miscellaneous Details Coordination

Coordinate design elements such as 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.

7.2 Final Structure Design

The Contractor will complete analysis and design of the bridge superstructure, substructure, and foundations. Specifically, this task includes:

7.2.1 Hydraulic Drainage System Design

At the onset of final bridge design activities, Contractor will perform an independent review of the deck drainage design, and drop shaft design concept developed by HZ United. This will include, but is not limited to, the following tasks:

- Confirm the bridge deck drainage design, and drop shaft design concept as shown in the 2006 Water Resources Preliminary Drainage Design, as amended in 2012 by HZ United.
- Contractor will prepare and submit a report that either concurs with the proposed bridge deck drainage system, and drop shaft design contained in the Preliminary Bridge Plan, or proposes modifications to the drainage system design. Minnesota and Wisconsin will review and comment on Contractor’s report within 30 days of receipt of the report from Contract. Contractor may proceed with design activities during the review period.

As water resources engineering progresses during the project, Contractor will perform the following tasks as well:

- Coordinate the review of bridge deck drainage system details with Peer Reviewer at the 30%, 60%, and 95% Plan completion stages.
- Develop bridge deck drainage design and drop shaft design in accordance with the 2006 Water Resources Preliminary Drainage Design, as amended in 2012 by HZ United; and the MnDOT Drainage Manual and other applicable standards, and provide the design with a Final Design Report to MnDOT WRE for review at the 60% and 95% Plan submittal stages.
- Respond to WRE 60% and 95% Plan review comments and incorporate revisions as necessary.
- Furnish all data or details necessary for the State to apply for and obtain applicable permits.
- Respond to all water resources issues that arise during construction.

7.2.2 Visual Quality

Visual quality during preliminary engineering included development of an addendum that incorporates modifications to the original structural and architectural concepts while adhering to the design intent documented in the Visual Quality Manual. It is intended that any significant proposed deviations from the VQM continue to be vetted through the visual quality process involving the standing Visual Quality Advisory Committee and both the Wisconsin and Minnesota DOTs. Because of unaddressed issues with the drainage system on the river crossing structure during preliminary design, special attention will be required in the design of the Minnesota approach spans. Other issues such as aesthetic lighting may also require additional attention during final design. To facilitate the visual quality aspects of the project, the Contractor will assign a qualified Visual Quality Coordinator who is experienced in the area of architectural bridge design and overall transportation projects similar to the St. Croix Crossing Project.

The Contractor will provide:
Bridge Design Scope of Work

- Hand drawn or CADD sketches indicating accurate scale and proportion to be used for discussion purposes with the Design Team, Minnesota and Wisconsin State Historic Preservation Offices, and the Visual Quality Advisory Committee.
- 2D and/or 3D CADD drawings to be developed for formal or informal presentations to the DOT’s, other agencies, and the public at large.
- Up to 8 rendered views to illustrate any modifications to the preliminary design that may be proposed during final design.
- 2D drawings to support any changes or updates to the animation prepared by MnDOT’s Metro Visualization Unit.
- Participation at VQAC, SHPO, or any other meetings where input regarding visual quality may be required.
- Provide electronic files to MnDOT for use in 3D animations. Attend meetings with MnDOT Visualization Unit to coordinate 3D animation (assume 6 meetings);
- Develop and submit 3D animation showing sequential construction of the bridges (4D), from shaft installation to final completion.

The Contractor will adhere to articles of the Visual Quality Manual and the Addendum dated March 7, 2011, and will facilitate all necessary coordination with both State DOTs, the VQAC, and the SHPO from both states.

7.2.3 Finalize Bridge Geometry and Layout
Review the final three-dimensional geometry of the associated roadways as it affects the bridge design.

7.2.4 Structure Modeling and Analysis
Contractor will provide a description of modeling techniques and types of elements (plates, shells, etc.), material properties and component sizes, member stiffnesses, creep model, soil model, linear and non-linear elements, etc. Contractor will obtain input from Peer Reviewer on modeling techniques and validation of methodology used. 4D analysis of all of the bridges will be required.

7.2.5 Superstructure Design
Design superstructure in accordance with established Design and Load Rating Criteria (see Article 6.1). Superstructure design will include attachments for signs, lights, and utilities, based on loads provided by others.

7.2.6 Longitudinal Superstructure Design and 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.

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

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

7.2.9 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. These elements include, but are not limited to the following:
- Extradosed cable tower assembly details
- Extradosed cable anchorage assembly details
Bridge Design Scope of Work

- Precast cross frame details
- Post-tensioned pier cap details
- Integration of drainage system with superstructure and substructure details
- Staged post-tensioning requirements

7.2.10  **Substructure Design**
Design substructure elements in accordance with established Design and Load Rating Criteria (see Article 6.1). The Contractor will be required to provide design and detail for two cofferdam designs. One cofferdam will use conventional methods; the other will provide a precast alternative, allowing the cofferdam to be jointly used as a pile cap (see to Article 5.1). Contractor must investigate cofferdam technology applications used across the country to minimize the environmental footprint and expedite construction, while maintaining high quality.

7.2.11  **Drilled Shaft Design and Detailing**
The Contractor will design drilled shafts in accordance with established Design and Load Rating Criteria (see Article 6.1).

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

7.2.13  **Drainage and Utility Design and Detailing**
The Contractor will design drainage system for both States consistent with water resources preliminary designs as amended. MnDOT and WisDOT Water Resources Units will approve designs. The Contractor will incorporate details for accommodating bridge deck drainage, and the drop shaft, both temporary and permanent, and utilities to be carried by the bridges.

7.2.14  **Constructability Analysis and Design**
The Contractor will study the bridges for constructability as part of the design development, identifying the most efficient and economical phasing, construction access, and contractor’s schedule. Consider thermal analysis of fluctuating temperatures to determine effects on closure pours and substructure displacements.

7.2.15  **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.

7.2.16  **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.

7.2.17  **Security Assessment**
Provide Security Assessment following the guidelines of current Federal Highway Administration (FHWA) practice and in conformance with project guidelines. Contractor will develop details to install security cameras on and off the bridges.

7.2.18  **Miscellaneous Design**
Provide design and detailing for miscellaneous bridge elements, including; anti-graffiti coating, bridge access, temporary drainage during construction, sign, signal and deck lighting details, navigational lighting, box lighting, etc. Contractor’s electrical subconsultant will provide engineering, plans and specifications for aesthetic, navigation and box interior lighting systems.

7.2.19  **Utility Hanger Design/Coordination**
Bridge Design Scope of Work

Provide coordination and design detailing for hangers and associated details to accommodate utilities.

7.3 Structure Plans Preparation

Plans will be produced in accordance with MnDOT standards. Specifically this task includes:

7.3.1 Plan Content

Certified Bridge Plans for Bridges 82045, 82047 and 82048 will be prepared in conformance with State’s approved Preliminary Bridge Plan, all Design Standards specified herein, all items provided by and/or completed by State. Plan sheets will be assembled in conformance with MnDOT LRFD Bridge Design Manual (emphasis on Article 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**
  The Index sheet will include a numerical listing of all plan sheets. Multiples sheets may be required to avoid crowding of information. Pay quantities will be a separate document and not be shown directly on any plan sheets; the Pay Items will be provided in tabular form and reference applicable plan sheet.

- **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/drilled shaft plan view will be detailed for each bridge foundation. Plan views to include pile/drilled shaft spacing and test pile identification at each foundation. Piles/drilled shafts are to be tied into workline and working points. A pile/drilled shaft load table with applicable pile notes is included for each foundation.

- **Precast Cofferdam Detail Sheet(s)**
  A precast cofferdam consisting of precast slab walls will be designed and detailed.

- **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**
  - The superstructure for the bridges will be designed to consider any stage of construction that is critical to the design stresses, such as sequence of closure pours, any required staged post-tensioning of the pier caps, and any portions of the structure designed to be cast on falsework;
  - Segment layout sheet with superstructure summary of quantities;
  - Tendon layout showing details of tendon bends;
  - Extradose cable tower details;
  - Precast cross frame details;
**Bridge Design Scope of Work**

- Extrados cable anchorage assembly (steel tower anchorages);
- Extrados cable anchor (deck blister anchor);
- Any vertical post-tensioning details;
- Diaphragm details;
- Transverse post-tensioning;
- All reinforcement bars will be completely detailed and called out in bar lists;
- Post-tensioned river pier cap details;
- Segment erection sequence, including longitudinal deck closure pours between segments;
- Any portions of superstructure designed to be supported by falsework will be noted;
- Any required longitudinal jacking forces required to position piers prior to closure pours;
- Any required staged post-tensioning requirements for pier caps or other elements;
- 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;
  - Cable replacement procedures and details (for future use);
  - 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.

- **Staging Plan Sheet(s)**
  The staging plan sheet(s) must identify the staging sequence for the project.

- **Drainage Plan Sheet(s)**
  The drainage plan sheet(s) must be provided to Minnesota and Wisconsin for inclusion in the grading plan for the project.

7.3.2 Independent Analysis – Quality Control
Bridge Design Scope of Work

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 (See article 2.5 for Quality Management Plan requirements). Documentation of the independent design and analysis will be required.

7.3.3 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 signed.**

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

Plan sheets will be produced using MicroStation Computer Assisted Design and Drafting (CADD) standards. The State Bridge Office has a compilation of suggested drafting procedures titled “Summary of Recommended Drafting Standards” available on the MnDOT Bridge Office web site:
- Go to [http://www.dot.state.mn.us/bridge](http://www.dot.state.mn.us/bridge). Click on CADD Resources, then “Summary of Recommended Drafting Standards.”

Electronic CADD files of the final certified bridge plan are included in the final deliverables for this Contract. All files must be submitted in the most current MicroStation format. Files will be assembled in accordance with the following conventions and procedures:

7.3.4.1 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.

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

7.3.4.3 File Extensions
New Plans:
- abt Abutment Details and Reinforcement
- det B-Details, Standard Sheets, and As-Built Bridge Data Sheet
- exp Expansion Device Details ***
- pce 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
8.0 CONCEPT DESIGN (30% PLAN)

8.1 Plan Content
Contractor will provide project management services, including peer review coordination for the development of the concept design and 30% Plan. The 30% Plan allows Peer Reviewer and State an early review of the final plan preparation for conformance with the Preliminary Bridge Plan, the VQM, 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 special provisions.

8.1.1 Design Considerations
The following items will be considered:
- Deck Drainage System in both MN and WI (drop shaft design for WI)
- Contaminated Soils (if encountered)
- Environmental issues
- Utilities (identified in Preliminary Plan, with potential for additional utilities identified during final design)
- 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 Collision Study
- Security Assessment
- Internal lighting and power for the superstructures boxes
- Aesthetic Lighting
- Stakeholder (VQAC/SHPOs) and public input

8.2 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.
- Bridge Layout Sheet(s)
  For this submittal the Bridge Layout sheet(s) will show a line diagram that indicates the control point, work line, reference lines, and proposed working point locations. The tabulations required need not be
Bridge Design Scope of Work

- The 30% Plan will be a “snapshot” of final bridge design progress. It is expected that the geometric details for piers and abutments will be nearly complete by the 60% Plan submittal.

8.3 30% Plan Peer Review
Contractor will coordinate the peer review of the 30% Plan and the drainage system design (see Article 7.2.1) with Peer Reviewer (refer to Article 2.4.1 for peer review process).

8.4 30% Plan Constructability Review
Contractor will evaluate the proposed construction and provide a report of findings. This evaluation will consider construction sequencing, equipment, duration of activities; the potential impact of weather and water elevations, borings, and winter shut downs, etc. Contractor must also review project constraints, including barge traffic, duct and tendon detail conflicts, box transition area details, and cofferdam construction, staging, improving design efficiency, and reducing construction time.

8.5 30% Plan SHPO Review
The State anticipates that both MN and WI SHPOs will review the 30% Plan. The Amended Section 106 Memorandum (MOA) dated May 16, 2006 stipulates the project design development, including design reviews. The State will provide the 30% Plan to both SHPOs for review. A 30-day review period is anticipated.

9.0 FINAL DESIGN (60% PLAN)
The 60% Plan will be a “snapshot” of final bridge design progress. It is expected that the geometric details for piers and abutments will be nearly complete by the 60% Plan submittal.

9.1 60% Plan Submittal
Contractor will submit two sets of the 60% Plan, along with draft Special Provisions, a draft Cost Estimate, two bound hard copies of draft design calculations, and electronic (.pdf) files of the Plan, to both State and Peer Reviewer. The plans will be on 11" x 17", 20-lb white bond paper or 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 will return a copy of the 60% Plan containing red-lined notations and corrections to Contractor. If Contractor disagrees with Peer Reviewer’s notations and corrections, these differences must be resolved. If necessary a meeting will be held with State, Contractor, and Peer Reviewer to resolve these issues.
Bridge Design Scope of Work

By the 60% Plan submittal stage, the Contractor must have completed the layout and design of the drainage system in both States (using external pipes), as defined by the drainage system limits shown in the Preliminary Bridge Plan.

9.2 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.

9.3 Final Design Peer Review
Contractor will coordinate the review of the 60% Plan, and the drainage system design, with Peer Reviewer (see Article 2.4.1).

9.4 60% Plan Constructability Review
Contractor will evaluate the proposed construction and provide a report of findings. This evaluation will consider construction sequencing, equipment, duration of activities; the potential impact of weather and water elevations, borings, and winter shut downs, etc. Contractor must also review project constraints, including barge traffic, duct and tendon detail conflicts, box transition area details, and cofferdam construction, staging, improving design efficiency, and reducing construction time.

9.5 60% Plan SHPO Review
The State anticipates that both MN and WI SHPOs will review the 60% Plan. The Amended Section 106 Memorandum (MOA) dated May 16, 2006 stipulates the project design development, including design reviews. The State will provide the 60% Plan to both SHPOs for review. A 30-day review period is anticipated.

10.0 CONSTRUCTABILITY REVIEW (95% PLAN)
The 95% Plan submittal is to be considered by Contractor as 100% complete, ready for Contractor’s certification and approval by the State Bridge Engineer.

10.1 95% Plan Submittal
The plan will be prepared in conformance with Articles 4.0, 6.0, and 7.3 of this Exhibit and will contain corrections provided by previous plan submittals. The 95% 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 electronic copy of Special Provisions;
- One electronic copy of Final Engineer’s Estimate.

Contractor will submit the 95% Plan to both States and Peer Reviewer. State and Peer Reviewer may meet with Contractor to return a copy of the 95% Plan with red-lined notations and corrections. Peer Reviewer will return the 95% Plan with red-lined notations and corrections to Contractor. If Contractor disagrees with Peer Reviewer’s notations and corrections these differences must be resolved. All corrections must be made prior to submittal of final deliverables. Contractor will make corrections and submit the Final Certified Plan to State.

10.2 Constructability Peer Review
Contractor will coordinate the peer review of the 95% Plan, and the drainage system design, with the Peer Reviewer (see Article 2.4.1).

If State or Peer Reviewer determines that major revisions are necessary Contractor will prepare and furnish a revised 95% review plan.

10.3 95% Plan Constructability Review
Bridge Design Scope of Work

Contractor will evaluate the proposed construction and provide a report of findings. This evaluation will consider construction sequencing, equipment, duration of activities; the potential impact of weather and water elevations, borings, and winter shut downs, etc. Contractor must also review project constraints, including barge traffic, duct and tendon detail conflicts, box transition area details, and cofferdam construction, staging, improving design efficiency, and reducing construction time.

10.4 95% Plan SHPO Review
The State anticipates that both MN and WI SHPOs will review the 95% Plan. The Amended Section 106 Memorandum (MOA) dated May 16, 2006 stipulates the project design development, including design reviews. The State will provide the 95% Plan to both SHPOs for review. A 30-day review period is anticipated.

11.0 LOAD RATING ANALYSIS
Contractor will perform a load rating analysis for each bridge. Work under this task will include rating the bridge on the conditions below, and providing an operating rating factor using designing loads. The ratings will be in accordance with the following design criteria:

- MnDOT LRFD Bridge Design Specifications;
- The CEB/FIP Model code for Concrete Structures, 1978 (For time Dependent Behavior of Concrete) or other model as agreed upon in design criteria;
- Bridge rating requirements provided by the State;
- Other applicable criteria as defined in the Project’s Design Specifications.

Each separate component, segment, or type within the overall bridge will be rated and reported. At a minimum, rate for moment and shear at the tenth points of each span.

Decks will be rated for any design that is not covered by the MnDOT Standard Design Tables.

The overall rating will be the lowest rating of any individual component, segment, or type. Ramps will be rated as separate members. The final rating and each component rating will be accompanied by the location of the rating, the limit state, and the impact factor.

The Contractor will:
- Rate for design live loads placed on one or more lanes with the appropriate multiple presence factor for the number of lanes occupied;
- At a minimum, rate for five Minnesota overweight permit vehicles placed on one or more lanes with the appropriate multiple presence factor for the number of lanes occupied;
- Rate for the Wisconsin Standard Permit Vehicle (Wis-SPV) evaluated for single-lane distribution assuming that the vehicle is mixing with normal traffic and that the full dynamic load allowance is utilized. Ensure that the design has a minimum capacity to carry a gross vehicle load of 190 kips.
- Rate for the Wisconsin specialized annual permit vehicles (PUP and Semi) evaluated for single-lane distribution assuming that the vehicle is mixing with normal traffic and that the full dynamic load allowance is utilized.
- At a minimum, rate for three Wisconsin overweight permit vehicles placed on one or more lanes with the appropriate multiple presence factor for the number of lanes occupied;
- Rate for each permit vehicle along with a uniform lane load equal to 200 lbs. per linear foot placed on one lane, plus the addition of AASHTO HL-93 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 AASHTO HL-93 will have the appropriate multiple presence factor for the number of lanes occupied;
- All bridge types will be rated for LRFR only;
- See LRFR Load Factors table for load factors of design loads and permit loads (Appendix C). When it is necessary, expand Appendix C to reflect each component of each bridge being rated during final design.
- Rate for both strength and service load combinations.
11.1 Special Rating Requirements for Cable Structures
The rating will be based on the value of time dependent effects at both the approximate time when the bridge is opened to traffic and at 10,000 days.

The locked-in effects of stay cable pre-shortening, deck and tower cambering, and deck and other prestressing must be included in the rating.

At a minimum, the Contractor will rate the following components:
1. Main longitudinal load resisting superstructure element(s): rate for axial force, bending moment, shear, and torsion at tenth points and stay cable connection points.
2. Stay cables: rate for the axial force and the combined effect of axial force and bending moments at the connections.
3. Stay cable connection to the deck and to the tower: rate for axial force imposed by the stay cables.
4. Deck: rate for axial force and bending moment, including superimposed effects from the main load resisting system.
5. Floor beams, stringers and other floor system elements: rate for axial force, bending moment, and shear. Elements with different loading or geometric conditions will be rated separately. Weak-axis bending will be included.
6. Pier Cap Beams: rate for the combined effects of axial force, moment, and shear. The rating manual will specify the effective lengths for second order effects for both strong- and weak-axis bending. The foundation need not be rated.
7. Struts: Struts between boxes, including strut connections, will be evaluated as primary members and rated in accordance with requirements for primary members.

11.2 Operating Rating
Contractor will provide an operating rating factor of the design load. The operating rating will be shown in the Design Data in the bridge plans.

11.3 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 rating table included in the standard form provide a table similar to the Rating Factor table included in this Exhibit (Appendix C).

11.4 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.

11.5 Peer Review Coordination
Contractor will coordinate the peer review for the Load Rating with Peer Reviewer (see Article 2.4.1).

12.0 SPECIAL PROVISIONS AND COST ESTIMATE
Contractor will perform the following tasks:
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12.1 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 Division SB Project Special Provisions for Bridges 82045, 82047, and 82048 (assume that the new MnDOT Standard Specifications for Construction will be utilized).

12.2 Cost Estimate
The Contractor will develop a Draft Engineer’s Estimate and a Final Engineer’s Estimate for each bridge that will be prepared by an individual who has experience estimating major long-span structures of similar type and complexity. All supporting computations, documentation, and information used to determine final unit costs will be delivered at the time of the estimate submission.

The Peer Reviewer will provide a contractor-style construction cost estimate.

At turn-in of final plan sheet tracings and Special Provisions, Contractor will review and adjust Engineer’s Estimate, revising unit costs as needed to reflect any changes. Submittals for this subtask will include copies of the final Engineer’s Estimate document and all documentation used to develop estimate (i.e. material quotes, item workup spreadsheets used to insert into software, sketches used in the development of the estimate, etc.).

Note: The estimator responsible for development of the Draft and Final Engineer’s Estimates will be precluded from participation as part of a construction contracting team for the St. Croix Crossing Project.

13.0 PROJECT PERMITS
The Contractor will furnish all data or details necessary for the State to apply for and obtain applicable permits (U.S. Coast Guard permit, etc.) detailed in Appendix D, Permit Matrix. The Contractor must begin coordinate permitting activities with the State SCC Project Coordinator, and MnDOT Metro District Water Resources Engineering, immediately after Notice to Proceed.

For each permit, the Contractor will initiate up to 12 conference calls with each lasting up to two hours with each unit of government (and State) noted in Appendix D to explain the project and determine specific needs of each agency in order to develop the permits required. The Contractor must schedule these meetings in an effort to combine agencies or portions of agencies together for efficiency. The Contractor will schedule the meetings, prepare agendas, facilitate the meetings, and produce meeting minutes that document meeting discussions, decisions made, and action items.

14.0 DELIVERABLES
14.1 Contractor Deliverables
Contractor will provide office space for five State personnel at Contractor’s local office within 5 days of Notice to Proceed. Contractor will coordinate these accommodations with the State Bridge Design Project Manager.

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. Electronic files of the plan will also be provided by the Contractor. Contractor will submit deliverables in accordance with the following schedule (estimated Notice to Proceed June 1, 2012, subject to change):

14.1.1 Design and Load Rating criteria deliverables:
- Draft Design and Load Rating criteria – two copies to both State and Peer Reviewer no later than two weeks after Notice to Proceed;
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- Peer Reviewer will return draft Design and Load Rating criteria to Contractor with red-lined notations and revisions no later than four weeks after Notice to Proceed;
- Final Design and Load Rating criteria – one copy to State no later than July 6, 2012.

14.1.2 Primavera P6 deliverables:
- Baseline cost and resource loaded CPM schedule – due within 30 days of Notice to Proceed;
- Monthly updated cost and resource loaded CPM schedule (to be submitted to the State Bridge Design Project Manager with monthly invoices).

14.1.3 Drainage System Design Review (see Article 7.2.1)
- Report of concurrence with drainage system proposed in the Preliminary Bridge Plan, or report of proposed drainage system design modifications – submitted prior to the 30% Plan submittal.

14.1.4 Concept Design (30% Plan) deliverables:
- Draft Concept Design (30% Plan) – two plan sets to both State and Peer Reviewer by August 17, 2012;
- Draft cross sections showing the box dimensions and location of tendons;
- Summary memorandum of Preliminary Cost Estimate review;
- Pier and fascia accent lighting system recommendations and rendering;
- Constructability review memo;
- The Peer Reviewer will return the 30% Plan to the Contractor with red-lined notations and revisions by August 31, 2012;
- Final 30% Plan – two sets to the State by September 14, 2012.

14.1.5 Foundations Recommendations
- Determination of foundation type for extradosed piers;
- Design data for lateral load resistance used in modeling – submitted with the 30% Plan.

14.1.6 Final Design (60% Plan) deliverables:
- Draft Final Design (60%) Plan – two plan sets to both State and Peer Reviewer no later than December 21, 2012;
- Electronic copies of the 60% Plan;
- In-progress MicroStation design files;
- Final foundation recommendations and the geotechnical engineering review;
- Concept design for maintenance and inspection platforms;
- Draft Special Provisions;
- Draft Engineer’s Estimate;
- WRE Final Design Report (see Article 7.2.1);
- Constructability review memo;
- Peer Reviewer will return the draft 60% Plan to the Contractor with red-lined notations and revisions by January 18, 2013.

14.1.7 Final Plan (95% Plan) deliverables:
- Two plan sets to both State and Peer Reviewer no later than March 29, 2013;
- Electronic copy of the 95% Plan;
- In-progress MicroStation design files;
- One copy of final Design and Quantity calculations;
- One copy of Special Provisions;
- One copy of Final Engineer’s Estimate;
- WRE Final Design Report (see Article 7.2.1);
- Constructability review memo;
- Peer Reviewer will return the 95% Plan to the Contractor with red-lined notations and revisions by April 19, 2013;
Bridge Design Scope of Work

- Final Certified Plan to the State by May 17, 2013.

14.1.8 Rating Manual (upon written authorization from State)
- Draft Rating Manual to both State and Peer Reviewer by July 1, 2013;
- Peer Reviewer will return draft Rating Manual to the Contractor with red-lined notations and revisions by August 1, 2013;
- Contractor will incorporate any necessary revisions and submit the Final Rating Manual to the State at a date to be determined.

14.1.9 Bridge Maintenance and Inspection Manual
- The Contractor will prepare and submit a Bridge Maintenance and Inspection Manual to State by June 30, 2013.

14.1.10 Project Permits
The Contractor will begin coordination of the project permits with the State SCC Project Coordinator, and MnDOT Metro District Water Resources Engineering, immediately after Notice to Proceed.

14.1.11 Corrosion Protection Plan
The Contractor will submit a Corrosion Protection Plan for sustainability of major structures to the State for approval. An overall global systems approach will be considered in development of the Corrosion Protection Plan, identifying levels of protection and inspection, and maintenance recommendations.

Consideration of concrete cover, stainless steel reinforcement, and protection of post-tensioning systems will be considered. A draft component outline of individual components requiring stainless steel reinforcement will be submitted with the 30% Plan. The Contractor will consider use of stainless steel in the top and bottom of the deck, the bridge railings, top deck anchorage areas, and in bridge components supporting inspection platforms.

Upon completion of the 60% Plan, the Contractor will submit a Draft Corrosion Protection Plan to the State for acceptance, leading to development of final plan details. This document will then be placed as a chapter of the Maintenance and Inspection Plan. MnDOT will return comments on the Draft Corrosion Protection Plan to Contractor within 15 business days of submittal. The Contractor will incorporate any proposed revisions into the 95% Plan, and the Corrosion Protection Plan.

14.1.12 Threat and Vulnerability Assessment
The Contractor will submit the Threat and Vulnerability Assessment to MnDOT for acceptance prior to the submittal of any structure Released for Construction Documents.

14.1.13 Redundancy Analysis Report
The Contractor will submit a Redundancy Analysis Report to the State with the submission superstructure for Bridge No. 82045 main spans.

14.1.14 Wind Engineering Study Report
The Contractor will coordinate the Wind Engineering Study deliverables with the State Bridge Design Project Manager beginning immediately after Notice to Proceed. The Wind Engineering Study Report will be submitted to the State within 9 months of Notice to Proceed.

14.2 State Deliverables:
The following items will be provided by State:
- Preliminary Bridge Plan
  A Preliminary Bridge Plan, prepared by the MnDOT Bridge Office and approved by the State Bridge Engineer, will be provided for each segmental bridge. Contractor’s design will be based on information contained in the Preliminary Plan and other information defined in this Exhibit. The
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The preliminary plan will have been prepared by the MnDOT 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 Foundation Unit.

The Preliminary Plan will be provided electronically in the latest MicroStation format. Contractor will incorporate preliminary plan sheets into the final plan as appropriate.

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 State Bridge Design Project Manager.

- **Preliminary Bridge Foundation Recommendations and Foundation Boring Information**
  A recommendation form that includes pile type, capacity, and estimated lengths and/or foundation earth pressures for spread footings will be provided for each segmental bridge approach spans foundations. These recommendations will be subject to change, particularly the pile configuration. State will provide a foundation report detailing the soil borings near the substructures and provide additional recommendations on settlement and other geotechnical issues. Data from the load test program information will also be provided by the State in a timely manner.

- **Concept Refinement Report**
  On visually sensitive projects, the State will prepare an Aesthetics Manual for the entire project (bridges, retaining walls, etc). State will provide Contractor with one copy of the manual. It is Contractor’s responsibility to examine the manual and to incorporate applicable details into the final bridge design.

- **MnDOT PPMS Network Activity Manual**
- **Preliminary Cost Estimate**
- **Bridge Rating Requirements**
- **Final River Hydraulic Analysis**
  Final hydraulic and scour analysis will be provided when pier size is finalized.

- **Roadway Lighting and Roadway Design**
  State will provide roadway design, lighting, signing, striping, maintenance of Traffic/Permitting/environmental. Contractor will coordinate light pole anchorage details and conduit locations.

- **Bridge Deck Drainage**
  State will provide the deck drainage spacing and location.

- **Value Engineering Report**
  CRAVE study completed in 2008. Value Engineering recommendations to be implemented are described in Approval Form dated 5/14/09.

- **Report of Findings (if available)**
- **2006 Supplemental Final Environmental Impact Statement (SFEIS)**
- **2006 Water Resources Preliminary Design Report, as amended by HZ United**
Bridge Design Scope of Work

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.

Scope of Work Appendices:

Appendix A – CPM Scheduling

Appendix B – Maintenance and Inspection Platforms Access

Appendix C – LRFR Table for rating requirements

Appendix D – Permits Matrix

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