1.0 PROJECT OVERVIEW
The St. Croix River Crossing Project has been developed in response to traffic congestion, operation 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](http://www.dot.state.mn.us/metro/projects/stcroix).

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 5,072 feet. 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 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.

Final bridge construction plans will be developed for Bridge Nos. 82045, 82047, and 82048 under MnDOT Contract No. 00610. The scope of work for this contract includes the independent peer review of the final bridge design for these bridges.

State has determined this project to be a major structure; therefore, a design review (with independent design computations) will be made by Contractor. Contractor will participate as part of the project team beginning with the development of design criteria. State expects that Contractor and Design Engineer of Record will generally resolve issues where they may initially differ.

The following stages of design will be reviewed by Contractor for concurrence (listed in sequence):

- Design and Load Rating Criteria;
- Deck Drainage Details Review;
- Wind Engineering Study Review;
- 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.
- 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 and provide independent calculations based on the foundation report and geotechnical parameters provided by State;
- 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.

For each of the stages of design listed above, Contractor will submit a Summary of Review Comments and Comment Log (see Section 12.2 for example of Comment Log), which will be kept by Contractor and will verify that the design is feasible and adequately incorporates the design and load rating criteria and concept design parameters. Contractor may recommend modifications that improve cost-effectiveness or constructability of the design when submitting Summaries of Review Comments for Design and Load Rating criteria and Concept Design.

The Contractor will also be required to prepare and submit a contractor-style construction cost estimate using HCSS Heavy Bid © Estimating Software for Bridges 82045, 82047 and 82048. The estimate will be based on the 60% Plan submitted by the Design Engineer of Record, and it will be revised to reflect revisions incorporated from the 60% and 95% Plan Reviews.

2.0 PROJECT MANAGEMENT
2.1 Contract Administration
State will provide a 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 State, invoicing, supplemental agreements, cost and schedule updates, billing preparation, and other non-technical work.

No changes in Contractor project management or lead design personnel will be made without written notice to State. State will notify Contractor if there are changes to State’s project management or lead design 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 Project Meetings
2.2.1 Project Design Team (PDT)
State and the Design Engineer of Record will collaborate to establish a Project Design Team (PDT) for the project. Members of the PDT may include:
• Contractor
• Design Engineer of Record
• State SCC Project Director
• State Bridge Design Project Manager
• State SCC Project Coordinator
• State Construction Project Manager
• State Metro District Project Manager (Roadway Designer)
• State SCC Project Controller
• Minnesota FHWA
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- WisDOT Structures and Roadway Design staff
- Wisconsin FHWA
- Visual Quality Advisory Committee (VQAC)

PDT meetings will be held monthly to address project progress. Immediately following the PDT meetings, Contractor will meet with the Design Engineer of Record and the State Bridge Design Project Manager to discuss design-specific issues that require resolution.

2.2.2 Kick-Off Meeting
Contractor will attend 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 State.

2.2.3 Plan Submittal Meetings
Contractor will attend plan submittal review meetings and perform reviews at the 30%, 60% and 95% completion stages using independent design computations as required.

2.2.4 Additional Project Meetings (as necessary)
At the direction of the State Bridge Design Project Manager, a local Contractor representative will attend up to 20 additional project meeting to address issues not covered during monthly PDT meetings.

2.3 Quality Management Plan (QMP) and Quality Assurance/Quality Control Procedures
Contractor will develop a Quality Management Plan that specifies how Contractor will perform Quality Assurance (QA) and Quality Control (QC) activities throughout the duration of the project to ensure delivery of a quality product in a timely manner that conforms to established contract requirements. Contractor will prepare the QMP and distribute it to all project team members, including subcontractors. Components of the QMP must include the following:
- A List of Requirements
- Intent of the QMP
- Philosophy of the QMP
- Technical Document Review Process
- Checking Procedures
- Quality Control Verification
- Definitions

The Contractor must ensure that the following Quality Control procedures are performed:

- **Design Check**
  Contractor is responsible for the completeness and accuracy of its work. Calculations must be completely checked and reconciled prior to submittal.

- **QA Verification for Extradosed Specialty Design Items**
  The Contractor will give special attention to the review of 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
  - Design criteria
  - Cable replacement
    - Cable corrosion protection
    - Cable damping requirements

- **Quantity Review**
Contractor will review final quantities shown in the plans prepared by Design Engineer of Record.

- **Computer Programs**
  All computer programs and/or spreadsheets used by Contractor must be verified by Contractor’s in-house Quality Assurance Program. Input and output forms with the specific title of the program/spreadsheet will be included in Contractor’s design and quantity calculation reviews. (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 review the entire peer review process independently to ensure the completeness and adequacy of their work and conformance with Contractor’s Quality Assurance procedures. Contractor must document the independent review process.

### 3.0 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.

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.

Current standard details and plans for various bridge components as illustrated in the MnDOT Bridge Details Manual Part I and Part II will be incorporated into the detail plans where applicable. MicroStation files are available on the Bridge Office Home Page http://www.dot.state.mn.us/bridge. It is the responsibility of the Design Engineer of Record to modify these details when necessary for conformance with the design.

### 4.0 PEER REVIEW OF DESIGN AND LOAD RATING CRITERIA
Contractor will participate in the development of Design and Load Rating criteria for this project and work collaboratively with State and the Design Engineer of Record at the onset of the design.

4.1 Standard Design and Load Rating Criteria and Drawings Development

- Study of Preliminary Bridge Plan prepared by the State;
- Peer review of Design and Load Rating Criteria and Standard Certified Drawings to be utilized for final design consisting of the following:
  - Typical Section sheets
  - Specified material properties
  - Recommended allowable stresses
  - Load factors
  - Erection loads and other parameters
  - Preliminary Foundation Recommendations
  - Geotechnical design criteria, recommendations and proposed soil lateral parameters.

4.2 Review of Preliminary Plan Design Revisions

For the main river bridge, Contractor will review Design Engineer of Record’s box girder configuration and extradosed cable connection to verify that the Design Engineer of Record has maintained no encroachment into the “zone of intrusion.”

For ramp Bridges 82047 and 82048, Contractor review the schemes developed by the Engineer of Record that best balance the hydraulic, maintenance, and visual quality needs of the project to best integrate and/or mask the drainage pipes on these structures. This review must take place prior to the 30% Plan submittal stage.

Also prior to the 30% Plan submittal stage, Contractor will review the Bridge Fixity Study Report for Bridge 82045. Contractor will review the Design Engineer of Record’s assessment of the longitudinal fixity of the structure, which must consider all extradosed piers as integral with the superstructure. Contractor will also review Design Engineer of Record’s assessment of the mid-span hinge composed of a sacrificial and re-constructible hinged section. Finally, Contractor will review the evaluation and comparison of these two fixity schemes. Contractor will provide comments to the State and the Design Engineer of Record. If necessary, a meeting will held to resolve differences of findings.

4.3 Peer Review of Wind Engineering Study

Contractor will review the Wind Engineering Study Report performed by the Design Engineer of Record. Requirements for the Wind Engineering Study Report include, but are not limited to, the following:

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.
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- 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 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 forced identified.
   - Wind loading due to buffeting will be measured at selected points.

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

The Design Engineer of Record will, at a minimum, investigate the stability of the bridge during construction and in its final configuration. Contractor will submit a Summary of Review Comments for the Wind Engineering Study Report to State. If necessary, meetings will be held to resolve differences between Contractor’s and Design Engineer of Record’s findings.

4.4 Extradosed Structure Redundancy Review
The Contractor will review the Redundancy Study Report performed by the Design Engineer of Record and submit a memo of concurrence to the State. If necessary, a meeting will be held with State and Design Engineer of Record to resolve any differences of findings.

4.5 Maintenance and Inspection Access Review
The Design Engineer of Record will provide a design of maintenance and inspection access platforms which allow access to the exterior box anchorage zones as shown in Appendix B. At the 60% design stage, the Contractor will review the maintenance and inspection access platforms and openings and submit a Summary of Review Comments to the State, (and if necessary, a memo of concurrence).

5.0 30% PLAN PEER REVIEW
Contractor will review the 30% Plan submitted by the Design Engineer of Record. The 30% Plan will provide an early review of the final plan preparation for conformance with the Preliminary Plan, aesthetic
guidelines, and key design specifications. The intent of this peer review is to identify design discrepancies at an early stage and avoid major plan modifications resulting from future reviews. At this stage, consideration will be given to potential revisions to the design criteria and project standard details.

5.1 Design Considerations
The following items will be considered during the 30% design stage:

- Construction staging
- Verification that profile grade and structure depth provide the required clearances over the navigation channel
- Vessel Impact Study Review
- Construction type (segmental or cast-in-place)

5.2 30% Plan Review Content
At a minimum the 30% Plan review will consist of reviewing the following sheets submitted to State and Contractor by the Design Engineer of Record:

- **General Plan and Elevation Sheet(s)**
  General Plan and Elevation sheet(s) will be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed beam type and spacing, 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)**
  Layout sheet(s) will be detailed in accordance with Section 2.4.2.4 of the MnDOT LRFD Bridge Design Manual. 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 might not be completely filled in; however, the sheet(s) will indicate the diagonal and other dimensions that will be included in the final plans. It will also contain any corner views, sections, and notations (i.e. expansion joint details at gutters, sidewalks, barriers, etc) needed to clarify the working point locations.

- **Bridge Survey Sheet(s)**
  Survey sheets provided by the State in the Bridge Preliminary Plan are to be included but may not be completed for this submittal.

- **Final Bridge Foundation Recommendations and Driving Analysis**
  Recommendation form provided by the State that includes pile type, capacity, and estimated lengths.

5.3 Constructability Review
Contractor will evaluate the proposed construction by building a CPM schedule and provide a report of findings. In this report, Contractor will make a recommendation on the superstructure type and submit a superstructure study report validating this recommendation (i.e. precast or cast-in-place segmental construction). 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.

6.0 60% PLAN PEER REVIEW
Contractor will review the 60% Plan submitted by the Design Engineer of Record without the aid of the original design calculations. Contractor will use structural design/analysis software different than that used by the Engineer of Record when available. This will result in a separate set of design calculations that will be documented in a report that will be certified. The report will then be compared to the original design performed by the Design Engineer of Record. Contractor will note any changes or recommendations and provide the results to State for review.
6.1 Design Requirements
The 60% Plan review is intended to assure the plan has been designed in accordance with all applicable design requirements and includes the following:

- Designs for post-tensioning requirements
- Erection sequence
- Movements: thermal, contraction, shrinkage, creep, etc.
- Diaphragms: longitudinal, transverse, and bearing
- Pier details
- General Notes
- Transverse Post Tension Details
- Typical Segment Blister Details and Reinforcement
- Access Opening Details
- Bearing Details
- Bulkhead Details

6.2 60% Plan Review Content
The 60% Plan will be a “snapshot” of the progress of the final bridge plan progress at the 60% Plan stage. Any required construction staging sheets will be substantially complete for this submittal. The Design Engineer of Record may continue with final plan preparation during this review. Contractor will review and note on the plan sheets any comments or suggestions for corrections. If Contractor’s results differ from the Design Engineer of Record’s, these differences must be reconciled. If necessary, a review meeting will be held with Contractor, Design Engineer of Record, and State.

6.3 Constructability Study Review
Contractor will evaluate the proposed construction by building a CPM schedule 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.

6.4 Draft Cost Estimate
Within 30 calendar days of the receipt of the 60% Plan from State, the Contractor will submit a Draft Contractor-style Construction Cost Estimate (see Article 10.0).

7.0 95% PLAN PEER REVIEW
Contractor will review the 95% Plan submitted by the Design Engineer of Record.

7.1 95% Plan
The 95% Plan review is to be considered as 100% complete by the Design Engineer of Record, ready for the certification by the Design Engineer of Record and approval by the State Bridge engineer. Contractor will review the 95% Plan and Special Provisions provided by Design Engineer of Record. The 95% Plan will contain the following sheets for review by Contractor:

- General Notes and Design Data Sheet(s)
- General Plan and Elevation Sheet(s)
- River 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
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bending details and reinforcement bar lists to allow separate shipment for each pier. For staged construction each reinforcement bar list will contain a separate column for each stage that indicates the number of individual bars for each particular stage. 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 address any staged construction considerations that are critical to the design stresses, such as sequence of closure pours and any portions of the structure that are designed to be cast on falsework.

7.2 **Constructability Study Review**
Contractor will evaluate the proposed construction by building a CPM schedule 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.

7.3 **Final Cost Estimate**
Contractor will review and adjust the estimate as needed, revising unit costs to reflect changes from the 60% Plan to the 95% Plan. Within 30 calendar days of receipt of the 95% Plan from State, Contractor will submit the final copies of HCSS Heavy Bid © Estimating Software electronic files, and all documentation used to develop the estimate (see Article 10.0).

8.0 **PEER REVIEW OF LOAD RATING**
Contractor will review final load rating analysis submitted by the Design Engineer of Record. This review will be performed without the aid of the original load rating calculations. Contractor will use structural rating/analysis software different than that used by the Design Engineer of Record. This will result in a separate set of rating calculations that will be documented in a report that will be certified by Contractor. The report will then be compared to the original load rating performed by the Design Engineer of Record. Contractor will note any changes or recommendations and provide the results to State for review.

8.1 **Load Rating Activities**
The review is meant to assure that the ratings of Bridges 82045, 82047, and 82048 are based on the conditions below and in accordance with the following design criteria:

- MnDOT LRFD Bridge Design Specifications;
- Other applicable criteria as defined in the Project’s Design Specifications;
- Bridge rating requirements provided by State;
- State LRFD Bridge Design Manual.

Each separate component, segment, or type within the overall bridge will be rated and reported. Contractor will rate for moment and shear at the segment joints or other appropriate locations, and any other points of interest 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;
- Rate for both strength and service load combinations;
- See LRFR Load Factors table for load factors of design loads and permit loads (Appendix C).

8.1.1 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.

8.2 Operating Rating

Contractor will review the operating rating factor listed in the Design Data section of the bridge plans submitted by the Design Engineer of Record. Contractor will make comments or suggestions for revisions on the plan sheet. If Contractor’s results differ from the Design Engineer of Record’s, these differences must
be reconciled. If necessary, a review meeting will be held with Contractor, Design Engineer of Record, and State.

8.3 Inventory Rating and Rating Report
Contractor will review the Bridge Rating and Load Posting Report submitted by Design Engineer of Record. Contractor will make comments or suggestions for revisions on the report. If Contractor’s results differ from the Design Engineer of Record’s, these differences must be reconciled. If necessary, a review meeting will be held with Contractor, Design Engineer of Record, and State.

8.4 Rating Manual
Contractor will review the Rating Manual submitted by Design Engineer of Record, including methodology, instructions, and examples. Contractor will make comments and suggest revisions to the manual. If Contractor’s results differ from the Design Engineer of Record’s, these differences must be reconciled. If necessary, a review meeting will be held with Contractor, Design Engineer of Record, and State.

9.0 SPECIAL PROVISIONS PEER REVIEW
Contractor will review Divisions SB Project Special Provision, and any other unique items not covered in the MnDOT Standard Specifications for Construction, including post-tensioning system requirements.

10.0 COST ESTIMATES
The Contractor will prepare and submit a contractor-style construction cost estimate using HCSS Heavy Bid © Estimating Software, and a cost and resource loaded P6 schedule, for Bridges 82045, 82047 and 82048. Contractor will base its estimate from the Preliminary Cost Estimate review, which will be provided by the Design Engineer of Record with the 30% Plan submittal. The Contractor will revise the estimate to reflect revisions from the 60% and the 95% Plan Reviews. The estimate will:

- Provide a thorough analysis of labor, materials, equipment, subcontractor and indirect (job site overhead) costs, along with bond rates and operating margin that will be required to ensure completion of all work tasks within the project timeline;
- Provide a detailed estimate for the precast yard to produce the segments locally or at the job site will be developed, which will include yard rent, temporary foundations, aggregate base for straddle life or crane runways, transport of segments, etc.;
- Use the quantities for—and verify—each bid item included in the 95% Plan, and the Contractor will notify State of any questionable quantities;
- Include development of a detailed estimate of a reasonable method of gaining access to construct the western approach substructure and superstructure (i.e. trestle work bridge, work road, etc.) based on applicable environmental permit requirements;
- Include a detailed breakdown of each bid item will be available for review and the final unit prices for each bid item will be submitted in a separate draft Engineer’s Estimate document;
- Submittals for this subtask will include copies of HCSS Heavy Bid © Estimating Software electronic files, draft Engineer’s Estimate document and any 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).
- Develop unit rate costs for Bridges 82045, 82047 and 82048 for use in MnDOT’s LWD/TPCE process.
- Develop cost estimate for removal of barge unloader facility.

Contractor will review and adjust the estimate as needed, revising unit costs to reflect changes from the 60% Plan to the 95% Plan. Contractor will submit the final copies of HCSS Heavy Bid © Estimating Software electronic files, and all documentation used to develop the estimate.

Note: The Construction Engineer/estimator responsible for development of the contractor-style construction cost estimate will be precluded from participation as part of a construction contracting team for the St. Croix Crossing Project.
11.0 STATE DELIVERABLES

11.1 Preliminary Bridge Plan
A Preliminary Bridge Plan, approved by the State Bridge Engineer, will be provided for the bridges. The Design Engineer of Record’s final design will be based on information contained in the Preliminary Plan and other information defined in this Exhibit. The Preliminary Plan will be prepared 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**
  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 be provided by the State Foundations Unit.

The Preliminary Plan will be provided electronically in MicroStation format. The Design Engineer of Record may modify information contained in the preliminary plan to improve the design upon written consent by the State Bridge Design Project Manager.

11.2 Draft Design and Load Rating Criteria
State will provide Draft Design and Load Rating Criteria performed by Design Engineer of Record.

11.3 Draft Concept Design (30% Plan)
State will provide the 30% Plan performed by Design Engineer of Record.

11.4 Draft Final Design/Constructability Review (60% Plan)
State will provide the 60% Plan performed by Design Engineer of Record.

11.5 Final Plan (95% Plan)
State will provide the 95% Plan performed by Design Engineer of Record.

11.6 Draft Rating Manual
Design Engineer of Record will proceed with the development of a Rating Manual upon written authorization from State. If State’s authorization is granted, Contractor will perform a review of the Rating Manual submitted by the Design Engineer of Record.

11.7 Load Rating Calculations
State will provide load rating calculations performed by Design Engineer of Record.

11.8 Bridge Foundation Recommendations
A recommendation form that includes pile type, capacity, and estimated lengths and/or foundation earth pressures for spread footings.

11.9 Aesthetic Design Guidelines

11.10 Review Summaries of Review Comments
Timely review of the draft Summaries of Review Comments, with comments to be addressed by Contractor.

*It is Contractor’s responsibility to examine all materials provided by State for completeness and to notify State if additional information is required.*

12.0 CONTRACTOR DELIVERABLES
The following schedule is based on a June 1, 2012 Notice to Proceed:
12.1 Peer Review Summaries of Review Comments
Contractor will submit all deliverables to State, with a copy to Design Engineer of Record. Submittals will include Summaries of Review Comments with Comment Log according to the following schedule:

- **Preliminary Plan Design and Constructability Report**
  Contractor will submit no later than two weeks after receipt of Draft Design and Load Rating Criteria from State.

- **Draft Design and Load Rating Criteria Review**
  Contractor will submit no later than two weeks after receipt of Draft Design and Load Rating Criteria from State.

- **Preliminary Plan Design Revisions**
  Contractor will submit no later than two weeks after receipt of Design Engineer of Record’s box girder configuration and extradosed cable connection, the schemes proposed to integrate drainage pipes on the structures, and the Bridge Fixity Study Report.

- **Wind Engineering Study Report**
  Contractor will submit no later than four weeks after receipt of Design Engineer of Record’s Wind Engineering Study Report.

- **30% Review Submittal**
  Contractor will submit no later than two weeks after receipt of 30% Plan from State. Contractor will include report of findings from 30% Constructability Study Review (1-2 pgs).

- **60% Review Submittal**
  Contractor will submit no later than four weeks after receipt of 60% Plan from State. Contractor will include report of findings from 60% Constructability Study Review (1-2 pgs).

- **95% Review Submittal**
  Contractor will submit no later than three weeks after receipt of 95% Plan from State. Contractor will include report of findings from 95% Constructability Study Review (1-2 pgs).

- **Special Provisions Review**
  Contractor will submit no later than four weeks after receipt of the 60% and two weeks after receipt of the 95% Plan from State.

- **Load Rating and Load Rating Manual Review**
  Contractor will submit no later than four weeks after receipt of Rating Manual from State.

- **Final Certified Report**
  Contractor will submit the Final Certified Report, including design calculations and any supporting documentation, by June 30, 2013.

12.2 Comment Log
Contractor will use a Comment Log to record resolution of design-related issues. Contractor may use the following form, or develop a similar format. A different form may be required to record and address comments related to the P6 CPM schedule. Contractor may be required to utilize a MnDOT computer system, or form, or approved equal to record P6 CPM comments.

12.3 Contractor-style Cost Estimate
The State will provide the Preliminary Cost Estimate Review (completed by the Design Engineer of Record) to the Contractor. Within 60 days of the receipt of the Preliminary Cost Estimate Review from State, Contractor will submit a Draft contractor-style cost estimate in accordance with Article 10.0.

Within 30 days of the receipt of the 95% Plan from State, Contractor will submit its Final contractor-style cost estimate in accordance with Article 10.0.

**Scope of Work Appendices:**
Peer Review Scope of Work

Appendix A – CPM Scheduling

Appendix B – Maintenance and Inspection Platforms Access

Appendix C – LRFR Table for rating requirements

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